

Provisioning Guide

Hitachi Virtual Storage Platform G200, G400, G600, G800
Hitachi Virtual Storage Platform F400, F600, F800

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Contents

Preface.....	xvii
Intended audience.....	xviii
Product version.....	xviii
Release notes.....	xviii
Changes in this revision.....	xviii
Referenced documents.....	xix
Document conventions.....	xix
Convention for storage capacity values.....	xxi
Accessing product documentation.....	xxii
Getting help.....	xxii
Comments.....	xxii
1 Introduction to provisioning.....	1-1
About provisioning.....	1-3
Basic provisioning.....	1-3
Fixed-sized provisioning.....	1-3
Disadvantages	1-4
When to use fixed-sized provisioning.....	1-5
Custom-sized provisioning.....	1-5
When to use custom-sized provisioning.....	1-6
Basic provisioning workflow.....	1-6
Dynamic Provisioning Overview.....	1-7
Dynamic Provisioning.....	1-7
Dynamic Provisioning concepts	1-7
When to use Dynamic Provisioning.....	1-8
Dynamic Provisioning advantages.....	1-9
DP-VOL of the data direct mapping attribute.....	1-10
Estimating the required capacity of pool-VOLs with System Area in the pool of the data direct mapping attribute.....	1-14
Dynamic Provisioning advantage example.....	1-15
Dynamic Provisioning workflow.....	1-15
Dynamic Tiering.....	1-15
Tiers concept	1-16
When to use Dynamic Tiering.....	1-17
Active flash	1-17
Prompt Promotion.....	1-17

High Prioritized Demotion.....	1-18
Dynamic Provisioning, Dynamic Tiering, and active flash functionality comparison	1-18
Data retention strategies.....	1-19
Resource groups strategies.....	1-19
Complimentary strategies.....	1-20
Key terms.....	1-20
Before you begin.....	1-21
About cache management devices.....	1-22
Calculating the number of cache management devices required by a DP-VOL.....	1-22
Maximum capacity of cache management device.....	1-23
Calculating the number of cache management devices required by a volume that is not a DP-VOL.....	1-23
Viewing the number of cache management devices.....	1-23
2 Managing Virtual Storage Machine Resources.....	2-1
About virtual storage machines and virtualized resources.....	2-2
Provisioning operations for resources in a virtual storage machine.....	2-3
Pair operations with virtual storage machine pairs.....	2-3
Software operations for resources in a virtual storage machine.....	2-4
Editing virtualization management settings.....	2-4
3 Configuring resource groups	3-1
Using resource groups to configure your system.....	3-2
Resource groups examples.....	3-2
Example of resource groups sharing a port.....	3-2
Example of resource groups not sharing ports.....	3-4
Meta_resource	3-6
Resource lock.....	3-6
User groups	3-6
Resource group assignments.....	3-7
Resource group license requirements	3-7
Resource group rules, restrictions, and guidelines.....	3-7
Creating a resource group.....	3-8
Adding resources to a resource group	3-9
Removing resources from a resource group	3-10
Managing resource groups.....	3-10
Changing resource group names.....	3-10
Deleting a resource group	3-11
Using Resource Partition Manager and other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products.....	3-12
Dynamic Provisioning, Dynamic Tiering, or active flash.....	3-12
Encryption License Key.....	3-13
LUN Manager.....	3-13
Performance Monitor.....	3-16
ShadowImage.....	3-16
Thin Image.....	3-16
TrueCopy.....	3-17
Global-active device	3-18
Universal Replicator.....	3-19
Universal Volume Manager.....	3-20

Open Volume Management.....	3-22
Virtual Partition Manager.....	3-23
Volume Shredder.....	3-23
Server Priority Manager.....	3-23
4 Configuring custom-sized provisioning.....	4-1
Spare drive and copy back mode	4-3
Assigning spare drives.....	4-3
Releasing spare drives.....	4-4
Setting copy-back mode.....	4-5
Parity group and volume.....	4-5
Configuration of interleaved parity groups.....	4-6
Creating parity groups.....	4-7
Create parity groups by selecting drives manually.....	4-7
Create parity groups by selecting drives automatically.....	4-8
Formatting parity groups	4-10
Deleting parity groups.....	4-11
Virtual LUN functions.....	4-11
Virtual LUN requirements.....	4-12
Virtual LUN specifications	4-12
RAID level for CV.....	4-12
CV capacity.....	4-13
Virtual LUN size calculations.....	4-13
Calculating volume size (CV capacity unit is MB).....	4-14
Calculating volume size (CV capacity unit is blocks).....	4-14
Calculating fixed-size volume size (CV capacity unit is MB).....	4-15
Calculating fixed-size volume size (CV capacity unit is blocks).....	4-16
Management area capacity of a volume.....	4-16
Boundary values for RAID levels.....	4-16
Capacity of a slot.....	4-17
Configuring volumes in a parity group	4-17
Creating LDEV functions.....	4-18
Creating LDEVs.....	4-18
Finding LDEV IDs.....	4-22
Changing LDEV settings.....	4-22
Removing an LDEV to be registered.....	4-23
Blocking LDEVs.....	4-23
Blocking LDEVs in a parity group	4-24
Restoring blocked LDEVs.....	4-24
Restoring blocked LDEVs in a parity group	4-25
Editing an LDEV name.....	4-26
Deleting an LDEV (converting to free space)	4-27
Formatting LDEVs.....	4-28
LDEV Format function.....	4-28
Storage system operation when LDEVs are formatted.....	4-28
Quick Format function.....	4-29
Quick Format specifications.....	4-29
Formatting LDEVs (Normal format).....	4-30
Formatting all LDEVs in a parity group	4-31
Assigning an MP unit.....	4-32
Assigning an MP unit to a resource.....	4-32
Changing the MP unit assigned to an LDEV.....	4-33

Viewing LDEVs of ALUs or SLU attribution.....	4-34

5 Configuring thin provisioning 5-1

Dynamic Provisioning overview.....	5-3
Dynamic Tiering overview.....	5-3
Active flash overview.....	5-3
Thin provisioning requirements	5-3
License requirements	5-3
Pool requirements.....	5-4
Pool-VOL requirements	5-5
DP-VOL requirements	5-7
Requirements for increasing DP-VOL capacity.....	5-8
V-VOL full allocation requirement.....	5-9
Operating system and file system capacity	5-10
Using Dynamic Provisioning, Dynamic Tiering, or active flash with other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products.....	5-11
Interoperability of DP-VOLs and pool-VOLs.....	5-11
ShadowImage pair status for reclaiming zero pages	5-13
TrueCopy.....	5-14
Global-active device	5-14
Universal Replicator.....	5-15
ShadowImage.....	5-16
Thin Image.....	5-17
Virtual Partition Manager CLPR setting.....	5-17
Volume Migration.....	5-17
Resource Partition Manager.....	5-17
Dynamic Provisioning workflow	5-18
Dynamic Tiering and active flash.....	5-19
Tiered storage.....	5-19
Tier monitoring and data relocation.....	5-19
Multi-tier pool.....	5-19
Tier monitoring and relocation cycles.....	5-20
Tier relocation workflow.....	5-25
Tier relocation rules, restrictions, and guidelines.....	5-28
Performance monitoring or tier relocation conditions.....	5-29
Buffer area of a tier.....	5-32
Setting external volumes for each tier.....	5-33
Execution modes for tier relocation.....	5-34
Execution modes when using Hitachi Device Manager - Storage Navigator.....	5-34
Execution modes when using Command Control Interface.....	5-38
Relocation speed.....	5-39
Monitoring modes.....	5-40
Cautions when using monitoring modes.....	5-41
Downloading the tier relocation log file.....	5-42
Tier relocation log file contents.....	5-42
Tiering policy.....	5-48
Tiering policy expansion.....	5-49
Tiering policy examples.....	5-49
Setting tiering policy on a DP-VOL.....	5-51
Tiering policy levels.....	5-51
Viewing the tiering policy in the performance graph.....	5-52
Reserving tier capacity when setting a tiering policy.....	5-53

Example of reserving tier capacity.....	5-54
Notes on tiering policy settings.....	5-56
Execution mode settings and tiering policy.....	5-57
New page assignment tier.....	5-59
Relocation priority.....	5-61
Assignment tier when pool-VOLs are deleted.....	5-62
Formatted pool capacity.....	5-63
Used capacity, mapped capacity, and reserved capacity.....	5-63
Rebalancing the usage level among parity groups.....	5-64
Changing the tiering policy level on a DP-VOL.....	5-64
Changing new page assignment tier of a V-VOL.....	5-65
Opening the Edit Tiering Policies window.....	5-66
Changing tiering policies.....	5-66
How to change tiering policies.....	5-66
Changing relocation priority setting of a V-VOL.....	5-67
Functions overview for active flash and Dynamic Tiering.....	5-68
Relocating LDEV pages whose latest I/Os frequency is suddenly high by using active flash.....	5-69
Dynamic Tiering workflow.....	5-70
Active flash workflow.....	5-72
Dynamic Tiering, active flash tasks and parameters.....	5-74
Task and parameter settings.....	5-74
Display items: Setting parameters.....	5-76
Display items: Capacity usage for each tier.....	5-77
Display items: Performance monitor statistics.....	5-77
Display items: Operation status of performance monitor/relocation.....	5-77
Managing Dynamic Tiering and active flash	5-78
Changing pool for Dynamic Provisioning to pool for Dynamic Tiering or active flash.....	5-78
Changing monitoring and tier relocation settings.....	5-80
Changing monitoring mode setting.....	5-81
Changing relocation speed.....	5-81
Changing buffer space for new page assignment setting.....	5-82
Changing buffer space for tier relocation setting.....	5-83
Viewing pool tier information.....	5-84
Viewing DP-VOL tier information.....	5-84
Changing a pool for Dynamic Tiering or active flash to a pool for Dynamic Provisioning.....	5-85
Enabling active flash for a Dynamic Tiering pool.....	5-85
Working with pools.....	5-86
Pools.....	5-86
Pool-VOLs.....	5-87
Creating a pool	5-88
Working with DP-VOLs.....	5-99
DP-VOLs.....	5-99
Relationship between a pool and DP-VOLs.....	5-99
Protecting DP-VOLs.....	5-100
Creating V-VOLs	5-101
Changing DP-VOL settings.....	5-104
Removing the DP-VOL to be registered.....	5-104
Formatting LDEVs in a Windows environment.....	5-104
Monitoring capacity and performance.....	5-105

Monitoring pool capacity.....	5-105
Monitoring performance.....	5-105
Managing I/O usage rates example.....	5-106
Tuning with Dynamic Tiering.....	5-107
Thresholds.....	5-107
Pool usage thresholds.....	5-107
Pool subscription limit.....	5-108
Changing pool thresholds.....	5-110
Changing the pool subscription limit	5-110
Working with SIMs.....	5-111
About SIMs.....	5-111
SIM reference codes.....	5-111
Managing pools and DP-VOLs	5-112
Viewing pool information	5-112
Viewing used pool capacity.....	5-112
Viewing the used capacity for each pool.....	5-112
Viewing the used capacity of a Thin Image pool.....	5-113
Viewing formatted pool capacity	5-113
Viewing the progress of rebalancing the usage level among parity groups	5-114
Increasing pool capacity	5-114
Changing a pool name.....	5-116
Recovering a blocked pool.....	5-116
Decreasing pool capacity.....	5-117
About decreasing pool capacity.....	5-117
Decreasing pool capacity.....	5-119
Stopping the decrease of pool capacity.....	5-120
Deleting a tier in a pool.....	5-120
Deleting a pool.....	5-122
Changing external LDEV tier rank	5-123
Increasing DP-VOL capacity.....	5-123
Changing the name of a DP-VOL	5-124
Releasing pages in a DP-VOL.....	5-125
Reclaiming zero pages in a DP-VOL	5-126
Stopping the release of pages in a DP-VOL	5-128
Changing full allocation settings in DP-VOLs	5-128
Enabling/disabling tier relocation of a DP-VOL.....	5-129
Deleting a DP-VOL.....	5-130
Starting pool monitoring manually.....	5-131
Stopping pool monitoring manually.....	5-131
Starting tier relocation manually.....	5-132
Stopping tier relocation manually.....	5-133
Creating the external volume, pool, or DP-VOL of the data direct mapping attribute.....	5-133
Creating the external volume of the data direct mapping attribute.....	5-133
Creating the pool of the data direct mapping attribute.....	5-135
Creating the DP-VOL of the data direct mapping attribute.....	5-137
Editing the pool of the data direct mapping attribute.....	5-139

6 Configuring access attributes.....	6-1
Access attributes.....	6-2
Access attribute requirements.....	6-2
Access attributes and permitted operations.....	6-3
Access attribute restrictions.....	6-3

Access attributes work flow.....	6-4
Assigning an access attribute to a volume.....	6-4
Changing an access attribute to read-only or protect.....	6-5
Changing an access attribute to read/write.....	6-6
Enabling or disabling the expiration lock.....	6-7
Disabling an S-VOL.....	6-8
Reserving volumes.....	6-9
7 Managing logical volumes.....	7-1
LUN Manager overview.....	7-3
LUN Manager function.....	7-3
LUN Manager operations.....	7-3
Fibre Channel operations.....	7-3
LUN Manager license requirements.....	7-5
LUN Manager rules, restrictions, and guidelines	7-5
Managing logical units workflow.....	7-6
Configuring hosts and Fibre Channel ports.....	7-7
Configuring Fibre Channel ports.....	7-7
Setting the data transfer speed on a Fibre Channel port.....	7-7
Combination of data-transfer speed and connection type.....	7-8
Setting the Fibre Channel port address.....	7-9
Addresses for Fibre Channel ports.....	7-9
Setting the fabric switch.....	7-10
Fibre Channel topology.....	7-11
Example of FC-AL and point-to-point topology.....	7-12
Setting the Fibre Channel topology.....	7-12
Configuring hosts.....	7-12
Configure hosts workflow.....	7-13
Host modes.....	7-13
Host mode options	7-14
Find WWN of the host bus adapter.....	7-18
Creating a host group and registering hosts in the host group (in a Fibre Channel environment)	7-18
Configuring LU paths.....	7-20
Configure LU paths workflow.....	7-21
Defining LU paths	7-21
Setting a UUID.....	7-22
Correspondence table for defining devices.....	7-23
Defining alternate LU paths.....	7-24
Copying all LU paths defined in a host group.....	7-24
Copying one or more (but not all) LU paths defined in a host group.....	7-25
Managing LU paths.....	7-25
Deleting LU paths.....	7-26
Clearing a UUID setting.....	7-27
Viewing LU path settings.....	7-27
Releasing LUN reservation by host.....	7-28
LUN security on ports.....	7-29
Examples of enabling and disabling LUN security on ports.....	7-29
Enabling LUN security on a port.....	7-31
Disabling LUN security on a port.....	7-32
Setting Fibre Channel authentication.....	7-33
User authentication.....	7-33

Settings for authentication of hosts.....	7-34
Settings for authentication of ports (required if performing mutual authentication).....	7-35
Host and host group authentication.....	7-35
Example of authenticating hosts in a Fibre Channel environment.....	7-36
Port settings and connection results.....	7-38
Fabric switch authentication.....	7-38
Fabric switch settings and connection results.....	7-40
Mutual authentication of ports.....	7-41
Fibre Channel authentication.....	7-41
Enabling or disabling host authentication on a host group.....	7-41
Registering host user information.....	7-42
Changing host user information registered on a host group.....	7-43
Deleting host user information.....	7-44
Registering user information for a host group (for mutual authentication). ..	7-45
Clearing user information from a host group.....	7-46
Fibre Channel port authentication.....	7-47
Setting Fibre Channel port authentication.....	7-47
Registering user information on a Fibre Channel port.....	7-48
Registering user information on a fabric switch.....	7-49
Clearing fabric switch user information.....	7-50
Setting the fabric switch authentication mode.....	7-51
Enabling or disabling fabric switch authentication.....	7-52
Managing hosts for Fibre Channel.....	7-53
Changing WWN or nickname of a host bus adapter	7-53
Changing the name or host mode of a host group	7-54
Initializing host group 0	7-55
Deleting a host bus adapter from a host group	7-56
Deleting WWNs from the WWN table.....	7-56
Deleting a host group	7-57
Adding a selected host to a host group	7-58
Adding a host to the selected host group	7-59
Setting T10 PI mode to the port.....	7-60
Overview for iSCSI.....	7-61
Network configuration for iSCSI.....	7-61
Creating iSCSI targets and registering hosts in the iSCSI target	7-62
Editing ports setting	7-65
Adding CHAP users.....	7-66
Editing CHAP users.....	7-67
Removing CHAP users.....	7-68
Removing target CHAP users.....	7-69
Removing port CHAP users.....	7-69
Defining LU paths	7-70
Defining alternate LU paths	7-71
Copying all LU paths defined in an iSCSI target.....	7-72
Copying one or more (but not all) LU paths defined in an iSCSI target.....	7-72
Managing hosts for iSCSI.....	7-73
Changing HBA iSCSI name or nickname of a host bus adapter	7-73
Changing iSCSI target setting.....	7-74
Remove hosts from iSCSI targets	7-76
Deleting login iSCSI names.....	7-76
Deleting iSCSI targets	7-77

Adding a host to the selected iSCSI target	7-78
Confirming communication status.....	7-79
8 Configuring VASA integrated storage systems	8-1
Creating LDEVs of ALU attribution.....	8-2
Viewing LDEVs of ALUs or SLU attribution.....	8-4
Unbinding LDEVs of SLUs attribution.....	8-4
9 Troubleshooting	9-1
Troubleshooting Virtual LUN.....	9-2
Troubleshooting Dynamic Provisioning.....	9-2
Troubleshooting Data Retention Utility	9-7
Data Retention Utility troubleshooting instructions.....	9-7
Troubleshooting provisioning while using Command Control Interface.....	9-8
Errors when operating CCI (Dynamic Provisioning, SSB1: 0x2e31/0xb96d)	9-8
Errors when operating CCI (Data Retention Utility, SSB1:2E31/B9BF/B9BD).....	9-10
Calling the Hitachi Data Systems customer support.....	9-11
A CCI command reference.....	A-1
Hitachi Device Manager - Storage Navigator tasks and CCI command list.....	A-2
B Resource Partition Manager GUI reference.....	B-1
Resource Group window.....	B-2
Selected resource group window.....	B-3
Create Resource Groups wizard.....	B-9
Create Resource Groups window.....	B-9
Select Parity Groups window.....	B-11
Select LDEVs window.....	B-12
Select Ports window.....	B-14
Select Host Groups window.....	B-15
Select iSCSI Targets window.....	B-16
Create Resource Groups confirmation window.....	B-17
Edit Resource Group wizard.....	B-18
Edit Resource Group window.....	B-18
Edit Resource Group confirmation window.....	B-19
Add Resources wizard.....	B-20
Add Resources window.....	B-20
Add Resources confirmation window.....	B-20
Remove Resources window.....	B-23
Delete Resource Groups window.....	B-26
Resource Group Properties window.....	B-27
Edit Virtualization Management Settings wizard.....	B-30
Edit Virtualization Management Settings window.....	B-30
Edit Virtualization Management confirmation window.....	B-32
C LDEV GUI reference.....	C-1
Parity Groups window.....	C-3
Parity Groups tab: Internal or external volume.....	C-8
LDEVs tab: Internal or external volumes.....	C-12

Logical Devices window.....	C-17
Create LDEVs wizard.....	C-22
Create LDEVs window.....	C-23
Create LDEVs confirmation window.....	C-30
Edit LDEVs wizard.....	C-32
Edit LDEVs window.....	C-32
Edit LDEVs confirmation window.....	C-34
Change LDEV Settings window.....	C-35
Select Free Spaces window.....	C-37
Select Pool window.....	C-38
View LDEV IDs window.....	C-39
View Physical Location window.....	C-40
Format LDEVs wizard.....	C-42
Format LDEVs window.....	C-42
Format LDEVs confirmation window.....	C-43
Restore LDEVs window.....	C-44
Block LDEVs window.....	C-45
Delete LDEVs window.....	C-46
LDEV Properties window.....	C-47
ALUs / SLUs window.....	C-57
Unbind SLUs window.....	C-58
Components window.....	C-58
DKC: Controller Boards & MP Units tab.....	C-60
Edit MP Units wizard.....	C-61
Edit MP Units window.....	C-62
Edit MP Units confirmation window.....	C-62
Assign MP Unit wizard.....	C-63
Assign MP Unit window.....	C-63
Assign MP Unit confirmation window.....	C-63
View Management Resource Usage window.....	C-65
Create Parity Groups wizard.....	C-66
Create Parity Groups window.....	C-66
Create Parity Groups confirmation window.....	C-69
Change Settings (Parity Group) window.....	C-70
Assign Spare Drives wizard.....	C-71
Assign Spare Drives window.....	C-71
Assign Spare Drives confirmation window.....	C-72
Edit Copy-Back Mode wizard.....	C-73
Edit Copy-Back Mode window.....	C-73
Edit Copy-Back Mode confirmation window.....	C-74
Format Parity Groups window.....	C-75
Delete Parity Groups window.....	C-75
Parity Group Properties window.....	C-76

D Dynamic Provisioning, Dynamic Tiering, and active flash GUI reference... D-1

Pools window.....	D-3
Pools: Volume tabs.....	D-10
Create Pools wizard.....	D-22
Create Pools window.....	D-22
Create Pools confirmation window.....	D-30
Expand Pool wizard.....	D-33
Expand Pool window.....	D-33

Expand Pool confirmation window.....	D-34
Edit Pools wizard.....	D-35
Edit Pools window.....	D-35
Edit Pools confirmation window.....	D-39
Delete Pools wizard.....	D-42
Delete Pools window.....	D-42
Delete Pools confirmation window.....	D-43
Expand V-VOLs wizard.....	D-45
Expand V-VOLs window.....	D-45
Expand V-VOLs confirmation window.....	D-46
Restore Pools window.....	D-47
Shrink Pool window.....	D-48
Stop Shrinking Pools window.....	D-50
Select Pool VOLs window.....	D-51
Reclaim Zero Pages window.....	D-54
Stop Reclaiming Zero Pages window.....	D-55
Pool Property window.....	D-55
View Tier Properties window.....	D-58
Monitor Pools window.....	D-66
Stop Monitoring Pools window.....	D-67
Start Tier Relocation window.....	D-68
Stop Tier Relocation window.....	D-69
View Pool Management Status window.....	D-71
Edit External LDEV Tier Rank wizard.....	D-77
Edit External LDEV Tier Rank window.....	D-77
Edit External LDEV Tier Rank confirmation window.....	D-78
Edit Tiering Policies wizard.....	D-79
Edit Tiering Policies window.....	D-79
Edit Tiering Policies confirmation window.....	D-80
Change Tiering Policy Window.....	D-81
Change Pool Configuration Pattern Window.....	D-82
E Data Retention Utility GUI reference.....	E-1
Data Retention window.....	E-2
Error Detail Dialog Box.....	E-4
F LUN Manager GUI reference	F-1
Ports/Host Groups/iSCSI Targets window.....	F-4
Ports/Host Groups: Host Groups and Hosts tabs (Fibre channel).....	F-12
Ports/iSCSI Targets: iSCSI Targets, Hosts, and CHAP Users tabs (iSCSI).....	F-15
Port / Host Groups / iSCSI Targets: Hosts, LUNs, Host Mode Options, and CHAP Users tabs.....	F- 20
Add LUN Paths wizard.....	F-37
Select LDEVs window.....	F-37
Select Host Groups / iSCSI Targets window.....	F-39
Add LUN Paths window.....	F-42
Add LUN Paths confirmation window.....	F-43
Create Host Groups wizard.....	F-45
Create Host Groups window.....	F-45
Create Host Groups confirmation window.....	F-47
Edit Host Groups wizard.....	F-48

Edit Host Groups window.....	F-48
Edit Host Groups confirmation window.....	F-50
Add to Host Groups wizard (when specific host is selected).....	F-51
Add to Host Groups window.....	F-51
Add to Host Groups confirmation window.....	F-52
Add Hosts wizard (when specific hosts group is selected).....	F-53
Add Hosts window.....	F-53
Add Hosts confirmation window.....	F-56
Delete LUN Paths wizard.....	F-58
Delete LUN Paths window.....	F-58
Delete LUN Paths confirmation window.....	F-59
Edit Host wizard.....	F-61
Edit Host window.....	F-61
Edit Host confirmation window.....	F-62
Edit Ports wizard.....	F-64
Edit Ports window.....	F-64
Edit Ports confirmation window.....	F-68
Create Alternative LUN Paths wizard.....	F-71
Create Alternative LUN Paths window.....	F-71
Create Alternative LUN Paths confirmation window.....	F-72
Copy LUN Paths wizard.....	F-74
Copy LUN Paths window.....	F-74
Copy LUN Paths confirmation window.....	F-76
Remove Hosts wizard.....	F-79
Remove Hosts window.....	F-79
Remove Hosts confirmation window.....	F-79
Edit UUIDs wizard.....	F-80
Edit UUIDs window.....	F-80
Edit UUIDs confirmation window.....	F-81
Add New Host window.....	F-82
Change LUN IDs window.....	F-84
Delete Host Groups window.....	F-84
Delete Login WWNs window.....	F-85
Delete UUIDs window.....	F-86
Host Group Properties window.....	F-86
LUN Properties window.....	F-88
Authentication window.....	F-91
Authentication window (fibre folder selected).....	F-91
Port tree.....	F-92
Port information list.....	F-92
Fabric Switch information list.....	F-93
Authentication window (fibre channel port selected).....	F-93
Port tree.....	F-94
Authentication information (target) list.....	F-94
Authentication information (host) list.....	F-95
Add New User Information (Host) window.....	F-95
Change User Information (Host) window.....	F-96
Clear Authentication information window.....	F-96
Specify Authentication Information window.....	F-97
Set Port Information.....	F-98
Default Setting(User Name/Secret) window.....	F-98
Edit Command Devices wizard.....	F-99

Edit Command Devices window.....	F-100
Edit Command Devices confirmation window.....	F-100
Host-Reserved LUNs window.....	F-102
Release Host-Reserved LUNs wizard.....	F-103
Release Host-Reserved LUNs window.....	F-103
View Login WWN Statuses window.....	F-104
View Login iSCSI Name Statuses window.....	F-105
Port Properties window.....	F-106
CHAP User Properties window.....	F-108
Host Properties window.....	F-109
Create iSCSI Targets wizard.....	F-110
Create iSCSI Targets window.....	F-110
Create iSCSI Targets confirmation window.....	F-114
Edit iSCSI Targets wizard.....	F-116
Edit iSCSI Targets window.....	F-116
Edit iSCSI Targets confirmation window.....	F-118
Add CHAP Users wizard when selected iSCSI target.....	F-119
Add CHAP Users window.....	F-119
Add CHAP Users confirmation window.....	F-121
Edit CHAP User wizard.....	F-122
Edit CHAP User window.....	F-122
Edit CHAP User confirmation window.....	F-123
iSCSI Target Properties window.....	F-124
Add New CHAP User window.....	F-125
Delete iSCSI Targets window.....	F-126
Delete Login iSCSI Names window.....	F-127
Remove CHAP Users window.....	F-127
Remove Target CHAP Users window.....	F-128
Remove Port CHAP Users window.....	F-129
Remove Hosts window.....	F-130
Test Communication Statuses window.....	F-131
Edit T10 PI Mode wizard.....	F-132
Edit T10 PI Mode window.....	F-132
Edit T10 PI Mode confirmation window.....	F-133

Glossary

Index



Preface

This document describes and provides instructions for using the provisioning software to configure and perform operations on Hitachi Virtual Storage Platform G200, G400, G600, G800 and Hitachi Virtual Storage Platform F400, F600, F800 systems. Provisioning software includes Hitachi Dynamic Provisioning, Hitachi Dynamic Tiering software, Hitachi LUN Manager, Virtual LUN, and Hitachi Data Retention Utility.

Please read this document carefully to understand how to use these products, and maintain a copy for your reference.

- ☐ [Intended audience](#)
- ☐ [Product version](#)
- ☐ [Release notes](#)
- ☐ [Changes in this revision](#)
- ☐ [Referenced documents](#)
- ☐ [Document conventions](#)

Intended audience

This document is intended for system administrators, Hitachi Data Systems representatives, and authorized service providers who install, configure, and operate storage systems of VSP Gx00 models and VSP Fx00 models.

Readers of this document should be familiar with the following:

- Data processing and RAID storage systems and their basic functions.
- VSP Gx00 models and VSP Fx00 models and the *Hardware Reference Guide* for your storage system model.
- The Hitachi Device Manager - Storage Navigator software and the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* or the Hitachi Command Suite software and the *Hitachi Command Suite User Guide*.
- The concepts and functionality of storage provisioning operations in the use of Hitachi Dynamic Provisioning, Hitachi Dynamic Tiering software, Hitachi LUN Manager, and Hitachi Data Retention Utility.

Product version

This document revision applies to firmware 83-02-0x or later.

Release notes

The release notes for this product are available on the Hitachi Data Systems Support Connect: https://support.hds.com/en_us/contact-us.html. Read the release notes before installing and using this product. They can contain requirements or restrictions that are not fully described in this document or updates or corrections to this document.

Changes in this revision

- Added support for DP volume capacity up to 256 TB
- Added a caution to [Editing virtualization management settings on page 2-4](#)
- Added a note about deleting the data direct mapping attribute to DP-VOL in [Deleting a DP-VOL on page 5-130](#)
- Updated [Estimating the required capacity of pool-VOLs with System Area in the pool of the data direct mapping attribute on page 1-14](#)
- Added information in [Virtual LUN size calculations on page 4-13](#) regarding the capacity of LDEVs
- Updated reference tables in sections [Errors when operating CCI \(Dynamic Provisioning, SSB1: 0x2e31/0xb96d\) on page 9-8](#), [Errors when operating CCI \(Data Retention Utility, SSB1: 2E31/B9BF/B9BD\) on page 9-10](#), [Virtual Volumes tab on page D-16](#), [Virtual Volumes tab on page D-16](#),

[Port / Host Groups / iSCSI Targets: Hosts, LUNs, Host Mode Options, and CHAP Users tabs on page F-20](#), and [LUNs tab on page F-30](#)

- Added information related to setting the T10 PI mode of a port
- Added information regarding Hitachi Storage Provider for VMware vCenter integrated storage system functions
- Added support for Hitachi Virtual Storage Platform F400, F600, F800 storage systems

Referenced documents

Hitachi Virtual Storage Platform G200, G400, G600, G800 and Hitachi Virtual Storage Platform F400, F600, F800 documents:

- *Hitachi Virtual Storage Platform G200 Hardware Reference Guide*, MK-94HM8020
- *Hitachi Virtual Storage Platform G400, G600 Hardware Reference Guide*, MK-94HM8022
- *Hitachi Virtual Storage Platform G800 Hardware Reference Guide*, MK-94HM8026
- *Hitachi Virtual Storage Platform F400, F600 Hardware Reference Guide*, MK-94HM8045
- *Hitachi Virtual Storage Platform F800 Hardware Reference Guide*, MK-94HM8046
- *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models*, MK-94HM8016
- *Hitachi Command Suite User Guide*, MK-90HC172
- *Hitachi Device Manager - Storage Navigator Messages*, MK-94HM8017
- *Performance Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models*, MK-94HM8012
- *Hitachi SNMP Agent User Guide*, MK-94HM8015
- *Hitachi TrueCopy® User Guide*, MK-94HM8019
- *Hitachi ShadowImage® User Guide*, MK-94HM8021
- *Hitachi Universal Replicator User Guide*, MK-94HM8023
- *Hitachi Universal Volume Manager User Guide*, MK-94HM8024
- *Hitachi Volume Shredder User Guide*, MK-94HM8025

Document conventions

This document uses the following terminology conventions:

Convention	Description
VSP Gx00 models	Refers to all models of the Hitachi Virtual Storage Platform G200, G400, G600, G800 storage systems, unless otherwise noted:

Convention	Description
	- Hitachi Virtual Storage Platform G200 - Hitachi Virtual Storage Platform G400 - Hitachi Virtual Storage Platform G600 - Hitachi Virtual Storage Platform G800
VSP Fx00 models	Refers to all models of the Hitachi Virtual Storage Platform F400, F600, F800 storage systems, unless otherwise noted: - Hitachi Virtual Storage Platform F400 - Hitachi Virtual Storage Platform F600 - Hitachi Virtual Storage Platform F800

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.
<i>Italic</i>	- 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: <code>pairdisplay -g group</code> (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: <code>pairdisplay - g oradb</code>
< > (angle brackets)	Indicates variables in the following scenarios: - Variables are not clearly separated from the surrounding text or from other variables. Example: <code>Status-<report-name><file-version>.csv</code> - 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.
↓value↓ floor floor(value)	Floor function (round down value to the next integer)
↑value↑ ceiling ceiling(value)	Ceiling function (round up value to the next integer)
_ (underlined text)	Default value

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.
	Important	Calls attention to important or additional information.
	Caution	Warns the user of adverse conditions or consequences (for example, disruptive operations).
	WARNING	Warns the user of severe conditions or consequences (for example, destructive operations).

Convention for storage capacity values

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

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

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

Logical capacity unit	Value
1 block	512 bytes
1 cylinder	• 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

Logical capacity unit	Value
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 documentation is available on Hitachi Data Systems Support Connect: https://support.hds.com/en_us/documents.html. 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.

[Hitachi Data Systems Community](#) is a new global online community for HDS customers, partners, independent software vendors, employees, and prospects. It is the destination to get answers, discover insights, and make connections. **Join the conversation today!** Go to community.hds.com, register, and complete your profile.

Comments

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

Thank you!

Introduction to provisioning

Provisioning a storage system requires balancing the costs of the solution with the benefits that the solution provides. The following is an overview of provisioning strategies that you can implement on the Hitachi Virtual Storage Platform G200, G400, G600, G800 and Hitachi Virtual Storage Platform F400, F600, F800 to support your business.

- ☐ [About provisioning](#)
- ☐ [Basic provisioning](#)
- ☐ [Fixed-sized provisioning](#)
- ☐ [Disadvantages](#)
- ☐ [When to use fixed-sized provisioning](#)
- ☐ [Custom-sized provisioning](#)
- ☐ [When to use custom-sized provisioning](#)
- ☐ [Basic provisioning workflow](#)
- ☐ [Dynamic Provisioning Overview](#)
- ☐ [Dynamic Provisioning](#)
- ☐ [Dynamic Provisioning concepts](#)
- ☐ [When to use Dynamic Provisioning](#)
- ☐ [Dynamic Provisioning advantages](#)

- ☐ [DP-VOL of the data direct mapping attribute](#)
- ☐ [Dynamic Provisioning advantage example](#)
- ☐ [Dynamic Provisioning workflow](#)
- ☐ [Dynamic Tiering](#)
- ☐ [Tiers concept](#)
- ☐ [When to use Dynamic Tiering](#)
- ☐ [Active flash](#)
- ☐ [Data retention strategies](#)
- ☐ [Resource groups strategies](#)
- ☐ [Complimentary strategies](#)
- ☐ [Key terms](#)
- ☐ [Before you begin](#)
- ☐ [About cache management devices](#)

About provisioning

Provisioning is a method of managing storage system devices or volumes. Some provisioning methods are host-based, while others use existing storage system capabilities such as concatenated array groups. Some provisioning methods are hardware-based, and others are software-based. Each technique has its particular use and benefit, for example, capacity, reliability, performance, or cost considerations, in a given storage environment. Used in the wrong scenario, each can be expensive, awkward, time consuming to configure and maintain, and can be potentially error prone. Your support representatives are available to help you configure the highest quality solution for your storage environment.

Provisioning strategies falls into two fundamental categories:

- [Basic provisioning on page 1-3](#) (or traditional provisioning). Basic provisioning includes logical devices (LDEVs) and custom-sized volumes.
- [Dynamic Provisioning Overview on page 1-7](#) (or virtual provisioning). Thin provisioning includes pooling physical storage and creating logical devices for hosts.

Basic provisioning

Several basic provisioning techniques traditionally are used to manage storage volumes. These strategies are useful in specific scenarios based on user needs, such as you prefer manual or automated control of your storage resources.

Basic provisioning relies on carving up physical storage into smaller units. Custom sizing is possible, and requires using Virtual LUN software.

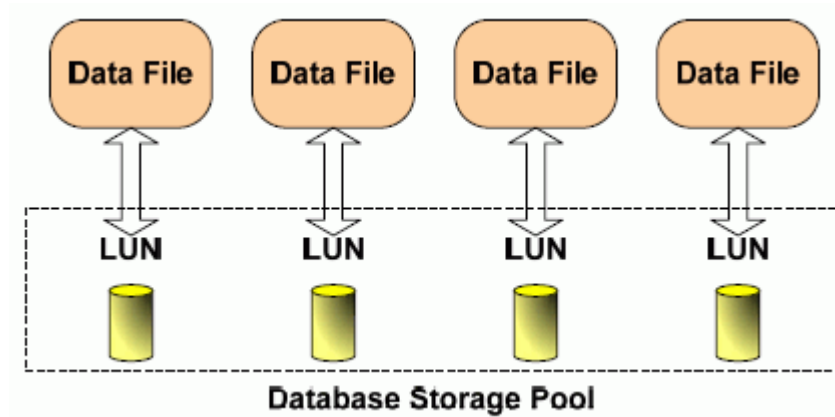
Basic provisioning includes:

- [Fixed-sized provisioning on page 1-3](#)
- [Custom-sized provisioning on page 1-5](#)

Fixed-sized provisioning

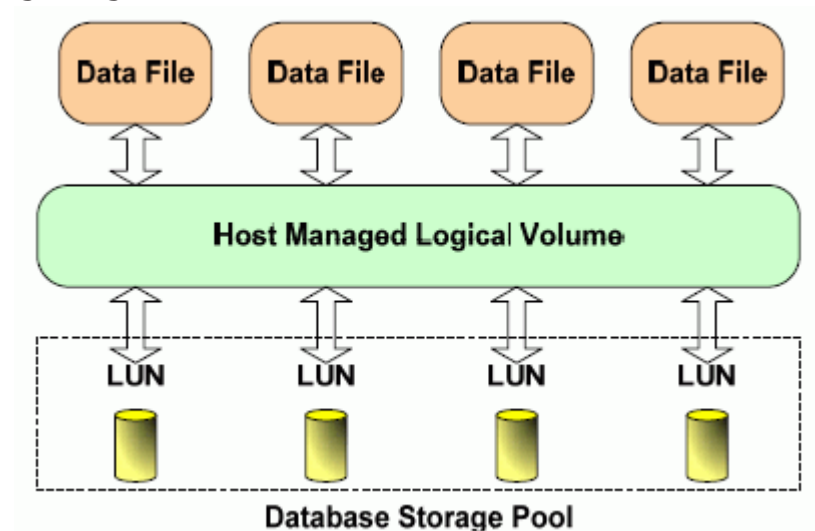
Two traditional fixed-size host-based volume management methods typically are used on open-systems to organize storage space on a server. One method is the direct use of physical volumes as devices for use either as raw space or as a local or clustered file system. These are fixed-size volumes with a fixed number of disks, and as such, each has a certain inherent physical random input/output operation per second (IOPS) or sequential throughput (megabytes per second) capacity. A System Administrator manages the aggregate server workloads against them. As workloads exceed the volume's available space or its IOPS capacity, the user contents are manually moved onto a larger or faster (more spindles) volume, if possible.

The following figure shows a simple fixed-size provisioning environment using individual LU volumes on a host:



The alternative is to use a host-based Logical Volume Manager (LVM) when the planned workloads require either more space or IOPS capacity than the individual physical volumes can provide. LVM is the disk management feature available on UNIX-based operating systems, including Linux, that manages their logical volumes.

The following shows a fixed-size provisioning environment using LUNs in host-managed logical volumes:



In either case, hosts recognize the size as fixed regardless of the actual used size. Therefore, it is not necessary to expand the volume (LDEV) size in the future if the actual used size does not exceed the fixed size.

When such a logical volume runs out of space or IOPS capacity, you can replace it with one that was created with more physical volumes then copy over all of the user data. In some cases, it is best to add a second logical volume then manually relocate only part of the existing data to redistribute the workload across two such volumes. These two logical volumes would be mapped to the server using separate host paths.

Disadvantages

Some disadvantages to using fixed-sized provisioning are:

- If you use only part of the entire capacity specified by an emulation type, the rest of the capacity is wasted.
- After creating fixed-sized volumes, typically some physical capacity is wasted due to being less than the fixed-size capacity.
- In a fixed-sized environment, manual intervention can become a costly and tedious exercise when a larger volume size is required.

When to use fixed-sized provisioning

Fixed-sized provisioning is to be applied when custom-sized provisioning is not supported.

Custom-sized provisioning

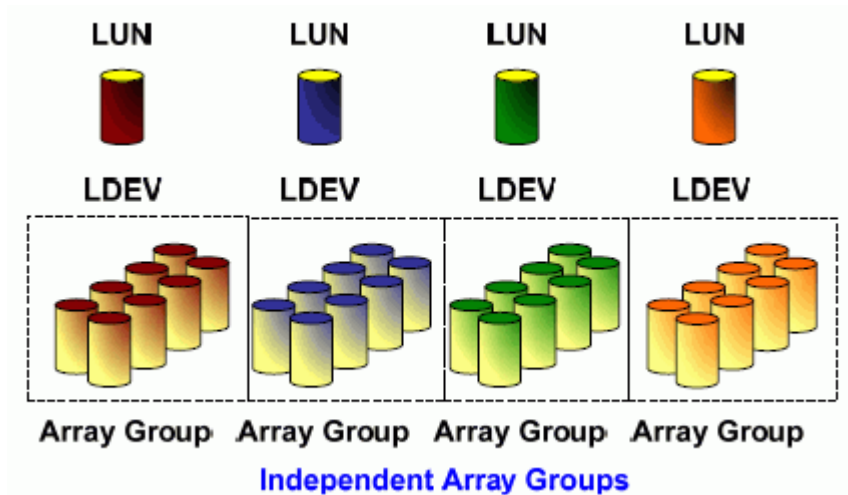
Custom-sized (or variable-sized) provisioning has more flexibility than fixed-sized provisioning and is the traditional storage-based volume management strategy typically used to organize storage space.

To create custom-sized volumes on a storage system, an administrator creates volumes of the desired size from individual array groups. These volumes are then individually mapped to one or more host ports as a logical unit.

Following are three scenarios where custom-sized provisioning is an advantage:

- In fixed-sized provisioning, when several frequently accessed files are located on the same volume and one file is being accessed, users cannot access the other files because of logical device contention. If the custom-sized feature is used to divide the volume into several smaller volumes and I/O workload is balanced (each file is allocated to different volumes), then access contention is reduced and access performance is improved.
- In fixed-sized provisioning, not all of the capacity can be used. Unused capacity on the volume will remain inaccessible to other users. If the custom-sized feature is used, smaller volumes can be created that do not waste capacity.
- Applications that require the capacity of many fixed-sized volumes can instead be given fewer large volumes to relieve device addressing constraints.

The following shows custom-sized provisioning in an open-systems environment using standard volumes of independent array groups:



To change the size of a volume already in use, you first create a new volume larger (if possible) than the old one, then move the contents of the old volume to the new one. The new volume would be remapped on the server to take the mount point of the old one, which is retired.

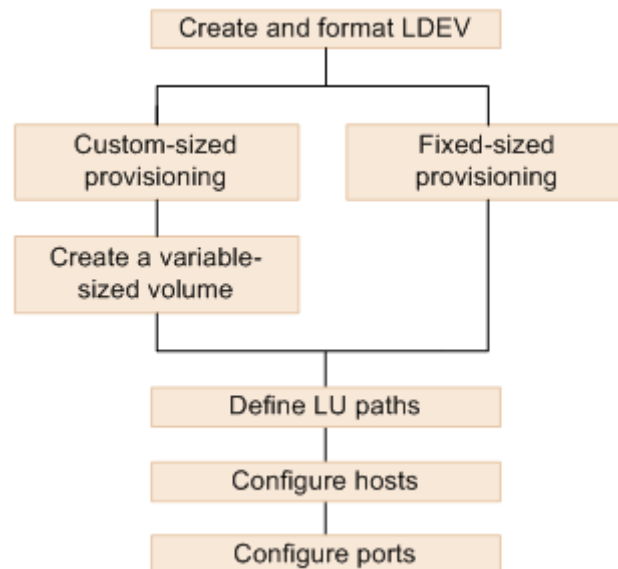
A disadvantage is that this manual intervention can become costly and tedious and this provisioning strategy is appropriate only in certain scenarios.

When to use custom-sized provisioning

Use custom-sized provisioning when you want to manually control and monitor your storage resources and usage scenarios.

Basic provisioning workflow

The following shows the basic provisioning workflow:



Virtual LUN software is used to configure custom-sized provisioning. For detailed information, see [Chapter 4, Configuring custom-sized provisioning on page 4-1](#).

Dynamic Provisioning Overview

Thin provisioning is an approach to managing storage that maximizes physical storage capacity. Instead of *reserving* a fixed amount of storage for a volume, it simply assigns capacity from the available physical pool when data is actually written to disk.

Thin provisioning includes:

- [Dynamic Provisioning concepts on page 1-7](#)
- [Dynamic Tiering on page 1-15](#)

Dynamic Provisioning

Though basic or traditional provisioning strategies can be appropriate and useful in specific scenarios, they can be expensive to set up, awkward and time consuming to configure, difficult to monitor, and error prone when maintaining storage.

Although Dynamic Provisioning requires some additional steps, it is a simpler alternative to the traditional provisioning methods. It uses thin provisioning technology that allows you to allocate *virtual storage capacity* based on anticipated future capacity needs, using *virtual volumes* instead of physical disk capacity.

Overall storage use rates can improve because you can potentially provide more virtual capacity to applications while using fewer physical disks. It can provide lower initial cost, greater efficiency, and storage management freedom for storage administrators. In this way, Dynamic Provisioning software:

- Simplifies storage management
- Provides balanced resources and more optimized performance by default without inordinate manual intervention.
- Maximizes physical disk usage
- Can reduce device address requirements over traditional provisioning by providing larger volume sizes.

Dynamic Provisioning concepts

Dynamic Provisioning is a volume management feature that allows storage managers and System Administrators to efficiently plan and allocate storage to users or applications. It provides a platform for the array to dynamically manage data and physical capacity without frequent manual involvement.

Dynamic Provisioning provides three important capabilities: thin provisioning of storage, enhanced volume performance, and larger volume sizes.

Dynamic Provisioning is more efficient than traditional provisioning strategies. It is implemented by creating one or more Dynamic Provisioning pools (DP pools) of physical storage space using multiple LDEVs. Then, you can establish virtual DP volumes (DP-VOLs) and connect them to the individual DP pools. In this way, capacity to support data can be randomly assigned on demand within the pool.

DP-VOLs are of a user-specified logical size without any corresponding physical space. Actual physical space (in 42-MB pool page units) is automatically assigned to a DP-VOL from the connected DP pool as that volume's logical space is written to over time. A new volume does not have any pool pages assigned to it. The pages are *loaned out* from its connected pool to that DP volume until the volume is reformatted or deleted. At that point, all of that volume's assigned pages are returned to the pool's free page list. This handling of logical and physical capacity is called *thin provisioning*. In many cases, logical capacity will exceed physical capacity.

Dynamic Provisioning enhances volume performance. This is an automatic result of how DP-VOLs map capacity from individual DP pools. A pool is created using from one to 1024 LDEVs (pool volumes) of physical space. Each pool volume is sectioned into 42-MB pages. Each page is consecutively laid down on a number of RAID stripes from one pool volume. The pool's 42-MB pool pages are assigned on demand to any of the DP-VOLs that are connected to that pool. Other pages assigned over time to that DP-VOL randomly originate from the next free page of some other pool volume in the pool.

Setting up a Dynamic Provisioning environment requires a few extra steps. You still configure various array groups to a desired RAID level and create one or more volumes (LDEVs) on each of them (see [Creating LDEVs on page 4-18](#)). Then set up a Dynamic Provisioning environment by creating one or more DP pools of physical storage space that are each a collection of some of these LDEVs (DP pool volumes). This pool structure supports creation of Dynamic Provisioning virtual volumes (DP-VOLs), where 42-MB pages of data are randomly assigned on demand.

For detailed information, see [Chapter 5, Configuring thin provisioning on page 5-1](#).

When to use Dynamic Provisioning

Dynamic Provisioning is a best fit in an open-systems environment in the following scenarios:

- Where the aggregation of storage pool capacity usage across many volumes provides the best opportunity for performance optimization.
- For stable environments and large consistently growing files or volumes.
- Where device addressing constraints are a concern.

Dynamic Provisioning advantages

Advantages	Without Dynamic Provisioning	With Dynamic Provisioning
Reduces initial costs	You must purchase physical disk capacity for expected future use. The unused capacity adds costs for both the storage system and software products.	You can logically allocate more capacity than is physically installed. You can purchase less capacity, reducing initial costs and you can add capacity later by expanding the pool. Some file systems take up little pool space. For more details, see Operating system and file system capacity on page 5-10 .
Reduces management costs	You must stop the storage system to reconfigure it.	When physical capacity becomes insufficient, you can add pool capacity without service interruption. In addition, with Dynamic Tiering you can configure pool storage consisting of multiple types of data drives, including SSD, SAS, and external volumes. This eliminates unnecessary costs. For VSP Fx00 models, SAS drives cannot be specified.
Reduces management labor and increases availability of storage volumes for replication	As the expected physical disk capacity is purchased, the unused capacity of the storage system also needs to be managed on the storage system and on licensed VSP G200, G400, G600, G800 and VSP F400, F600, F800 products.	VSP G200, G400, G600, G800 and VSP F400, F600, F800 product licenses are based on used capacity rather than the total defined capacity. You can allocate volumes of up to 256 TB regardless of physical disk capacity. Dynamic Tiering allows you to use storage efficiently by automatically migrating data to the most suitable data drive.
Increases the performance efficiency of the data drive	Because physical disk capacity is initially purchased and installed to meet expected future needs, portions of the capacity can be unused. I/O loads can concentrate on a subset of the storage which might decrease performance.	Effectively combines I/O patterns of many applications and evenly spreads the I/O activity across available physical resources, preventing bottlenecks in parity group performance. Configuring the volumes from multiple parity groups improves parity group performance. This also increases storage use while reducing power and pooling requirements (total cost of ownership).

DP-VOL of the data direct mapping attribute

By using a DP-VOL for which the data direct mapping attribute is enabled (henceforth referred to as a DP-VOL of the data direct mapping attribute), you can create a mapping of an external volume larger than 4 TB without having to change its capacity as a DP-VOL of the local storage system.

A DP-VOL of the data direct mapping attribute is associated with the following pool-VOLs: an external volume for which the data direct mapping attribute is enabled (henceforth referred to as an external volume of the data direct mapping attribute) and a pool-VOL with System Area. For details about estimating the capacity of pool-VOLs with system area in the pool of the data direct mapping attribute, see [Estimating the required capacity of pool-VOLs with System Area in the pool of the data direct mapping attribute on page 1-14](#).

If you want to use DP-VOLs of the data direct mapping attribute, you must enable the data direct mapping attribute for pool-VOLs, pools, and DP-VOLs. Follow the procedure below if you want to use a DP-VOL of the data direct mapping attribute.

1. In the **Add External Volumes** window, add a volume of an external storage system to an external volume group.
2. In the **Create LDEVs** window, create an external volume of the data direct mapping attribute.
3. In the **Create Pools** window, create a Dynamic Provisioning pool for which the data direct mapping attribute is enabled (henceforth referred to as a pool of the data direct mapping attribute).
Specify the following volumes as pool-VOLs:
 - The external volume of the data direct mapping attribute
 - One or more normal volumes or external volumes
4. In the **Create LDEVs** window, create a DP-VOL of the data direct mapping attribute.
5. In the **Add LUN Paths** window, configure a LU path to the DP-VOL of the data direct mapping attribute.

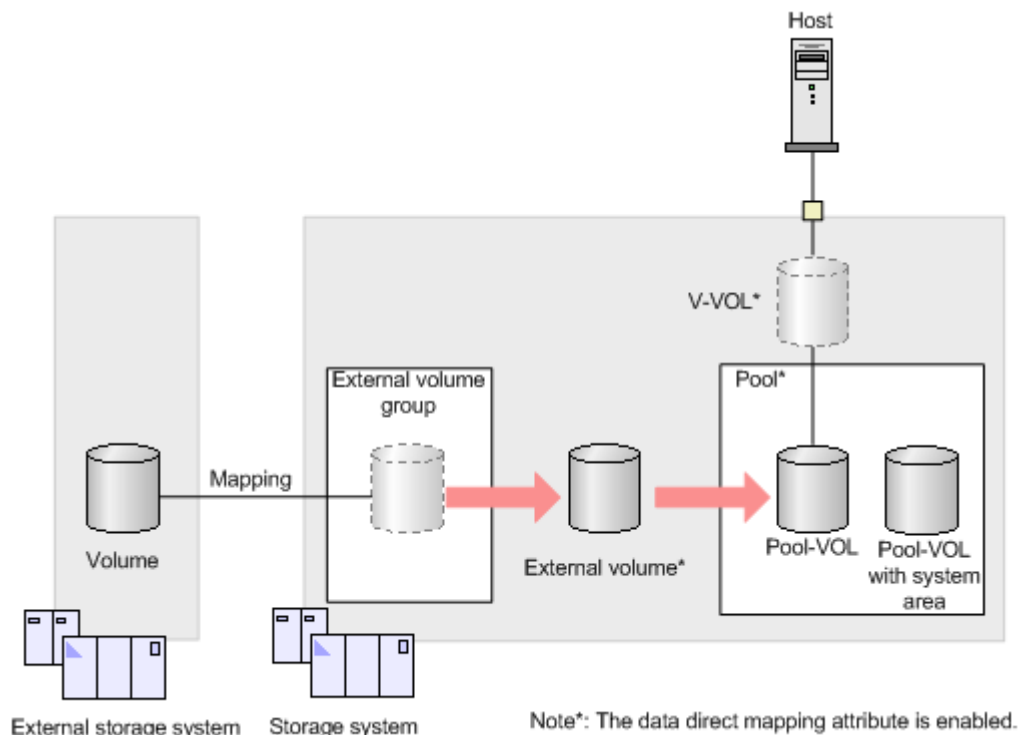


Figure 1-1 DP-VOL of the data direct mapping attribute

The following table shows the different kinds of external volumes can be added as pool-VOLs:

Operation	Data direct mapping attribute of external volumes	
	Disabled	Enabled
Add volumes to a pool of the data direct mapping attribute	The volumes can be added.	The volumes can be added.
Add volumes to the following pools: - Dynamic Provisioning pools - Dynamic Tiering pools (including active flash)	The volumes can be added.	The volumes cannot be added.

The following table shows the kinds of operation that can be performed when the data direct mapping attribute of a Dynamic Provisioning pool is enabled or disabled:

Operation	Data direct mapping attribute of the pool		Remark
	Disabled	Enabled	
Add an LDEV for which the data direct mapping attribute is disabled to the pool	The operation can be performed.	The operation can be performed.	None
Add an external volume of the data direct mapping attribute to pool	The operation cannot be performed.	The operation can be performed.	None
Set the depletion threshold and the warning threshold	The operation can be performed.	The operation cannot be performed. The depletion threshold and the warning threshold are set to 100%.	None
Set subscription	The operation can be performed.	The operation can be performed.	None
Protect V-VOLs when I/O fails to Blocked Pool VOL	The operation can be performed.	The operation can be performed.	None
Protect V-VOLs when I/O fails to Full Pool	The operation can be performed.	The operation can be performed.	None
Perform rebalancing	The operation can be performed.	The operation can be performed. However, if the data direct mapping attribute of a pool-VOL is enabled, the pool-VOL is not a target for rebalancing.	None
Define the used capacity of the pool	The sum of the reserved pages capacity and the mapped capacity	The sum of the reserved pages capacity and the mapped capacity	None
Define the licensed capacity	The sum of the pool-VOLs	The sum of pool-VOLs for which the data direct mapping attribute is disabled. However, the license capacity does not include the capacity of pool-VOLs for which the data direct mapping attribute is enabled.	None
Expand pool	The operation can be performed.	The operation can be performed.	None

Operation	Data direct mapping attribute of the pool		Remark
	Disabled	Enabled	
		However, the capacity of pool-VOLs with System Area must be reserved in advance. For details on how to estimate the capacity of pool-VOLs with System Area.	
Shrink pool	The operation can be performed.	The operation can be performed. However, if a pool-VOL for which the data direct mapping attribute is enabled is associated with a DP-VOL, you cannot shrink the pool.	None
Delete pool	The operation can be performed.	The operation can be performed.	You can delete a pool only if there is no DP-VOL that is associated with the pool.
Create DP-VOL	You can only create DP-VOLs for which the data direct mapping attribute is disabled.	You can only create DP-VOLs of the data direct mapping attribute.	None
Implement a change to Dynamic Tiering (including active flash) pool	The operation can be performed.	The operation cannot be performed.	None

The following table shows what kind of operations can be performed when the data direct mapping attribute of a DP-VOL is enabled or disabled:

Operation	Data direct mapping attribute of the DP-VOL	
	Disabled	Enabled
Configure LU paths	The operation can be performed.	The operation can be performed.
Format LDEVs	The operation can be performed.	The operation can be performed.
Delete LDEVs	The operation can be performed.	The operation can be performed.
Expand V-VOLs	The operation can be performed.	The operation cannot be performed.
Reclaim zero pages	The operation can be performed.	The operation cannot be performed.

Operation	Data direct mapping attribute of the DP-VOL	
	Disabled	Enabled
Execute the V-VOL full allocation function	The operation can be performed.	The operation cannot be performed.
Protect V-VOLs when I/O fails to Blocked Pool VOL	The operation can be performed.	The operation can be performed.
Protect V-VOLs when I/O fails to Full Pool	The operation can be performed.	The operation can be performed.
Apply to LDEVs of SLU attribution	The operation can be performed.	The operation cannot be performed.

Estimating the required capacity of pool-VOLs with System Area in the pool of the data direct mapping attribute

If you want to expand a pool of the data direct mapping attribute, you must free up space in the pool. Make sure that the estimated capacity of free space is available before expanding the pool.

Use the following mathematical formulas to estimate the capacity of free space required in the pool:

Formula 1

Required-free-space-for-a-pool-to-be-added-of-one-external-volume-of-the-data-direct-mapping-attribute [in MB] = (ceil (pool-VOL-capacity [in MB] / 3,145,548) x 4 pages x 42 MB) + (ceil (pool-VOL-capacity [MB] / 42 MB) - floor (pool-VOL-capacity [in MB] / 42 MB)) x 42 MB.

Formula 2

Required-capacity-of-pool-VOL-with-system-area-in-one-pool-of-a-data-direct-mapping-attribute [in MB] = Total-of-calculated-values-by-the-Formula-1-for-each-volume + Management area (4200) [in MB] + 42 [in MB].

The (ceil) indicates the number enclosed by brackets must be rounded up to the whole number.

The (floor) indicates the number enclosed by brackets must be rounded down to the whole number.



Note: One DP-VOL of the data direct mapping attribute uses the following capacities:

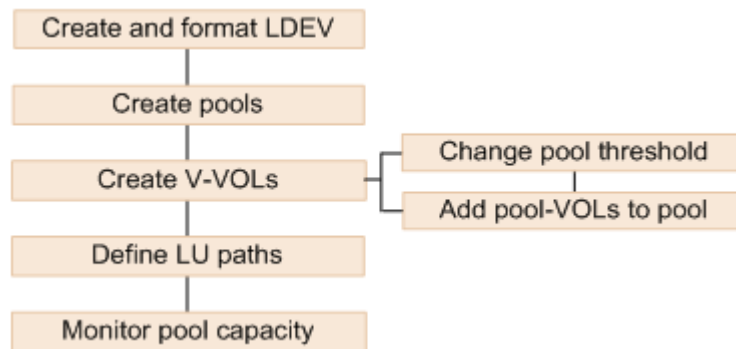
- Mapped capacity uses multiples of 42 MB in the capacity of the pool volume, as well as the capacity for one page (The area of the capacity other than multiples of 42 MB).
 - Control information (168 MB is used per 3,145,548 MB)
The pool-VOL with system area contains the one page capacity and the control information.
-

Dynamic Provisioning advantage example

To illustrate the merits of a Dynamic Provisioning environment, assume you have twelve LDEVs from 12 RAID 1 (2D+2D) array groups assigned to a DP pool. All 48 disks contribute their IOPS and throughput power to all DP volumes assigned to that pool. Instead, if more random read IOPS horsepower is desired for a pool, then it can be created with 32 LDEVs from 32 RAID 5 (3D+1P) array groups, thus providing 128 disks of IOPS power to that pool. Up to 1024 LDEVs can be assigned to a single pool, providing a considerable amount of I/O capability to a few DP volumes.

Dynamic Provisioning workflow

The following shows the Dynamic Provisioning workflow.



Dynamic Tiering

After using Dynamic Provisioning software to virtualize LUs and pool storage into a thin provisioning strategy, the array now has all the elements in place to offer automatic self-optimizing storage tiers provided by Hitachi Dynamic Tiering software (HDT). Using Dynamic Tiering, you can configure a VSP G200, G400, G600, G800 storage system with multiple storage tiers using different kinds of data drives, including SSD, SAS, and external volumes. This helps improve the speed and cost of performance. Dynamic Tiering extends and improves the functionality and value of Dynamic Provisioning. Both use pools of physical storage against which virtual disk capacity, or V-VOLs, is defined. Each thin provisioning pool can be configured to operate either as a DP pool or a Dynamic Tiering pool. Dynamic Tiering is supported only in VSP Gx00 models.

Automated tiering of physical storage is the logical next step for thin provisioned enterprise arrays. Automated tiering is the ability of the array to dynamically monitor and relocate data on the optimum tier of storage. It focuses on data segments rather than entire volumes. The functionality is entirely within the array without any mandated host level involvement. Dynamic Tiering adds another layer to the thin provisioned environment.

Using Dynamic Tiering on a VSP G200, G400, G600, G800 storage system, you can:

- Configure physical storage into tiers consisting of multiple kinds of data drives, including SSD, and SAS. Although host volumes are conventionally configured from a common pool, the pool is efficiently configured using multiple kinds of data disk drives. Dynamic Tiering enables you to place data that needs high performance on SSDs while reducing storage costs by using lower cost physical storage for infrequently accessed data.
- Automatically migrate small portions of host volumes to the most suitable data drive according to access frequency. Frequently accessed data is migrated to higher speed data drives (for example, SSD). Infrequently accessed data is migrated to lower cost and lower speed data drives (for example, SAS7.2K) to use the storage efficiently.

Dynamic Tiering simplifies storage administration by automating and eliminating the complexities of efficiently using tiered storage. It automatically moves data on pages in Dynamic Provisioning virtual volumes to the most appropriate storage media, according to workload, to maximize service levels and minimize total cost of storage.

Dynamic Tiering gives you:

- Improved storage resource usage
- Improved return on costly storage tiers
- Reduced storage management effort
- More automation
- Nondisruptive storage management
- Reduced costs
- Improved performance

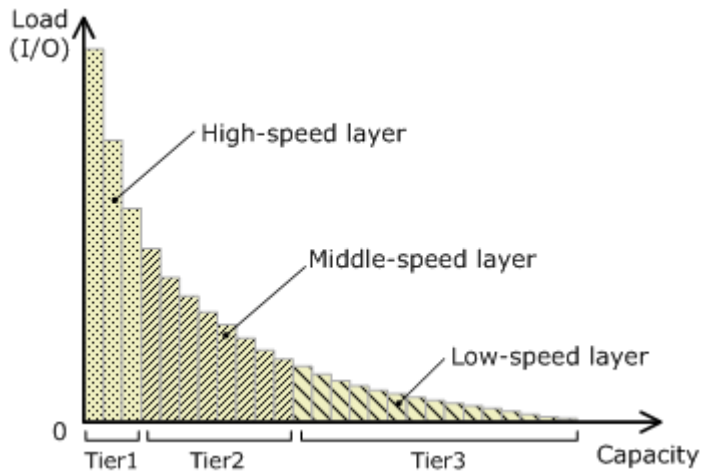
Tiers concept

When not using Dynamic Tiering, data is allocated to only one kind of data drive (typically an expensive high-speed data drive) without regard to the workload to the volumes because the volumes are configured with only one kind of data drive. When using Dynamic Tiering, the higher speed data drive is automatically allocated to the volumes of high workload, and the lower speed drive to the volumes of low workload. This improves performance and reduces costs.

Dynamic Tiering places the host volume's data across multiple tiers of storage contained in a pool. There can be up to three tiers (high-, medium-, and low-speed layers) in a pool. Dynamic Tiering determines tier usage based on data

access levels. It allocates the page with high I/O load to the upper tier, which contains a higher speed drive, and the page with low I/O load to the lower tier, which contains a lower speed drive.

The following figure shows the basic tier concept.



When to use Dynamic Tiering

Dynamic Tiering is the best fit in an environment in which the workload is such that some set of pages are read very frequently, but writes are infrequent.

For detailed information, see [Chapter 5, Configuring thin provisioning on page 5-1](#).

Active flash

The active flash feature of Dynamic Tiering monitors a page's access frequency level real time and promotes pages that suddenly became busy from a slower media to high-performance flash media, in real-time.

The active flash feature can be enabled on any HDT pool as long as you have SSD drives in Tier 1 of the Dynamic Tiering pool. No special configuration beyond what is needed for HDT is required. The active flash feature is only supported in VSP Gx00 models.

Prompt Promotion

A primary goal of HDT and active flash is to have the most frequently access pages in Tier 1. As the workload varies in both the frequency of access and the type of access, reads or writes, the threshold for moving pages from one tier to another changes. HDT generates a dynamic tier range value that is used to determine which pages need to be in Tier 1 and which need to be in a lower tier.

The active flash feature uses the Prompt Promotion threshold to determine if a page qualifies to be promoted to Tier 1. The active flash feature compares the recent access frequency of each page to the Prompt Promotion threshold to determine whether a page should be promoted to Tier 1. The Prompt Promotion threshold is a dynamic threshold that adjusts based upon changes in workload to make most efficient use of the SSD drives. If the recent access frequency for a page meets or exceeds the Prompt Promotion threshold, the page is relocated to Tier 1 without waiting for the next HDT relocation cycle.

Certain type of I/O benefit more from being served by flash media than others. To achieve the best performance gains for certain I/O, active flash gives read I/O greater weight than write I/O when calculating the total access frequency for a page.

High Prioritized Demotion

In order to be certain that there is always some room for active flash to do Prompt Promotion of pages to Tier 1, High Prioritized Demotion is used to demote pages out of Tier 1. Pages that have the lowest IOPH are candidates for High Prioritized Demotion. Similar to Prompt Promotion, High Prioritized Demotion does not wait for the current HDT cycle to end to make relocation decisions.

High Prioritized Demotion is only triggered when:

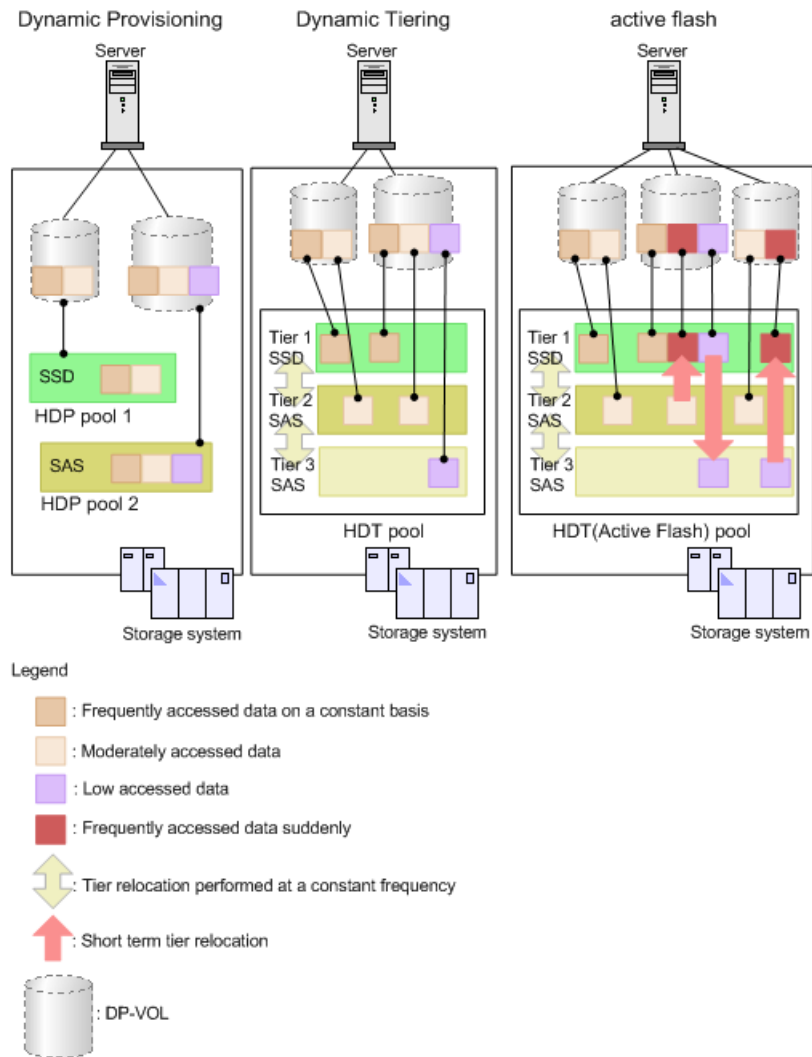
- Tier 1 free capacity is depleted
- performance utilization reaches 80%

Peak performance utilization is predefined for a particular media.

Performance utilization of a tier is the maximum amount of I/O it can receive. The maximum I/O load that should be targeted to a tier depends upon the media type used to make the tier. A performance utilization of 100% means that the tier is receiving the maximum amount of I/O it can sustain. When performance utilization reaches about the 60% level, response time to the particular media becomes noticeably slower. See [Tier relocation workflow on page 5-25](#) for more information on performance utilization.

Dynamic Provisioning, Dynamic Tiering, and active flash functionality comparison

The following diagram shows a comparison between functions of pools and V-VOLs for Dynamic Provisioning, Dynamic Tiering, and active flash.



Data retention strategies

After provisioning your system, you can assign access attributes to open-system volumes to protect the volume against read, write, and copy operations and to prevent users from configuring LU paths and command devices. Use the Data Retention Utility to assign access attributes.

For more information, see [Chapter 6, Configuring access attributes on page 6-1](#).

Resource groups strategies

A storage system can connect to multiple hosts and be shared by multiple divisions in a company or by multiple companies. Many storage administrators from different organizations can access the storage system. Managing the entire storage system can become complex and difficult. Potential problems are that private data might be accessed by other users, or

a volume in one organization might be destroyed by mistake by a storage administrator in another organization.

To avoid such problems, use Hitachi Resource Partition Manager software to set up resource groups that allow you to manage one storage system as multiple virtual private storage systems. The storage administrator in each resource group can access only their assigned resources and cannot access other resources. Configuring resource groups prevents the risk of data leakage or data destruction by another storage administrator in another resource group.

The resources such as LDEVs, parity groups, external volumes, ports, host groups, or iSCSI targets can be assigned to a resource group. These resources can be combined to flexibly compose a virtual private storage system.

Resource groups should be planned and created before creating volumes. For more information, see [Chapter 3, Configuring resource groups on page 3-1](#).

Complimentary strategies

Functions related to provisioning

For the following functions, see the appropriate manuals:

- Replication: ShadowImage, TrueCopy, Universal Replicator
- External storage: Universal Volume Manager
- Migration: Volume Migration (contact the Hitachi Data Systems customer support)
- Partitioning: Virtual Partition Manager (*Performance Guide*)

Key terms

The following are provisioning key terms:

Term	Description
access attributes	Security function used to control the access to a logical volume. Access attributes are assigned to each volume: read only, read/write, and protect.
CV (variable volume)	Customized Volume. A fixed volume that is divided into arbitrary sizes.
DP pool	A group of DP-VOL. The DP pool consists of one or more pool-VOLs.
DP-VOL	Dynamic Provisioning virtual volume.
expiration lock	Security option used to allow or not allow changing of the access attribute on a volume.

Term	Description
FV	Abbreviation for fixed-sized volume.
meta_resource	A resource group in which additional resources (other than external volumes) and the resources existing before installing Resource Partition Manager belong.
page	In Dynamic Provisioning, a page is 42 MB of continuous storage in a DP-VOL that belongs to a DP-pool.
pool	A set of volumes that are reserved for storing Dynamic Provisioning or Thin Image write data.
pool threshold	In a thin provisioned storage system, the proportion (%) of used capacity of the pool to the total pool capacity. Each pool has its own pool threshold values for warning and depletion.
pool-VOL, pool volume	A volume that is reserved for storing snapshot data for Thin Image operations or write data for Dynamic Provisioning.
resource group	A group that is assigned one or more resources of the storage system. The resources that can be assigned to the resource group are LDEV IDs, parity groups, external volumes, ports, host group IDs, and iSCSI targets.
subscription threshold	In a thin provisioned storage system, the proportion (%) of total DP-VOL capacity associated with the pool versus the total capacity. You can set the percentage of DP-VOL capacity that can be created to the total capacity of the pool. This can help prevent DP-VOL blocking caused by a full pool. For example, when the subscription limit is set to 100%, the total DP-VOL capacity that can be created is obtained using this formula: $\text{total DP-VOL capacity} \leq \text{pool capacity} \times 100\%$ Using this setting protects the pool when doing the following: • Shrinking a pool • Creating DP-VOL • Increasing DP-VOL capacity
tier boundary	The value of the reached maximum I/O counts that each tier can process.
tier relocation	A combination of determining the appropriate storage tier and migrating the pages to the appropriate tier.
tiered storage	A storage hierarchy of layered structures of data drives consisting of different performance levels, or tiers, that match data access requirements with the appropriate performance tiers.

Before you begin

Before you begin provisioning your storage system, certain requirements must be met.

System requirements

- The hardware and firmware for your storage system and Hitachi Device Manager - Storage Navigator essential for operating the storage system must be installed and configured for use
- A VSP G200, G400, G600, G800 or VSP F400, F600, F800 storage system
- The storage system must have parity groups installed
- A management client

Control memory requirements



Caution:

- For details about the installing of the control memory, see the hardware reference guide for your storage system.
- Before the control memory is uninstalled, all Dynamic Provisioning, Dynamic Tiering, and active flash pools must be deleted.

If Dynamic Provisioning is used in conjunction with Dynamic Tiering or Thin Image pools, additional control memory is needed. The amount of additional control memory needed depends on the size of the Dynamic Provisioning and Dynamic Tiering pools. No additional control memory is required for active flash.

About cache management devices

Cache management devices are associated with volumes (LDEVs) and used to manage caches. One volume (LDEV) requires at least one cache management device. An entire system can manage up to following numbers of cache management devices. A DP-VOL can require more than one cache management device. This topic describes how to calculate the number of cache management devices.

- VSP G800 and VSP F800: 32,512
- VSP G400, G600 or VSP F400, F600: 7,936
- VSP G200: 3,840

Calculating the number of cache management devices required by a DP-VOL

The number of cache management devices that a DP-VOL requires depends on the capacity of the V-VOL (capacity of the user area) and the maximum capacity of cache management device. The maximum capacity of cache management device depends on the pool attribute (internal volume or external volume) associated with V-VOL. The following table explains the relationship between the pool attribute and the maximum capacity of cache management device.

Maximum capacity of cache management device

Pool attribute	Maximum capacity (in MB)	Maximum capacity (in blocks)
Internal volume	3,145,548 (2.99 TB)	6,442,082,304
External volume	3,145,548 (2.99 TB)	6,442,082,304

Use the following formula to calculate the number of cache management devices that a DP-VOL requires. In this formula, the user-specified capacity is the user area capacity of a V-VOL.

$\text{ceil}(\text{user-specified capacity} \div \text{max-capacity-of-cache-management-device})$

The calculated value must be rounded up to the nearest whole number.

Calculating the number of cache management devices required by a volume that is not a DP-VOL

One volume that is not a DP-VOL requires one cache management device.

Viewing the number of cache management devices

Click **Actions** and select **View Management Resource Usage** to display the number of cache management devices in the View Management Resource Usage window. For details, see [About cache management devices on page 1-22](#) and [View Management Resource Usage window on page C-65](#).

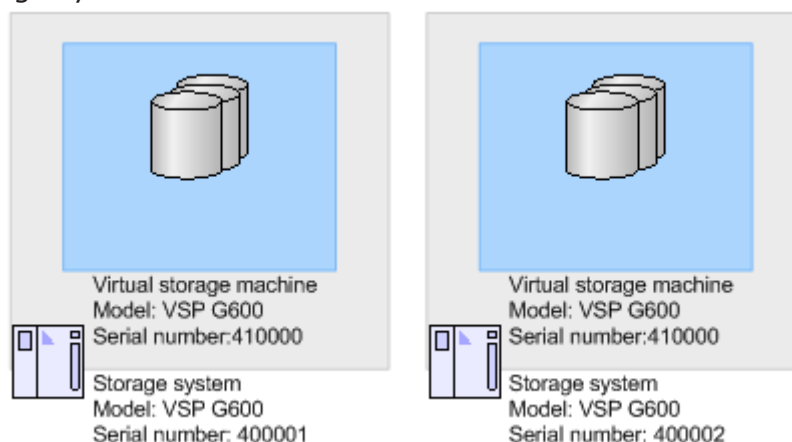
Managing Virtual Storage Machine Resources

The virtual storage machine is the unit that is used to manage virtualized resources for each storage system. For software with global storage virtualization functions, a virtual storage machine is created in the storage system.

- ☐ [About virtual storage machines and virtualized resources](#)
- ☐ [Provisioning operations for resources in a virtual storage machine](#)
- ☐ [Pair operations with virtual storage machine pairs](#)
- ☐ [Software operations for resources in a virtual storage machine](#)
- ☐ [Editing virtualization management settings](#)

About virtual storage machines and virtualized resources

The following describes the relationship between virtual storage machines and a storage system.



Virtual storage machines are created with operations involving data migration or the high availability function. Other than those operations, a user cannot create virtual storage machines in a storage system. For information on removing virtual storage machines, see the *Command Control Interface User and Reference Guide*.

Information on the virtualized resources of a virtual storage machine appears in Hitachi Device Manager - Storage Navigator with associated physical storage information. If the information on these resources is not displayed by default, you can change the **Column Settings** window.

For information on displaying virtualized resources, see the *Command Control Interface User and Reference Guide*.

As for the information about virtualized resources, following terms appear in Storage Navigator windows.

Term	Description
LDEVs for which virtualization management is disabled	LDEVs that satisfy both of these conditions: • The model name and serial number of the virtual storage machine that manages a resource group with LDEVs is the same as the storage system involved in the operation. • The values of the virtual LDEV ID and the LDEV ID are the same.
LDEVs for which virtualization management is enabled	LDEVs that satisfy one of these conditions: • The model name and serial number of the virtual storage machine that manages a resource group with LDEVs is different than the storage system involved in the operation. • The model name and serial number of the virtual storage machine that manages a resource group with LDEVs is the same as the storage system involved in the operation. Yet, the values of the virtual LDEV ID and the LDEV ID are different.

Provisioning operations for resources in a virtual storage machine

For provisioning operations that involve virtualized resources in a virtual storage machine, you can perform provisioning operations that specify conventional physical resources or virtualized resources. However, provisioning operations that specify IDs of virtualized resources are limited. For details about data management operations for virtualized resources, see the *Command Control Interface User and Reference Guide* .

Pair operations with virtual storage machine pairs

Specifying virtual IDs in pair operations

You can perform pair operations by specifying both of the following in the **HORCM_LDEV** parameters of the Command Control Interface configuration definition file:

- Serial number of the virtual storage machine in the **Serial#** parameter
- Virtual LDEV number in the **CU:LDEV(LDEV#)** parameter

You can perform conventional pair operations by specifying both of the following in the **HORCM_LDEV** parameters of the configuration definition file:

- Serial number of the physical storage system in the **Serial#** parameter
- Physical LDEV number in the **CU:LDEV(LDEV#)** parameter



Caution: If the following condition exists, the local copy pair operation cannot be performed by specifying virtual IDs:

- Primary volume and secondary volume are defined differently for the virtual storage machine.

If both of the following conditions exist, remote copy pair operations cannot be performed by specifying virtual IDs:

- Primary volume is an LDEV of VSP, HUS VM, USP V, or USP VM
- Secondary volume is an LDEV of VSP G1000, VSP G200, G400, G600, G800, or VSP F400, F600, F800.



Caution: The global-active device pair operation that specifies the virtual ID cannot be performed.

Displaying pair information

You can create pairs by specifying both of following in the **HORCM_LDEV** parameters of the Command Control Interface configuration definition file:

- Serial number of the physical storage system in the **Serial#** parameter
- Virtual LDEV number in the **CU:LDEV(LDEV#)** parameter

If the pair is created under the above conditions, the following are displayed as results of executing the `pairdisplay` command:

- Serial number of the virtual storage machine in the **Seq#** parameter
- Virtual LDEV number in the **LDEV#** parameter

You can create pairs by specifying both of the following in the **HORCM_LDEV** parameters of the configuration definition file:

- Serial number of the physical storage system in the **Serial#** parameter
- Physical LDEV number in the **CU:LDEV(LDEV#)** parameter

If the pair is created under the above conditions, the following are displayed as results of executing the `pairdisplay` command:

- Physical serial number of the virtual storage machine in the **Seq#** parameter
- Physical virtual LDEV number in the **LDEV#** parameter



Caution: You can create pairs by specifying both of the following in the **HORCM_LDEV** parameters of the configuration definition file:

- Serial number of the physical storage system in the **Serial#** parameter
- Physical LDEV number in the **CU:LDEV(LDEV#)** parameter

For pairs created under the above conditions, the device information that is recognized by the server and the device information that results from executing the `pairdisplay` command are different.

Software operations for resources in a virtual storage machine

For data management operations that involve virtualized resources in a virtual storage machine, you can perform data management operations that specify conventional physical resources or virtualized resources. However, data management operations that specify IDs of virtualized resources are limited. For details about data management operations for virtualized resources, see the *Command Control Interface User and Reference Guide* .

Editing virtualization management settings

This section explains how to edit virtualization management settings.



Caution: If the setting of the LDEV virtualization management is canceled, **Transient** is displayed in the Virtual LDEV ID, and **Failed** is displayed on the Status column of the Task window. To resolve the transient status, perform one of the following operations to LDEVs:

- Resolve the cause of the failure by addressing the solution of the error message in the Task window. Then retry the same operation by using the **Edit Virtualization Management Settings** window.

- In the **Edit Virtualization Management Settings** window, set **Virtual Management Settings** to **Disable** and apply the setting to the storage system.
-

Prerequisite information

- The Security Administrator (View & Modify) role is required.

Procedure

1. In the **Administration** tree, select **Resource Groups**.
2. Select the resource group that has the volume whose virtualization management settings you want to edit.
3. In the **LDEVs** tab, select a volume whose virtualization management settings you want to edit.
4. Use either of the following methods to display the **Edit Virtualization Management Settings** window.
 - Click **Edit Virtualization Management Settings**.
 - In the **Settings** menu, select **Resource Management**, and then **Edit Virtualization Management Settings**.
5. In **Virtualization Management Settings**, select one or more of the following virtualization management settings.
 - **Enable**: Virtualization management can be used. You can set a initial virtual LDEV ID or the virtual configuration, or both.
 - **Enable (Not Set)**: Virtualization management can be used. However, you cannot set the initial virtual LDEV ID and the virtual configuration.
 - **Disable**: Virtual management cannot be used.
6. If you select **Enable** in **Virtualization Management Settings** and can set a virtual LDEV ID, set the starting virtual LDEV ID for **Initial Virtual LDEV ID**.

A virtual LDEV ID that is not used in the virtual storage machine is assigned at the interval specified in **Interval**, sequentially starting from the specified virtual LDEV ID.



Note: If the virtual storage machine is the same as the storage system, assign the virtual LDEV ID which is different from the LDEV ID of the selected LDEV. If the virtual storage machine is the same as the storage system, and if the virtual LDEV ID which is the same as LDEV ID of the selected LDEV must be assigned, select **Disable** in **Virtualization Management Settings**.



Caution: If the virtual storage machine is configured by multiple storage systems, a virtual LDEV ID that is already used in another storage system might be assigned. In such a configuration, set the interval so that a virtual LDEV ID that is already used in another storage system is not assigned.

7. If you select **Enable** in **Virtualization Management Settings**, select **Virtual Configuration**.
If you want to specify the virtual configuration of the LDEV (to make the configuration different from that of the LDEV), select **Specify**.
If you do not want to specify the virtual configuration of the LDEV (to make the configuration the same as that of the LDEV), select **Not Set**.
 - a. In **Emulation Type**, select the virtual emulation type.
For the virtual emulation type, like the emulation type, set one of the emulation types that exist in the same group of 32 volumes with LDEV IDs.
 - b. Select **CVS Settings**.
 - c. In **Number of Concatenated LDEVs**, specify the number of concatenated virtual LDEVs with a value from 1 to 36 (decimal number).
If you do not concatenate virtual LDEVs, enter 1.
 - d. In **SSID**, specify a virtual SSID with a value from 0004 to FFFE (hexadecimal number).
Set a virtual SSID for each virtual LDEV address (64, 128, 256) in the virtual storage machine.



Note: For the virtual configuration, the specified values are set for all selected LDEVs.

8. Click **Finish**.
9. Enter the task name in **Task Name**.
10. Click **Apply**.
The task is registered, and if the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Related Topics

- [Edit Virtualization Management Settings wizard on page B-30](#)

Configuring resource groups

The Storage Administrator can divide a provisioned storage system into resource groups that allow managing the storage system as multiple virtual private storage systems. Configuring resource groups involves creating resource groups, moving storage system resources into the resource groups, and assigning resource groups to user groups.

- ☐ [Using resource groups to configure your system](#)
- ☐ [Resource groups examples](#)
- ☐ [Meta resource](#)
- ☐ [Resource lock](#)
- ☐ [User groups](#)
- ☐ [Resource group assignments](#)
- ☐ [Resource group license requirements](#)
- ☐ [Resource group rules, restrictions, and guidelines](#)
- ☐ [Creating a resource group](#)
- ☐ [Adding resources to a resource group](#)
- ☐ [Removing resources from a resource group](#)
- ☐ [Managing resource groups](#)
- ☐ [Using Resource Partition Manager and other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products](#)

Using resource groups to configure your system

Configuring resource groups prevents the risk of data leakage or data destruction by another Storage Administrator in another resource group. The Storage Administrator considers and plans which resource should be managed by which user, then the Security Administrator creates resource groups and assigns each resource to the resource groups.

A resource group is assigned one or more storage system resources. The following resources can be assigned to resource groups.

- LDEV IDs*
- Parity groups
- External volumes
- Ports
- Host group IDs*
- iSCSI target IDs*

* Before you create LDEVs, the LDEV IDs can be reserved and assigned to a resource group for future use. Host group numbers can also be reserved and assigned in advance because the number of host groups created on a single port is limited. iSCSI targets numbers can also be reserved and assigned in advance because the number of iSCSI targets created on a single port is limited.

The following tasks provide instructions for configuring resource groups.

- [Creating a resource group on page 3-8](#)
- [Adding resources to a resource group on page 3-9](#)
- [Removing resources from a resource group on page 3-10](#)
- [Changing resource group names on page 3-10](#)
- [Deleting a resource group on page 3-11](#)

Resource groups examples

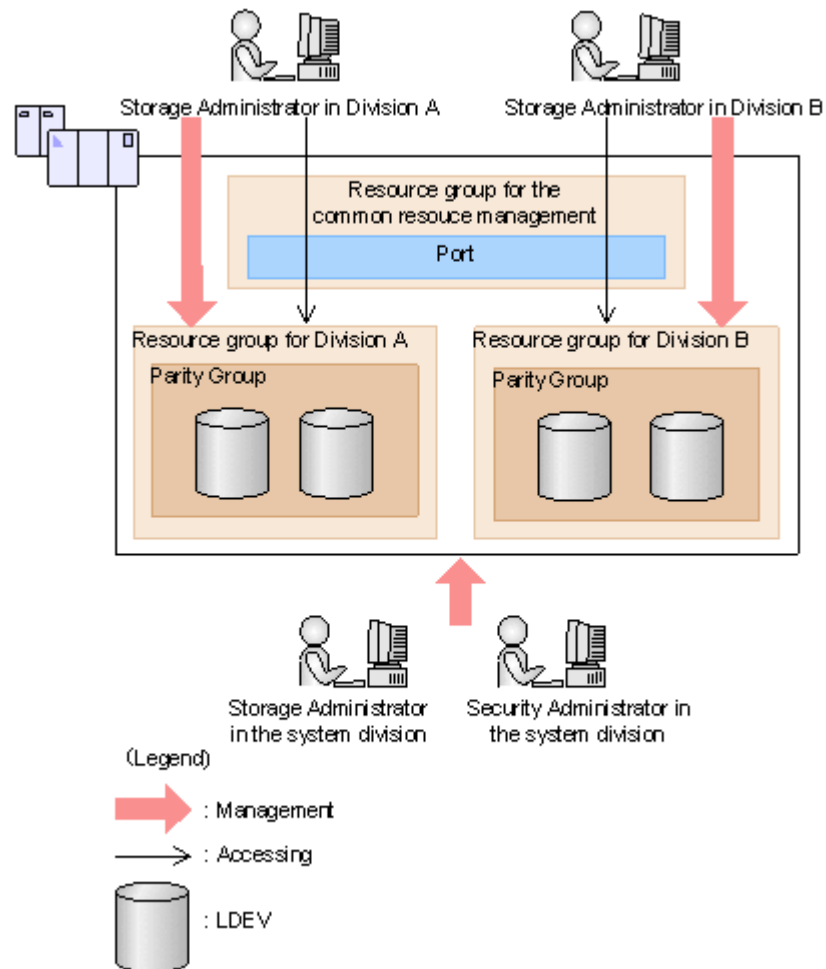
The following examples illustrate how you can configure resource groups on your storage system:

- [Example of resource groups sharing a port on page 3-2](#)
- [Example of resource groups not sharing ports on page 3-4](#)

Example of resource groups sharing a port

If you have a limited number of ports, you can still operate a storage system effectively by sharing ports using resource groups.

The following example shows the system configuration of an in-house division providing virtual private storage system for two divisions. Division A and division B use their own assigned parity group, but share a port. The shared port is managed by the system division.



The Security Administrator in the system division creates resource groups for each division in the storage system and assigns them to the respective divisions. The Storage Administrator in Division A can manage the resource groups for Division A, but cannot access the resource groups for Division B. In the same manner, the Storage Administrator in Division B can manage the resource groups for Division B, but cannot access the resource groups for Division A.

The Security Administrator creates a resource group for managing the common resources, and the Storage Administrator in the system division manages the port that is shared between Divisions A and B. The Storage Administrators in Divisions A and B cannot manage the shared port belonging to the resource group for common resources management.

Configuration workflow for resource groups sharing a port

1. The system division forms a plan about the resource group creation and assignment of the resources.
2. The Security Administrator creates resource groups.
See [Creating a resource group on page 3-8](#) for more information.
3. The Security Administrator creates user groups.

See the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* for more information.

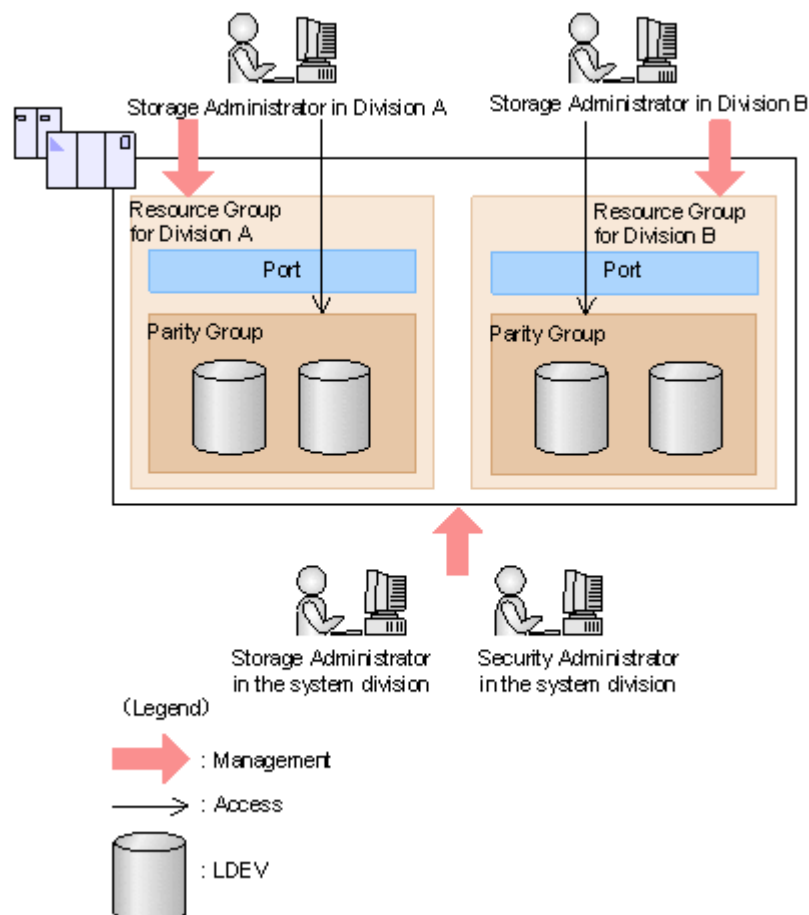
4. The Security Administrator assigns the resource groups to user groups.
See the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* for more information.
5. The Storage Administrator in the system division sets a port.
6. The Security Administrator assigns resources to the resource groups.
See [Adding resources to a resource group on page 3-9](#) for more information.
7. The Security Administrator assigns each Storage Administrator to each user group.
See the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* for more information.

After the above procedures, the Storage Administrators in A and B divisions can manage the resource groups assigned to their own division.

Example of resource groups not sharing ports

If you assign ports to each resource group without sharing, performance can be maintained on a different port even if the bulk of I/O is issued from one side port.

The following shows a system configuration example of an in-house system division providing the virtual private storage system for two divisions. Divisions A and B each use individual assigned ports and parity groups. In this example, they do not share a port.



The Security Administrator in the system division creates resource groups for each division in the storage system and assigns them to the respective divisions. The Storage Administrator in Division A can manage the resource groups for Division A, but cannot access the resource groups for Division B. In the same manner, the Storage Administrator in Division B can manage the resource groups for Division B, but cannot access the resource groups for Division A.

Configuration workflow for resource groups not sharing a port

1. The system division forms a plan about creating resource groups and the assigning resources to the groups.
2. The Security Administrator creates resource groups.
See [Creating a resource group on page 3-8](#) for more information.
3. The Security Administrator creates user groups.
See the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* for more information.
4. The Security Administrator assigns the resource groups to user groups.
See the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* for more information.
5. The Storage Administrator in the system division sets ports.

6. The Security Administrator assigns resources to the resource groups.
See [Adding resources to a resource group on page 3-9](#) for more information.
7. The Security Administrator assigns each Storage Administrator to each user group.
See the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* for more information.

After the above procedures, the Storage Administrators in A and B divisions can access the resource groups allocated to their own division.

Meta_resource

The *meta_resource* is a resource group comprised of additional resources (other than external volumes) and the resources that exist on the storage system before the Resource Partition Manager is installed. By default, existing resources initially belong to the *meta_resource* group to ensure compatibility with older software when a system is upgraded to include Resource Partition Manager.

Resource lock

While processing a task on a resource, all of the resource groups assigned to the logged-on user are locked.

A secondary window (such as the Basic Information Display) locks all of the resource groups in the storage system.

When a resource is locked, a status indicator appears on the status bar. Click the **Resource Locked** button to view information about the locked resource.



User groups

User groups and associated built-in roles are defined in Device Manager - Storage Navigator. A user belongs to one or more user groups. Privileges allowed to a particular user are determined by the user group or groups to which the user belongs.

The Security Administrator assigns resource groups to user groups. A user group can already be configured, or a new user group can be required for certain resources.

See the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* for more information.

Resource group assignments

All resource groups are normally assigned to the Security Administrator and the Audit Log Administrator.

Each resource group has a designated Storage Administrator who can access only their assigned resources and cannot access other resources.

All resource groups to which all resources in the storage system belong can be assigned to a user group. Configure this in Hitachi Device Manager - Storage Navigator by setting **All Resource Groups Assigned** to **Yes**.

A user who has **All Resource Groups Assigned** set to **Yes** can access all resources in the storage system. For example, if a user is a Security Administrator (with View and Modify privileges) and a Storage Administrator (with View and Modify privileges) and **All Resource Groups Assigned** is **Yes** on that user account, the user can edit the storage for all the resources.

If allowing this access conflicts with storage system security, register the following two user accounts and use these different accounts for different purposes.

- A user account for a Security Administrator where **All Resource Groups Assigned** is set to **Yes**.
- A user account for a Storage Administrator who does not have all resource groups assigned and has only some of the resource groups assigned.

Resource group license requirements

Use of Resource Partition Manager on your storage system requires the following:

- A license key for Resource Partition Manager software.
For details about license keys, see the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models*.

Resource group rules, restrictions, and guidelines

Rules

- The maximum number of resource groups that can be created on a storage system is 1023.
- A Storage Administrator with the Security Administrator (View and Modify) role can create resource groups and assign resources to resource groups.
- Resources removed from a resource group are returned to meta_resource.
- Only a Security Administrator (View and Modify) can manage the resources in assigned resource groups.

Restrictions

- No new resources can be added to `meta_resource`.
- Resources cannot be deleted from `meta_resource`.
- LDEVs that have the same pool IDs or the journal IDs cannot be added to multiple resource groups.

When adding LDEVs that are used as pool volumes or journal volumes, add all the LDEVs that have the same pool IDs or journal IDs by using a function such as `sort`.

Guidelines

- If you are providing a virtual private storage system to different companies, do not share parity groups, external volumes, or pools. To limit the capacity that can be used by each user. When parity groups, external volumes, or pools are shared between multiple users, and one uses too much shared resource capacity, other users can not be able to create an LDEV.

Creating a resource group

When creating a resource group, observe the following:

- The maximum number of resource groups that can be created on a storage system is 1023.
- The name `meta_resource` cannot be set for a resource group name.
- Duplicate occurrences of the same name are not allowed.
- Resource group names can use alphanumeric characters, spaces, and the following symbols: `! # $ % & ' ( ) + - . = @ [ ] ^ _ ` { } ~`
- Characters in resource group names are case-sensitive.
- You must have Security Administrator (View and Modify) role to perform this task.

To create resource groups:

1. In the **Storage Systems** tree on the left pane of the main window, click **Administration>Resource Groups**.
2. Click **Create Resource Groups** in the **Resource Groups** tab.
3. Enter a resource group name in the **Create Resource Groups** window. Parity groups, LDEVs, ports, host groups, and iSCSI targets can be specified as follows:
 - a. Click **Select resource-name**. For example, click **Select Parity Groups**.
 - b. Select resources from the Available *resource-name* table.
 - c. Click **Add resource-name** table.
The added resources move to the Selected *resource-name* table.

Click **Remove** to move resources from the Selected to the Available *resource-name* table if necessary.

d. Click **OK**.

The **Create Resource Groups** window

4. Click **Add**.

The resource group is added to **Selected Resource Groups** table.

If you select a row and click **Detail**, the **Resource Group Properties** window appears.

If you select a row and click **Remove**, a message appears that asks To remove the selected row. To remove the row, click **OK**.

5. Click **Finish**.

6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.

If you select a row and click **Detail**, the **Resource Group Properties** window appears.

If **Go to tasks window for status** is checked, the **Tasks** window opens.

Adding resources to a resource group

Before adding resources to a resource group, consider the following:

- You must have a Security Administrator (View and Modify) role to perform this task.
- No resource can be added to meta_resource.
- Only resources allocated to meta_resource can be added to resource groups.
- LDEVs with the same pool IDs or journal IDs cannot be added to multiple resource groups. For example, when two LDEVs belong to the same pool, you must allocate both to the same resource group. You cannot allocate them separately. Use the sort function to sort the LDEVs by pool ID or journal ID, select them, and then add them all at once.
- If virtual storage machine attributes differ between meta_resource and the resource group:
 - LDEVs cannot be added to the resource group when virtual LDEV IDs are assigned to LDEVs in meta_resource.
 - LDEVs and host groups cannot be added to the resource group when LUN paths are assigned to LDEVs and host groups in meta_resource.

To add resources to a resource group:

1. In the **Storage Systems** tree on the left pane of the main window, click **Administration>Resource Groups**.
2. Click a resource group to add in the **Resource Groups** tab.
3. Click **Add Resources**.
4. Select the type of resources to add in the resource group.

5. Select one or more resources to add to the resource group, then click **Add**.
6. Click **OK**, then click **Finish**.
7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Removing resources from a resource group

Before removing resources from a resource group, consider the following:

- The resources removed from a resource group are returned to meta_resource.
- Resources cannot be deleted from meta_resource.
- LDEVs with the same pool IDs or journal IDs cannot be partially removed. For example, if two LDEVs belong to the same pool, you cannot remove only LDEV1 from the resource group and leave LDEV2. Use the sort function to sort the LDEVs by pool ID or journal ID, then select them and remove them all at once.
- If virtual storage machine attributes differ between meta_resource and the resource group:
 - LDEVs cannot be added to the resource group when virtual LDEV IDs are assigned to LDEVs in meta_resource.
 - LDEVs and host groups cannot be added to the resource group when LUN paths are assigned to LDEVs and host groups in meta_resource.
- You must have a Security Administrator (View and Modify) role to perform this task.

To remove resources from a resource group:

1. In the **Storage Systems** tree on the left pane of the main window, click **Administration>Resource Groups**.
2. Click a resource group to remove in the **Resource Groups** tab.
3. Select one or more resources to remove from the resource group, then click **Remove Resources**.
4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Managing resource groups

Changing resource group names

When changing the name of a resource group, observe the following:

- The name *meta_resource* cannot be changed.

- Duplicate occurrences of the same name are not allowed.
- The name of *meta_resource* cannot be set for a resource group name.
- Resource group names can use alphanumeric characters, spaces, and the following symbols: ! # \$ % & ' () + - . = @ [] ^ _ ` { } ~
- Characters in a resource group name are case-sensitive.
- You must have a Security Administrator (View and Modify) role to perform this task.

To change a resource group name:

1. In the **Storage Systems** tree on the left pane of the main window, click **Administration** then **Resource Groups**.
2. Click a resource group to change its name in the **Resource Groups** tab.
3. Click **Edit Resource Group**.
4. In the **Edit Resource Group** window, type a new resource group name, then click Finish.
5. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If you select a row and click **Detail**, the **Resource Group Properties** window appears.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Deleting a resource group

The Security Administrator (View and Modify) role is required to perform this task.

You cannot delete the following:

- The *meta_resource*.
- A resource group that is assigned to a user group.
- A resource group that has resources assigned to it.
- Resource groups included in different virtual machines cannot be removed at the same time.

To delete a resource group:

1. In the **Storage Systems** tree on the left pane of the main window, click **Administration** then **Resource Groups**.
2. Click one or more resource groups to delete in the **Resource Groups** tab.
3. Click **Delete Resource Groups**.
4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Using Resource Partition Manager and other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products

To use Resource Partition Manager with other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products, the resources that are required for the operation must satisfy specific conditions. The following topics provide information about the specific resource conditions that are required for using each VSP G200, G400, G600, G800 or VSP F400, F600, F800 product.

- [Dynamic Provisioning, Dynamic Tiering, or active flash on page 3-12](#)
- [Encryption License Key on page 3-13](#)
- [LUN Manager on page 3-13](#)
- [Performance Monitor on page 3-16](#)
- [Thin Image on page 3-16](#)
- [TrueCopy on page 3-17](#)
- [Global-active device on page 5-14](#)
- [Universal Replicator on page 3-19](#)
- [Universal Volume Manager on page 3-20](#)
- [Open Volume Management on page 3-22](#)
- [Virtual Partition Manager on page 3-23](#)
- [Volume Shredder on page 3-23](#)
- [Server Priority Manager on page 3-23](#)

Active Flash, Dynamic Tiering, Global-active device, Server Priority Manager, Universal Volume Manager, Virtual Partition Manager, Volume Migration, Volume Shredder are not supported in VSP Fx00 models.

Dynamic Provisioning, Dynamic Tiering, or active flash

The following table provides information about specific Dynamic Provisioning conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Create LDEVs	If DP-VOLs are created, the following must be assigned to the Storage Administrator group that is permitted to manage them. • LDEV ID • Pool-VOL of the pool
Delete LDEVs	If DP-VOLs are deleted, the following must be assigned to the Storage Administrator group that is permitted to manage them. • LDEV ID • Pool-VOL of the pool
Create pools Expand pools	Volumes to be specified as pool-VOLs must be assigned to the Storage Administrator group permitted to manage them.

Operation name	Condition
	All the volumes that are specified when creating a pool must belong to the same resource group.
Edit pools Delete pools	Pool-VOLs of the specified pool must be assigned to the Storage Administrator group permitted to manage them.
Expand V-VOLs	You can only expand the DP-VOLs that are assigned to the Storage Administrator group permitted to manage them.
Reclaim zero pages Stop reclaiming zero pages	You can reclaim or stop reclaiming zero pages only for the DP-VOLs that are assigned to the Storage Administrator group permitted to manage them.

Encryption License Key



Note: Encryption License Key support is not available with Virtual Storage Platform G200.

The following table provides information about specific Encryption License Key conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Edit encryption keys	When you specify a parity group and open the Edit Encryption window, the specified parity group and LDEVs belonging to the parity group must be assigned to the Storage Administrator group permitted to manage them. When you open the Edit Encryption window without specifying a parity group, more than one parity group and LDEVs belonging to the parity group must be assigned to the Storage Administrator group permitted to manage them.

LUN Manager

The following table provides information about specific LUN Manager conditions that must be observed when using Resource Partition Manager.

For Fibre Channel

Operation name	Condition
Add LUN paths	When you specify host groups and open the Add LUN Paths window, the specified host groups must be assigned to the Storage Administrator group permitted to manage them. When you specify LDEVs and open the Add LUN paths window, the specified LDEVs must be assigned to the Storage Administrator group permitted to manage them.
Delete LUN paths	When you specify a host group and open the Delete LUN Paths window, the specified host group must be assigned to the Storage Administrator group permitted to manage them.

Operation name	Condition
	When you specify LDEVs and open the Delete LUN Paths window, the specified LDEVs must be assigned to the Storage Administrator group permitted to manage them. When selecting the Delete all defined LUN paths to above LDEVs check box, the host group of all the alternate paths in the LDEV displayed on the Selected LUNs table must be assigned to the Storage Administrator group permitted to manage them.
Edit host groups	The specified host groups and ports must be assigned to the Storage Administrator group permitted to manage them.
Add hosts	The specified host groups must be assigned to the Storage Administrator group permitted to manage them.
Edit hosts	The specified host groups must be assigned to the Storage Administrator group permitted to manage them. When you select the Apply same settings to the HBA WWN of all ports check box, all the host groups where the specified HBA WWNs are registered must be assigned to the Storage Administrator group permitted to manage them.
Remove hosts	The specified host group must be assigned to the Storage Administrator group permitted to manage them. When you select the Remove hosts from all host groups containing the hosts in the storage system check box, all the host groups where the HBA WWNs displayed in the Selected Hosts table are registered must be assigned to the Storage Administrator group permitted to manage them.
Edit ports	The specified port must be assigned to the Storage Administrator group permitted to manage them.
Create alternative LUN paths	The specified host groups and all the LDEVs where the paths are set to the host groups must be assigned to the Storage Administrator group permitted to manage them.
Copy LUN paths	The specified host groups and the LDEVs where the paths are set must be assigned to the Storage Administrator group permitted to manage them.
Edit command devices	LDEVs where the specified paths are set must be assigned to the Storage Administrator group permitted to manage them.
Edit UUIDs	The specified LDEV must be assigned to the Storage Administrator group permitted to manage them.
Delete UUIDs	The specified LDEV must be assigned to the Storage Administrator group permitted to manage them.
Create host groups	When you open the Create Host Groups window by specifying host groups, the specified host groups must be assigned to the Storage Administrator group permitted to manage them.
Delete host groups	The specified host groups and all the LDEVs where the paths are set to the host groups must be assigned to the Storage Administrator group permitted to manage them.
Release Host-Reserved LUNs	LDEVs where the specified paths are set must be assigned to you.

For iSCSI

Operation name	Condition
Add LUN paths	When you specify host groups and open the Add LUN Paths window, the specified iSCSI target must be assigned to the Storage Administrator group permitted to manage them. When you specify LDEVs and open the Add LUN paths window, the specified LDEVs must be assigned to the Storage Administrator group permitted to manage them.
Delete LUN paths	When you specify an iSCSI target and open the Delete LUN Paths window, the specified iSCSI target must be assigned to the Storage Administrator group permitted to manage them. When you specify LDEVs and open the Delete LUN Paths window, the specified LDEVs must be assigned to the Storage Administrator group permitted to manage them. When selecting the Delete all defined LUN paths to above LDEVs check box, the iSCSI target of all the alternate paths in the LDEV displayed on the Selected LUNs table must be assigned to the Storage Administrator group permitted to manage them.
Add hosts	The specified iSCSI target must be assigned to the Storage Administrator group permitted to manage them.
Edit hosts	The specified iSCSI target must be assigned to the Storage Administrator group permitted to manage them. When you select the Apply same settings to the HBA WWN of all ports check box, all the iSCSI targets where the specified HBA WWNs are registered must be assigned to the Storage Administrator group permitted to manage them.
Remove hosts	The specified iSCSI target must be assigned to the Storage Administrator group permitted to manage them.
Edit ports	The specified port must be assigned to the Storage Administrator group permitted to manage them.
Create alternative LUN paths	The specified iSCSI target and all the LDEVs where the paths are set to the iSCSI target must be assigned to the Storage Administrator group permitted to manage them.
Copy LUN paths	The specified iSCSI target and the LDEVs where the paths are set must be assigned to the Storage Administrator group permitted to manage them.
Edit command devices	LDEVs where the specified paths are set must be assigned to the Storage Administrator group permitted to manage them.
Edit UUIDs	The specified LDEV must be assigned to the Storage Administrator group permitted to manage them.
Delete UUIDs	The specified LDEV must be assigned to the Storage Administrator group permitted to manage them.
Release host-reserved LUNs	LDEVs where the specified paths are set must be assigned to you.
Create iSCSI targets	When you open the Create iSCSI targets window by specifying iSCSI targets, the specified iSCSI targets must be

Operation name	Condition
	assigned to the Storage Administrator group permitted to manage them.
Edit iSCSI targets	The specified iSCSI targets and ports must be assigned to the Storage Administrator group permitted to manage them.
Delete iSCSI targets	The specified iSCSI targets and all the LDEVs where the paths are set to the iSCSI targets must be assigned to the Storage Administrator group permitted to manage them.

Performance Monitor

The following table provides information about specific Performance Monitor conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Add to ports	The specified ports must be assigned to the Storage Administrator group permitted to manage them.
Add new monitored WWNs	
Edit WWNs	

ShadowImage

The following table provides information about specific ShadowImage conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Create pairs	Both primary volume and secondary volumes must be assigned to the Storage Administrator group permitted to manage them.
Split pairs	Primary volumes must be assigned to the Storage Administrator group permitted to manage them.
Suspend pairs	
Resynchronize pairs	
Release pairs	

Thin Image

The following table provides information about specific Thin Image conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Create LDEVs	If LDEVs for Thin Image are created, the following must be assigned to the Storage Administrator group that is permitted to manage them.

Operation name	Condition
	- LDEV ID - Pool VOL of the pool
Delete LDEVs	If LDEVs for Thin Image are deleted, the following must be assigned to the Storage Administrator group that is permitted to manage them. - LDEV ID - Pool VOL of the pool
Create pools Expand pool	Volumes that are specified when creating or expanding pools must be assigned to the Storage Administrator group that is permitted to manage them. All the volumes that are specified when creating pools must belong to the same resource group.
Edit pools Delete pools	Pool-VOLs of the specified pools must be assigned to the Storage Administrator group that is permitted to manage them.
Create pairs	Both primary volumes and secondary volumes must be assigned to the Storage Administrator group that is permitted to manage them.
Split pairs	Primary volumes must be assigned to the Storage Administrator group that is permitted to manage them.
Suspend pairs	
Resynchronize pairs	
Release pairs	

TrueCopy

The following table provides information about specific TrueCopy conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Edit ports	Specified ports must be assigned to the user.
Add Remote Connection	Specified ports must be assigned to the user.
Edit Remote Connection Options	This operation can be performed without conditions.
Create Pairs	Primary volumes must be assigned to the user. Ports of remote paths that are connected with the primary volume in the remote storage must be assigned to the user.
Split Pairs	Specified primary volumes or secondary volumes must be assigned to the user.
Resync Pairs	Primary volumes must be assigned to the user.
Delete Pairs	Specified volumes must be assigned to the user.

Operation name	Condition
	If primary volumes are specified, the ports of remote paths that are connected with the primary volume in the remote storage must be assigned to the user.
Edit Pair Options	Primary volumes must be assigned to the user.
Add Remote Paths	Specified ports must be assigned to the user.
Remove Remote Paths	Specified ports must be assigned to the user.
Edit Remote Connection Options	Ports of remote paths that are connected to a specified remote storage must be assigned to the user.
Remove Remote Connections	Ports of remote paths that are connected to a specified remote storage must be assigned to the user.
Force Delete Pairs	Specified primary volumes or secondary volumes must be assigned to the user.

Global-active device

The following table provides information about specific global-active device conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Edit Ports	Specified ports must be assigned to the user.
Add Remote Connection	Specified initiator ports must be assigned to the user.
Edit Remote Connection Options	Operation can be performed with no conditions.
Create Pairs	Primary volumes must be assigned to the user. Initiator ports of remote paths that are connected with the primary volume in the remote storage must be assigned to the user.
Split Pairs	Specified primary volumes or secondary volumes must be assigned to the user.
Resync Pairs	Primary volumes must be assigned to the user.
Delete Pairs	Specified volumes must be assigned to the user. If primary volumes are specified, the initiator ports of remote paths that are connected with the primary volume in the remote storage must be assigned to the user.
Edit Pair Options	Primary volumes must be assigned to the user.
Add Remote Paths	Specified initiator ports must be assigned to the user.
Remove Remote Paths	Specified initiator ports must be assigned to the user.
Edit Remote Connection Options	Initiator ports of remote paths that are connected to a specified remote storage must be assigned to the user.
Remove Remote Connections	Initiator ports of remote paths that are connected to a specified remote storage must be assigned to the user.

Operation name	Condition
Force Delete Pairs	Specified primary volumes or secondary volumes must be assigned to the user.
Add Quorum Disks	LDEVs to be set as quorum disks must be assigned to the user.
Remove Quorum Disks	LDEVs to be set as quorum disks must be assigned to the user.

Universal Replicator

The following table provides information about specific Universal Replicator conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Edit Ports	Specified ports must be assigned to the user.
Add Remote Connection	Specified ports must be assigned to the user.
Add Remote Paths	Specified ports must be assigned to the user.
Create Journals	All LDEVs that are specified when creating a journal must belong to the same resource group. Volumes to be assigned to a journal must be assigned to the user.
Assign Journal Volumes	Volumes assigned to a journal must be assigned to the user and belong to the same resource group of the existing journal volumes.
Assign MP Unit	Journal volumes must be assigned to the user.
Edit Remote Connection Options	This operation can be performed without conditions.
Create Pairs	Journal volumes for pair volumes and primary volumes must be assigned to the user. Ports of remote paths that are connected with the primary volume in the remote storage must be assigned to the user.
Split Pairs	Specified primary volumes or secondary volumes must be assigned to the user.
Split Mirrors	All data volumes configured to a mirror must be assigned to the user.
Resync Pairs	Primary volumes must be assigned to the user.
Resync Mirrors	All data volumes configured to a mirror must be assigned to the user.
Delete Pairs	Specified volumes or secondary volume must be assigned to the user. Ports of remote paths that are connected with the primary volume in the remote storage must be assigned to the user.
Delete Mirrors	All data volumes configured to a mirror must be assigned to the user.

Operation name	Condition
Edit Pair Options	Primary volumes must be assigned to the user.
Force Delete Pairs	Specified volumes must be assigned to the user.
Edit Journal Options	All data volumes consisting of the specified journal must be assigned to the user. Journal volumes must be assigned to the user.
Edit Mirror Options	All data volumes configuring the specified journal must be assigned to the user. Journal volumes must be assigned to the user.
Remove Journals	Journal volumes must be assigned to the user.
Edit Remote Connection Options	Ports of remote paths that are connected to a specified remote storage must be assigned to the user.
Remove Remote Paths	Specified ports must be assigned to the user.
Move LDEVs to other resource groups	When moving LDEVs used for journal volumes to other resource groups, specify all the journal volumes of the journal to which the LDEVs belong.
Assign Remote Command Devices	Journal volumes must be assigned to the user. Specified remote command devices must be assigned to the user.
Release Remote Command Devices	Journal volumes must be assigned to the user. Specified remote command devices must be assigned to the user.

Universal Volume Manager

The following table provides information about specific Universal Volume Manager conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Add external volumes	When creating an external volume, a volume is created in the resource group where the external port belongs. When you specify a path group and open the Add External Volumes window, all the ports that compose the path group must be assigned to the Storage Administrator group permitted to manage them.
Delete external volumes	The specified external volume and all the LDEVs allocated to that external volume must be assigned to the Storage Administrator group permitted to manage them.
Disconnect external storage systems	All the external volumes belonging to the specified external storage system and all the LDEVs allocated to that external volumes must be assigned to the Storage Administrator group permitted to manage them.
Reconnect external storage systems	All the external volumes belonging to the specified external storage system and all the LDEVs allocated to that external

Operation name	Condition
	volumes must be assigned to the Storage Administrator group permitted to manage them.
Disconnect external volumes	The specified external volume and all the LDEVs allocated to the external volumes must be assigned to the Storage Administrator group permitted to manage them.
Reconnect external volumes	The specified external volume and all the LDEVs allocated to the external volumes must be assigned to the Storage Administrator group permitted to manage them.
Edit external volumes	The specified external volume must be assigned to the Storage Administrator group permitted to manage them.
Assign MP Unit	The specified external volumes and all the ports of the external paths connecting the external volumes must be assigned to the Storage Administrator group permitted to manage them.
Disconnect external paths	Ports of the specified external paths and all the external volumes connecting with the external path must be assigned to the Storage Administrator group permitted to manage them. When you specify By Ports, all the external paths connecting with the specified ports and all the external volumes connecting with the external paths must be assigned to the Storage Administrator group permitted to manage them. When you specify By External WWNs, all the ports of the external paths connecting to the specified external WWN and all the external volumes connecting with those external paths must be assigned to the Storage Administrator group permitted to manage them.
Reconnect external paths	Ports of the specified external paths and all the external volumes connecting with those external paths must be assigned to the Storage Administrator group permitted to manage them. When you specify By Ports, all the external paths connecting with the specified ports and all the external volumes connecting with the external paths must be assigned to the Storage Administrator group permitted to manage them. When you specify By External WWNs, all the ports of the external paths connecting to the specified external WWN and all the external volumes connecting with those external paths must be assigned to the Storage Administrator group permitted to manage them.
Edit external WWNs	All the ports of the external paths connecting to the specified external WWN and all the external volumes connecting with the external paths must be assigned to the Storage Administrator group permitted to manage them.
Edit external path configuration	Ports of all the external paths composing the specified path group and all the external volumes that belong to the path group must be assigned to the Storage Administrator group permitted to manage them.

Open Volume Management

The following table provides information about specific Open Volume Management conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Create LDEVs	When specifying a parity group and opening the , the parity group must be assigned to the Storage Administrator group permitted to manage them. When creating internal or external volumes parity groups where the LDEV belongs to, the ID of the new LDEV must be assigned to the Storage Administrator group permitted to manage them.
Delete LDEVs	When deleting an internal or external volume, the deleted LDEV and parity groups where the LDEV belongs must be assigned to the Storage Administrator group permitted to manage them.
Edit LDEVs	The specified LDEV must be assigned to the Storage Administrator group permitted to manage them.
Restore LDEVs	When you specify LDEVs and open the Restore LDEVs window, the specified LDEVs must be assigned to the Storage Administrator group permitted to manage them. When you specify a parity group and open the Restore LDEVs window, the specified parity group and all the LDEVs in the parity group must be assigned to the Storage Administrator group permitted to manage them.
Block LDEVs	When you specify LDEVs and open the Block LDEVs window, the specified LDEVs must be assigned to the Storage Administrator group permitted to manage them. When you specify a parity group and open the Block LDEVs window, the specified parity group and all the LDEVs in the parity group must be assigned to the Storage Administrator group permitted to manage them.
Format LDEVs	When you specify LDEV and open the Format LDEVs window, the specified LDEV must be assigned to the Storage Administrator group permitted to manage them. When you specify a parity group and open the Format LDEVs window, the specified parity group and all the LDEVs in the parity group must be assigned to the Storage Administrator group permitted to manage them.
Delete Parity Groups	When deleting a parity group, the parity group to be deleted must be assigned to the Storage Administrator group permitted to manage them.
Format Parity Groups	When you specify a parity group and open the Format Parity Groups window, the specified parity group must be assigned to the Storage Administrator group permitted to manage them.

Virtual Partition Manager

The following table provides information about specific Virtual Partition Manager conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Migrate parity groups	When you specify virtual volumes, the specified LDEV must be assigned to the Storage Administrator group permitted to manage them. When you specify a parity group, the specified parity group must be assigned to the Storage Administrator group permitted to manage them.

Volume Shredder

The following table provides information about specific Volume Shredder conditions that must be observed when using Resource Partition Manager.

Operation name	Condition
Shred LDEVs	When you specify LDEVs and open the Shred LDEVs window, the specified LDEVs must be assigned to the Storage Administrator group permitted to manage them. When you specify a parity group and open the Shred LDEVs window, the specified parity group and all the LDEVs in the parity group must be assigned to the Storage Administrator group permitted to manage them.

Server Priority Manager

The following table provides information about specific Server Priority Manager conditions that must be observed when using Resource Partition Manager.

Operation name	Conditions
Set priority of ports (attribute/threshold/upper limit)	The specified ports must be assigned to the Storage Administrator group permitted to manage them.
Release settings on ports by the decrease of ports	
Set priority of WWNs (attribute/upper limit)	
Change WWNs and SPM names	
Add WWNs (add WWNs to SPM groups)	
Delete WWNs (delete WWNs from SPM groups)	

Operation name	Conditions
Add SPM groups and WWNs	
Delete SPM groups	
Set priority of SPM groups (attribute/upper limit)	
Rename SPM groups	
Add WWNs	
Delete WWNs	
Initialization	All ports must be assigned to the Storage Administrator group permitted to manage them.
Set threshold	

Configuring custom-sized provisioning

Configuring custom-sized provisioning involves creating and configuring spare drives, parity groups, or customized volumes (CV). A CV is a fixed-sized volume that is divided into arbitrary sizes.

- ☐ [Spare drive and copy back mode](#)
- ☐ [Parity group and volume](#)
- ☐ [Virtual LUN functions](#)
- ☐ [Virtual LUN requirements](#)
- ☐ [Virtual LUN specifications](#)
- ☐ [Virtual LUN size calculations](#)
- ☐ [Creating LDEV functions](#)
- ☐ [Blocking LDEVs](#)
- ☐ [Blocking LDEVs in a parity group](#)
- ☐ [Restoring blocked LDEVs](#)
- ☐ [Restoring blocked LDEVs in a parity group](#)
- ☐ [Editing an LDEV name](#)
- ☐ [Deleting an LDEV \(converting to free space\)](#)
- ☐ [Formatting LDEVs](#)

- [Assigning an MP unit](#)

Spare drive and copy back mode

A drive mounted separately from the drives for usual write and read operation. When a drive fails, data stored in the failed drive is copied to the spare drive so that the storage system can continue to be available. If the copy back mode is enabled, data copied to the spare drive returns to the recovered drive. If the copy back mode is disabled, data copied to the spare drive still exists. This mode can be set to a parity group basis.

The maximum number of spare drives that can be specified for each storage system is as follows:

- VSP G800 or VSP F800: 64 spare drives can be specified.
- VSP G400, G600 or VSP F400, F600: 32 spare drives can be specified.
- VSP G200: 16 spare drives can be specified.

Assigning spare drives

The Storage Administrator (Provisioning) role is required to perform this task.

1. Do one of the following to display the **Assign Spare Drives** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** on the target storage system. Click **Operation>Assign Spare Drives**.For Storage Navigator:
 - a. Display the **Drives** tab.
To display the **Drives** tab, perform one of the following:
 - (1) To display all drives in the storage system, in the storage system tree, select **Parity Groups** and then select the **Drives** tab.
 - (2) To display drives related to **Internal**, in the storage system tree, select **Parity Groups > Internal** and then select the **Drives** tab.
 - (3) To display drives related to each parity group, in the storage system tree, select **Parity Groups**, then select the parity group ID, then the **Drives** tab.
 - b. Select the row of the drive box that assigns the spare drive.
The drive box row displaying **Free** on the **Usage** column can be selected.
If the **Usage** column is not displayed on the **Drives** tab or you do not select drive boxes, go to the next step.
 - c. To display the **Assign Spare Drives** window, perform one of the following:
 - (1) Click **Assign Spare Drives**.
 - (2) Click **Actions > Parity Group > Assign Spare Drives** to open the window.
2. In the **Available Drives** table, select the drive box and click **Add**.
The selected drive box is registered in the **Selected Spare Drives** table.

3. Click **Finish**.
The **Confirm** window opens.
4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Releasing spare drives

The Storage Administrator (Provisioning) role is required to perform this task.



Tip: Drives released from spare drives can be used as data drives.

1. Perform one of the following to display the **Assign Spare Drives** window.
For Hitachi Command Suite:
 - o On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system. Click **Operation>Assign Spare Drives**.For Storage Navigator:
 - a. Display the **Drives** tab.
To display the **Drives** tab, perform one of the following:
 - (1) To display all drives in the storage system, in the storage system tree, select **Parity Groups** and then select the **Drives** tab.
 - (2) To display drives related to **Internal**, in the storage system tree, select **Parity Groups > Internal** and then select the **Drives** tab.
 - (3) To display drives related to each parity group, in the storage system tree, select **Parity Groups**, select the parity group ID, and then select the **Drives** tab.
 - b. Select the row of the drive box that releases the spare drive.
The drive box row displaying **Spare** on the **Usage** column can be selected.
If the **Usage** column is not displayed on the **Drives** tab or you do not select drive boxes, go to the next step.
 - c. To display the **Assign Spare Drives** window, perform one of the following:
 - (1) Click **Assign Spare Drives**.
 - (2) Click **Actions > Parity Group > Assign Spare Drives** to open the window.
2. In the **Selected Spare Drives** table, select the drive box. Then click **Remove**.
The selected drive box is registered in the **Available Drives** table. If you select a row and click **Remove**, a message appears asking whether you want to remove the selected row or rows. To remove the row, click **OK**.
3. Click **Finish**.
The **Confirm** window opens.

4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Setting copy-back mode

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Edit Copy-Back Mode** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system. Click **Edit Copy-Back Mode**.For Storage Navigator:
 - a. On the **Parity Groups** tab, select the parity group that defines the copy-back mode.
To display the **Parity Groups** tab, perform one of the following:
 - (1) To display all parity groups in the storage system, in the storage system tree, select **Parity Groups**, then select the **Parity Groups** tab.
 - (2) To display parity groups related to **Internal**, in the storage system tree, expand **Parity Groups** select **Internal**, then select the **Parity Groups** tab.
 - b. To display the **Edit Copy-Back Mode** window, perform one of the following:
 - (1) Click **More Actions**, then select **Edit Copy-Back Mode**.
 - (2) Click **Actions** > **Parity Group** > **Edit Copy-Back Mode** to open the window.
2. In the **Edit Copy-Back Mode** window, check **Enable** or **Disable**.
Enable: When a failed drive is recovered, data copied to the spare drive is in the recovered drive.
Disable: When a failed drive is recovered, data copied to the spare drive is in the spare drive.
3. Click **Finish**.
4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Parity group and volume

When adding drives to increase LDEV free space, the free space can be increased in the storage system by configuring RAID. VSP G200, G400, G600, G800 and VSP F400, F600, F800 support RAID 1, RAID 5, and RAID 6.

In one parity group, a maximum of 2,048 fixed-size volumes (FVs) and some free space is available. Maximum number of LDEVs in the storage system are as follows:

- VSP G800 or VSP F800: 16,384
- VSP G400, G600 or VSP F400, F600: 4,096
- VSP G200: 2,048

Configuration of interleaved parity groups

If RAID configurations are RAID1 (2D+2D) or RAID5 (7D+1P), the interleaved parity group can be created by concatenation of multiple parity groups. RAID configurations and the number that can be concatenated are as follows:

RAID configuration	2 concatenating	4 concatenating
RAID1 (2D+2D)	Available	Not Available
RAID5 (7D+1P)	Available	Available

When concatenating parity groups, data in LDEVs that are FV or CV are dispersedly allocated between the interleaved parity groups. Therefore, loads are dispersed because of the parity group concatenation, so that the performance of LDEV is improved.

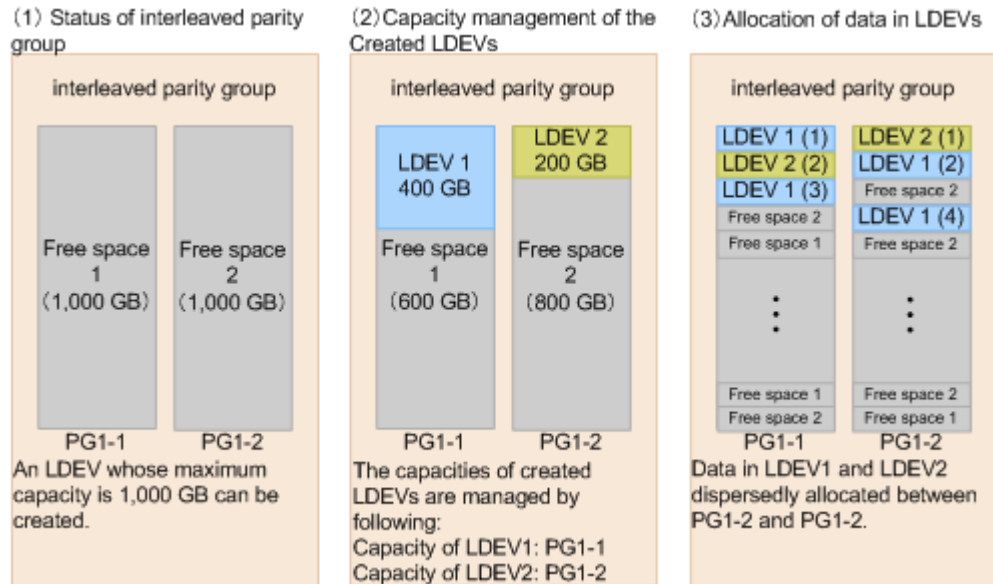
The capacity of the created LDEV are managed by each of the parity groups that are in the interleaved parity group. The maximum capacity of an LDEV is same as the capacity of the interleaved parity group.



Note: Even if the parity groups are concatenated, the total capacity of the interleaved parity group will not be of large capacity.

See the examples below:

- Creating the interleaved parity group by concatenating of parity groups of PG1-1 and PG1-2.
- Creating LDEVs in each parity group that are in the interleaved parity group.
 - LDEV 1 in PG1-1
 - LDEV 2 in PG1-2



Creating parity groups

The Storage Administrator (Provisioning) role is required to perform this task.

Create parity groups by selecting drives manually

1. Perform one of the following to display the **Create Parity Groups** window.

For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. On the **Parity Groups** tab, select **Create Parity Groups**.

For the **General Tasks** pane in Storage Navigator:

- On the **General Tasks** pane, select **Create Parity Groups**.

For the **Parity Groups** window in Storage Navigator:

- To display all parity groups in the storage system, expand the **Storage Systems** tree and select **Parity Groups**. On the **Parity Groups** tab, select **Create Parity Groups**.
 - To display parity groups related to **Internal**, expand the **Storage Systems** tree and select **Parity Groups** and then **Internal**. On the **Parity Groups** tab, select **Create Parity Groups (Internal)**.
 - In the Hitachi Device Manager - Storage Navigator main window, click **Actions > Parity Group > Create Parity Groups** to open the window.
2. From the **Drive Type/RPM/Capacity** list, select the drive.
 3. From the **RAID Level** list, select the RAID level.
 4. From the **Drive Selection** field, select **Manual**.

5. In the **Available Drives** table, select drives. Drives must be selected up to the number displayed in **The number you have to select**.
6. Click **Options**.
7. In the **Initial Parity Group ID** text box, type the number of the initial parity group ID.
The smallest available number is displayed in the text box as a default. If a parity group ID is unavailable, no number is displayed.
When you specify a parity group ID that was already registered, the smallest available ID is displayed. If a parity group ID is unavailable, no number is displayed.
8. From the **Cache Partition** list, select the CLPR number.
9. From the **Encryption** field, select **Enable** or **Disable**.



Note: Encryption License Key support is not available with Virtual Storage Platform G200.

10. From the **Copy-Back Mode** field, select **Enable** or **Disable**.
11. Click **Add**.
The created parity group is added to the **Selected Parity Groups** table. If invalid values are set, an error message appears.



Tip:

- When you select multiple rows and click **Concatenate**, click **OK**. If selected parity groups cannot be concatenated, an error message appears.
 - If you select a row and click **Change Settings**, the **Change Settings** window appears. After you change parity group settings, click **OK**.
 - If you select a row and click **Detail**, the **Parity Group Properties** window appears.
 - When you select a row and click **Remove**, click **OK**.
-

12. Click **Next**.
The **Create LDEVs** window appears.
Click **Finish**. The **Confirm** window appears.
13. In the **Confirm** window, click **Apply** to register the setting in the task.
If you select a row and click **Detail**, the **Parity Group Properties** window appears.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Create parity groups by selecting drives automatically

1. Perform one of the following to display the **Create Parity Groups** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. On the **Parity Groups** tab, select **Create Parity Groups**.

For the **General Tasks** pane in Storage Navigator:

- On the **General Tasks** pane, select **Create Parity Groups**.

For the **Parity Groups** window in Storage Navigator:

- To display all parity groups in the storage system, expand the **Storage Systems** tree and select **Parity Groups**. On the **Parity Groups** tab, select **Create Parity Groups**.
- To display parity groups related to **Internal**, expand the **Storage Systems** tree and select **Parity Groups** and then **Internal**. On the **Parity Groups** tab, select **Create Parity Groups(Internal)**.
- In the Hitachi Device Manager - Storage Navigator main window, click **Actions > Parity Group > Create Parity Groups** to open the window.

- Perform one of the following to display the **Create Parity Groups** window.

- On the **General Tasks** pane, select **Create Parity Groups**.
- Expand the **Storage Systems** tree and select **Parity Groups**. On the **Parity Groups** tab, select **Create Parity Groups**.
- In the Hitachi Device Manager - Storage Navigator main window, click **Actions > Parity Group > Create Parity Groups** to open the window.

- From the **Drive Type/RPM/Capacity** list, select the drive.
- From the **RAID Level** list, select the RAID level.
- From the **Drive Selection** field, select **Auto**.
- In the **Number of Parity Groups** text box, enter the number you want to create.
- Click **Options**.
- In the **Initial Parity Group ID** text box, type the number of the initial parity group ID.

The smallest available number is displayed in the text box as a default. If a parity group ID unavailable, no number is displayed.

When you specify a parity group ID that was already registered, the smallest available ID is displayed. If a parity group ID is unavailable, no number is displayed.

- From the **Drive Box Type** list, select the drive box type.
- From the **Initial Drive Box** list, select the drive box.
- From the **Drive Select Type** field, select **Disperse** or **Linear**.



Note: This item is not available with Virtual Storage Platform G200. If this storage system is used, only **Linear** is available.

- From the **Cache Partition** list, select the CLPR number.

13. From the **Encryption** field, select **Enable** or **Disable**.



Note: Encryption License Key support is not available with Virtual Storage Platform G200.

14. From the **Copy-Back Mode** field, select **Enable** or **Disable**.

15. Click **Add**.

The created parity group is added to the **Selected Parity Groups** table.
If invalid values are set, an error message appears.



Tip:

- When you select multiple rows and click **Concatenate**, click **OK**. If selected parity groups cannot be concatenated, an error message appears.
- If you select a row and click **Change Settings**, the **Change Settings** window appears. After you change the parity group setting, click **OK**.
- If you select a row and click **Detail**, the **Parity Group Properties** window appears.
- When you select a row and click **Remove**, click **OK**.

16. Click **Next**.

The **Create LDEVs** window appears.

Click **Finish**. The **Confirm** window appears.

17. In the **Confirm** window, click **Apply** to register the setting in the task.

If you select a row and click **Detail**, the **Parity Group Properties** window appears.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Formatting parity groups

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the tab.

For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. Select the **Parity Groups** tab.

For the **Parity Groups** window in Storage Navigator:

- To display all parity groups in the storage system, in the storage system tree, select **Parity Groups**, then select the **Parity Groups** tab.
- To display parity groups related to **Internal** or **External**, in the storage system tree, expand **Parity Groups** and select **Internal** or **External**, then select the **Parity Groups** tab.

2. Block all LDEVs in the target parity groups.

For details about blocking LDEVs, see [Blocking LDEVs on page 4-23](#).

3. Perform one of the following to display the **Format Parity Groups** window.
 - Click **Format Parity Groups**.
 - Click **Actions > Parity Group > Format Parity Groups** to open the window.
4. In the **Format Parity Groups** window, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Deleting parity groups

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Parity Groups** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. Select the **Parity Groups** tab.
For the **Parity Groups** window in Storage Navigator:
 - To display all parity groups in the storage system, in the storage system tree, select **Parity Groups**, then select the **Parity Groups** tab.
 - To display parity groups related to **Internal** or **External**, in the storage system tree, expand **Parity Groups**, select **Internal** or **External**, then select the **Parity Groups** tab.
2. Perform one of the following to display the **Delete Parity Groups** window.
 - Click **More Actions**, then select **Delete Parity Groups**.
 - Click **Actions > Parity Group > Delete Parity Groups** to open the window.
3. In the **Confirm** window, confirm the settings. In **Task Name** type a unique name for this task or accept the default, then click **Apply**.
A message appears asking whether you want to delete the selected parity group or parity groups. To remove the row, click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Virtual LUN functions

The Virtual LUN function is used to create, configure, or delete a customized volume (LDEV).

The Virtual LUN function is an open-systems function available in Open Volume Management software.

A parity group usually consists of some fixed-sized volumes (FVs) and some free space. The number of FVs is determined by the emulation type. A Virtual

LUN volume usually consists of at least one FV, one or more customized volumes (CVs), and some free space.

Use the Virtual LUN function to configure variable-sized volumes that efficiently exploit the capacity of a disk. Variable-sized volumes are logical volumes that are divided into smaller than normal fixed-size volumes. This configuration is desirable when frequently accessed files are distributed across smaller multiple logical volumes. This generally improves the data accessing performance, though file access can be delayed.

The Virtual LUN function can also divide a logical volume into multiple smaller volumes to reduce unused capacity and provide a more efficient use of space for small volumes such as command devices. The Virtual LUN function can efficiently exploit the capacity of a disk by not wasting capacity using larger volumes when the extra capacity is not needed.

Virtual LUN requirements

Use of Virtual LUN on your storage system to configure variable-sized volumes requires a license key for Virtual LUN. This license is available in the Open Volume Management software and is for open-systems.

For details about license keys, see the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models*.

Virtual LUN specifications

[RAID level for CV on page 4-12](#)

[CV capacity on page 4-13](#)

RAID level for CV

RAID level	RAID configuration that can be applied to CV (including Pool-VOL)
RAID 1	• 2D+2D, or concatenated 2 parity groups with 2D+2D
RAID 5	• 3D+1P • 4D+1P • 6D+1P • 7D+1P, concatenated 2 parity groups with 7D+1P, or concatenated 4 parity groups with 7D+1P
RAID 6	• 6D+2P • 12D+2P • 14D+2P

CV capacity

Emulation type*	Minimum CV capacity (CYL)	Maximum CV capacity	Number of control cylinders (cyl)
OPEN-V	48,000 KB (96,000 blocks)	Internal volume* : 3,221,159,680 KB (2.99 TB, 6,442,319,360 blocks) External volume: 4,294,967,296 KB (4 TB, 8,589,934,592 blocks)	None
*If the parity group is 2D+1P or 4D+2P, the maximum CV capacity is 2 TB which is 4,294,967,296 blocks.			

Virtual LUN size calculations

When creating a CV, you can specify the capacity of each CV. However, rounding produces different values for the user-specified CV capacity and the entire CV capacity. To estimate the actual capacity of a CV, use a mathematical formula. The following topics explain how to calculate the user area capacity and the entire capacity of a CV.

The CV or LDEV capacity consists of two types of capacity. One type is the user area capacity that stores the user data. The second type is the capacities of all areas that are necessary for an LDEV implementation, including control information. The sum of these two types of capacities is the entire capacity.

Implemented LDEVs consume the entire capacity from the parity group capacity. Therefore, even if the sum of user areas of multiple CVs and the user area of one CV are the same size, the remaining free space generated when multiple CVs are created can be smaller than the free space in the parity group when one CV is created.

When using the CCI, the specified size of CVs is created regardless of the capacity calculation. Therefore, even if the same capacity size (for example, 1 TB) appears, the actual capacity size might be different between the CVs created by CCI and the CVs created by Hitachi Device Manager - Storage Navigator .

If an LDEV is created by the **Create LDEVs** Window, depending on the specifying of the offset boundary option, the capacity of LDEV differs even if the specified value is the same. If the Offset Boundary option is selected, the specified capacity of LDEV is offset conforming to the prescribed boundary values, and an LDEV is created. For details about the prescribed boundary values, see [Calculating volume size \(CV capacity unit is MB\) on page 4-14](#), [Calculating volume size \(CV capacity unit is blocks\) on page 4-14](#), [Calculating fixed-size volume size \(CV capacity unit is MB\) on page 4-15](#), or [Calculating fixed-size volume size \(CV capacity unit is blocks\) on page 4-16](#).

If the Offset Boundary option is not selected, the LDEV whose capacity is the specified size is created.

In the storage system, data is managed based on a slot, and data protection is performed based on a parity stripe unit. For an LDEV whose capacity is offset by a boundary, the efficiency of the drive capacity is improved because the capacity of LDEV is offset by the unit of the data management. If you emphasize the efficiency of the drive capacity, select the Offset Boundary option when creating LDEVs. If you want to have the LDEV whose capacity is the specified size, do not select the Offset Boundary option when creating LDEVs.

Calculating volume size (CV capacity unit is MB)

The methods for calculating the user area capacity and the entire capacity of a CV vary depending on the CV capacity unit that is specified when creating the CV.

To calculate the user area capacity of a CV whose capacity unit is defined as megabytes:

```
ceil(ceil(user-specified-CV-capacity * 1024 / 64) / 15) * 64 * 15
```

where

- The value enclosed in `ceil( )` must be rounded up to the nearest whole number.
- *user-specified-CV-capacity* is expressed in megabytes.
- The resulting *user area capacity* is expressed in kilobytes.

To calculate the entire capacity of a CV:

```
ceil(user-area-capacity / boundary-value) * boundary-value / 1024
```

where

- The value enclosed in `ceil( )` must be rounded up to the nearest whole number.
- *user-area-capacity* is expressed in kilobytes.
- *boundary value* is expressed in kilobytes. The boundary value depends on volume emulation types and RAID levels (see [Boundary values for RAID levels on page 4-16](#)).
- The resulting entire capacity is expressed in megabytes.

Calculating volume size (CV capacity unit is blocks)

To calculate the user area capacity of a CV whose capacity unit is defined as blocks:

```
ceil(user-specified-CV-capacity / 2)
```

where

- The value enclosed in `ceil( )` must be rounded up to the nearest whole number.

- *user-specified-CV-capacity* is expressed in blocks.
- The resulting *user area capacity* is expressed in kilobytes.

To calculate the entire capacity of a CV:

```
ceil(user-specified-CV-capacity / (boundary-value * 2)) * (boundary-value * 2)
```

where

- The value enclosed in `ceil( )` must be rounded up to the nearest whole number.
- *user-specified-CV-capacity* is expressed in blocks.
- *boundary-value* is expressed in kilobytes. The boundary value depends on volume emulation types and RAID levels (see [Boundary values for RAID levels on page 4-16](#)).
- The resulting entire capacity is expressed in blocks. To convert the resulting entire capacity into megabytes, divide this capacity by 2,048.

Calculating fixed-size volume size (CV capacity unit is MB)

To calculate the user area capacity of a CV whose capacity unit is defined as megabytes:

```
ceil(ceil(user-specified-CV-capacity * 1024 / capacity-of-a-slot) / 15) * capacity-of-a-slot * 15
```

where

- The value enclosed in `ceil( )` must be rounded up to the nearest whole number.
- *user-specified-CV-capacity* is expressed in megabytes.
- *capacity-of-a-slot* is expressed in kilobytes. The capacity of a slot depends on volume emulation types (see [Capacity of a slot on page 4-17](#)).
- The resulting *user area capacity* is expressed in kilobytes.

To calculate the entire capacity of a CV:

```
ceil((user-area-capacity + management-area-capacity) / boundary-value) * boundary-value / 1024
```

where

- The value enclosed in `ceil( )` must be rounded up to the nearest whole number.
- *user-area-capacity* is expressed in kilobytes.
- *management-area-capacity* is expressed in kilobytes. The management area capacity depends on volume emulation types (see [Management area capacity of a volume on page 4-16](#)).
- *boundary-value* is expressed in kilobytes. The boundary value depends on volume emulation types and RAID levels (see [Boundary values for RAID levels on page 4-16](#)).
- The resulting entire capacity is expressed in megabytes.

Calculating fixed-size volume size (CV capacity unit is blocks)

To calculate the user area capacity of a CV whose capacity unit is defined as blocks:

$$\text{user-specified-CV-capacity} / 2$$

where

- *user-specified-CV-capacity* is expressed in blocks.
- The resulting *user area capacity* is expressed in kilobytes.

To calculate the entire capacity of a CV:

$$\text{ceil}((\text{user-specified-CV-capacity} + \text{management-area-capacity} * 2) / (\text{boundary-value} * 2)) * (\text{boundary-value} * 2)$$

where

- The value enclosed in `ceil( )` must be rounded up to the nearest whole number.
- *user-specified-CV-capacity* is expressed in blocks.
- *management-area-capacity* is expressed in kilobytes. The management area capacity depends on volume emulation types (see [Management area capacity of a volume on page 4-16](#)).
- *boundary-value* is expressed in kilobytes. The boundary value depends on volume emulation types and RAID levels (see [Boundary values for RAID levels on page 4-16](#)).
- The CV capacity recognized by hosts is the same as the CV capacity calculated by the previous formula.
- If **block** is selected as the LDEV capacity unit in the and dialog boxes, the window and dialog boxes correctly show the calculated LDEV capacity. However, if **MB**, **GB**, or **TB** is selected as the LDEV capacity unit in the and dialog boxes, the capacity values shown might have a margin of error due to unit conversion reasons. If you need to know the exact LDEV capacity, select **block** as the capacity unit.
- The resulting entire capacity is expressed in blocks. To convert the resulting entire capacity into megabytes, divide this capacity by 2,048.

Management area capacity of a volume

Emulation type	Management area capacity (KB)
OPEN-V	None

Boundary values for RAID levels



Note:

- OPEN-V is applied as the emulation type.
- Boundary values of external volumes are always one slot, regardless of RAID levels.

RAID level		Boundary value (KB)
RAID1	(2D+2D)	1,024
RAID5	(3D+1P)	1,536
	(4D+1P)	2,048
	(6D+1P)	3,072
	(7D+1P)	3,584
RAID6	(6D+2P)	3,072
	(12D+2P)	6,144
	(14D+2P)	7,168

Capacity of a slot

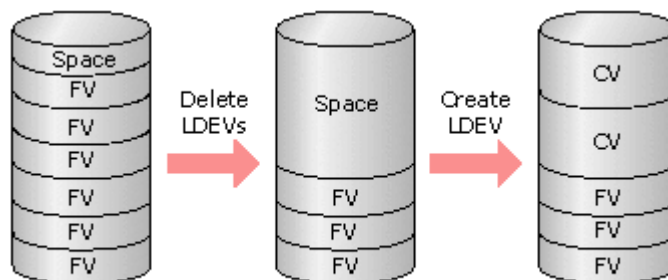
Emulation type	Slot capacity (KB)
OPEN-V	256
Notes: xx indicates one or more numbers or letters.	

Configuring volumes in a parity group

The Virtual LUN functions of Delete LDEVs and Create LDEVs are performed on each parity group. Parity groups are also separated from each other by boundary limitations. Therefore, you cannot define a volume across two or more parity groups beyond these boundaries.

As the result of the Virtual LUN operations, a parity group contains FVs, CVs, and free spaces that are delimited in logical cylinders. Sequential free spaces are combined into a single free space.

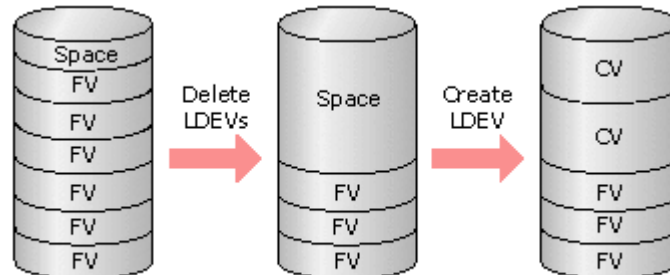
The following depicts an example of configuring volumes in a parity group:



Creating LDEV functions

Use the Create LDEV function to create a customized variable-sized volume. Use Virtual LUN to create an open-systems volume.

The following is an example of creating customized volumes. First, delete FVs to create free space. Then, create one or more customized volumes of any size in that free space.



Creating LDEVs

The Storage Administrator (Provisioning) role is required to perform this task.

Use this procedure to create one or more internal or external logical volumes (LDEVs) in a selected storage system. You can create multiple LDEVs at once, for example, when you are setting up your storage system. After the storage system is set up, you can add LDEVs as needed.

Before creating an LDEV in a selected storage system, free space can need to be created. Before volumes are deleted to create free space, remove the LU paths to the open-system volumes. For instructions on removing LU paths, see [Deleting LU paths on page 7-26](#).



Note: You can create multiple LDEVs in the specified free space by setting the necessary items collectively. If multiple free spaces are in one parity group, the number of free spaces appears in **Total Selected Free Space** in the **Parity Group Selection** section on the **Create LDEVs** wizard. Confirm the number of free spaces, then create the LDEVs accordingly. For example, if you are creating LDEVs in parity group PG1-1 that contains two free spaces, **2** appears in **Total Selected Free Space**. In this case, if you specify **1** in **Number of LDEVs per Free Space**, and continue to create the LDEV, two LDEVs are created because one LDEV is created for each free space.

When you select parity groups in the **Parity Groups** window or the **Internal/External** window, and open the **Create LDEVs** window, all free spaces in the parity groups are selected in the initial setting of the **Select Free Spaces** window. When you select the interleaved (concatenated) parity group in the **Parity Groups** window or the **Internal/External** window, and open the **Create LDEVs** window, all free spaces in every parity groups are selected in the initial setting of the **Select Free Spaces** window.

In this case, if LDEVs are created by the initial setting without confirming the number of free spaces, more LDEVs than necessary can be created. When

you create LDEVs, make sure the number of free spaces displayed on the **Select Free Spaces** window in the **Create LDEVs** window.

To create an LDEV:



Caution: The T10 PI attribute can be defined only during the initial creation of LDEVs. The defined attribute cannot be removed from LDEVs on which the T10 PI mode is already set.

1. Perform one of the following to display the **Create LDEVs** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Create LDEVs**.For the **General Tasks** pane in Storage Navigator:
 - On the **General Tasks** pane, select **Create LDEVs**.For the **Parity Groups** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Parity Groups**. On the **Parity Groups** tab, click **Create LDEVs**.
 - Expand the **Storage Systems** tree and select **Parity Groups** > **Internal** or **External** >. On the **LDEVs** tab, click **Create LDEVs**.
 - Expand the **Storage Systems** tree and select **Parity Groups**. Click **Actions** > **Logical Device** > **Create LDEVs** to open the window.For the **Logical Devices** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, click **Create LDEVs**.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions** > **Logical Device** > **Create LDEVs** to open the window.
2. In the **Create LDEVs** window, from the **Provisioning Type** list, select a provisioning type for the LDEV to be created.
 - If creating internal volumes, select **Basic**.
 - If creating external volumes, select **External**.
3. If creating an internal volume, select the parity group and do the following:
 - a. From the **Drive Type/RPM** list in **Parity Group Selection**, select the drive type and RPM.
 - b. From the RAID level list in **Parity Group Selection**, select the RAID level.
 - c. Click **Select Free Spaces**.
 - d. In the **Select Free Spaces** window, in the **Available Free Spaces** table, select the free spaces to be assigned to the volumes.
Do the following, if necessary:
 - To specify the conditions and show the free space, click **Filter**, specify the conditions, then click **Apply**.

- To specify the unit for capacity and the number of rows to view, click **Options**.
 - e. Click **View Physical Location**.
 - f. In the **View Physical Location** window, confirm where the selected free space is physically located, then click **Close**.
 - g. In the **Select Free Spaces** window, if the selected free spaces have no issues, click **OK**.
4. Otherwise, if creating an external volume, select the external volume, then do the following:
 - a. Click **Select Free Spaces**.
 - b. In the **Select Free Spaces** window, in the **Available Free Spaces** table, select the free space to be assigned to the volumes.
Do the following, if necessary:
 - To specify the conditions and show the free space, click **Filter**, specify the conditions, then click **Apply**.
 - To specify the unit for capacity and the number of rows to view, click **Options**.
 - c. Click **View Physical Location**.
 - d. In the **View Physical Location** window, confirm where the selected free space is physically located, then click **Close**.
 - e. In the **Select Free Spaces** window, if the selected free spaces have no issues, click **OK**.
 5. To offset the specified LDEV capacity by boundary, set the **Offset Boundary** to **ON**.
Offset boundary is set to **OFF** by default.
 6. In **LDEV Capacity**, type the amount of LDEV capacity to be created and select a capacity unit from the list.
Enter the capacity within the range of figures displayed below the text box. You can enter a number with two digits after the decimal point. You can change the capacity unit from the list.
 7. In **Number of LDEVs**, type the number of LDEVs to be created.
 - o If you create internal volume, **Number of LDEVs per Free Space** appears.
 - o If you create external volume, **Number of LDEVs per External Volume** appears.
 8. In **LDEV Name**, specify a name for this LDEV.
 - a. In **Prefix**, type the characters that is come the fixed characters for the beginning of the LDEV name. The characters are case-sensitive.
 - b. In **Initial Number**, type the initial number that will follow the prefix name.
 9. In **Format Type**, select the format type for the LDEV from the list.
 - o For an internal volume, select **Normal Format**, **Quick Format**, **Parity Group Format**, or **No Format**.

- If **No Format** is selected, format the volume after creating LDEVs.
 - For an external volume, if you create the LDEV, select **Normal Format** or **No Format**.
 If the external volume can be used as it is, select **No Format**. The created LDEV can be used without formatting.
 If the external volume needs to be formatted, select **No Format** and format the volume with the external storage system, or select **Normal Format**.
 - If **Quick Format** is selected while quick formatting is in progress, host I/Os can be affected. For details, see [Quick Format function on page 4-29](#).
- 10. Click **Options** to show more options.
- 11. In **Initial LDEV ID**, make sure that an LDEV ID is set. To confirm the used number and unavailable number, click **View LDEV IDs** to open the **View LDEV IDs** window.
 - a. In **Initial LDEV ID** in the **Create LDEVs** window, click **View LDEV IDs**.
 In the **View LDEV IDs** window, the matrix vertical scale represents the second-to-last digit of the LDEV number, and the horizontal scale represents the last digit of the LDEV number. The **LDEV IDs** table shows the available, used, and disabled LDEV IDs.
 In the table, used LDEV numbers appear in blue, unavailable numbers appear in gray, and unused numbers appear in white. LDEV numbers that are unavailable can be already in use, or already assigned to another emulation group (group by 32 LDEV numbers).
 - b. Click **Close**.
- 12. In the **Create LDEVs** window, from the **MP Unit** list, select an MP unit to be used by the LDEVs.
 - If you assign a specific MP unit, select the ID of the MP unit.
 - If you can assign any MP unit, click **Auto**.
- 13. In **T10 PI**, select **Enable** or **Disable**.
- 14. Click **Add**.
 The created LDEVs are added to the **Selected LDEVs** table.
 The **Provisioning Type**, **Parity Group Selection**, **LDEV Capacity**, and **Number of LDEVs per Free Space** or **Number of LDEVs per External Volume** fields must be set. If these required items are not registered, you cannot click **Add**.
- 15. If necessary, change the following LDEV settings:
 - Click **Change LDEV Settings** to open the **Change LDEV Settings** window. For details about how to change the LDEV settings, see [Changing LDEV settings on page 4-22](#).
- 16. If necessary, delete an LDEV from the **Selected LDEVs** table.
 Select an LDEV to delete, then click **Remove**. For details about how to remove an LDEV, see [Removing an LDEV to be registered on page 4-23](#).

17. Click **Finish**.

The **Confirm** window opens.

To continue the operation for setting the LU path and defining a logical unit, click **Next**. For details about how to set the LU path, see [Defining LU paths on page 7-21](#).

18. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Finding LDEV IDs

When creating volumes, the LDEV ID (LDKC: CU: LDEV) must be specified. Use this procedure to determine the LDEV IDs in use in the storage system so you can specify the correct LDEV.

1. In **Initial LDEV ID** in the **Create LDEVs** window, click **View LDEV IDs**.
2. In the **View LDEV IDs** window, review the list to confirm the LDEV IDs. The **LDEV IDs** table shows the available, used, and disabled LDEV IDs. The matrix vertical scale represents the second-to-last digit of the LDEV number, and the horizontal scale represents the last digit of the LDEV number.
In the table, used LDEV numbers appear in blue, unavailable LDEV numbers appear in gray, and unused LDEV IDs appear in white. LDEV numbers that are unavailable can be already in use, or already assigned to another emulation group (group by 32 LDEV numbers).
3. Click **Close**.
The **Create LDEVs** window opens.

Changing LDEV settings

The Storage Administrator (Provisioning) role is required to perform this task.

Before registering an LDEV, you can need to change the LDEV settings.

1. In the **Create LDEVs** window, in the **Selected LDEVs** table, select an LDEV and click **Change LDEV Settings**.
2. In the **Change LDEV Settings** window, change the setting of **LDEV Name**, **Initial LDEV ID**, **MP Unit**, or **T10 PI**.
 - If you change **LDEV Name**, specify the prefix characters and the initial number for this LDEV.
 - If you change **Initial LDEV ID**, specify the number of LDKC, CU, LDEV, and Interval. To confirm used LDEV IDs, click **View LDEV IDs** in the **View LDEV IDs** window.
 - If you change **MP Unit**, click the list and specify the MP unit ID. If the specific MP unit is specified, select the MP unit ID. If any MP unit is specified, click **Auto**.
 - If you change the **T10 PI** setting, select **Enable** or **Disable**.
3. Click **OK**.

4. In the **Create LDEVs** window, click **Finish**.
5. In the **Confirm** window, verify the settings, then click **Apply**.
The settings are changed.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Removing an LDEV to be registered

The Storage Administrator (Provisioning) role is required to perform this task.

If you do not want to register an LDEV that is scheduled to be registered, you can remove it from the registration task.

1. In the **Selected LDEVs** table in the **Create LDEVs** window, select an LDEV, then click **Remove**.
A message appears asking whether you want to remove the selected row or rows. To remove the row, click **OK**.
2. Click **Finish**.
3. In the **Confirm** window, click **Apply**. The LDEV is removed from the registering task.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Blocking LDEVs

The Storage Administrator (Provisioning) role is required to perform this task.

Before formatting or shredding a registered LDEV, block the LDEV. Use this procedure to block internal and external volumes from any of these tabs.

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. Displays the **LDEVs** tab.For Storage Navigator:
 - Expand the **Storage Systems** tree, and select **Parity Groups** > **Internal** or **External** > for each parity group. Display the **LDEVs** tab.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Display the **LDEVs** tab.
 - Expand the **Storage Systems** tree and select **Pools**. Display the **Virtual Volumes** tab.
2. If **Blocked** does not appear in the **Status** column, use the following steps to block the LDEV.
If **Blocked** does appear in the column, skip the remaining steps.
3. Select the LDEV.
You can select multiple LDEVs that are listed together or separately.

4. Open the **Block LDEVs** window in one of two ways.
 - Click **More Actions > Block LDEVs**.
 - From the Actions menu, select **Logical Device > Block LDEVs**.
5. Note the settings in the **Confirm** window and enter a unique **Task Name** or accept the default. Then, click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Blocking LDEVs in a parity group

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. Displays the **Parity Groups** tab.
For Storage Navigator:
 - To display all parity groups in the storage system, expand the **Storage Systems** tree, and select **Parity Groups**. Display the **Parity Groups** tab.
 - To display parity groups related to **Internal** or **External**, expand the **Storage Systems** tree, and select **Parity Groups > Internal** or **External**. Display the **Parity Groups** tab.
2. If **Blocked** does not appear in the **LDEV Status** column, use the following steps to block the LDEV.
If **Blocked** does appear in the column, skip the remaining steps.
3. Select the parity group.
You can select multiple parity groups that are listed together or separately.
4. Open the **Block LDEVs** window in one of two ways.
 - Click **More Actions > Block LDEVs**.
 - From the Actions menu, select **Logical Device > Block LDEVs**.
5. Note the settings in the **Confirm** window and enter a unique **Task Name** or accept the default. Then, click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Restoring blocked LDEVs

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the tab.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. Displays the **LDEVs** tab.

For Storage Navigator:

- Expand the **Storage Systems** tree, and select **Parity Groups > Internal** or **External > each parity group**. Display the **LDEVs** tab.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Display the **LDEVs** tab.
 - Expand the **Storage Systems** tree and select **Pools**. Display the **Virtual Volumes** tab.
- If **Blocked** appears in the **Status** column, use the following steps to restore the LDEV.
If **Blocked** does not appear in the column, skip the remaining steps.
 - Select the LDEV.
You can select multiple LDEVs that are listed together or separately.
 - Open the **Restore LDEVs** window in one of two ways.
 - Click **More Actions > Restore LDEVs**.
 - From the Actions menu, select **Logical Device > Restore LDEVs**.
 - Note the settings in the **Confirm** window and enter a unique **Task Name** or accept the default. Then, click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.



Note: If **Provisioning Type** of the LDEV is **Basic**, the processing time increases by approximately 5 seconds on the basis of the Parity Group ID which contains the LDEV.

Restoring blocked LDEVs in a parity group

The Storage Administrator (Provisioning) role is required to perform this task.

- Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. Displays the **Parity Groups** tab.
 For Storage Navigator:
 - To display all parity groups in the storage system, expand the **Storage Systems** tree, and select **Parity Groups**. Display the **Parity Groups** tab.
 - To display parity groups related to **Internal** or **External**, expand the **Storage Systems** tree, and select **Parity Groups > Internal** or **External**. Display the **Parity Groups** tab.
- If **Blocked** appears in the **LDEV Status** column, use the following steps to restore a blocked LDEV.

- If **Blocked** does not appear in the column, skip the remaining steps.
3. Select the parity group.
You can select multiple parity groups that are listed together or separately.
 4. Open the **Restore LDEVs** window in one of two ways.
 - Click **More Actions > Restore LDEVs**.
 - From the Actions menu, select **Logical Device > Restore LDEVs**.
 5. Note the settings in the **Confirm** window and enter a unique **Task Name** or accept the default and click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Editing an LDEV name

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Edit LDEVs** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Edit LDEVs**.
For the **Parity Groups** window in Storage Navigator:
 - Expand the **Storage Systems** tree, and select **Parity Groups > Internal** or **External > each parity group**. On the **LDEVs** tab, select the LDEV to be edited, and click **Edit LDEVs**.
 - Expand the **Storage Systems** tree and select **Parity Groups**. Click **Actions > Logical Device > Edit LDEVs** to open the window.
For the **Logical Devices** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be edited, and click **Edit LDEVs**.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Edit LDEVs** to open the window.
For the **Pools** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be edited, and click **Edit LDEVs**.
 - Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Edit LDEVs** to open the window.
2. In **Edit LDEVs** window, edit **LDEV Name**.
3. Click **Finish**.
4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Deleting an LDEV (converting to free space)

The Storage Administrator (Provisioning) role is required to perform this task.

You can convert one or more of the LDEVs on a selected parity group into free space by deleting the LDEVs. That free space can be used to either create one or more variable-sized volumes (CVs) using the Create LDEVs function, or left as free space for future use.



WARNING: Deleting LDEVs will erase your data. Back up your data before deleting LDEVs.

An LDEV cannot be deleted successfully if it is:

- In the defined path (including the pair volumes of TrueCopy, global-active device, and Universal Replicator).
- A pool-VOL.
- A journal volume.
- A remote command device.
- A volume security volume.
- A quorum disk used by global-active device.
- An LDEV that has the Read/Write access attribute.

When you delete an LDEV, the alias information contained in the LDEV is also deleted. Therefore, if you delete an LDEV related to an alias device, do one of the following:

- Allocate another LDEV to the alias device, then delete the LDEV.
- Delete the LDEV first, then allocate another LDEV to the alias device.

For information about how to delete a registered external volume, see the *Hitachi Universal Volume Manager User Guide*.

To delete an LDEV:

1. Perform one of the following to display the **Delete LDEVs** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Delete LDEVs**.For the **Logical Devices** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be deleted, click **More Actions**, then **Delete LDEVs**.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Delete LDEVs** to open the window.For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be deleted, click **More Actions**, then **Delete LDEVs**.
 - Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions** > **Logical Device** > **Delete LDEVs** to open the window.
2. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
The LDEV is deleted.
- If **Go to tasks window for status** is checked, the **Tasks** window opens.

Formatting LDEVs

If you initialize LDEVs that are being used, format the LDEVs. Read the following topics before formatting LDEVs:

- [LDEV Format function on page 4-28](#)
- [Storage system operation when LDEVs are formatted on page 4-28](#)
- [Quick Format function on page 4-29](#)

Formatting LDEVs includes the following tasks:

- [Formatting LDEVs \(Normal format\) on page 4-30](#)
- [Formatting all LDEVs in a parity group on page 4-31](#)

LDEV Format function

The LDEV Format function includes Normal Format, and Quick Format. These functions format volumes, including external volumes. Before formatting volumes, ensure that the volumes are in blocked status.

The following table lists formatting functions for LDEV types.

Formatting function	Corresponding volume
Normal Format	Internal volume Virtual volume External volume
Quick Format	Internal volume

Storage system operation when LDEVs are formatted

The storage system acts in one of two ways immediately after an LDEV is added, depending on the default settings in the storage system.

- The storage system automatically formats the added LDEV. This is the default action.

- The storage system blocks the LDEV instead of automatically formatting it.

To confirm or change the default formatting settings on the storage system, contact the administrator. Users who have the Storage Administrator (Provisioning) role can change these default formatting settings.

Quick Format function

The Quick Format function formats internal volumes in the background. While Quick Format is running, you can configure your system before the formatting completes.

Before using Quick Format to format internal volumes, ensure that the internal volumes are in blocked status.

I/O operations from hosts during Quick Format are allowed. Formatting in the background can affect performance.

Because shared resources such as MP units or cache paths are used during quick format operations, all host I/Os in a storage system can be affected.

Do not start more than four quick format operations at the same time.

Quick Format specifications

Item	Description
Preparation for executing the Quick Format feature	Internal volumes must be in blocked status.
The number of parity groups that can undergo Quick Format	Up to 72 (VSP G800 or VSP F800), 36 (VSP G400, G600 or VSP F400, F600), or 18 (VSP G200) parity groups can concurrently undergo Quick Format. There is no limit on the number of volumes that can undergo Quick Format.
Concurrent Quick Format operations	While one Quick Format operation is in progress, another Quick Format operation can be performed. Up to 72 (VSP G800 or VSP F800), 36 (VSP G400, G600 or VSP F400, F600), or 18 (VSP G200) parity groups can concurrently undergo Quick Format.
Preliminary processing	At the beginning of the Quick Format operation, preliminary processing is performed to generate management information. If a volume is undergoing preliminary processing, the status of the volume is Preparing Quick Format . While preliminary processing is in progress, hosts cannot perform I/O access to the volume.
Blocking and restoring of volumes	If a volume undergoing Quick Format is blocked, the storage system recognizes that the volume is undergoing Quick Format. After the volume is restored, the status of the volume changes to Normal (Quick Format). If all volumes in one or more parity groups undergoing Quick Format are blocked, the displayed number of parity groups undergoing Quick Format decreases by the number of blocked parity groups. However, the number of parity groups that have not undergone and can undergo Quick Format does not increase.

Item	Description
	To calculate the number of parity groups that have not undergone but can undergo Quick Format, use the following formula: VSP G800 or VSP F800: $72 - X - Y$ VSP G400, G600 or VSP F400, F600: $36 - X - Y$ VSP G200: $18 - X - Y$ Where: X indicates the number of parity groups on which Quick Format is being performed. Y indicates the number of parity groups where all volumes are blocked during the Quick Format.
Storage system is powered off and back on	The Quick Format operation resumes when power is turned back on.
Restrictions	- Quick Format cannot be executed on external volumes, virtual volumes, or journal volumes of Universal Replicator . - The volume migration feature or the QuickRestore feature cannot be applied to volumes undergoing Quick Format. When you use Command Control Interface to execute the volume migration operation or the QuickRestore operation on volumes undergoing Quick Format, EX_CMDRJE is reported to Command Control Interface. In this case, check the volume status.
SIM which is output when finishing of the quick format	If a quick format is performed, SIM=0x410100 is output when the format processing is finished. If multiple quick formats are performed, SIM=0x410100 is output when all format processing is finished.

Formatting LDEVs (Normal format)

The Storage Administrator (Provisioning) role is required to perform this task.

This procedure performs Normal formatting on the volume.

- Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. Displays the **LDEVs** tab.
 For Storage Navigator:
 - Expand the **Storage Systems** tree, and select **Parity Groups** > **Internal** or **External** > parity group. Display the **LDEVs** tab.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Display the **LDEVs** tab.
 - Expand the **Storage Systems** tree and select **Pools**. Display the **Virtual Volumes** tab.
- Select and block the LDEV to be formatted.

See [Blocking LDEVs on page 4-23](#) for blocking an internal volume. See the *Hitachi Universal Volume Manager User Guide* for blocking an external volume.

3. Perform one of the following to display the **Format LDEVs** window.

For Hitachi Command Suite:

- On the **LDEVs** tab, select **Format LDEVs**.

For the **Parity Groups** window in Storage Navigator:

- Select the LDEVs to be operated, click **More Actions**, and select **Format LDEVs**.
- Click **Actions** > **Logical Device** > **Format LDEVs** to open the window.

For the **Logical Devices** window in Storage Navigator:

- On the **LDEVs** tab, select LDEVs to be operated, and click **Format LDEVs**.
- Click **Actions** > **Logical Device** > **Format LDEVs** to open the window.

For the **Pools** window in Storage Navigator:

- Select the LDEVs to be operated, click **More Actions**, and select **Format LDEVs**.
- Click **Actions** > **Logical Device** > **Format LDEVs** to open the window.

4. In the **Format LDEVs** window, select the format type from the **Format Type** list, then click **Finish**.
5. In the **Confirm** window, click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Formatting all LDEVs in a parity group

The Storage Administrator (Provisioning) role is required to perform this task.

Use this procedure to perform Normal formatting on the volume.

When formatting all LDEVs in a parity group, do the following:

- Specify a parity group.
- Format the LDEV.

Before formatting all LDEVs in a parity group, make sure that all LDEVs under this parity group have been blocked.

See [Blocking LDEVs on page 4-23](#) for blocking an internal volume. See the *Hitachi Universal Volume Manager User Guide* for blocking an external volume.

1. Perform one of the following to display the tab.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. Displays the **Parity Groups** tab.
- For Storage Navigator:
- To display all parity groups in the storage system, expand the **Storage Systems** tree, and select **Parity Groups**. Display the **Parity Groups** tab.
 - To display parity groups related to **Internal** or **External**, expand the **Storage Systems** tree, and select **Parity Groups > Internal** or **External**. Display the **Parity Groups** tab.
2. To format all LDEVs in the parity group, select the parity group.
 3. Perform one of the following to display the **Format LDEVs** window.
For Hitachi Command Suite:
 - On the **LDEVs** tab, select **Format LDEVs**.
 For the **Parity Groups** window in Storage Navigator:
 - Select the parity groups to be operated, click **More Actions**, and select **Format LDEVs**.
 - Click **Actions > Logical Device > Format LDEVs** to open the window.
 4. In the **Format LDEVs** window, select the format type from the **Format Type** list, then click **Finish**.
In the **Confirm** window, click **Next** to go to the next operation.
 5. Click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Assigning an MP unit

Assigning an MP unit to a resource

The Storage Administrator (System Resource Management) role is required to perform this task.

You can assign an MP unit to resources (logical devices, external volumes, and journal volumes).

1. Perform one of the following to display the **Components** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Select **Component**.
 For Storage Navigator:
 - Expand the **Storage Systems** tree, and select **Components**.
2. In **Components**, select the name of the DKC for which you want to assign an MP unit.
MP units can be viewed in the **MP Units** tab.

3. Select an MP unit for which you want to change the settings, then click **Edit MP Units**.
4. In the **Edit MP Units** window, disable or enable **Auto Assignment**. The default value depends on the value set for the selected MP unit.
 - Select **Enable** if the MP unit can be automatically assigned.
 - Select **Disable** if the MP unit cannot be automatically assigned.
5. Click **Finish**.
6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Changing the MP unit assigned to an LDEV



Caution:

- Changes to the MP unit ID of an LDEV should be made during off-peak hours when the I/O load is as low as possible. Before and after changes are made, it is recommended that the cache write-pending rate (%) for all CLPRs is lower than 50%. Do not change the MP unit ID when the I/O load is high: for example, during initial copy of ShadowImage, TrueCopy, global-active device, or Universal Replicator).
 - When you change the MP unit ID of an LDEV, use the Performance Monitor before and after the change to check the load status of devices. Do not change several LDEV MP unit IDs during a short period of time. As a guideline, you can change 10% or less of the total number or the full workload of LDEV MP unit IDs assigned to the same MP unit ID at the same time.
 - After you change the MP unit for an LDEV, wait more than 30 minutes before changing the ID again for the same LDEV.
-

The Storage Administrator (System Resource Management) role is required to perform this task.

1. Perform one of the following to display the **Logical Devices** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Assign MP Unit**.
For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Logical Devices**.
LDEVs appear in the **LDEVs** tab.
2. Select the LDEV for which you want to change the MP unit.
3. Perform one of the following to display the **Assign MP Unit** window.
 - Click **More Actions**, then select **Assign MP Unit**.

- Click **Actions > Logical Device > Assign MP Unit** to open the window.
- 4. In the **Assign MP Unit** window, specify the MP unit in **MP Unit**.
- 5. Click **Finish**.
- 6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Viewing LDEVs of ALUs or SLU attribution

Use this procedure to view the ALUs or SLUs of the storage system. The procedure can be performed on an ESXi host or vCenter Server as well.

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.

Procedure

1. Open the **Logical Devices** window.
In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.
 - b. Expand the target storage system, right-click **Volumes**, and then select **System GUI**.In Device Manager - Storage Navigator:
 - a. Click **Storage Systems** and expand the **Storage Systems** tree.
 - b. Select **Logical Devices**.
2. In the **LDEVs** pane, click **More Actions > View ALUs/SLUs**.

Configuring thin provisioning

Thin provisioning technology allows you to allocate *virtual storage capacity* based on anticipated future capacity needs, using *virtual volumes* instead of physical disks.

Thin provisioning is an optional provisioning strategy. Thin provisioning is implemented with Dynamic Provisioning by creating one or more Dynamic Provisioning pools (DP pools) of physical storage space.

- ☐ [Dynamic Provisioning overview](#)
- ☐ [Dynamic Tiering overview](#)
- ☐ [Active flash overview](#)
- ☐ [Thin provisioning requirements](#)
- ☐ [Using Dynamic Provisioning, Dynamic Tiering, or active flash with other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products](#)
- ☐ [Dynamic Provisioning workflow](#)
- ☐ [Dynamic Tiering and active flash](#)
- ☐ [Changing a pool for Dynamic Tiering or active flash to a pool for Dynamic Provisioning](#)
- ☐ [Enabling active flash for a Dynamic Tiering pool](#)
- ☐ [Working with pools](#)
- ☐ [Working with DP-VOLs](#)

- ☐ [Monitoring capacity and performance](#)
- ☐ [Thresholds](#)
- ☐ [Working with SIMs](#)
- ☐ [Managing pools and DP-VOLs](#)
- ☐ [Starting pool monitoring manually](#)
- ☐ [Stopping pool monitoring manually](#)
- ☐ [Starting tier relocation manually](#)
- ☐ [Stopping tier relocation manually](#)
- ☐ [Creating the external volume, pool, or DP-VOL of the data direct mapping attribute](#)

Dynamic Provisioning overview

Dynamic Provisioning is an advanced thin-provisioning software product that allows you to save money on storage purchases and reduce storage management expenses.

You can operate Dynamic Provisioning using both Hitachi Device Manager - Storage Navigator software and the Command Control Interface.

Dynamic Tiering overview

Dynamic Tiering is a software that helps you reduce storage costs and increase storage performance by supporting a volume configured with different storage media of different cost and performance capabilities. This support allows you to allocate data areas with heavy I/O loads to higher-speed media and to allocate data areas with low I/O loads to lower-speed media. Up to three storage tiers consisting of different types of data drives are supported in a single pool of storage.

Active flash overview

Based on functions for Dynamic Tiering, active flash can promote pages to tier 1 if their latest access frequency suddenly becomes high. active flash can improve tier 1 I/O performance by reallocating tier 2 pages if their I/O loads have increased suddenly.

Thin provisioning requirements

License requirements

Before you can use Dynamic Provisioning, the Dynamic Provisioning program products must be installed on the storage system. For this, purchase the Storage Virtualization Operating System (SVOS) license.

Before you can use Dynamic Tiering, the Dynamic Provisioning, and Dynamic Tiering program products must be installed on the storage system. For this, purchase the Storage Virtualization Operating System (SVOS) license and the Dynamic Tiering licence.

You need the Dynamic Tiering license to access the total pool capacity for which the tier function is enabled.

You do not need to purchase an additional license to use active flash, but you do need to have purchased the Dynamic Provisioning and Dynamic Tiering licenses and the Dynamic Provisioning, and Dynamic Tiering program products must be installed on the storage system.

If the DP-VOLs of Dynamic Provisioning or Dynamic Tiering, or active flash are used for the primary volumes and secondary volumes of ShadowImage, TrueCopy, Universal Replicator, Volume Migration, global-active device, or

Thin Image, you need the ShadowImage, TrueCopy, Universal Replicator, Volume Migration, global-active device, and Thin Image license for the total pool capacity in use.

If you exceed the licensed capacity, you can use the additional unlicensed capacity for 30 days.

For more information about temporary license capacity, see the *System Administrator Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models*.

Pool requirements

A pool is a set of volumes reserved for storing Dynamic Provisioning write data.

Items	Requirements
Pool capacity	Calculate pool capacity using the following formula: $\text{The capacity of the pool (MB)} = \text{Total number of pages} * 42 - 4200.$ 4200 in the formula is the management area size of the pool-VOL with System Area. $\text{Total Number of pages} = \sum(\text{floor}(\text{floor}(\text{pool-VOL number of blocks} \div 512) \div 168)) \text{ for each pool-VOL.}$ floor(): Truncates the value calculated from the formula in parentheses after the decimal point. - VSP G800 and VSP F800: the total capacity of all pools is 6.5 PB if control memory is installed. - VSP G400, G600 or VSP F400, F600: the total capacity of all pools is 6.5 PB if control memory is installed. - VSP G200: the total capacity of all pools is 3.5 PB if control memory is installed.
Maximum number of pool-VOLs	From 1 to 1,024 volumes (per pool). A volume can be registered as a pool-VOL to one pool only.
Maximum number of pools	- VSP G800 or VSP F800: Up to a total of 128 pools per storage system. Pool numbers (0 to 127) are assigned as pool identifiers. - VSP G400, G600 or VSP F400, F600: Up to a total of 64 pools per storage system. Pool numbers (0 to 63) are assigned as pool identifiers. - VSP G200 : Up to a total of 64 pools per storage system. Pool numbers (0 to 63) are assigned as pool identifiers. The maximum number of pools includes following pool types: - Dynamic Provisioning (including Dynamic Tiering and active flash) - Thin Image
Increasing capacity	You can increase pool capacity dynamically. We recommend adding pool-VOLs to increase capacity by one or more parity groups.
Reducing capacity	You can reduce pool capacity by removing pool-VOLs.

Items	Requirements
Deleting	You can delete pools that are not associated with any DP-VOLs.
Subscription limit	From 0 to 65534 (%). If you do not specify a value, the subscription is set to unlimited.
Thresholds	- Warning threshold: You can set the value between 1% and 100%, in 1% increments. The default is 70%. - Depletion threshold: You can set the value between the warning threshold and 100%, in 1% increments. The default is 80%. - Thresholds cannot be defined as the pool of the data direct mapping attribute.
Data allocation unit	42 MB The 42-MB page corresponds to a 42-MB continuous area of the DP-VOL. Pages are allocated for the pool only when data has been written to the area of the DP-VOL.
Tier (Dynamic Tiering and active flash)	Defined based on the media type (see Drive type for Dynamic Tiering and active flash tier, below). Maximum three tiers.
Maximum capacity of each tier (Dynamic Tiering and active flash)	- VSP G800 or VSP F800: 4.0 PB (Total capacity of the tiers must be within 4.0 PB and the control memory must be installed) - VSP G400, G600 or VSP F400, F600: 4.0 PB (Total capacity of the tiers must be within 4.0 PB and the control memory must be installed) - VSP G200: 3.5 PB (Total capacity of the tiers must be within 3.5 PB and the control memory must be installed)

Pool-VOL requirements

Pool-VOLs make up a DP pool.

Items	Requirements
Volume type	Logical volume (LDEV) While pool-VOLs can coexist with other volumes in the same parity group, for best performance: - Pool-VOLs cannot share a parity group with other volumes. - Pool-VOLs cannot be located on concatenated parity groups. Pool-VOLs cannot be used for any other purpose. For instance, you cannot specify the following volumes as Dynamic Provisioning and Dynamic Tiering, and active flash pool-VOLs: - Volumes used by ShadowImage, Volume Migration, TrueCopy, global-active device, or Universal Replicator - Volumes already registered in Thin Image, Dynamic Provisioning, or Dynamic Tiering, or active flash pools - Volumes used as Thin Image P-VOLs or S-VOLs - Data Retention Utility volumes with a Protect, Read Only, or S-VOL Disable attribute

Items	Requirements
	- Volumes whose LDEV status is other than Normal or Normal (Quick Format) You cannot specify volumes in blocked status or volumes in copying process. - Command devices - Quorum disks used by global-active device The external volume of the data direct mapping attribute cannot be specified as pool-VOL for Dynamic Tiering.
RAID level for a Dynamic Provisioning pool	RAID 1, RAID 5, or RAID 6 can be applied. Pool-VOLs of RAID 1, RAID 5, RAID 6, and the external volume can coexist in the same pool. For pool-VOLs in the same pool: - RAID 6 is the recommended RAID level for pool-VOLs, especially for a pool where the recovery time of a pool failure due to a drive failure is not acceptable. - Pool-VOLs of the same drive type with different RAID levels can coexist in the same pool. Use the following configuration: - Set one RAID level for pool-VOLs. If you register pool-VOLs with multiple RAID levels, the I/O performance depends on the RAID levels of pool-VOLs to be registered. In this case, note the I/O performance of the disks. - For the RAID configuration that can be applied to pool volumes, see RAID level for CV on page 4-12.
RAID level for a Dynamic Tiering or active flash pool	RAID 1, RAID 5, or RAID 6 can be applied. Pool-VOLs of RAID 1, RAID 5, RAID 6, and the external volume can coexist in the same pool. For pool-VOLs in a pool: - RAID 6 is the recommended RAID level for pool-VOLs, especially for a pool where the recovery time of a pool failure due to a drive failure is not acceptable. - Pool-VOLs of the same drive type with different RAID levels can coexist in the same pool. Use the following configuration: - Set one RAID level for pool-VOLs. If you register pool-VOLs with multiple RAID levels, the I/O performance depends on the RAID levels of pool-VOLs to be registered. In that case, note the I/O performance of the disks. - Because the speed of RAID 6 is slower than other RAID levels, tiers that use other RAID levels should not be placed under a tier that uses RAID 6. - For the RAID configuration that can be applied to pool volume, see RAID level for CV on page 4-12.
Data drive type for a Dynamic Provisioning pool	SSD*, SAS15K, SAS10K, SAS7.2K, and external volume can be used as the data drive type. These data drive types can coexist in the same pool. Cautions: Best practice is to have drives with different types not in the same pool. If multiple pool-VOLs with different drive types are registered in the same pool, the I/O performance depends on the drive type of the pool-VOL to which the page is assigned.

Items	Requirements
	Therefore, if different drive types are registered in the same pool, ensure that the required I/O performance is not degraded by using less desirable drive types. If multiple data drives coexist in the same pool, do not use data drives that are same types and different capacity sizes.
Data drive type for a Dynamic Tiering or active flash pool	SSD*, SAS15K, SAS10K, SAS7.2K, and external volume can be used as the data drive type. These data drive types can coexist in the same pool. If active flash is used, SSD must be installed in advance. Cautions: If multiple data drives coexist in the same pool, do not use the same types of data drives that have different capacity sizes.
Volume capacity	Internal volume: From 8 GB to 2.9 TB External volume: From 8 GB to 4 TB External volume of the data direct mapping attribute: From 8 GB to 256 TB
LDEV format	The LDEV format operation can be performed on pool-VOLs if one of these conditions is satisfied: - The DP-VOL defined for the pool does not exist. - All DP-VOLs defined for the pool are blocked.
Path definition	You cannot specify a volume with a path definition as a pool-VOL.
* Includes FMC, FMD, and MLC. For VSP Fx00 models, only SSD can be specified.	

DP-VOL requirements

Items	Requirements
Volume type	DP-VOL (V-VOL) The LDEV number is handled in the same way as for normal volumes.
Maximum number of DP-VOLs	For VSP Fx00 models, only SSD can be specified. - VSP G800 or VSP F800 - Up to 14,080 per pool (For the pool of the data direct mapping attribute, up to 1,023 per pool). Any number of available DP-VOLs can be associated with a pool. - Up to 14,080 volumes per system. If external volumes and V-VOLs are used, the total number of external volumes and V-VOLs must be 14,080 or less. - VSP G400, G600 or VSP F400, F600 - Up to 4,095 per pool (For the pool of the data direct mapping attribute, up to 1,023 per pool). Any number of available DP-VOLs can be associated with a pool. - Up to 4,095 volumes per system. If external volumes and V-VOLs are used, the total number of external volumes and V-VOLs must be 4,095 or less. - VSP G200

Items	Requirements
	Up to 2,047 per pool (For the pool of the data direct mapping attribute, up to 1,023 per pool). Any number of available DP-VOLs can be associated with a pool. Up to 2,047 volumes per system. If external volumes and V-VOLs are used, the total number of external volumes and V-VOLs must be 2,047 or less.
Volume capacity	Volume capacity from 46.87 MB to 256 TB per volume. • TB: 0.01 to 256 • GB: 0.04 to 262,144 • MB: 46.87 to 268,435,456 • Blocks: 96,000 to 549,755,813,888 Total maximum volume capacity is as follows: • VSP G800 or VSP F800: 6.5 PB (The control memory must be installed) • VSP G400, G600 or VSP F400, F600: 6.5 PB (The control memory must be installed) • VSP G200: 3.5 PB (The control memory must be installed)
Path definition	Available.
LDEV format	Available (Quick Format is not available.) System Option Mode 867 OFF When you perform the format operation on a DP-VOL, the storage system releases the allocated page area in the DP-VOL. The quick format cannot be performed. If the LDEV format is applied to V-VOLs that are enabled for full allocation, the used capacity of the pool is not changed before the LDEV format is applied.



Note: System Option Mode 867 OFF: When you format an LDEV on a DP-VOL, the capacity mapped to the DP-VOL is released to the pool as free space.

Requirements for increasing DP-VOL capacity

You can increase DP-VOL capacity up to 59.9 TB. To notify the host that the DP-VOL capacity has been increased, make sure host mode option 40 is enabled. Processing differs as follows, depending on the value of host mode option 40:

- When host mode option 40 is not enabled, the host is not notified that the DP-VOL capacity has increased. Therefore, the DP-VOL data has to be read again by the host after the capacity is increased.
- When host mode option 40 is enabled, the host is notified that the DP-VOL capacity has increased. If the operating system cannot recognize the capacity value that was increased, the DP-VOL data has to be read again by the host.

The following requirements are important when increasing the DP-VOL capacity:

- The DP-VOL to be increased is not shared with the VSP G200, G400, G600, G800 or VSP F400, F600, F800 product that does not allow increasing the DP-VOL (See [Increasing DP-VOL capacity on page 5-123](#)).
- The DP-VOL is not undergoing LDEV formatting.
- The DP-VOL is not the DP-VOL of the data direct mapping attribute.
- The capacity to be added to the DP-VOL must be specified within the range indicated below **LDEV Capacity** in the **Expand V-VOLs** window.
- The pool related to DP-VOLs to be increased is in any one of the following statuses:
 - Normal
 - Exceeding the subscription limit threshold
 - In progress of pool capacity shrinking



Caution: When increasing DP-VOL capacity, do not perform the following operations.

- Operations using Virtual LUN
- Creating DP-VOLs
- Restoring pools
- Deleting DP-VOLs
- Operations to increase the DP-VOL capacity in another instance of CCI
- Maintenance of your storage system

After increasing DP-VOL capacity, refresh the display, then confirm that the DP-VOL is increased. If you perform an operation without making sure that the DP-VOL is increased, operations can fail.

If either of the following operations is being performed, the DP-VOL capacity might not be increased:

- Volume Migration
- Configuration change of journal used by Universal Replicator
- Quick Restore by ShadowImage

V-VOL full allocation requirement

The V-VOL full allocation is performed in a range less than the depletion threshold size of the pool. If the capacity of V-VOLs is larger than the depletion threshold size, the full allocation operation is rejected.

The reserved capacity for each pool can be calculated by the following formula. In the formula, the value enclosed in ceil () must be rounded up to the nearest whole number.

Reserved capacity for each pool [block] =

$$\text{ceil}(\text{CV capacity of V-VOL [block]} / 86016) * 86016 + \text{ceil}(\text{CV capacity of V-VOL [block]} / 6442082304) * 4 * 86016 - \text{Used capacity of V-VOL [block]}$$

Operating system and file system capacity

Operating systems and file systems, when initializing a DP-VOL, consume some Dynamic Provisioning pool space. Some combinations initially take up little pool space, while other combinations take as much pool space as the virtual capacity of the DP-VOL.

The following table shows some combinations of the operating system and file system capacity. For more information, contact your Hitachi Data Systems representative.

OS	File System	Metadata Writing	Pool Capacity Consumed
Windows Server 2003 and Windows Server 2008*	NTFS	Writes metadata to first block.	O Small (one page) If file update is repeated, allocated capacity increases when files are updated (overwritten). Therefore, the effectiveness of reducing the pool capacity consumption decreases.
Linux	XFS	Writes metadata in Allocation Group Size intervals.	O Depends upon allocation group size. The amount of pool space consumed is approximately [DP-VOL Size]*[42 MB/Allocation Group Size]
	Ext2 Ext3	Writes metadata in 128-MB increments.	O About 33% of the size of the DP-VOL. The default block size for these file systems is 4 KB. This results in 33% of the DP-VOL acquiring HDP pool pages. If the file system block size is changed to 2 KB or less then the DP-VOL Page consumption becomes 100%.
Solaris	UFS	Writes metadata in 52-MB increments.	X Size of DP-VOL.
	VxFS	Writes metadata to the first block.	O Small (one page).
AIX	JFS	Writes metadata in 8-MB increments.	X Size of DP-VOL. If you change the Allocation Group Size settings when you create the file system, the metadata can be written

OS	File System	Metadata Writing	Pool Capacity Consumed
			to a maximum interval of 64 MB. Approximately 65% of the pool is used at the higher group size setting.
	JFS2	Writes metadata to the first block.	O Small (one page).
	VxFS	Writes metadata to the first block.	O Small (one page).
HP-UX	JFS (VxFS)	Writes metadata to the first block.	O Small (one page).
	HFS	Writes metadata in 10-MB increments.	X Size of DP-VOL.
Explanatory notes: O : Indicates an effective reduction of pool capacity. X : Indicates no effective reduction of pool capacity. *See Formatting LDEVs in a Windows environment on page 5-104			

Using Dynamic Provisioning, Dynamic Tiering, or active flash with other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products

Interoperability of DP-VOLs and pool-VOLs

DP-VOLs and pool-VOLs can be used in conjunction with other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products. The following table lists the operations that are permitted and not permitted.

Product name (Guide name)	Permitted	Not permitted
Thin Image (<i>Hitachi Thin Image User Guide</i>)	Using a V-VOL as a Thin Image primary volume. The maximum total number of pools per storage system is 128. Thin Image pool limits are reduced by the number of Dynamic Provisioning pools, Dynamic Tiering pools, and active flash pools.	- Using a DP-VOL as a Thin Image secondary volume or pool-VOL. - Using a Dynamic Provisioning, Dynamic Tiering, or active flash pool-VOL as a Thin Image primary volume, secondary volume, or pool-VOL. - Increasing the capacity of a DP-VOL using Thin Image. - Reclaiming zero pages of a V-VOL used by Thin Image. - Using an external volume of the data direct mapping attribute as a Thin Image pair's primary volume, secondary volume, or pool-VOL.

Product name (Guide name)	Permitted	Not permitted
Data Retention Utility (Provisioning Guide)	Performing operations on DP-VOLs.	Performing operations on DP pool-VOLs. Performing operations on an external volume of the data direct mapping attribute.
Global-active device (<i>Global-Active Device User Guide</i>)	Using a DP-VOL as a global-active device P-VOL or S-VOL.	- Using a DP-VOL as a quorum disk. - Using a pool-VOL as a global-active device P-VOL or S-VOL. - Increasing the capacity of DP-VOL used by global-active device. - Using an external volume of the data direct mapping attribute as a quorum disk. - Using a DP-VOL of the data direct mapping attribute as a quorum disk.
LUN Manager (Provisioning Guide) LUN Security (Provisioning Guide)	Performing operations on DP-VOLs.	Performing operations on DP pool-VOLs. Performing operations on an external volume of the data direct mapping attribute.
ShadowImage (<i>Hitachi ShadowImage® User Guide</i>)	Using a DP-VOL as a ShadowImage primary volume or secondary volume.	- Using a pool-VOL as a ShadowImage primary volume or secondary volume. - Increasing the capacity of a DP-VOL used by ShadowImage. - Reclaiming zero pages of a DP-VOL is determined by the pair status. For more information, see ShadowImage pair status for reclaiming zero pages on page 5-13.
TrueCopy (<i>Hitachi TrueCopy® User Guide</i>)	Using a DP-VOL as a TrueCopy primary volume or secondary volume.	- Using a pool-VOL as a TrueCopy primary volume or secondary volume. - Increasing the capacity of a DP-VOL used as a primary or secondary volume of a TrueCopy pair.
Universal Replicator (<i>Hitachi Universal Replicator User Guide</i>)	Using a DP-VOL as a Universal Replicator primary volume, secondary volume, or journal volume. However, the journal volume must be a DP-VOL that has OPEN-V emulation type.	- Using a DP pool-VOL as a Universal Replicator journal volume, secondary volume, or primary volume. - Increasing the capacity of a DP-VOL as a primary or secondary volume of a Universal Replicator pair. - Reclaiming zero pages of a DP-VOL used by a journal volume. - Using an external volume of the data direct mapping attribute as a journal volume. - Using a DP-VOL of the data direct mapping attribute as a journal volume.
Universal Volume Manager (<i>Hitachi</i>	Enabling volumes created by Universal	Increasing the capacity of a DP-VOL mapped to the Universal Volume Manager.

Product name (Guide name)	Permitted	Not permitted
<i>Universal Volume Manager User Guide)</i>	Volume Manager to be used as pool-VOLs.	If you try to increase the capacity of a DP-VOL with the conventional LDEV operation, the capacity of the DP-VOL does not change. In this case, remove the mapping between DP-VOL and Universal Volume Manager, increase a capacity of the external volume used as a pool-VOL, then map between DP-VOL and the Universal Volume Manager again.
Virtual LUN (<i>Provisioning Guide</i>)	Registering Virtual LUN volumes in Dynamic Provisioning pools.	Performing Virtual LUN operations on volumes that are already registered in a DP pool.
Virtual Partition Manager (<i>Performance Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models</i>)	Performing operations on DP-VOLs and pool-VOLs.	Not applicable
Volume Shredder (<i>Hitachi Volume Shredder User Guide</i>)	Use on DP-VOLs.	- Using on pool-VOLs. - Increasing the capacity of DP-VOL used by Volume Shredder. - Reclaiming zero pages of V-VOL used by Volume Shredder.

ShadowImage pair status for reclaiming zero pages

You can use the following table to determine whether reclaiming zero pages is possible for a particular pair status.

Pair status	Reclaim zero pages from Hitachi Device Manager - Storage Navigator	Reclaim zero pages from Command Control Interface
SMPL, status of an unpaired volume	Enabled	Enabled
COPY(PD)/COPY	Disabled	Disabled
PAIR	Disabled	Disabled
COPY(SP)	Disabled	Disabled
PSUS(SP)/PSUS	Disabled	Disabled
PSUS	Enabled	Enabled
COPY(RS)/COPY	Disabled	Disabled
COPY(RS-R)/RCPY	Disabled	Disabled
PSUE	Disabled	Disabled

TrueCopy

You can use Dynamic Provisioning, Dynamic Tiering, or active flash with TrueCopy to replicate V-VOLs. The following figure shows the interaction when the TrueCopy primary volume and secondary volume are also V-VOLs.

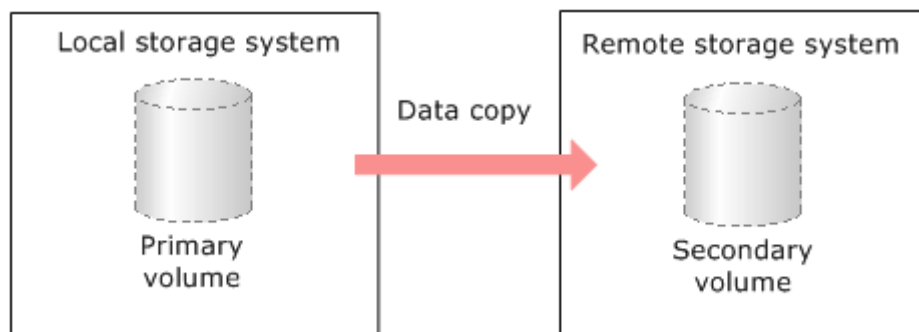


Figure 5-1 Dynamic Provisioning, Dynamic Tiering, or active flash and TrueCopy

TrueCopy P-VOL	TrueCopy S-VOL	Explanation
DP-VOLs	DP-VOLs	Supported.
DP-VOLs	Normal (ordinary) volumes*	Supported.
Normal (ordinary) volumes*	DP-VOLs	Supported. This combination consumes the same amount of pool capacity as the original normal volume (primary volume).
*Normal volumes include the internal volumes and external volumes that are mapped to the volumes of the external storage system using Universal Volume Manager. For more information about external volumes, see the <i>Hitachi Universal Volume Manager User Guide</i> .		

You cannot specify a Dynamic Provisioning, Dynamic Tiering, or active flash pool-VOL as a primary volume or secondary volume.

Global-active device

You can use Dynamic Provisioning, Dynamic Tiering, or active flash in combination with global-active device to replicate V-VOLs. The following figure illustrates the interaction when the global-active device primary volume and secondary volume are also V-VOLs.

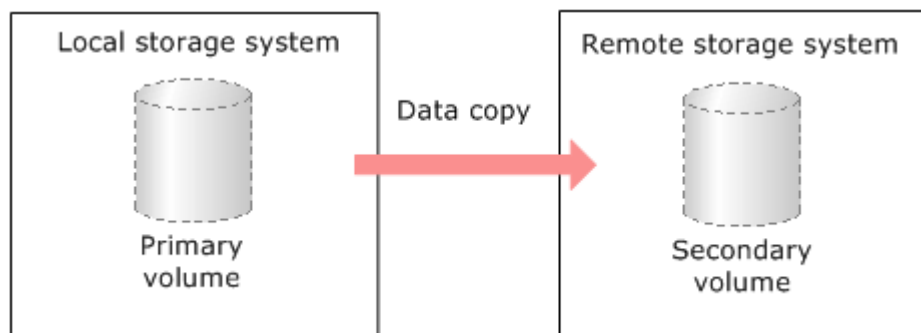


Figure 5-2 Dynamic Provisioning, Dynamic Tiering, or active flash and global-active device

Global-active device P-VOL	Global-active device S-VOL	Explanation
DP-VOLs	DP-VOLs	Supported.
DP-VOLs	Normal (ordinary) volumes ¹	Not supported.
Normal (ordinary) volumes ¹	DP-VOLs	Not supported.
Note: 1. Normal volumes include the internal volumes and external volumes that are mapped to the volumes of the external storage system using Universal Volume Manager. For more information on external volumes, see the <i>Hitachi Universal Volume Manager User Guide</i> .		

You cannot specify a Dynamic Provisioning, Dynamic Tiering, or active flash pool-VOL as a primary volume or secondary volume. For more information, see the *Global-Active Device User Guide*.

Universal Replicator

You can use Dynamic Provisioning, Dynamic Tiering, or active flash in combination with Universal Replicator to replicate DP-VOLs.

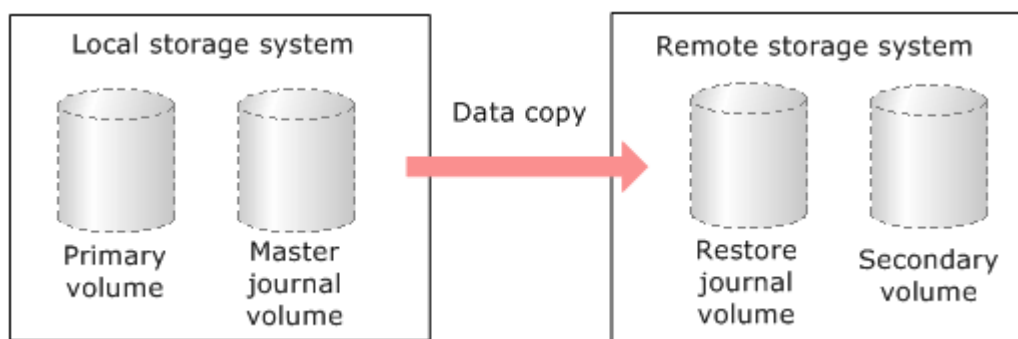


Figure 5-3 Using Dynamic Provisioning, Dynamic Tiering, or active flash and Universal Replicator

The following table lists the supported Universal Replicator and Dynamic Provisioning, Dynamic Tiering, or active flash volume combinations.

Universal Replicator P-VOL	Universal Replicator S-VOL	Universal Replicator journal volume	Explanation
DP-VOLs	DP-VOLs	DP-VOL that has the OPEN-V emulation type	Supported.
DP-VOLs	Normal (ordinary) volumes*	DP-VOL that has the OPEN-V emulation type	Supported.
Normal (ordinary) volumes*	DP-VOLs	DP-VOL that has the OPEN-V emulation type	Supported. This combination consumes the same amount of pool capacity as the original normal volume (primary volume).
*Normal volumes include the internal volumes and external volumes that are mapped to the volumes of the external storage system using Universal Volume Manager. For more information about external volumes, see the <i>Hitachi Universal Volume Manager User Guide</i> .			

You cannot specify a Dynamic Provisioning, Dynamic Tiering, or active flash pool-VOL as a primary volume, secondary volume, or journal volume.

ShadowImage

You can use Dynamic Provisioning, Dynamic Tiering, or active flash in combination with ShadowImage to replicate DP-VOLs.

The following table lists the interaction when the ShadowImage primary volume and secondary volume are also DP-VOLs.

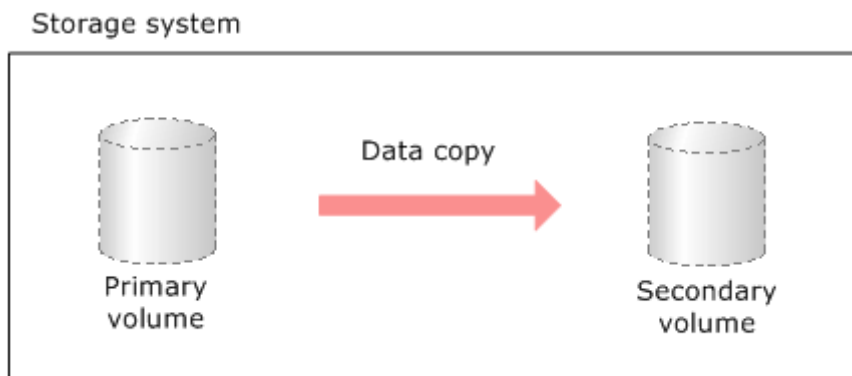


Figure 5-4 Using Dynamic Provisioning, Dynamic Tiering, or active flash and ShadowImage

ShadowImage P-VOL	ShadowImage S-VOL	Explanation
DP-VOLs	DP-VOLs	Supported.
DP-VOLs	Normal (ordinary) volumes*	Supported. The Quick Restore function is unavailable.
Normal (ordinary) volumes*	DP-VOLs	Supported. Note, however, that this combination consumes the same amount of pool capacity as the normal volume. The Quick Restore function is unavailable.
*Normal volumes include the internal volumes and external volumes that are mapped to the volumes of the external storage system using Universal Volume Manager. For more information about external volumes, see the <i>Hitachi Universal Volume Manager User Guide</i> .		

You cannot specify a Dynamic Provisioning, Dynamic Tiering, or active flash pool-VOL as a primary volume or secondary volume

Thin Image

When using Dynamic Provisioning, Dynamic Tiering, active flash, and Thin Image in a storage system, note the following:

- Pools for Dynamic Provisioning (including Dynamic Tiering and active flash) cannot be used in conjunction with Thin Image. The pool for Thin Image cannot be used in conjunction with Dynamic Provisioning.
- A pool-VOL cannot be shared with Dynamic Provisioning (including Dynamic Tiering and active flash) and Thin Image.

Virtual Partition Manager CLPR setting

If DP-VOL and pool-VOLs related to the same pool are assigned to CLPR, HDS recommends that DP-VOL and pool-VOLs in the same pool are assigned to the same CLPR.

For detailed information about CLPRs, see the *Performance Guide*.

Volume Migration

For more information, see the *Hitachi Volume Migration User Guide*.

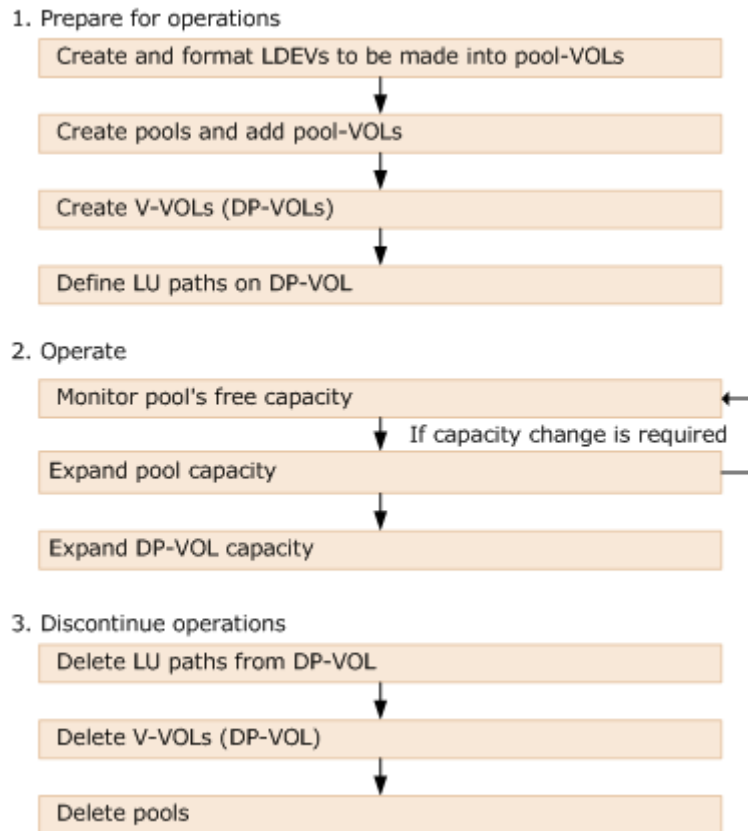
Resource Partition Manager

See [Resource group rules, restrictions, and guidelines on page 3-7](#) for the conditions of resources that are necessary in the operation of other Hitachi Data Systems software and the precautions required when using Resource Partition Manager.

Dynamic Provisioning workflow

The following diagram shows the steps for a Storage Administrator to follow in setting up Dynamic Provisioning on a storage system.

Use Hitachi Device Manager - Storage Navigator or Command Control Interface to create pools and DP-VOLs.



Caution: If you delete a pool, its pool-VOLs (LDEVs) is blocked. Blocked volumes must be formatted before use.



Caution: If the V-VOL data is migrated through the host, unallocated areas of the volume can be copied as well. The used capacity of the pool increases after the data migration because the areas that were unallocated before the data migration have become allocated areas due to migration.

To migrate the V-VOL data:

1. Copy all data of V-VOLs from the source to the target.
2. Perform the operation to reclaim zero pages.
Perform this procedure for each V-VOL. When data migration is done on a file-by-file basis, perform the operation to reclaim zero pages if necessary.

To restore the backup data:

1. Restore the V-VOL data.
2. Perform the operation to reclaim zero pages.
Perform the previous procedure for each V-VOL.

Dynamic Tiering and active flash

Tiered storage

In a tiered storage environment, storage tiers can be configured to accommodate different categories of data. A tier is a group of storage media (pool volumes) in a DP pool. Tiers are determined by a single storage media type. A storage tier can be one type of data drive, including SSD, SAS, or external volumes. Media of high-speed performance make up the upper tiers. Media of low-speed response become the lower tiers. Up to a maximum of three tiers can coexist in each Dynamic Tiering pool.

Categories of data can be based on levels of protection needed, performance requirements, frequency of use, and other considerations. Using different types of storage tiers helps reduce storage costs and improve performance.

Because assigning data to particular media can be an ongoing and complex activity, Dynamic Tiering software automatically manages the process based on user-defined policies.

As an example of the additional implementation of tiered storage, tier 1 data (such as mission-critical or recently accessed data) might be stored on expensive and high-quality media such as double-parity RAID5 (redundant arrays of independent disks). Tier 2 data (such as financial or seldom-used data) might be stored on less expensive storage media.

Tier monitoring and data relocation

Dynamic Tiering uses tiers to manage data storage. It classifies the specified drives in the pool into tiers (storage hierarchy). Up to three tiers can be defined in a pool depending on the processing capacity of the data drives. Tiering allocates more frequently accessed data to the upper tier and less frequently accessed data, stored for a long period of time, to the lower tier.

Multi-tier pool

With Dynamic Tiering, you can enable the Multi-Tier pool option for an existing pool. The default is to allow tier relocation for each DP-VOL. Only the DP-VOLs for which tier relocation is enabled can undergo tier relocation. If tier relocation is disabled for all DP-VOLs in a pool, tier relocation is not performed.

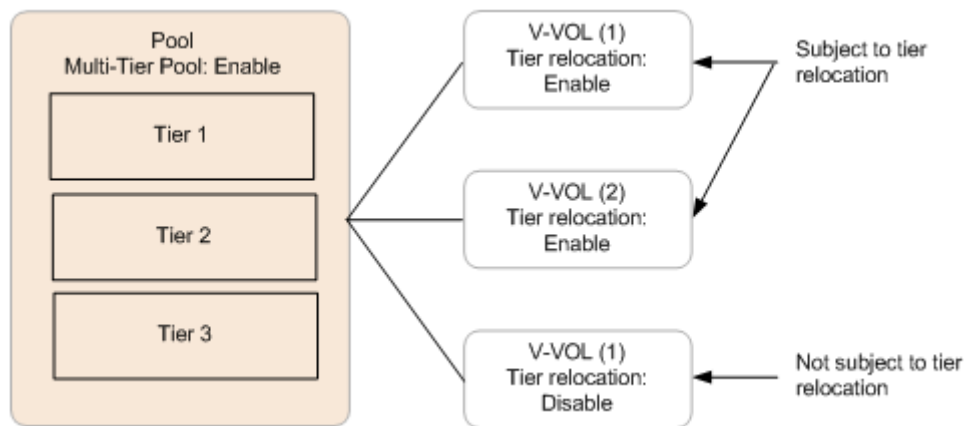
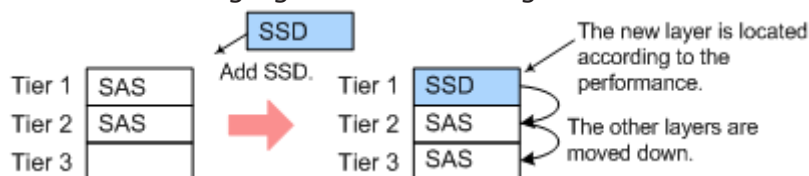


Figure 5-5 Relationship between multi-tier pool and tier relocation

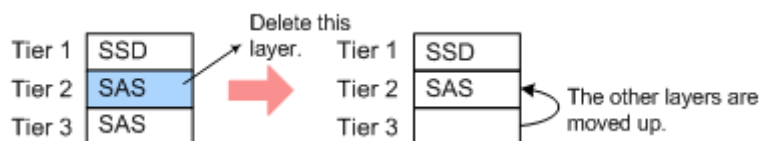
Example of adding a tier

If the added pool-VOL is a different media type, then a new tier is created in the pool. The tier is added to the appropriate position according to its performance. The following figure shows adding a tier.



Example of deleting a tier

If a tier no longer has any pool-VOLs when you delete them, the tier is deleted from the pool. The following figure shows deleting a tier.



Tier monitoring and relocation cycles

Performance monitoring and tier relocation can be set to execute in one of two execution modes: Auto and Manual. You can set up execution modes, or switch between modes by using either Hitachi Device Manager - Storage Navigator or Command Control Interface.

In Auto execution mode, monitoring and relocation are continuous and automatically scheduled. In Manual execution mode, the following operations are initiated manually.

- Start monitoring
- Stop monitoring and recalculate tier range values
- Start relocation

- Stop relocation

In both execution modes, relocation of data is automatically determined based on monitoring results. The settings for these execution modes can be changed nondisruptively while the pool is in use.

Auto execution mode

Auto execution mode performs monitoring and tier relocation based on information collected by monitoring at a specified constant frequency: 0.5, 1, 2, 4, or 8 hours. All Auto execution mode cycle frequencies start at midnight (00:00). For example, if you select a 1 hour monitoring period, the starting times would be 00:00, 01:00, 02:00, 03:00, and so on.

As shown in the following table, the 24-hour monitoring cycle allows you to specify the times of day to start and stop performance monitoring. The 24-hour monitoring cycle does not have to start at midnight. Tier relocation begins at the end of each cycle. For more information, see [Edit Pools window on page D-35](#).

Monitoring cycle (hours)	Start Times	Finish Times
0.5	0.5 hours from 00:00 AM. For example 00:00, 00:30, and 01:00	0.5 hours after the start time
1	1 hour from 00:00 AM. For example 00:00, 01:00, and 02:00	1 hour after the start time
2	2 hours from 00:00 AM. For example 00:00, 02:00, and 04:00	2 hours after the start time
4	4 hours from 00:00 AM. For example 00:00, 04:00, and 08:00	4 hours after the start time
8	8 hours from 00:00 AM. For example 00:00, 08:00, and 16:00	8 hours after the start time
24 (monitoring time period can be specified)	Specified time	Specified time

If the setting of the monitoring cycle is changed, performance monitoring begins at the new start time. The collection of monitoring information and tier relocation operations already in progress is not interrupted when the setting is changed.

Example 1: If the monitoring cycle is changed from 1 hour to 4 hours at 01:30 AM, the collection of monitoring information and tier relocation in progress at 01:30 AM continues. At 02:00 AM and 03:00 AM, however, monitoring information is not collected and tier relocation is not performed. From 04:00 AM, the collection of monitoring information and tier relocation

operations are restarted. These operations are then performed at 4-hour intervals.

Example 2: If the monitoring cycle is changed from 4 hours to 1 hour at 01:30 AM, the collection of monitoring information and tier relocation in progress at 01:30 AM continues. From 04:00 AM, the collection of monitoring information and tier relocation operations are restarted. These operations are then performed at 1-hour intervals.

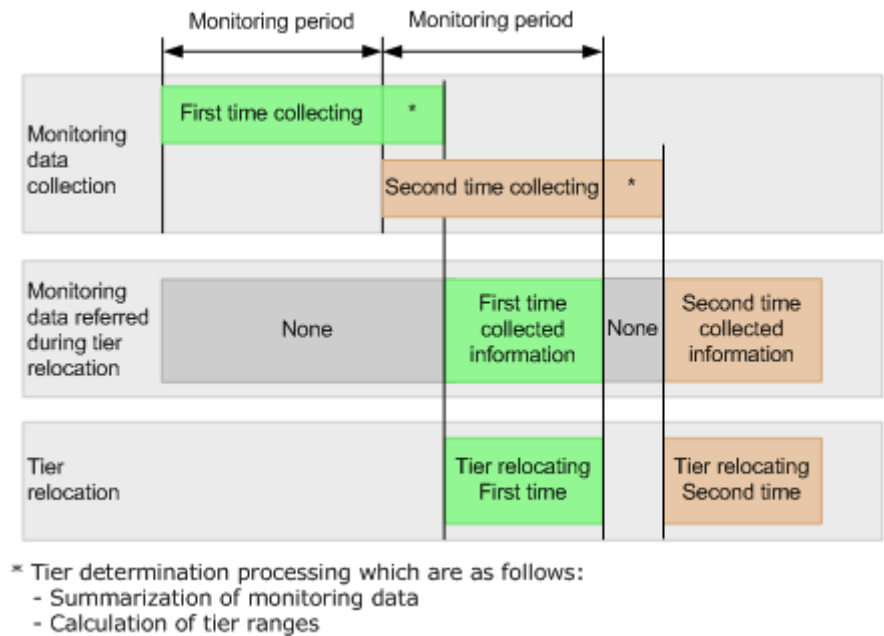


Figure 5-6 Collection of monitoring data to tier relocation workflow in Auto execution mode

In auto execution mode, the collection of monitoring data and tier relocation operations is performed in parallel in the next cycle. Data from these parallel processes are stored in two fields:

- Data while monitoring is in progress in the next cycle.
- Fixed monitoring information used in the tier relocation.

Manual execution mode

You can start and stop performance monitoring and tier relocation at any time. Keep the duration of performance monitoring to less than 7 days (168 hours). If performance monitoring exceeds 7 days, monitoring stops automatically.

Manual execution mode manages monitoring and relocation when the command is issued. You can use scripts to manage tasks based on a schedule for each day of the week.

In manual execution mode, the next monitoring cycle can be started with the collection of monitoring data and tier relocation operations performed in parallel. Data from these parallel processes are stored in two separate fields:

- Data while monitoring is in progress in the next cycle.
- Fixed monitoring information used in the tier relocation.

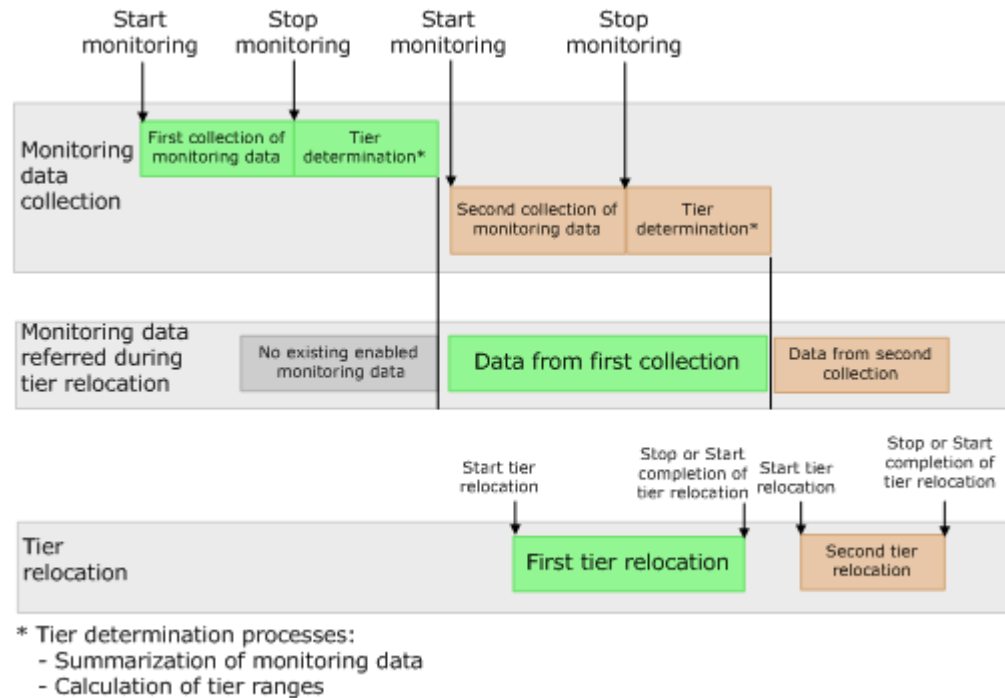


Figure 5-7 Collection of monitoring data to tier relocation workflow in manual execution mode

Case 1: If the second collection of the monitoring information finishes during the first tier relocation, the latest monitoring information is the second collection. In that case, the first collection of monitoring information is referenced only after the first tier relocation completes.

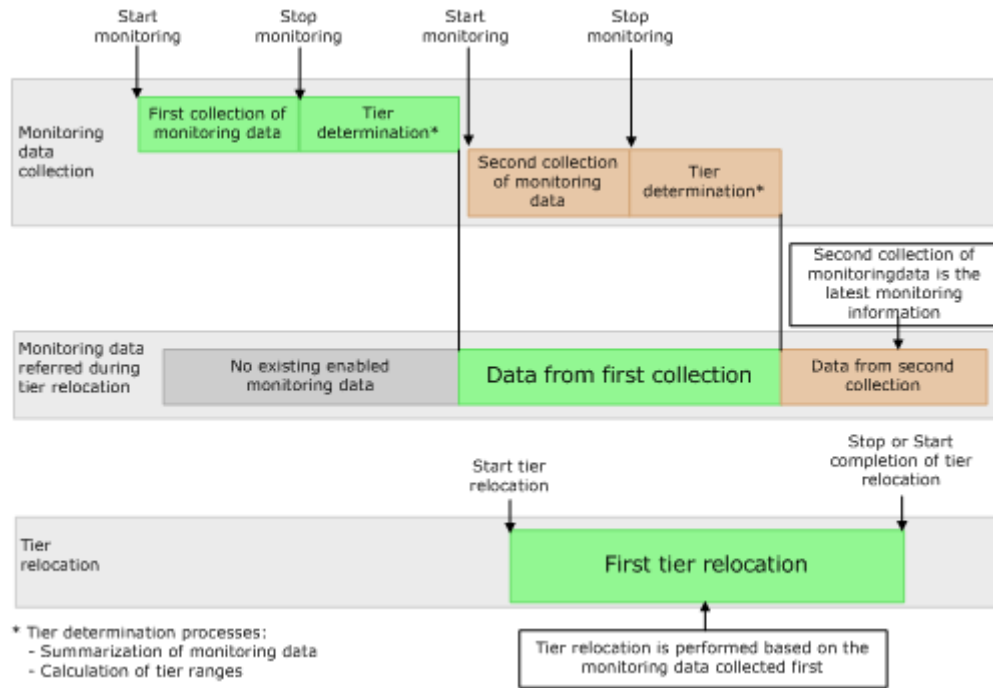


Figure 5-8 Second collection of monitoring information finishes before the first tier relocation completes

Case 2: When tier relocation is performed with the first collection of monitoring information, the second collection of monitoring information can be performed. However, the third collection cannot start. Because only two fields store collected monitoring information, the third collection cannot be overwritten.

In that case, the third collection of the monitoring information starts after the first tier relocation stops or tier relocation completes.

Monitoring information also does not start under these conditions:

- When the second tier relocation is performed, the fourth collection of monitoring information cannot start.
- When the third tier relocation is performed, the fifth collection of monitoring information cannot start.

If such conditions exist, two cycles of monitoring information cannot be collected continuously while tier relocation is performed.

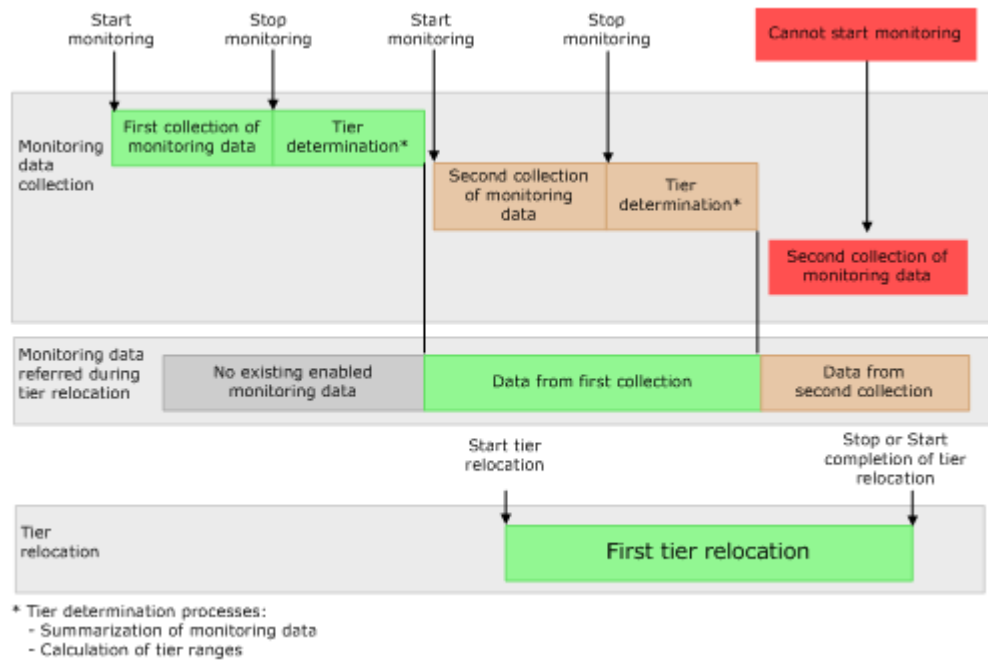
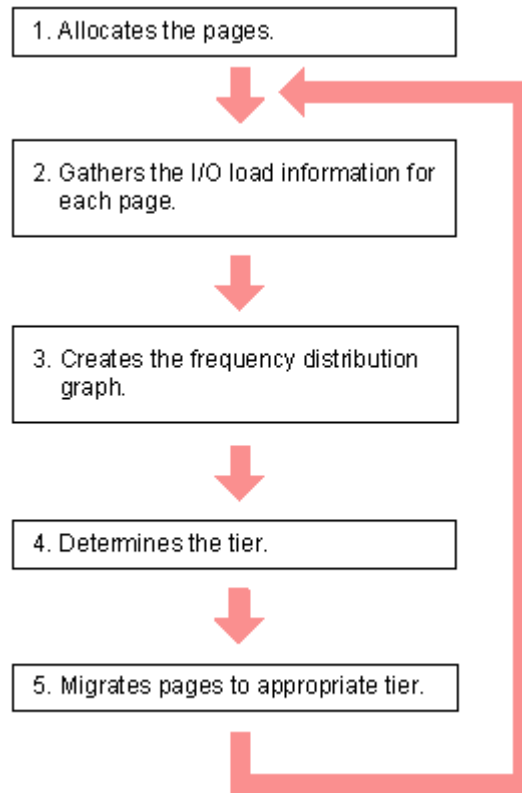


Figure 5-9 Third collection of monitoring information while tier relocation is performed

Tier relocation workflow

The following figure shows the flow of allocating new pages and migrating them to the appropriate tier. The combination of determining the appropriate storage tier and migrating the pages to the appropriate tier is referred to as tier relocation.



Explanation of the relocation flow:

1. **Allocate pages and map them to DP-VOLs**

Pages are allocated and mapped to DP-VOLs on an on-demand basis. Page allocation occurs when a write is performed to an area of any DP-VOL that does not already have a page mapped to that location. Normally, a free page is selected for allocation from an upper tier with a free page. If the capacity of the upper tier is insufficient for the allocation, the left over pages are allocated to the nearest lower tier. A DP-VOL set to a tier policy is assigned a new page that is based on the tier policy setting. The relative tier for new page allocations can be specified during operations to create and edit LDEVs. If the capacity of all the tiers is insufficient, an error message is sent to the host.

2. **Gather I/O load information of each page**

Performance monitoring gathers monitoring information of each page in a pool to determine the physical I/O load per page in a pool. I/Os associated with page relocation, however, are not counted.

3. **Create frequency distribution graph**

The frequency distribution graph, which shows the relationship between I/O counts (I/O load) and capacity (total number of pages), is created. You can use the **View Tier Properties** window to view this graph. The vertical scale of the graph indicates ranges of I/Os per hour, and the horizontal scale indicates a capacity that received the I/O level. Note that the horizontal scale is accumulative.



Caution: When the number of I/Os is counted, the number of I/Os satisfied by cache hits are not counted. Therefore, the number of I/Os counted by Performance Monitoring is different from the number of I/Os from the host. The number of I/Os per hour is shown in the graph. If the monitoring time is less than an hour, the number of I/Os shown in the graph might be higher than the actual number of I/Os.

For details about a frequency distribution graph, see [View Tier Properties window on page D-58](#).

Monitoring mode settings (see [Monitoring modes on page 5-40](#)) of Period or Continuous influences the values shown on the performance graph. Period mode reports the most recent completed monitor cycle I/O data on the performance graph. Continuous mode reports a weighted average of I/O data that uses recent monitor cycle data, along with historical data on the performance graph.

4. **Determine the tier range values**

The page is allocated to the appropriate tier according to performance monitoring information. The tier is determined as follows.

a. Determine the tier boundary

The tier range value of a tier is calculated using the frequency distribution graph. This acts as a boundary value that separates tiers.

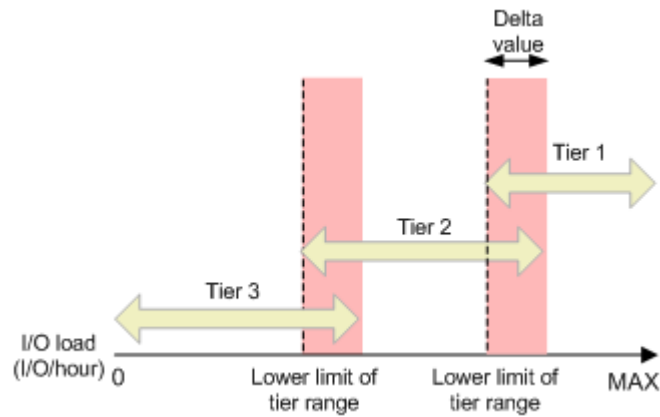
The pages of higher I/O load are allocated to the upper tier in sequence. Tier range is defined as the lowest I/Os per hour (IOPH) value at which the total number of stored pages matches the capacity of the target tier (less some buffer percentage) or the IOPH value that will reach the maximum I/O load that the tier should process. The maximum I/O load that should be targeted to a tier is the limit performance value, and the rate of I/Os to the limit performance value of a tier is called the performance utilization percent. If the performance utilization percent shows 100%, the target I/O load to a tier exceeds the predicted limit performance value.



Caution: The limit performance value is proportional to the capacity of the pool volumes used in the tier. Use the total capacity of the parity group for a pool to improve the limit performance.

b. Determine the tier delta values

The tier range values are set as the lower limit boundary of each tier. The delta values are set above and below the tier boundaries (+10% to 20%) to prevent pages from being migrated unnecessarily. If all pages subject to tier relocation can be contained in the upper tier, both the tier range value (lower limit) and the delta value are zero.



- c. Determine the target tier of a page for relocation.
The IOPH recorded for the page is compared against the tier range value to determine the tier to which the page moves.

5. **Migrate the pages**

The pages move to the appropriate tier. After migration, the page usage rates are averaged in all tiers. I/Os occurring in the page migration are not monitored.

Tier relocation rules, restrictions, and guidelines

Rules

- Performance monitoring, using both Auto and Manual execution modes, observes the pages that were allocated to DP-VOLs prior to the start of the monitoring cycle and the new pages allocated during the monitoring cycle. Pages that are not allocated during performance monitoring are not candidates for tier relocation.
- Tier relocation can be performed concurrently on up to eight pools. If more than eight pools are specified, relocation of the ninth pool starts after relocation of any of the first eight pools completes.
- If Auto execution mode is specified, performance monitoring can stop about one minute before to one minute after the beginning of the next monitor cycle start time.
- The amount of relocation varies per cycle. In some cases, the cycle can end before all relocation can be handled. If tier relocation does not finish completely within the cycle, relocation to appropriate pages is executed in the next cycle.
- Calculating the tier range values is influenced by the capacity allocated to DP-VOLs with relocation disabled and the buffer reserve percentages.
- While a pool-VOL is being deleted, tier relocation is not performed. After the pool-VOL deletion completes, tier relocation starts.
- Frequency distribution is unavailable when there is no data provided by performance monitoring.
- While the frequency distribution graph is being created or the tier range values are being calculated, the frequency distribution graph is not

available. The time required for determining the tier range values varies depending on the number of DP-VOLs and total capacity. The maximum time is about 20 minutes.

- To balance the usage levels of all parity groups, rebalancing can be performed after several tier relocation operations. If rebalancing is in progress, the next cycle of tier relocation might be delayed.

For details about rebalancing, see [Rebalancing the usage level among parity groups on page 5-64](#).

Performance monitoring or tier relocation conditions

The status of data collection, fixed monitoring, and tier relocation operations are described in the following table. The latest fixed monitoring information is referenced when tiers are relocated.

Monitoring information or execution conditions	Status of data collection in progress	Status of fixed monitoring information used in tier relocation	Tier relocation operations	Solutions
Unallocated pages.	Pages are not monitored.	No monitoring information on pages.	Tiers of the pages are not relocated.	Unnecessary. After the pages are allocated, monitoring and relocation are performed automatically.
Zero data is discarded during data monitoring.	Monitoring on pages is reset.	Only monitoring information on pages is invalid.	Tiers of the pages are not relocated.	Unnecessary. After the pages are allocated, monitoring and relocation are performed automatically.
V-VOL settings do not allow tier relocation.	Volume is monitored.	Monitoring information on the volume is valid.	If the tier relocation setting is being disabled at the performance monitoring finish time, tiers of the volume are not relocated.	N/A
When V-VOLs are deleted	Volume is not monitored.	Only monitoring information on the volume is invalid.	Tier relocation of the volume is suspended.	N/A
When execution mode is	Suspended.	Monitoring information collected before	Suspended.	Collect the monitoring

Monitoring information or execution conditions	Status of data collection in progress	Status of fixed monitoring information used in tier relocation	Tier relocation operations	Solutions
changed to Manual from Auto or vice versa.		suspension is valid.		information again if necessary. ¹
When the power switch is power ON or OFF.	Monitoring is suspended by powering OFF and is not resumed even after powering ON. ¹	Monitoring information collected during the previous cycle is valid.	Tier relocation is suspended by powering OFF and is resumed after powering ON.	Collect the monitoring information again if necessary. ¹
- When Volume Migration is performed. - When Quick Restore of ShadowImage is performed.	The monitoring information of the volume is not collected at the present moment. In the next monitoring period, the monitoring information will be collected.	Monitoring information is invalid and the volumes must be monitored.	Tier relocation to volumes is suspended.	Collect the monitoring information again if necessary. ¹
S-VOL of the following program products when the initial copy operation is performed: - TrueCopy - Global-active device - Universal Replicator	Monitoring information is continuously collected, but the monitoring of the volumes is reset. ²	No effect on the fixed monitoring information. The monitoring information collected during the previous cycle continues to be valid.	Tier relocation to volumes is suspended.	Collect the monitoring information again if necessary. ¹
- When the number of tiers increases by adding pool-VOLs. - When the pool-VOLs of the tiers are switched by adding pool-VOLs.³	Continued.	Fixed monitoring information is invalid because the monitoring information has been discarded. If the monitoring mode is set to continuous mode, weighted data calculated by using the monitoring information in	Suspended.	Relocate tiers again. ¹

Monitoring information or execution conditions	Status of data collection in progress	Status of fixed monitoring information used in tier relocation	Tier relocation operations	Solutions
- When pool-VOLs are deleted. - When tier rank of the external LDEV is changed.		past periods is also discarded.		
When the pool-VOLs are deleted.	Continued.	Monitoring information is temporarily invalid. The monitoring information is calculated again after deleting pool-VOLs. ⁴	Deleting the pool-VOL stops the tier relocation. The process resumes after the pool-VOL is deleted.	N/A
When a cache is blocked.	Continued.	No effect on the fixed monitoring information. The monitoring information collected during the previous cycle continues to be valid.	Suspended.	After recovering the faulty area, relocate tiers again. ¹
When an LDEV is blocked (Pool-VOL or V-VOL).	Continued.	No effect on the fixed monitoring information. The monitoring information collected during the previous cycle continues to be valid.	Suspended.	After recovering the faulty area, relocate tiers again. ¹
When the pool is almost full during relocation.	Continued.	No effect on the fixed monitoring information. The monitoring information collected during the previous cycle continues to be valid.	Suspended.	Add pool-VOLs, then collect monitoring information and relocate tiers again. ¹
When execution mode is Auto and the execution cycle	At the end time of execution cycle, data monitoring stops.	The monitoring information collected before monitoring	Suspended.	Unnecessary. The relocation is performed automatically in the next cycle.

Monitoring information or execution conditions	Status of data collection in progress	Status of fixed monitoring information used in tier relocation	Tier relocation operations	Solutions
ends during tier relocation.		performance stops is valid.		
When execution mode is Manual and 7 days elapse after monitoring starts.	Suspended.	The monitoring information collected before suspension is valid.	Continued.	Collect the monitoring information again if necessary. ¹
Notes: 1. The execution mode is Auto or the script is written in manual execution mode, information is monitored again and tiers are relocated automatically. 2. All pages of the S-VOLs are not allocated, and the monitoring information of the volume is reset. After the page is allocated to the new page, the monitoring information is collected. 3. Example: Pool-VOLs of SAS15K are added to the following configuration: - Configuration 1 (before change): Tier 1 is SSD, Tier 2 is SAS10K, and Tier 3 is SAS7.2K. - Configuration 2 (after change): Tier 1 is SSD, Tier 2 is SAS15K, and Tier 3 is SAS10K and SAS7.2K. 4. The monitoring information status is changed from invalid (INV) to calculating (PND). After calculations are complete, the monitor information status is changed from calculating (PND) to valid (VAL).				

Buffer area of a tier

Dynamic Tiering uses buffer percentages to reserve pages for new page assignments and to allow the tier relocation process. Areas necessary for processing these operations are distributed corresponding to settings used by Dynamic Tiering . The following describes how processing takes place to handle the buffer percentages.

Buffer space: The following table shows the default rates (rate to capacity of a tier) of buffer space used for tier relocation and new page assignments, listed by drive type.

Drive type	Buffer area for tier relocation	Buffer area for new page assignment	Total
SSD	2%	0%	2%
Non-SSD	2%	8%	10%

New page assignment: New pages are assigned based on a number of optional settings. Pages are then assigned to the next lower tier, leaving a buffer area (2% per tier by default) for tier relocation. When 98% of capacity

of all tiers is assigned, the remaining 2% of the buffer space is assigned from the upper tier. The buffer space for tier relocation is 2% in all tiers. The following shows the workflow of new page assignment.

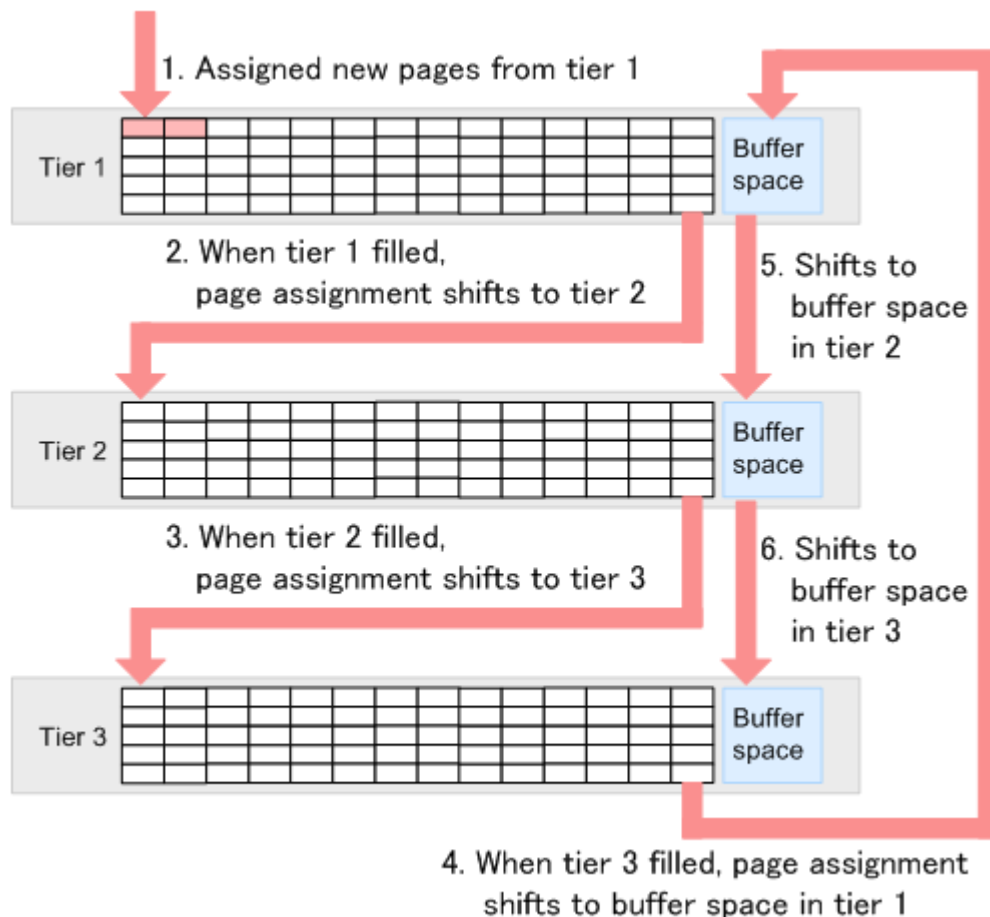


Figure 5-10 Workflow of a new page assignment

Setting external volumes for each tier

If you use external volumes as pool-VOLs, you can put the external volumes in tiers by setting the **External LDEV Tier Rank** for the external volumes. The **External LDEV Tier Rank** consists of the following three types: **High**, **Middle**, and **Low**. The following examples describe how tiers can be configured:

Example 1: Configuring tiers by using external volumes only

Tier 1: External volumes (**High**)

Tier 2: External volumes (**Middle**)

Tier 3: External volumes (**Low**)

Example 2: Configuring tiers by combining internal volumes and external volumes

Tier 1: Internal volumes (SSD)

Tier 2: External volumes (**High**)

Tier 3: External volumes (**Low**)

You can set the **External LDEV Tier Rank** when creating the pool, changing the pool capacity, or setting the **Edit External LDEV Tier Rank** window. The following table explains the performance priority (from the top) of data drives.

Priority	Data drive type
1	SSD
2	SAS 15K RPM
3	SAS 10K RPM
4	SAS 7.2K RPM
5	External volume* (High)
6	External volume* (Middle)
7	External volume* (Low)
*Displays as External Storage in the Drive Type/RPM .	

Reserved pages for relocation operation: A small percentage of pages, normally two, are reserved per tier to allow relocation to operate. These are the buffer spaces for tier relocation.

Tier relocation workflow: Tier relocation is performed taking advantage of the buffer space allocated for tier relocation, as mentioned previously. Tier relocation is also performed to secure the space reserved in each tier for new page assignment. The area is called the buffer space for new page assignments. When tier relocation is performed, Dynamic Tiering reserves buffer spaces for relocation and new page assignment.

During relocation, a tier can temporarily be assigned when the buffer space exceeds 98% of capacity under the allowance for the buffer areas.

Execution modes for tier relocation

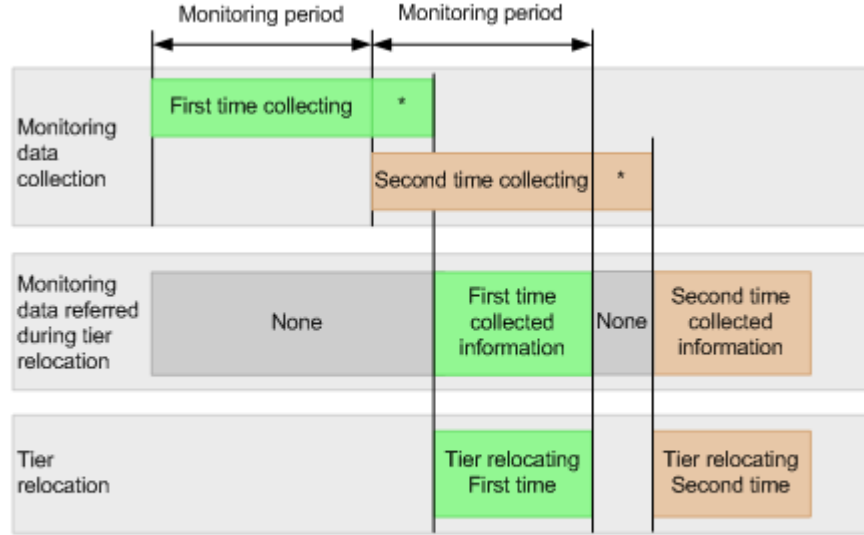
Execution modes when using Hitachi Device Manager - Storage Navigator

Dynamic Tiering relocates tier using Auto or Manual execution mode. You can switch modes using Hitachi Device Manager - Storage Navigator .

Auto execution mode

In Auto execution mode, the system automatically and periodically collects monitoring data and performs tier relocation. You can select an Auto execution cycle of 0.5, 1, 2, 4, or 8 hours, or a specified time.

The following shows tier relocation processing in a 2-hour Auto execution mode:



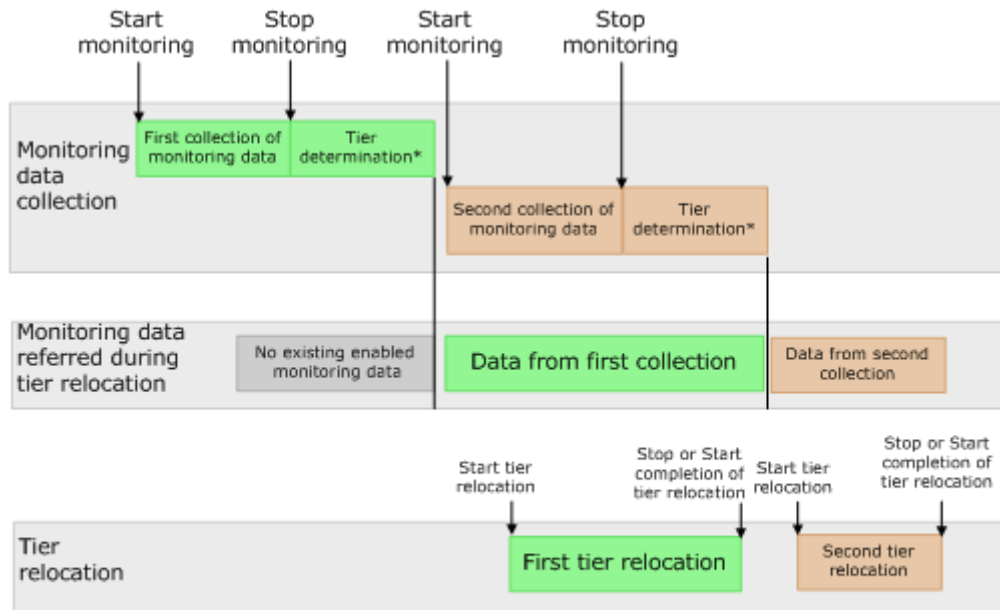
* Tier determination processing which are as follows:
- Summarization of monitoring data
- Calculation of tier ranges

Manual execution mode

In Manual execution mode, you can manually collect monitoring data and relocate a tier. You can issue commands to manually:

1. Start monitoring.
2. Stop monitoring.
3. Perform tier relocation.

The following shows tier relocation processing in Manual execution mode:



* Tier determination processes:
 - Summarization of monitoring data
 - Calculation of tier ranges

Notes on performing monitoring

- You can collect the monitoring data during relocation.
- After stopping the monitoring, the tier range is automatically calculated.
- The latest available monitoring information, which is collected before the relocation is performed, is used for the relocation processing.
- When the relocation is performed, the status of the monitor information must be valid.

Viewing monitor and tier relocation information:

Information is displayed on the following items in the GUI windows:

- **Monitoring Status** on [Pools window on page D-3](#), [Pools: Volume tabs on page D-10](#), and [View Pool Management Status window on page D-71](#).

Displays the status of pool monitoring.

- In Progress: The monitoring is being performed.
 - During Computation: The calculating is being processed.
- For other cases, a hyphen (-) displays.

- **Recent Monitor Data** on [Pools window on page D-3](#) and [Pools: Volume tabs on page D-10](#).

Displays the latest monitoring data.

- If the monitoring data exists, the monitoring period of time is displayed.

Example: 2010/11/15 00:00 - 2010/11/15 23:59

- If the monitoring data is being obtained, only the starting time is displayed.
Example: 2010/11/15 00:00 -
 - If the latest monitoring data does not exist, a hyphen (-) is displayed.
- **Pool Management Task** on [Pools window on page D-3](#) and [Pools: Volume tabs on page D-10](#).
Displays the pool management task being performed to the pool.
 - **Waiting for Relocation:** The tier relocation process is waiting.
 - **Relocating:** The tier relocation process is being performed.
For details about the relocation progress rate, check the tier relocation log. For more information about the table item for the tier relocation log file, see [Tier relocation log file contents on page 5-42](#).
- **Pool Management Task (Status/Progress)** on [View Pool Management Status window on page D-71](#).
Displays the status of the pool management task being performed, each V-VOL progress ratio in the pool and its average.
 - **Waiting for Relocation:** The tier relocation process is waiting.
 - **Relocating:** The tier relocation process is being performed.
For details about the relocation progress rate, check the tier relocation log. For more information about the table item for the tier relocation log file, see [Tier relocation log file contents on page 5-42](#).
- **Relocation Result** on [Pools window on page D-3](#), [Pools: Volume tabs on page D-10](#), and [View Pool Management Status window on page D-71](#).
Displays the status of the tier relocation processing.
 - In Progress: The status of **Pool Management Task** is **Waiting for Relocation** or **Relocating**.
 - Completed: The tier relocation operation is not in progress, or the tier relocation is complete.
 - Uncompleted (n% relocated): The tier relocation is suspended at the indicated percentage progression.
 - Hyphen (-): The pool is not a Dynamic Tiering pool.
- **Relocation Speed** on [Pools window on page D-3](#), [View Pool Management Status window on page D-71](#), [Create Pools window on page D-22](#), [Edit Pools window on page D-35](#), [Start Tier Relocation window on page D-68](#), and [Stop Tier Relocation window on page D-69](#).
Displays the tier relocation speed settings: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), and 5(Fastest).
- **Relocation Priority** on [Pools: Volume tabs on page D-10](#) and [View Pool Management Status window on page D-71](#).
Displays the relocation priority.
 - **Prioritized:** The priority is set to V-VOL.
 - Blank: The priority is not set to V-VOL.

- Hyphen (-): V-VOL is not the Dynamic Tiering V-VOL or the tier relocation function is disabled.
- **Performance Graph** on [View Tier Properties window on page D-58](#).
The performance graph for the available monitor information is displayed in the **View Tier Properties** window.

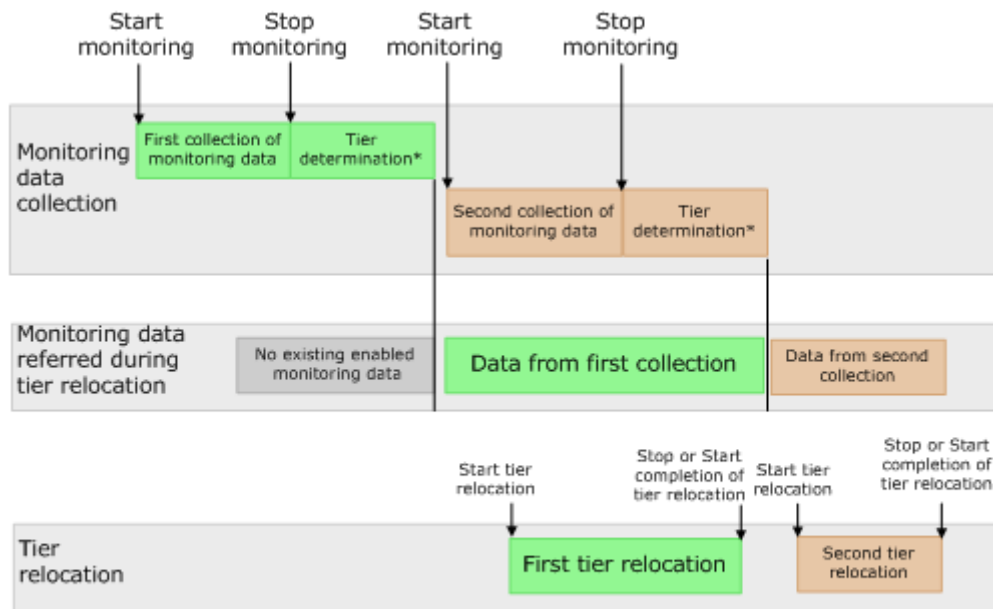
Execution modes when using Command Control Interface

Manual execution mode

In Manual execution mode, you can manually collect monitoring data and relocate a tier. You can execute commands to do the following:

1. Start monitoring.
2. Stop monitoring.
3. Perform tier relocation.

The following shows tier relocation processing when in Manual execution mode:



* Tier determination processes:
- Summarization of monitoring data
- Calculation of tier ranges

Notes on performing monitoring

- You can collect the monitoring data even while performing the relocation.
- After stopping the monitoring, the tier range is automatically calculated.
- The latest available monitoring information, which is collected before the relocation is performed, is used for the relocation processing.
- When the relocation is performed, the status of the monitor information must be valid.

Viewing monitor and tier relocation information:

If the `raidcom get dp_pool` command is executed with the `-key opt` option specified, the monitoring information and tier relocation information are displayed. For details about the `raidcom get dp_pool` command, see *Command Control Interface Command Reference*. Items are displayed as follows:

- STS
This item displays the operational status of the performance monitor and the tier relocation.
 - STP: The performance monitor and the tier relocation are stopped.
 - RLC: The performance monitor is stopped. The tier relocation is operating.
 - MON: The performance monitor is operating. The tier relocation is stopped.
 - RLM: The performance monitor and the tier relocation are operating.
- DAT
This item displays the status of the monitor information.
 - VAL: Valid.
 - INV: Invalid.
 - PND: Being calculated.
- R(%)
This item displays the progress percentage of tier relocation.
0 to 99: Shows one of the following statuses.
 - When the value of STS is RLC or RLM: Relocation is in progress.
 - When the value of STS is STP or MON: Relocation is suspended at the indicated percentage progression.
100: Shows if the relocation operation is not in progress, or the relocation is complete.

Relocation speed

Relocation speed: The page relocation speed can be set to 1(Slowest), 2(Slower), 3(Standard), 4(Faster), and 5(Fastest). The default is 3(Standard). To perform tier relocation at high speed, use the 5(Fastest) setting. If you set a speed that is slower than **3(Standard)**, the load to data drives is low when tier relocation is performed.

Based on the number of the parity groups that constitute a pool, this function adjusts the number of V-VOLs for which tier relocation can be performed at one time. Tier relocation can be performed on as many as 32 V-VOLs in a storage system at once.

After changing the setting, the relocation speed does not change and the data drive load can not change in the following cases:

- The number of parity groups is very few.

- The number of V-VOLs associated with the pool is very few.
- Tier relocations are being performed on the multiple pools.

Monitoring modes

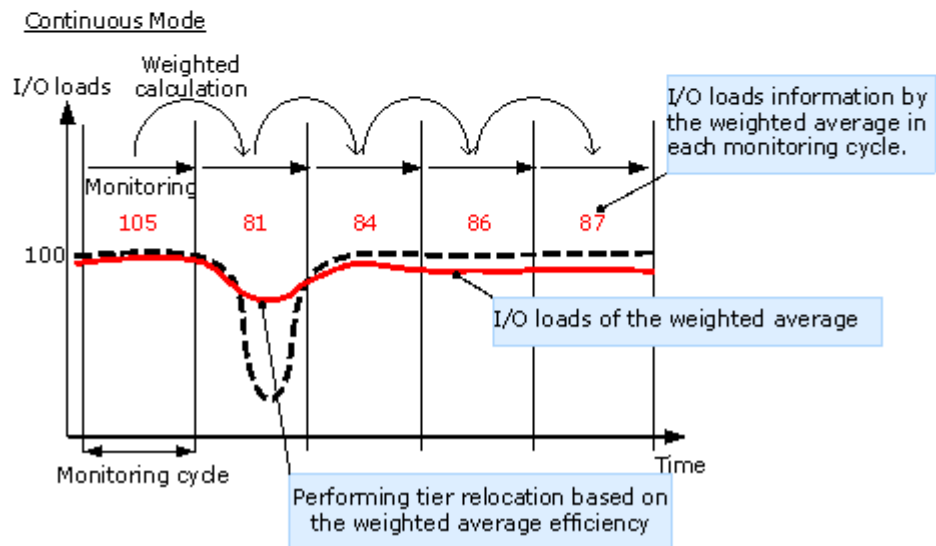
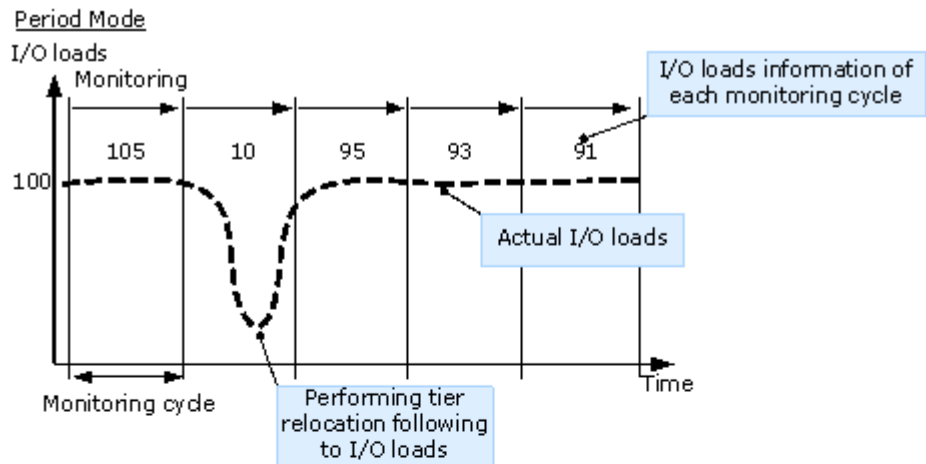
When you create or edit a pool, specify the Dynamic Tiering monitoring mode. The monitoring mode is either the period mode or the continuous mode. If you change the mode from the one to the other while performing the monitoring, the changed setting becomes effective when the next monitoring starts.

Period mode

Period mode is the default setting. If Period mode is enabled, tier range values and page relocations are determined based on the monitoring data from the last complete cycle. Relocation is performed according to any changes in I/O loads. However, if the I/O loads vary significantly, relocation can not finish in one cycle.

Continuous mode

If Continuous mode is enabled, by weighting the latest monitoring information and the collected monitoring information in the past cycles, the weighted average efficiency is calculated. By performing the tier relocation based on the weighted average efficiency, even if a temporary decrease or an increase of the I/O load occurs, unnecessary relocation can be avoided.



Cautions when using monitoring modes

- If Continuous mode is used, best practice is to collect monitoring information using the following execution modes:
 - Auto execution mode
 - Manual execution mode with collecting the periodic monitoring information by defining a script using CCI

If the Manual execution mode is used without scripts, the Continuous monitoring mode can be set. However, in this case, unexpected results can be calculated because the weighted average efficiency is calculated based on very different duration (short and long) periods information obtained in the past cycles.

- When the monitoring mode is set to Continuous, the frequency distributions are displayed for each pool and V-VOL calculated by using the monitor value on which the weighted calculation is done.

These calculated values are the predictive values for the next cycle after successfully relocating all pages. Therefore, these values can differ from an actual monitoring result when they appear.

In **Performance Utilization** of each tier, regardless of the type of the monitoring mode setting, the monitor values that were collected in the current cycle display.

If you switch the monitoring mode from Period to Continuous or from Continuous to Period, the current cycle's monitoring data that is being collected is not discarded. However, the data calculated by using past monitor cycle information on which the weighted calculation is done is reset.

Downloading the tier relocation log file

The Storage Administrator (Provisioning) role is required to perform this task.

You can download the log file that contains the results of past tier relocations. See [Tier relocation log file contents on page 5-42](#) for information about the contents of the log.

1. Perform one of the following to operate **Tier Relocation Log Export**.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**. On the **Pools** tab, click **More Actions** and select **Tier Relocation Log Export**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**. In the **Pools** tab, click **More Actions** and select **Tier Relocation Log Export**.
 - From the **Actions** menu, select **Pool management > Tier Relocation Log Export**.
2. In the dialog box, specify a folder for the log file you download and click **Save**.

If you change the file name from the default, make sure the file name is appended with the .tsv extension before saving the file.

Tier relocation log file contents

In every cycle in which tier relocation is performed, information about each pool and V-VOL is exported to the tier relocation log. The time required to incorporate the latest tier relocation results can be approximately 30 minutes. The tier relocation log file is tab-delimited and contains the following information.

Item	Does each pool output the log information?	Does each V-VOL output the log information?	Type of information	Description
Cycle ID	Yes	Yes	Common	ID of each cycle of a tier relocation. A common ID is allocated to pool logs and V-VOL logs that are collected in one cycle.
Log Format Version	Yes	Yes	Common	Version number of the tier relocation log format.
DKC Serial Number	Yes	Yes	Common	Serial number of the storage system.
Log Type	Yes	Yes	Common	The following log types are displayed. POOL: Log information of each pool. V-VOL: Log information of each V-VOL.
LDEV ID	No	Yes	Common	LDEV ID of a V-VOL exported to a log.
Pool ID	Yes	Yes	Common	Pool ID of a pool exported to a log.
Num of V-VOLs	Yes	No	Common	The number of V-VOLs to be processed when tier relocation is performed.
Tiering Policy	No	Yes	Tier relocation result	Value of the tiering policy. Values from All(0) to Level31(31) can be displayed.
Tier1 Total	Yes	No	Capacity information	Total pages of tier 1.
Tier2 Total	Yes	No	Capacity information	Total pages of tier 2.
Tier3 Total	Yes	No	Capacity information	Total pages of tier 3.
Tier1 Used	Yes	Yes	Capacity information	Pages assigned to tier 1 at the start of tier relocation.
Tier2 Used	Yes	Yes	Capacity information	Pages assigned to tier 2 at the start of tier relocation.
Tier3 Used	Yes	Yes	Capacity information	Pages assigned to tier 3 at the start of tier relocation.
Start Relocation Date	Yes	Yes ¹	Common	Starting date of the tier relocation.
Start Relocation Time	Yes	Yes ¹	Common	Starting time of the tier relocation.

Item	Does each pool output the log information?	Does each V-VOL output the log information?	Type of information	Description
End Relocation Date	Yes	Yes ¹	Common	Ending date of the tier relocation.
End Relocation Time	Yes	Yes ¹	Common	Ending time of the tier relocation.
Result Status	Yes	Yes ¹	Tier relocation result	Statuses of a tier relocation. Normal End: A tier relocation ended normally. Suspend: A tier relocation suspended.
Detail Status	Yes	Yes ¹	Tier relocation result	If the Result Status is Suspend, one of the following reasons is displayed. Monitor discarded: Suspended due to the discard of monitoring data. End of cycle: Suspended due to incomplete tier relocation during a monitoring cycle. Requested by user: Suspended due to request by a user.² Threshold exceeded: Suspended because the used capacity of pools reaches a threshold due to a tier relocation. When the pool is almost full, this reason is logged. Cache blocked: Suspended because a cache memory is blocked. Volume blocked: Suspended because an LDEV which is pool-VOL or V-VOL is blocked. The tier management changed (Auto/Manual): Suspended because the tier management mode is changed from Auto to Manual, or Manual to Auto. Other reasons: Suspended for reasons other than the above, such as: • A V-VOL was specified as the secondary volume of the TrueCopy pair and an initial copy operation was performed. • A V-VOL was specified as the secondary volume of the

Item	Does each pool output the log information?	Does each V-VOL output the log information?	Type of information	Description
				global-active device pair, and an initial copy operation was performed. A V-VOL was specified as the secondary volume of the Universal Replicator pair, and an initial copy operation was performed.
Completed Rate (%)	Yes	Yes	Tier relocation result	Progress percentage rate at the time tier relocation ends or is suspended.
Remediation Rate (%)	Yes	Yes	Tier relocation result	IOPH (I/O per hour) remediation rate at the time tier relocation ends or is suspended. The remediation rate = ((Total IOPH of pages after the promotion¹) / (Total IOPH of all pages to be performed of promotion¹)) * 100 1: Promotion is the page migration from a lower to higher tier.
Planned Tier1->Tier2	Yes	Yes	Tier relocation	Number of pages that are planned to move from the tier 1 to tier 2.
Planned Tier1->Tier3	Yes	Yes	Tier relocation	Number of pages that are planned to move from the tier 1 to tier 3.
Planned Tier2->Tier1	Yes	Yes	Tier relocation	Number of pages that are planned to move from the tier 2 to tier 1.
Planned Tier2->Tier3	Yes	Yes	Tier relocation	Number of pages that are planned to move from the tier 2 to tier 3.
Planned Tier3->Tier1	Yes	Yes	Tier relocation	Number of pages that are planned to move from the tier 3 to tier 1.
Planned Tier3->Tier2	Yes	Yes	Tier relocation	Number of pages that are planned to move from the tier 3 to tier 2.
Moved Tier1->Tier2	Yes	Yes	Tier relocation	Number of pages that are moved from the tier 1 to tier 2.
Moved Tier1->Tier3	Yes	Yes	Tier relocation	Number of pages that are moved from the tier 1 to tier 3.

Item	Does each pool output the log information?	Does each V-VOL output the log information?	Type of information	Description
Moved Tier2->Tier1	Yes	Yes	Tier relocation	Number of pages that are moved from the tier 2 to tier 1.
Moved Tier2->Tier3	Yes	Yes	Tier relocation	Number of pages that are moved from the tier 2 to tier 3.
Moved Tier3->Tier1	Yes	Yes	Tier relocation	Number of pages that are moved from the tier 3 to tier 1.
Moved Tier3->Tier2	Yes	Yes	Tier relocation	Number of pages that are moved from the tier 3 to tier 2.
IOPH	Yes	Yes	Monitoring result	IOPHs of all pools or V-VOLs.
IOPH Tier1 (%)	Yes	Yes	Monitoring result	Percentage of IOPH for tier 1.
IOPH Tier2 (%)	Yes	Yes	Monitoring result	Percentage of IOPH for tier 2.
IOPH Tier3 (%)	Yes	Yes	Monitoring result	Percentage of IOPH for tier 3.
Performance Util Tier1 (%)	Yes	No	Monitoring result	Performance utilization of tier 1. The performance utilization is the current I/O percentage based on the maximum performance of tier 1.
Performance Util Tier2 (%)	Yes	No	Monitoring result	Performance utilization of tier 2. The performance utilization is the current I/O percentage based on the maximum performance of tier 2.
Performance Util Tier3 (%)	Yes	No	Monitoring result	Performance utilization of tier 3. The performance utilization is the current I/O percentage based on the maximum performance of tier 3.
Tier1 Low Range	No	Yes	Monitoring result	Lower limit in a range for tier 1.
Tier2 High Range	No	Yes	Monitoring result	Higher limit in a range for tier 2.
Tier2 Low Range	No	Yes	Monitoring result	Lower limit in a range for tier 2.
Tier3 High Range	No	Yes	Monitoring result	Higher limit in a range for tier 3.
Reclaim Zero Page Num	Yes	Yes	Tier relocation	Number of pages processed in an operation to reclaim zero pages.

Item	Does each pool output the log information?	Does each V-VOL output the log information?	Type of information	Description
Non-Compliant Tiering Policy Number	Yes	No	Monitoring result	Number of a tiering policy that does not conform to the current tier configuration. A non-compliant policy prevents tier relocation.
Realtime Moved Tier2->Tier1 (Unplanned)	Yes	Yes	Tier relocation	Number of pages moved from tier 2 to tier 1 by active flash, during the performing of the tier relocation by Dynamic Tiering. However, the pages migration is not planned by Dynamic Tiering.
Realtime Moved Tier3->Tier1 (Unplanned)	Yes	Yes	Tier relocation	Number of pages moved from tier 3 to tier 1 by active flash, during the performing of the tier relocation by Dynamic Tiering. However, the pages migration is not planned by Dynamic Tiering.
Realtime Moved Tier2->Tier1 (Planned)	Yes	Yes	Tier relocation	Number of pages moved from tier 2 to tier 1 by active flash, during the performing of the tier relocation by Dynamic Tiering. And the pages migration is planned by Dynamic Tiering.
Realtime Moved Tier3->Tier1 (Planned)	Yes	Yes	Tier relocation	Number of pages moved from tier 3 to tier 1 by active flash, during the performing of the tier relocation by Dynamic Tiering. And the pages migration is planned by Dynamic Tiering.
Realtime Moved Tier1->Tier2	Yes	Yes	Tier relocation	Number of pages moved from tier 1 to tier 2 by active flash, during the performing of the tier relocation for Dynamic Tiering.
Realtime Moved Tier1->Tier3	Yes	Yes	Tier relocation	Number of pages moved from tier 1 to tier 3 by active flash, during the performing of the tier relocation for Dynamic Tiering.
Realtime Moved Tier2->Tier1 (Non Compliant)	Yes	Yes	Tier relocation	In the total pages moved from tier 2 to tier 1 by active flash, the number of the migrated pages that are not conformed with the plan of Dynamic Tiering page migration appears.
Realtime Moved Tier3->Tier1 (Non Compliant)	Yes	Yes	Tier relocation	In the total pages moved from tier 3 to tier 1 by active flash, the number of the migrated pages that are not conformed with the

Item	Does each pool output the log information?	Does each V-VOL output the log information?	Type of information	Description
				plan of Dynamic Tiering page migration appears.
Realtime Moved Tier1->Tier2 (Non Compliant)	Yes	Yes	Tier relocation	In the total pages moved from tier 1 to tier 2 by active flash, the number of the migrated pages that are not conformed with the plan of Dynamic Tiering page migration appears.
Realtime Moved Tier1->Tier3 (Non Compliant)	Yes	Yes	Tier relocation	In the total pages moved from tier 1 to tier 3 by active flash, the number of the migrated pages that are not conformed with the plan of Dynamic Tiering page migration appears.
Note 1. If the log file is lfv2 (Log Format Version 2) or later, the log file information of each V-VOL appears. If the log file is lfv 1, a hyphen appears. 2. If pool-VOLs are deleted, valid monitoring information is simultaneously discarded. Therefore, the tier relocation is interrupted. In this case, after pool-VOLs are deleted, the tier determination calculation is executed again and valid monitor information is re-created.				

Tiering policy

The tiering policy function is used to assign a specific storage tier to a specific DP-VOL. A tiering policy specifies subset of tiers that is available to a given set of DP-VOLs.

Tier relocation changes the location of previously stored data. It is performed in conformance with the tiering policy. If a DP-VOL is initially allocated to a low-speed tier and the tiering policy is changed to a high-speed tier, relocation is performed in the next cycle.

For example, if you set the tiering policy level on a V-VOL (DP-VOL) to a tier with a high I/O speed, the data is always stored on the high-speed tier when relocating tiers. When you use that V-VOL (DP-VOL), regardless of the actual size of the I/O load, you can always get high-speed responses. See [Tiering policy expansion on page 5-49](#).

When you create the DP-VOL, you can designate one of six existing tiering policies and define up to 26 new tiering policies. See [Tiering policy expansion on page 5-49](#) and [Setting tiering policy on a DP-VOL on page 5-51](#).

Use the **Edit LDEVs** window to change the tiering policy settings. When tier relocation occurs, the related tiering policy set for the DP-VOL is used to relocate data to the desired tier or tiers.

The tiering policy does not own pool capacity. Rather, pool capacity is shared among tiers. Pages are allocated in order of priority from upper to lower tiers

in a tiering policy. When you specify a new allocation tier, pages are allocated starting from the tier that you specify.

The tier range, frequency distribution, and used capacity are displayed for each tiering policy: existing tier level All(0), Level1(1) through Level5(5), and Level6(6) to Level31(31).

Tiering policy expansion

In the current release, the tiering policy concept has been expanded to provide new options:

- Custom policies. You can define up to 26 new policies (Level6(6) - Level31(31)) in addition to the existing six (All(0), Level1(1), Level2(2), Level3(3), Level4(4), and Level5(5)). See [Setting tiering policy on a DP-VOL on page 5-51](#).

A custom policy can be set for a DP-VOL when it is created and changed, if necessary, after creation.



Note: Custom policies cannot be renamed.

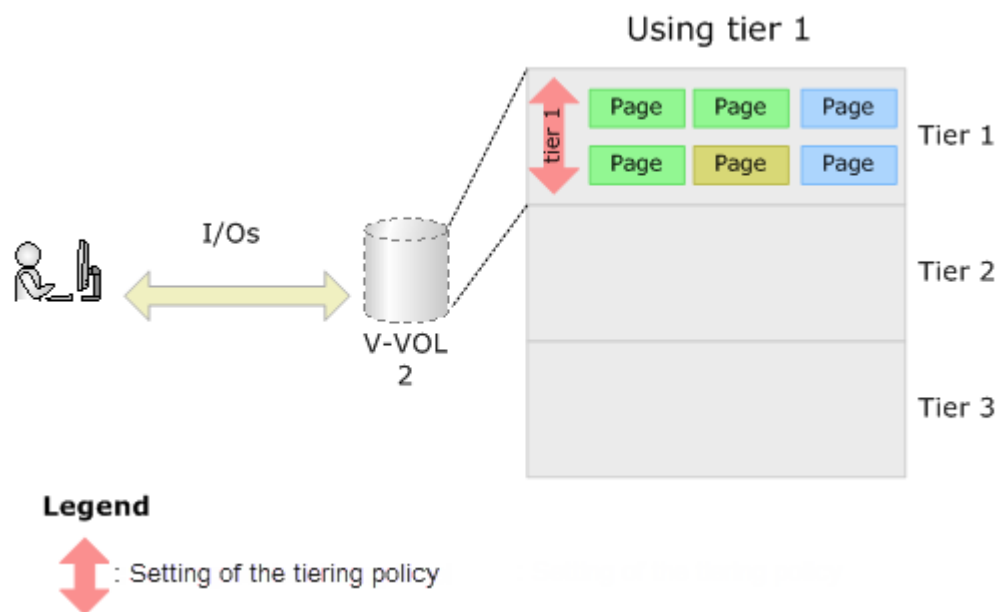
-
- Dynamic Tiering performs relocation while calculating page allocation based on the tiering policy setting of all DP-VOLs that have the same tiering policy in each pool.
 - Max(%) and Min(%) parameters. When a tiering policy is created, 4 types of parameters can be set: Tier1 Max and Tier 1 Min, Tier 3 Max and Tier 3 Min. Each parameter setting is a ratio that corresponds to the total capacity of the allocated area of DP-VOLs that have the same tiering policy set for a pool. See [Tiering policy examples on page 5-49](#).

Tier1 and Tier3 parameter settings can also limit the capacity for all volumes in a configuration that contain multiple DP-VOLs that have the same intended use. These settings can prevent conditions such as the following from occurring.

- Excess allocation of SSD capacity for unimportant applications.
- Degradation in average response time for high performance operations.

Tiering policy examples

The following figure shows the parameter settings Tier1 Max=40%, Tier1 Min=20%, Tier3 Max=40%, and Tier3 Min=20% for a DP-VOL with a Level6(6) setting when the initial mapped capacity of is 100 GB.



Setting tiering policy on a DP-VOL

The setting of a tiering policy for a DP-VOL is optional. If one is not selected, the default is the All(0) tiering policy level. The available levels are listed in [Tiering policy levels on page 5-51](#)). DP-VOLs of different tiering policies can coexist in one pool. If you specify the level of the tiering policy, DP-VOLs with the policy are grouped together.

- All(0) is the default policy. In this case, data is stored to all of the tiers.
- When a tier is added to the pool after setting the tiering policy on a DP-VOL, the DP-VOL is relocated according to the new tier lineup.

For example, if you set the tiering policy to level 5, the data is always allocated to the tier of the low I/O speed. If the pool has two tiers, data is stored in tier 2. If a new tier is added, the number of tiers becomes three and if the new tier is the lowest tier, relocation is performed to move data into tier 3.

For more information about tiering policy and groups, see [Tiering policy levels on page 5-51](#).

Tiering policy levels

Tiering policy	1 tier pool	2 tier pool	3 tier pool	Note
All(0)	Single Tier	Both tiers	All 3 tiers	Default Tiering Policy
Level1(1)	Same as All(0)	Tier 1	Tier 1	Data is located to the Top Tier. Any overflow moves to the next lower tier.
Level2(2)	Same as All(0)	Same as All(0)	Tier 1 and Tier 2	Data is located to the Top Tier after Level1(1) assignments are processed.

Tiering policy	1 tier pool	2 tier pool	3 tier pool	Note
			See note	Any overflow moves to the next lower tier.
Level3(3)	Same as All(0)	Same as All(0)	Tier 2 See note	Data is located to the Middle Tier. Any overflow moves to the top tier.
Level4(4)	Same as All(0)	Same as All(0)	Tier 2 and Tier 3 See note	Data is located to the Middle Tier after Level3(3) assignments are processed. Any overflow moves to the next lower tier.
Level5(5)	Same as All(0)	Tier 2	Tier 3 See note	Data is located to the bottom tier. Any overflow moves to the next higher tier.
From Level6(6) to Level31(31)	Same as All(0)	Depends on user setting	Depends on user setting	
For example: If additional capacity is added to the pool and the capacity defines a new Tier 1 or new Tier 2, then the DP-VOLs with a Level 5(5) assignment will not physically move but Level 5(5) is associated with Tier 3. If additional capacity is added to the pool and the capacity defines a new Tier 3, the DP-VOLs with a Level 5(5) assignment will physically move to the new Tier 3 and Level 5(5) is associated with Tier 3.				

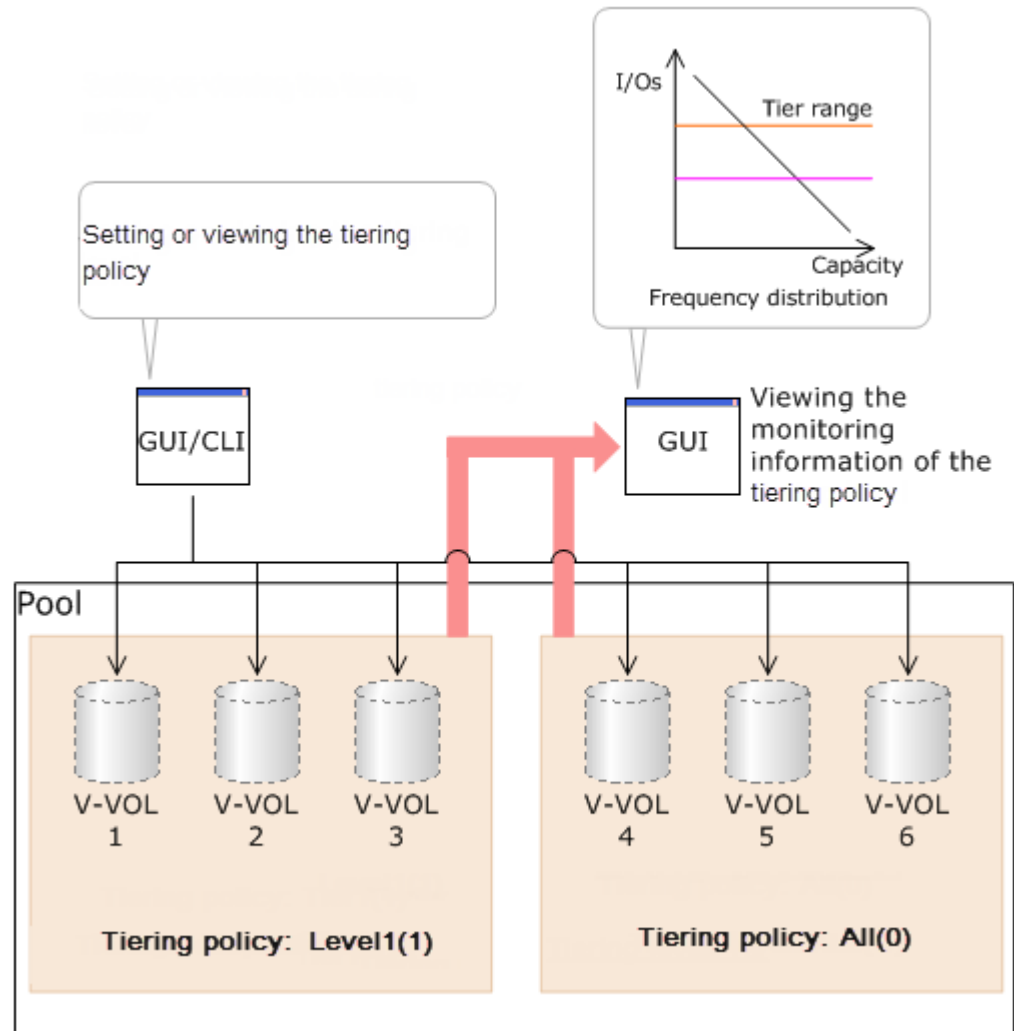
Viewing the tiering policy in the performance graph

You can view the frequency distribution graph of the pool by selecting the level of the tiering policy or the entire pool on the performance graph in the **View Tier Properties** window.

The following table shows how tiering policy is shown in the performance graph. How the graph appears depends on the number of tiers set in a pool and the tiering policy level selected.

Tiering policy selected with performance graph	V-VOL displayed in the performance graph
All(0)	In the performance graph, you can display a frequency distribution of a DP-VOL, set to all tiers.
Level 1(1)	In the performance graph, you can display the frequency distribution of a DP-VOL set to level 1.
Level 2(2)	In the performance graph, you can display the frequency distribution of a DP-VOL set to level 2.
Level 3(3)	In the performance graph, you can display the frequency distribution of a DP-VOL set to level 3.

Tiering policy selected with performance graph	V-VOL displayed in the performance graph
Level 4(4)	In the performance graph, you can display the frequency distribution of a DP-VOL set to level 4.
Level 5(5)	In the performance graph, you can display the frequency distribution of a DP-VOL set to level 5.
From Level6(6) to Level31(31)	In the performance graph, you can display the frequency distribution of a DP-VOL set to custom policy.

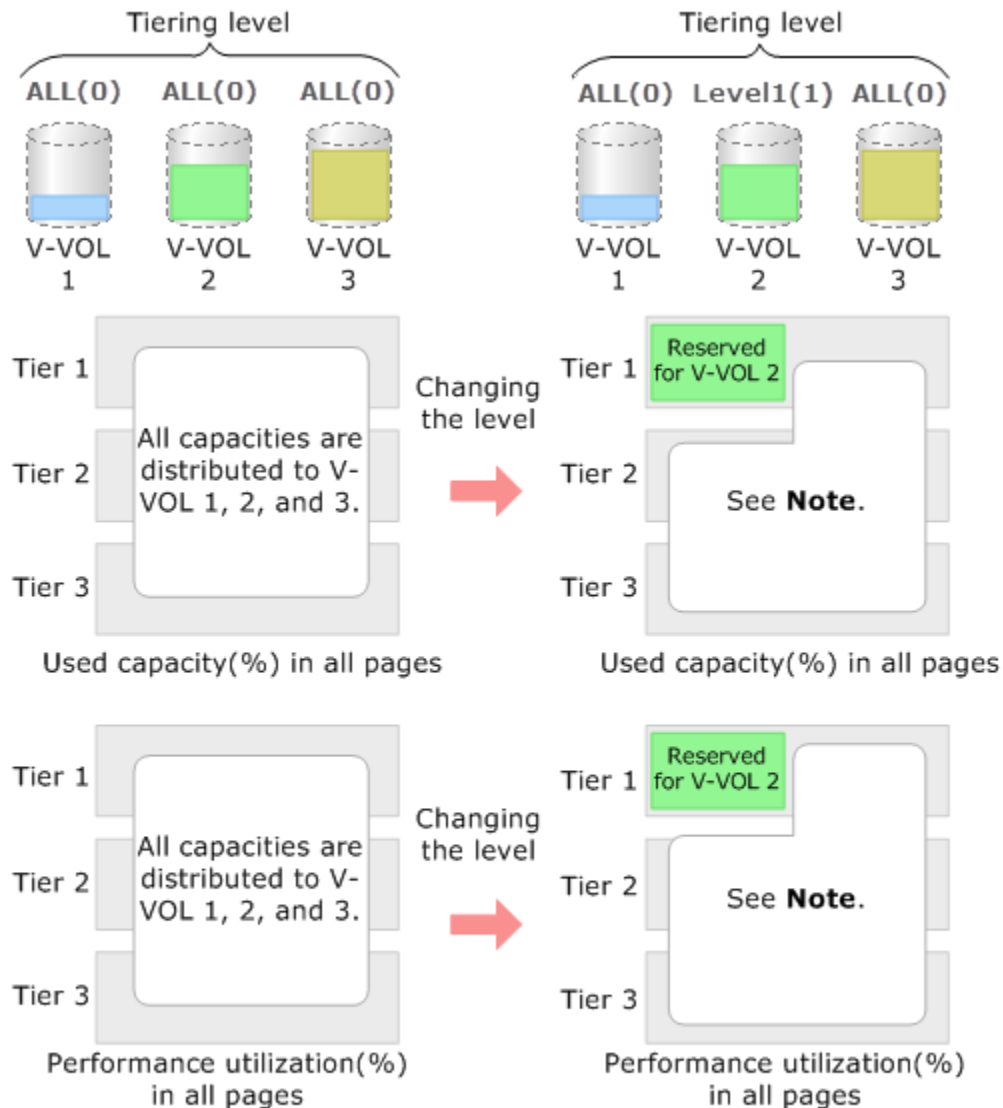


Reserving tier capacity when setting a tiering policy

If you set the tiering policy of a DP-VOL, the DP-VOL used capacity and the I/O performance limitation are reserved from the tier. The reserved limit performance per page is calculated as follows:

The reserved limit performance per page = $(\text{The performance limit of the tier}) \div (\text{The number of pages in the tier})$.

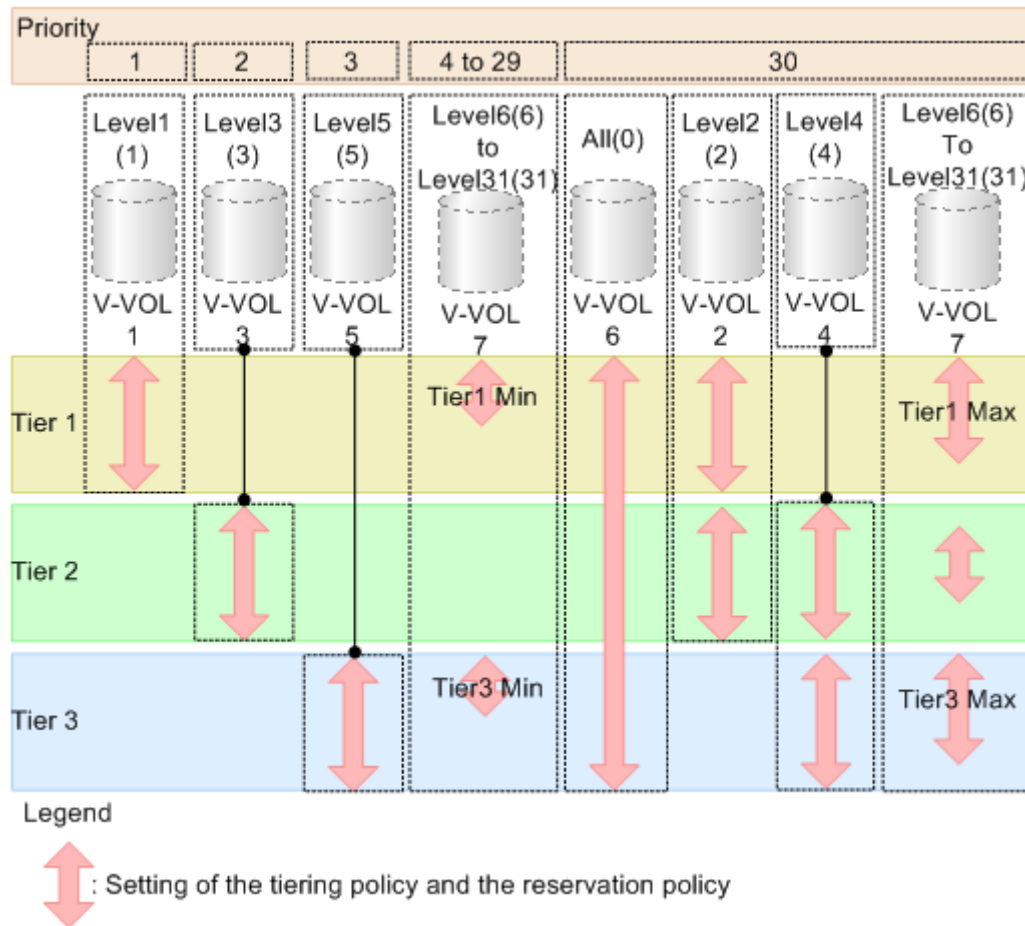
A DP-VOL without a tiering policy setting uses the unreserved area in the pool.



Example of reserving tier capacity

The reservation priority depends on the level of tiering policy. The following figure shows the reservation priority. Tiers are reserved in order of priority from (1) to (7) in the figure. If the pool-VOL capacity is deficient when you reserve a tier, the nearest tier of your specified tier is allocated. If you specify two tiers like level 2 or level 4 of the tiering policy, the upper tier is reserved. If the capacity of the pool-VOL assigned to the upper tier is deficient, the lower tier defined by the tiering policy is reserved. For example, in case of level 2 in the following figure, tier 1 is reserved first. If the capacity of tier 1 is deficient at this point, tier 2 is reserved. For details, see [Notes on tiering policy settings on page 5-56](#).

Tier reservation priority	Tiering policy	Reserved tier
1	Level1(1)	Tier 1
2	Level3(3)	Tier 2
3	Level5(5)	Tier 3
From 4 to 29	From Level6(6) to Level31(31)	The custom policy whose number is small is prioritized. Tier 1: From Level6(6) to Level31(31), each of the Tier1 Min values are reserved. Tier 2: From Level6(6) to Level31(31), each of values that deduct the total value of Tier1 Max and Tier3 Max from 100(%) are reserved. Tier 3: From Level6(6) to Level31(31), each of the Tier3 Min values are reserved.
30	All(0)	All tiers
	Level2(2)	Tier 1 and Tier 2
	Level4(4)	Tier 2 and Tier 3
	From Level6(6) to Level31(31)	Tier 1: From Level6(6) to Level31(31), each of the Tier1 Max values are reserved. Tier 3: From Level6(6) to Level31(31), each of the Tier3 Max values are reserved.



Notes on tiering policy settings

- If Auto is set as the execution mode, tier relocation is performed based on the monitoring cycle. When the tiering policy setting changes, tier relocation implements the tiering policy at the end of the current monitoring cycle. See Example 1 in [Execution mode settings and tiering policy on page 5-57](#).
- If Manual is set as the execution mode, you must manually perform monitoring, issue a monitor stop, then start relocation (see Example 2, Case 1, in [Execution mode settings and tiering policy on page 5-57](#)). If you change the tiering policy settings while obtaining monitoring data, the monitoring data is used for the next tier relocation (see Example 2, Case 2, in [Execution mode settings and tiering policy on page 5-57](#)). Therefore, you do not need to perform new monitoring.
- If a capacity shortage exists in the tier being set, a message can appear in the **View Tier Property** window that the page allocation cannot be completed according to the tiering policy specified for the V-VOL. The page allocation in the entire pool, including the tier that defines the tiering policy, may not be optimized.



Note: a message that page allocation cannot be completed according to the tiering policy does not appear when these tiering policies are set:

- All(0)
- In a 2-tier configuration, Level2(2), Level3(3), or Level4(4), equivalent to All(0)

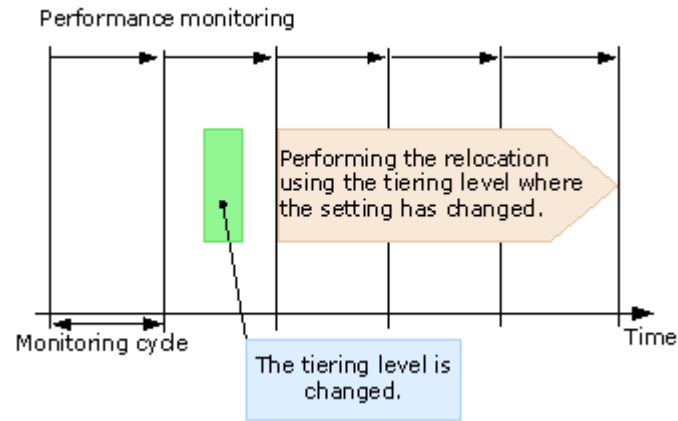
When a capacity shortage exists in a tier, you can revise the setting of the tiering policy or the configuration of tiers. If the capacity of one tier is fully exhausted, the migrating pages are assigned to the next tier according to the tiering policy.

- Level1(1): When tier 1 is full, the remaining pages are allocated to tier 2. If tier 2 is full, the remaining pages are allocated to tier 3.
- Level3(3): When tier 2 is full, the remaining pages are allocated to tier 1. If tier 1 is full, the remaining pages are allocated to tier 3.
- Level5(5): When tier 3 is full, the remaining pages are allocated to tier 2. If tier 2 is full, the remaining pages are allocated to tier 1.
- Level2(2), Level4(4), and from Level6(6) to Level31(31): When the specified tier is full, the unallocated pages are kept in the prior tier or they are allocated to the tier that has free space.
- If a performance shortage exists in the tier being set, pages can not be allocated in conformance with the tiering policy specified for the V-VOL. Pages are allocated according to the performance ratio of each tier. As shown in the following table, allocation capacity considerations are based on the tiering policy.

Tiering Policy	Allocation capacity considerations
All(0), Level2(2), or Level4(4)	Tier range and I/O performance
Level1(1), Level3(3), or Level5(5)	Tier range
From Level6(6) to Level31(31)	First phase: Tier range. Allocation capacities in each tier. • Tier1: The setting value(%) in Tier1 Min. • Tier2: The value deducted Tier1 Max(%) and Tier3 Max(%) from 100(%) • Tier3: The setting value(%) in Tier3 Min.
	Second phase: Tier range and I/O performance. Capacities deducted from the mapped capacities of the first phase from the total used capacity, are mapped to each tier.

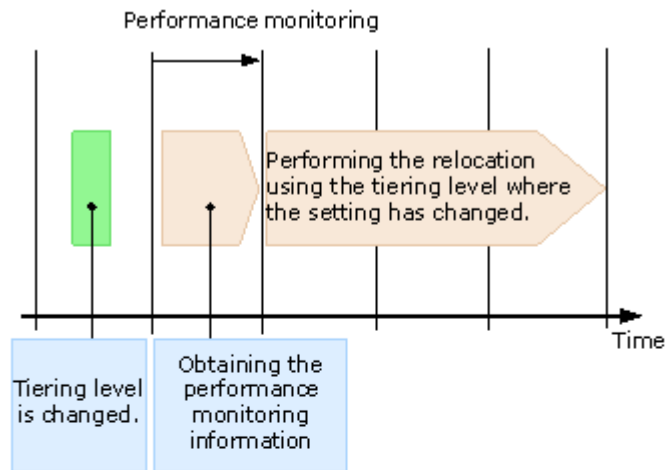
Execution mode settings and tiering policy

The following figure shows how tier relocation is performed after changing the tiering policy setting while Auto execution mode is used.

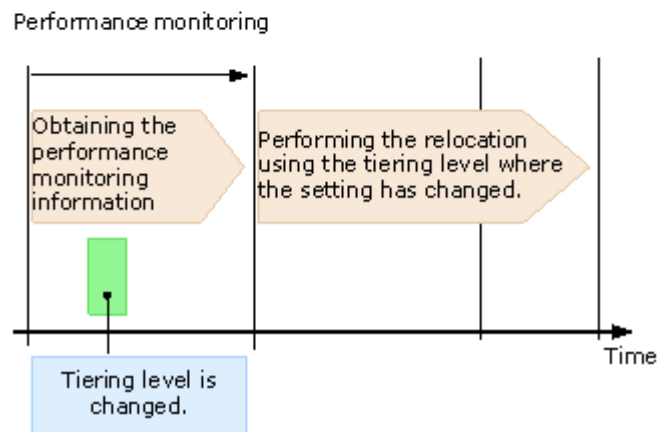


The following figure shows two cases of how tier relocation is performed after changing the tiering policy setting while Manual execution mode is used.

Case 1



Case 2



New page assignment tier

If you set the new page assignment tier value when a new page is needed by a DP-VOL, the page is taken from the specified tier aligned with the new page assignment tier value. You can set this function by using Hitachi Device Manager - Storage Navigator . In addition, this function becomes effective after setting it. The following table lists setting values:

Setting value	Description
High	The new page is assigned from the higher tier of tiers set in the tiering policy.
Middle	The new page is assigned from the middle tier of tiers set in the tiering policy.
Low	The new page is assigned from the lower tier of tiers set in the tiering policy.

The following tables show the tiers to which new pages are preferentially assigned.

Tiering Policy	When specifying High	When specifying Middle	When specifying Low	Note
All	From tier 1 to 2	From tier 1 to 2	From tier 2 to 1	If you set Low, tier 2 is given a priority over tier 1.
Level 1	From tier 1 to 2	From tier 1 to 2	From tier 1 to 2	Assignment sequences when High, Middle, and Low are the same.
Level 2	From tier 1 to 2	From tier 1 to 2	From tier 2 to 1	Every assignment sequence is the same as when All is specified as the tiering policy.
Level 3	From tier 1 to 2	From tier 1 to 2	From tier 2 to 1	Every assignment sequence is the same as when All is specified as the tiering policy.
Level 4	From tier 1 to 2	From tier 1 to 2	From tier 2 to 1	Every assignment sequence is the same as when All is specified as the tiering policy.
Level 5	From tier 2 to 1	From tier 2 to 1	From tier 2 to 1	Assignment sequences when High, Middle, and Low are same.

Number	Condition	Order of new page allocation
1	T1 MIN = 100%	Same as Level1(1)
2	T1 MAX = 0%	Same as Level5(5)
3	T1 MAX > 0%	Same as All(0)

Tiering policy	When specifying High	When specifying Middle	When specifying Low	Note
All	From tier 1, 2, to 3	From tier 2, 3, to 1.	From tier 3, 2, to 1.	Specifying High, Middle or Low to the assignment sequence is effective.
Level 1	From tier 1, 2, to 3	From tier 1, 2, to 3.	From tier 1, 2, to 3.	Assignment sequences when High, Middle, and Low are same.
Level 2	From tier 1, 2, to 3	From tier 1, 2, to 3.	From tier 2, 1, to 3.	If you set Low, tier 2 is given a priority over tier 1.
Level 3	From tier 2, 3, to 1	From tier 2, 3, to 1	From the 2, 3, to 1	Assignment sequences when High, Middle, and Low are same.
Level 4	From tier 2, 3, to 1	From tier 2, 3, to 1	From tier 3, 2, to 1	If you set Low, tier 3 is given priority over tier 2.
Level 5	From tier 3, 2, to 1	From tier 3, 2, to 1	From tier 3, 2, to 1	Assignment sequences when High, Middle, and Low are same.

Number	Condition	Order of new page allocation
1	T1 MIN = 100%	Same as Level1(1)
2	T3 MIN = 100%	Same as Level5(5)
3	T1 MAX > 0% and T3 MAX = 0%	Same as Level2(2)
4	T1 MAX = 0% and T3 MAX = 0%	Same as Level3(3)
5	T1 MAX = 0% and T3 MAX > 0%	Same as Level4(4)
6	T1 MAX > 0% and T3 MAX > 0%	Same as All(0)

Relocation priority

You can use the relocation priority function to set the selection priority of a DP-VOL when performing relocation. With this setting, a prioritized DP-VOL can be relocated earlier during a relocation cycle. To set this function, use Hitachi Device Manager - Storage Navigator . The function is activated after the monitoring data is collected.

- If no relocation priority is set for all DP-VOLs, the general order of DP-VOL selection is to select the next DP-VOL in LDEV number order after the last DP-VOL that fully performed relocation. This selection order persists across relocation cycles.
- If one or more DP-VOLs are assigned a relocation priority, the prioritized DP-VOLs are operated upon in the early portion of the relocation cycle, before others in the general order of DP-VOL selection.
- If a V-VOL is not given priority for relocation:
For example, if LDEVs of LDEV IDs with LDEV#1, LDEV#2, LDEV#3, LDEV#4, and LDEV#5 are not given priority for relocation, LDEVs are relocated with the following sequences. In this example, three LDEVs are relocated in each period. The number of LDEVs to relocate can change by the relocation cycle or the data size.

Relocating cycle	Relocating sequence of LDEV#1 in each cycle	Relocating sequence of LDEV#2 in each cycle	Relocating sequence of LDEV#3 in each cycle	Relocating sequence of LDEV#4 in each cycle	Relocating sequence of LDEV#5 in each cycle
T1	1st	2nd	3rd	Unperformed	Unperformed
T2	3rd	Unperformed	Unperformed	1st	2nd
T3	Unperformed	1st	2nd	3rd	Unperformed
T4	2nd	3rd	Unperformed	Unperformed	1st

- If a V-VOL is given priority for relocation:
For example, if LDEVs of LDEV IDs with LDEV#3 and LDEV#4 are given priority for relocation from LDEV#1 to LDEV#5, LDEVs are relocated with the following sequences. In this example, three LDEVs are relocated in each period, but the number of LDEVs to relocate can change by the relocation cycle or data size.

Relocating cycle	Relocating sequence of LDEV#1 in each cycle	Relocating sequence of LDEV#2 in each cycle	Relocating sequence of LDEV#3 in each cycle	Relocating sequence of LDEV#4 in each cycle	Relocating sequence of LDEV#5 in each cycle
T1	3rd	Unperformed	1st	2nd	Unperformed

Relocating cycle	Relocating sequence of LDEV#1 in each cycle	Relocating sequence of LDEV#2 in each cycle	Relocating sequence of LDEV#3 in each cycle	Relocating sequence of LDEV#4 in each cycle	Relocating sequence of LDEV#5 in each cycle
T2	Unperformed	3rd	1st	2nd	Unperformed
T3	Unperformed	Unperformed	1st	2nd	3rd
T4	3rd	Unperformed	1st	2nd	Unperformed

Assignment tier when pool-VOLs are deleted

When you delete pool-VOLs, the pages allocated to the pool-VOLs are moved to other pool-VOLs. The following table shows the tier numbers to which pages are allocated before and after pool-VOLs are deleted. This operation does not depend on the tiering policy or the settings of newly assigned tiers. Relocate tiers after deleting pool-VOLs.

The following table describes page allocation in a 3-tier configuration.

Tier of deleted pool-VOLs	Order in which pages are allocated to tiers	Description
Tier 1	Tier 1, Tier 2, and Tier 3	If there is free space in Tier 1, pages are allocated to Tier 1. If there is no free space in Tier 1, pages are allocated to Tier 2. If there is no free space in Tier 1 and Tier 2, pages are allocated to Tier 3.
Tier 2	Tier 2, Tier 1, and Tier 3	If there is free space in Tier 2, the pages are allocated to Tier 2. If there is no free space in Tier 2, pages are allocated to Tier 1. If there is no free space in Tier 1 and Tier 2, pages are allocated to Tier 3.
Tier 3	Tier 3, Tier 2, and Tier 1	If there is free space in Tier 3, pages are allocated to Tier 3. If there is no free space in Tier 3, pages are allocated to Tier 2. If there is no free space in Tier 2 and Tier 3, pages are allocated to Tier 1.

The following table describes page allocation in a 2-tier configuration.

Tier of deleted pool-VOLs	Order in which pages are allocated to tiers	Description
Tier 1	Tier 1 and Tier 2	If there is free space in Tier 1, pages are allocated to Tier 1. If there is no free space in Tier 1, pages are allocated to Tier 2.
Tier 2	Tier 2 and Tier 1	If there is free space in Tier 2, pages are allocated to Tier 2. If there is no free space in Tier 2, pages are allocated to Tier 1.

Formatted pool capacity

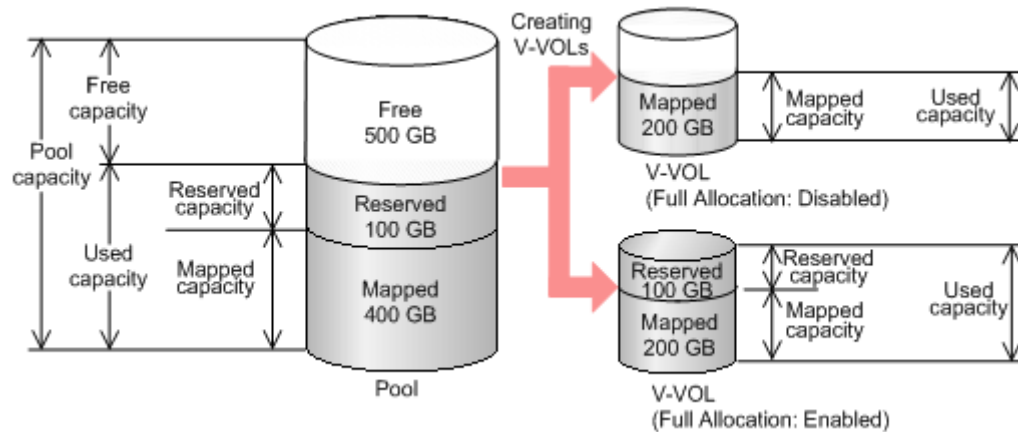
The formatted pool capacity is the capacity of initialized free space and the reserved capacity of a pool, but not the capacity of all the free space and reserved capacity of the pool. The free space of the pool is monitored by a storage system. Space is formatted automatically if needed. You can confirm the formatted pool capacity in the **View Pool Management Status window** (see [View Pool Management Status window on page D-71](#)). Depending on the load of the storage system, the format speed of the free space and reserved capacity of the pool is adjusted.

New pages are allocated, then initialized, during data write operations to the V-VOL. If a significant number of new pages are allocated, initialization might be delayed as a result of conflicts between data write and new page initialization processes. Such conflicts could occur, for example, when you create a file system of new DP-VOLs from the host. You can initialize the free space of a pool in advance to prevent delays in data write operations.

To change the method of performing the function to format the free space of a pool, contact the Hitachi Data Systems customer support.

Used capacity, mapped capacity, and reserved capacity

The used capacity is the total capacity of pages that are assigned and reserved for each V-VOL. The mapped capacity is the total of pages which contain user data and control information of each V-VOL. The reserved capacity is the total of pages reserved in each V-VOL for which the full allocation function is enabled.



Rebalancing the usage level among parity groups

If multiple parity groups that contain LDEVs used as pool-VOLs exist, rebalancing can improve biased usage rates in parity groups. Rebalancing is performed as if each parity group were a single pool-VOL. After rebalancing, the usage rates of LDEVs in a parity group can not be balanced, but the usage rate in the entire pool is balanced.

The usage level among parity groups is automatically rebalanced when these operations are in progress:

- Expanding pool capacity
- Shrinking pool capacity
- Reclaiming zero pages
- Reclaiming zero pages in a page release request issued by the host with the Write Same command, for example.
- Performing tier relocations

If you expand the pool capacity, Dynamic Provisioning moves data to the added space on a per-page basis. When the data is moved, the usage rate among parity groups of the pool-VOLs is rebalanced.

Host I/O performance can decrease when data is moved. If you do not want to have the usage level of parity groups automatically balanced, call the Hitachi Data Systems customer support.

You can see the rebalancing progress of the usage level among parity groups in the View Pool Management Status window (see [View Pool Management Status window on page D-71](#)). Dynamic Provisioning automatically stops balancing the usage levels among parity groups if the cache memory is not redundant or if the pool is almost full.

Changing the tiering policy level on a DP-VOL

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Edit LDEVs** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Edit LDEVs**.

For the **Logical Devices** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be edited, click **More Actions** then select **Edit LDEVs**.
- Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Edit LDEVs** to open the window.

For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be edited, click **More Actions** then select **Edit LDEVs**.
- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Edit LDEVs** to open the window.

- In the **Edit LDEVs** window, select **Tiering Policy**, and select the tiering policy.
- Click **Finish**.
- In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Changing new page assignment tier of a V-VOL

The Storage Administrator (Provisioning) role is required to perform this task.

- Perform one of the following to display the **Edit LDEVs** window.

For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Edit LDEVs**.

For the **Logical Devices** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be edited, click **More Actions** then select **Edit LDEVs**.
- Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Edit LDEVs** to open the window.

For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be edited, click **More Actions** then select **Edit LDEVs**.
- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Edit LDEVs** to open the window.

2. Click the **New Page Assignment Tier** check box and select the new page assignment.
3. Click **Finish**.
The **Confirm** window appears.
4. In the **Task Name** text box, type a unique name for the task or accept the default.
You can enter up to 32 ASCII characters and symbols, except: \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
5. Click **Apply**.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Opening the Edit Tiering Policies window

The Storage Administrator (View) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Pools**. Display the **Pools** tab.
2. In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
The pool information is displayed on the right pane of the window.
3. Click the **Edit Tiering Policies** button.
The **Edit Tiering Policies** window appears.

Changing tiering policies

You must have the Storage Administrator (System Resource Management) role to perform this task.

How to change tiering policies

1. Perform one of the following to display the **Edit Tiering Policies** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**. On the **Pools** tab, click the **Edit Tiering Policies**.For Storage Navigator:
 - a. In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
The pool information is displayed on the right pane of the window.

- b. Click the **Edit Tiering Policies** button.
The **Edit Tiering Policies** window appears.
2. Select the tiering policy that you want to change and click the **Change** button.
The **Change Tiering Policies** window appears. Policies with ID 0 to 5 cannot be changed.
3. Change the tiering policy, and click OK.
4. Return to the **Edit Tiering Policies** window.
Each tiering policy value is needed to meet the conditions described in the following table.
5. In the **Task Name** text box, type a unique name for the task or accept the default.
6. Click **Apply**.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.
7. Click **Finish**.
8. In the **Confirm** window, verify your settings. In Task Name, type a unique name for this task or accept the default, then click **Apply**.

Item	Explanation
Tier1 Max	Satisfy either one of the following: Equal to Tier1 Min Bigger than Tier1 Min
Tier1 Min*	Satisfy either one of the following: Equal to Tier1 Max Smaller than Tier1 Max
Tier3 Max	Satisfy either one of the following: Equal to Tier3 Min Bigger than Tier3 Min
Tier3 Min*	Satisfy either one of the following: Equal to Tier3 Max Smaller than Tier3 Max
* The sum of Tier1 Min and Tier3 Min must be 100 (%) or less.	

Changing relocation priority setting of a V-VOL

The Storage Administrator (System Resource Management) role is required to perform this task.

1. Perform one of the following to display the **Edit LDEVs** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Edit LDEVs**.

For the **Logical Devices** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be edited, click **More Actions** then select **Edit LDEVs**.
- Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Edit LDEVs** to open the window.

For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be edited, click **More Actions** then select **Edit LDEVs**.
- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Edit LDEVs** to open the window.

- Select the **Relocation Priority** check box and click **Default** or **Prioritize**. If you choose **Prioritize**, LDEV is relocated preferentially.
- Click **Finish**.
The **Confirm** window appears.
- In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols, except: \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
- Click **Apply**.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Functions overview for active flash and Dynamic Tiering

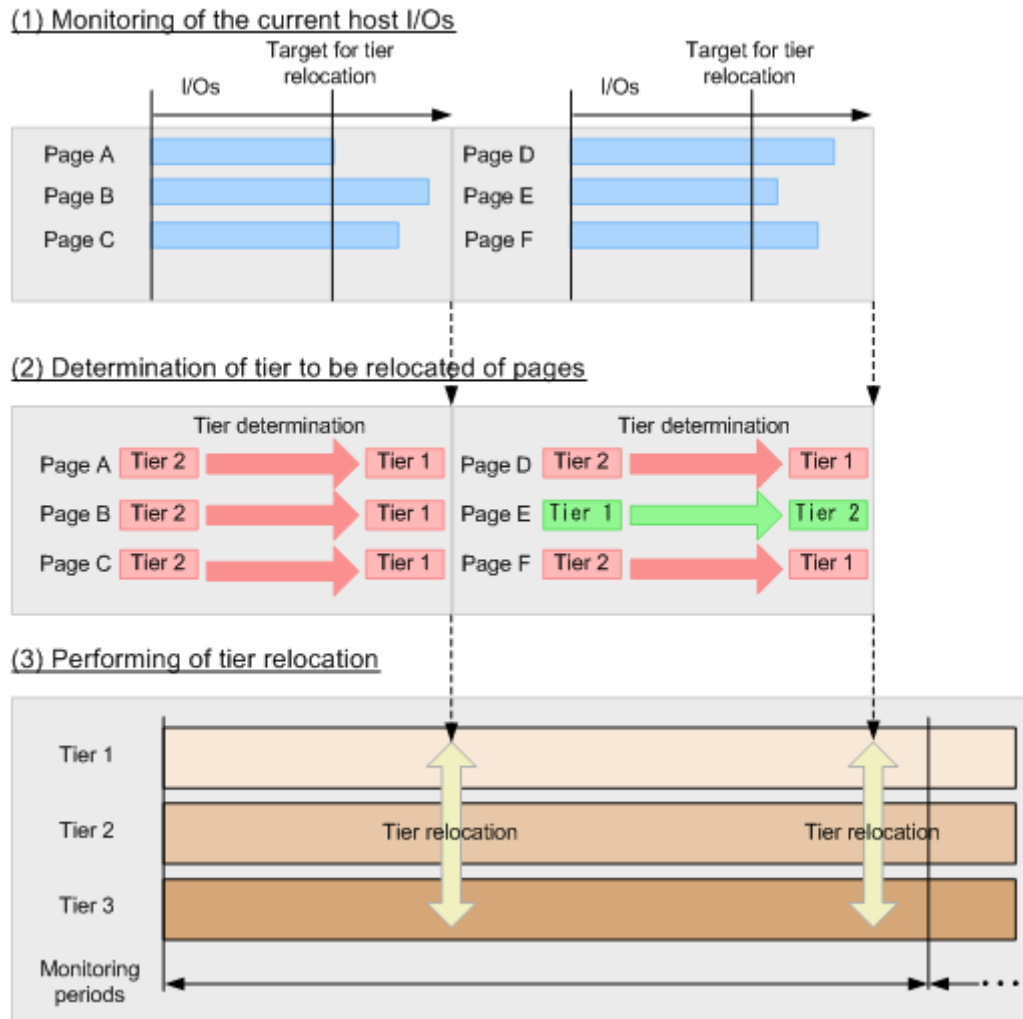
Tier management functions show in the following table.

Category	Functions	active flash	Dynamic Tiering
Initial page allocation	Assigning new pages to the write data of the host	Supported	Supported
Monitoring of performance	Monitoring tiers based on the specified cycle time	Supported	N/A
Tier relocation	Promoting pages to the tier which is determined by the scheduled performance monitoring	Supported	Supported

Category	Functions	active flash	Dynamic Tiering
	Promoting pages from the tier 2 or 3 to tier 1, the pages where the latest access frequency is suddenly high	Supported	N/A
	To maintain capacity in the tier 1, demoting pages from the tier 1 to tier 2 or 3, the pages where the latest access frequency is low	Supported	N/A

Relocating LDEV pages whose latest I/Os frequency is suddenly high by using active flash

To relocate LDEV pages, active flash identifies the frequently accessed pages by counting the number of I/Os to specific pages. Pages that are accessed many times are promoted to tier 1. Pages where the latest access frequency is low are allocated to lower tiers.



Dynamic Tiering workflow

The following workflow shows the steps that a Storage Administrator takes to set up Dynamic Tiering on the storage system.

As shown in the diagram, Hitachi Device Manager - Storage Navigator and Command Control Interface have different workflows. Details about setting up Dynamic Tiering using the Hitachi Device Manager - Storage Navigator are covered in subsequent topics. For details about how to set up Dynamic Tiering using Command Control Interface, see the *Command Control Interface Command Reference* and *Command Control Interface User and Reference Guide*. Use Hitachi Device Manager - Storage Navigator to create pools and DP-VOLs.



*1 In Command Control Interface, when creating a pool, you cannot enable Multi-Tier Pool and cannot register multiple media as pool-VOLs. Before making tiers, enable Multi-Tier Pool.

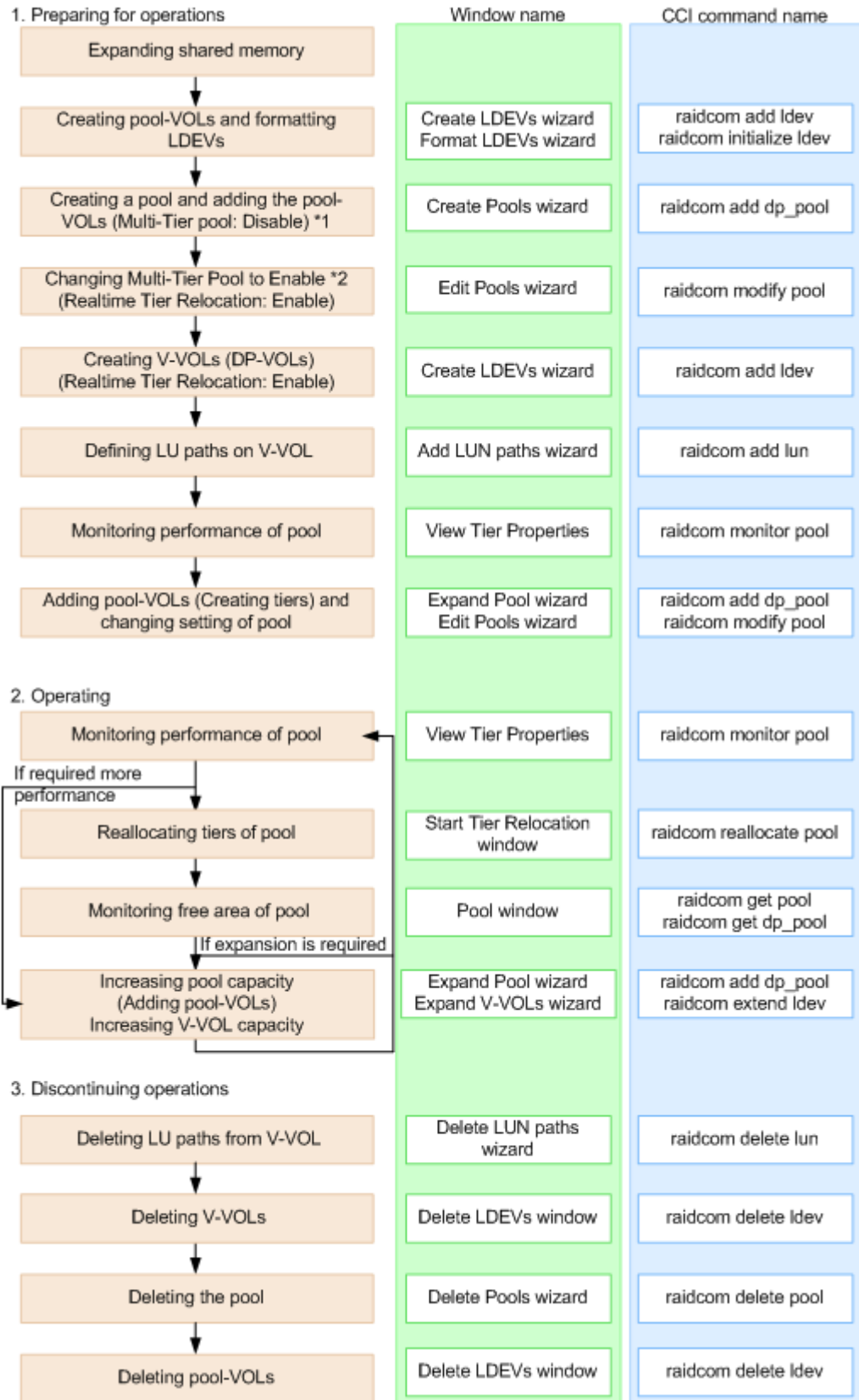
*2 Enabling Multi-Tier Pool from Command Control Interface automatically sets **Tier Management** to **Manual**. To change **Tier Management** to **Auto**, you must do this in Hitachi Device Manager - Storage Navigator.



Note: If you delete a pool, its pool-VOLs (LDEVs) will be blocked. If they are blocked, format them before using them.

Active flash workflow

The following diagram shows the flow of work for a Storage Administrator to set up active flash on the storage system. As shown in the diagram, Hitachi Device Manager - Storage Navigator and Command Control Interface have different workflows. The details about how to set up active flash using Hitachi Device Manager - Storage Navigator are covered in subsequent topics. For details about how to set up active flash using Command Control Interface, see the *Hitachi Command Control Interface Command Reference* and *Hitachi Command Control Interface User and Reference Guide*. Use Hitachi Device Manager - Storage Navigator to create pools and DP-VOLs.



*1 In Command Control Interface, when creating a pool, you cannot enable Multi-Tier Pool and cannot register multiple media as pool-VOLs. Before making tiers, enable Multi-Tier Pool.

*2 Enabling Multi-Tier Pool from Command Control Interface automatically sets **Tier Management** to **Manual**. To change **Tier Management** to **Auto**, you must do this in Hitachi Device Manager - Storage Navigator.



Note: If you delete a pool, its pool-VOLs (LDEVs) will be blocked. If they are blocked, format them before using them.

Dynamic Tiering, active flash tasks and parameters

The following topics list the Dynamic Tiering and active flash tasks and parameter settings, and indicate whether the tasks can be performed or the parameters can be set in Hitachi Device Manager - Storage Navigator (GUI) or Command Control Interface (CCI), or both.

- [Task and parameter settings on page 5-74](#)
- [Display items: Setting parameters on page 5-76](#)
- [Display items: Capacity usage for each tier on page 5-77](#)
- [Display items: Performance monitor statistics on page 5-77](#)
- [Display items: Operation status of performance monitor/relocation on page 5-77](#)

Task and parameter settings

N o.	Item			GUI	CCI
1	DP pool	Create (Setting item)	Create	Y	Y
2			Pool Name	Y	Y
3			Threshold	Y	Y
4			Multi-Tier Pool: Enable/Disable	Y	N ¹
5			Active Flash: Enable/Disable	Y	N ¹
6			Tier Management: Auto mode	Y	N
7			Tier Management: Manual mode	Y	N
8			Rate of space for new page assignment	Y ³	N
9			Buffer Space for Tier relocation	Y	N
10			Cycle Time	Y	N
11			Monitoring Period	Y	N
12			Monitoring Mode	Y	N
13			External LDEV Tier Rank	Y	N

N o.	Item			GUI	CCI
14			Relocation speed	Y	N
15		Delete		Y	Y
16		Change Settings (Setting item)	Change Settings	Y	Y
17			Pool Name	Y	Y ²
18			Threshold	Y	Y
19			Multi-Tier Pool: Enable/Disable	Y	Y
20			Active Flash: Enable/Disable	Y	Y
21			Tier Management: Auto to Manual	Y	Y
22			Tier Management: Manual to Auto	Y	N
23			Buffer Space for New page assignment	Y ³	Y ³
24			Buffer Space for Tier relocation	Y	Y
25			Cycle Time	Y	N
26			Monitoring Period	Y	N
27			Monitoring Mode	Y	Y
28			External LDEV Tier Rank	Y	N
29			Relocation speed	Y	N
30	DP pool	Add pool-VOLs		Y	Y
31		Delete pool-VOLs		Y	Y
32		Restore Pools		Y	Y
33		Monitoring start/end		Y	Y
34		Tier relocation start/stop		Y	Y
35	DP-VOL	Create (Setting item)	Create	Y	Y
36			DP-VOL Name	Y	Y
37			Multi-Tier Pool relocation: Disable	N	N
38			Tiering Policy	Y	N
39			New page assignment tier	Y	N
40			Relocation priority	Y	N
41		Expand		Y	Y
42		Reclaim zero pages		Y	Y
43		Delete		Y	Y
44		Change Settings	Change Settings	Y	Y

N o.	Item			GUI	CCI
45		(Setting item)	Tier relocation: Enable/Disable	Y	Y
46			Tiering Policy	Y	Y
47			New page assignment tier	Y	N
48			Relocation priority	Y	N
49	Relocation log	Download relocation log		Y	N
Notes: 1. Set to Disable if the pool is created by Command Control Interface. The Command Control Interface cannot be used to create Dynamic Tiering pools initially. You can use the Command Control Interface <code>raidcom modify pool</code> command to modify Dynamic Provisioning pools for use as Dynamic Tiering or active flash pools. 2. You can rename a pool when adding pool-VOLs to it. 3. We recommend that you specify 0% for SSD and 8% for other drives.					

Display items: Setting parameters

No.	Category	Output information	GUI	Command Control Interface
1	DP pool	Multi-Tier Pool: Enable/Disable	Y	Y
2		Active Flash: Enable/Disable	Y	Y
3		Tier Management mode: Auto/Manual	Y	Y
4		Rate of space for new page assignment	Y	Y
5		Cycle Time	Y*	N
6		Monitoring Period	Y*	N
7		Monitoring Mode	Y	Y
8		External LDEV Tier Rank	Y	N
9		Relocation speed	Y	N
10	DP-VOL	Tier relocation: Enable/Disable	Y	Y
11		Tiering Policy	Y	Y
12		New page assignment tier	Y	N
13		Relocation priority	Y	N
*You can view this item only in the Auto execution mode.				

Display items: Capacity usage for each tier

No.	Category	Output information	GUI	Command Control Interface
1	DP pool	Capacity for each tier (Total)	Y	Y
2		Capacity for each tier (Usage)	Y	Y
3	DP-VOL	Capacity for each tier (Usage)	Y	Y

Display items: Performance monitor statistics

No.	Category	Output information	GUI	Command Control Interface
1	DP pool	Frequency distribution	Y ¹	N
2		Tier range	Y ¹	Y ²
3		Performance utilization	Y	Y
4		Monitoring Period starting time	Y	N
5		Monitoring Period ending time	Y	N
6	DP-VOL	Frequency distribution	Y	N
7		Tier range	Y	N
8		Monitoring Period starting time	Y	N
9		Monitoring Period ending time	Y	N
Notes:				
1. You can select either each level of the tiering policy or the entire pool. If you set other than All(0), the tier range is not displayed when you select the entire pool.				
2. The tier range when the tiering policy All(0) is selected is displayed.				

Display items: Operation status of performance monitor/relocation

No.	Category	Output information	GUI	Command Control Interface
1	DP pool	Monitor operation status: Stopped/Operating	Y	Y
2		Performance monitor information: Valid/Invalid/Calculating	Y	Y
3		Relocation status: Relocating/Stopped	Y	Y
4		Relocation progress: 0 to 100%	Y	Y

Managing Dynamic Tiering and active flash

Changing pool for Dynamic Provisioning to pool for Dynamic Tiering or active flash

The Storage Administrator (Provisioning) role is required to perform this task.



Note: To change the pool of Dynamic Tiering or active flash to the pool of the data direct mapping attribute, operate as follows:

1. In the operation target pool, open the **Edit Pools** window, then select **Enable** from the **Multi-Tier Pool** field.
2. Apply the setting to the storage system.
3. In the operation target pool, open the **Edit Pools** window, then select **Enable** from the **Data Direct Mapping** field.
4. Apply the setting to the storage system.

To change a pool for Dynamic Provisioning to a pool for Dynamic Tiering or active flash:

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.
For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of a pool you want to change to the Dynamic Tiering or active flash setting.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions > Pool > Edit Pools** to open the window.
4. Check **Multi-Tier Pool**.
5. Select **Enable** from the **Multi-Tier Pool** field.
6. If active flash is used, select the **Active Flash** check box. If there is no pool volume whose drive type is SSD, the check box cannot be selected.
7. To configure Dynamic Tiering:
 - a. Select the **Tier Management** check box.
 - b. From the Tier Management field, select **Auto** or **Manual**.
Typically, set **Auto**.
When you select **Auto**, monitoring and tier relocation can automatically executed.
When you select **Manual**, monitoring and tier relocation can be executed with the Command Control Interface commands or the **Pools** window.

When you change the setting of **Auto** to **Manual** while monitoring and tier relocation is executing, it is canceled.

- c. From the **Cycle Time** list, select the cycle of performance monitoring and tier relocation.



Note:

- When you change the **Cycle Time** while performance monitoring and tier relocation are being executed, the setting becomes effective for the next cycle after the current cycle is complete.

When you select **24 Hours** (default):

Monitoring and tier relocation is performed once a day. In the **Monitoring Period** field, specify the time of starting and ending of monitoring in 00:00 to 23:59 (default value).

- If you specify the starting time later than the ending time, the monitoring continues until the time you specify as the ending time on the next day.
- You can view monitored information with Hitachi Device Manager - Storage Navigator and Command Control Interface.
- When you change the time range of performance monitoring, the setting becomes effective from the next cycle after the cycle that is executing completes.

When you select **0.5 Hours**, **1 Hour**, **2 Hours**, **4 Hours**, or **8 Hours**:

Performance monitoring is performed every duration you selected starting at 00:00.

You cannot specify the monitoring period.

-
- d. Select the **Monitoring Mode** check box.
 - e. From the **Monitoring Mode** option, select **Period Mode** or **Continuous Mode**.

To perform tier relocation using the monitor results from the prior cycle, select **Period Mode**. To perform tier relocation weighted to the past period monitoring result, select **Continuous Mode**.
 - f. Select the speed for page relocation in **Relocation speed**. You can set the speed to: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest). The default is 3(Standard). If the speed specified is slower than 3(Standard), the data drive load is low when tier relocation is performed.
 - g. Select the **Buffer Space for New page assignment** check box.
 - h. In the **Buffer Space for New page assignment** text box, enter an integer value from 0 to 50 as the percentage (%) to set for each tier.
 - i. Select the **Buffer Space for Tier relocation** check box.
 - j. In the **Buffer Space for Tier relocation** text box, enter an integer value from 2 to 40 as the percentage (%) to set for each tier.
8. Click **Finish**.

The **Confirm** window appears.

9. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
10. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Changing monitoring and tier relocation settings

The Storage Administrator (Provisioning) role is required to perform this task.

This topic describes how to change the following pool settings of Dynamic Tiering:

- Automatic or manual execution of monitoring and tier relocation
- Cycle time of monitoring and tier relocation
- Time period of monitoring

How to change monitoring and tier relocation settings:

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions > Pool > Edit Pools** to open the window.
4. Check **Tier Management**.
5. From the Tier Management field, select **Auto** or **Manual**.
Typically, set **Auto**.
When you select **Auto**, monitoring and tier relocation can automatically execute.
When you select **Manual**, monitoring and tier relocation can be executed with the Command Control Interface commands or the **Pools** window.
When you change the setting of **Auto** to **Manual** while performance monitoring and tier relocation is executing, it is canceled.
6. If **Auto** is selected from the **Cycle Time** list, select the cycle of performance monitoring and tier relocation.
7. Click **Finish**.
The **Confirm** window appears.

8. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
9. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Changing monitoring mode setting

The Storage Administrator (Provisioning) role is required to perform this task.

To change monitoring mode setting:

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions** > **Pool** > **Edit Pools** to open the window.
4. Check **Monitoring Mode**.
5. From the **Monitoring Mode** option, select **Period Mode** or **Continuous Mode**.
To perform tier relocation using the monitor results from the prior cycle, select **Period Mode**. To perform tier relocation weighted to the past period monitoring result, select **Continuous Mode**.
6. Click **Finish**.
The **Confirm** window appears.
7. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
8. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Changing relocation speed

The Storage Administrator (Provisioning) role is required to perform this task.

To change relocation speed

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions** > **Pool** > **Edit Pools** to open the window.
4. Set the **Relocation Speed** check box to **ON**.
5. Use the **Relocation Speed** option to set the speed for page relocation to **1(Slowest)**, **2(Slower)**, **3(Standard)**, **4(Faster)**, and **5(Fastest)**.
The default is **3(Standard)**. To perform tier relocation at high speed, set **5(Fastest)**. If the speed specified is slower than **3(Standard)**, the data drive load is low when tier relocation is performed.
6. Click **Finish**.
The **Confirm** window appears.
7. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
8. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Changing buffer space for new page assignment setting

The Storage Administrator (Provisioning) role is required to perform this task.

To change buffer space for new page assignment setting:

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.

3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions > Pool > Edit Pools** to open the window.
4. Select the **Buffer Space for New page assignment** check box.
5. In the **Buffer Space for New page assignment** text box, enter an integer value from 0 to 50 as the percentage (%) to set for each tier.
6. Click **Finish**.
The **Confirm** window appears.
7. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
8. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Changing buffer space for tier relocation setting

The Storage Administrator (Provisioning) role is required to perform this task.

To change buffer space for tier relocation setting:

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.
 For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions > Pool > Edit Pools** to open the window.
4. Select the **Buffer Space for Tier relocation** check box.
5. In the **Buffer Space for Tier relocation** text box, enter an integer value from 2 to 40 as the percentage (%) to set for each tier.
6. Click **Finish**.
The **Confirm** window appears.
7. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
8. In the **Confirm** window, click **Apply** to register the setting in the task.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Viewing pool tier information

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. In the **Pools** tab, select a pool for which you want to view the information.
3. Perform one of the following to display the **View Tier Properties** window.
 - Click **More Actions** and select **View Tier Properties**.
 - Click **Actions** > **Pool** > **View Tier Properties** to open the window.
4. Select the target pool to display the graph.

Viewing DP-VOL tier information

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - a. In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. In the **Pools** tab, select a pool associated with the DP-VOL for which you want to view the information.
3. Click the **Virtual Volumes** tab.
4. From the **Virtual Volumes** table, select the DP-VOL for which you want to view the information.
5. Perform one of the following to display the **View Tier Properties** window.
 - Click **More Actions** and select **View Tier Properties**.
 - Click **Actions** > **Pool** > **View Tier Properties** to open the window.

Changing a pool for Dynamic Tiering or active flash to a pool for Dynamic Provisioning

The Storage Administrator (Provisioning) role is required to perform this task.

You can change a Dynamic Tiering or an active flash pool to a Dynamic Provisioning pool. However, you cannot change the pool status to disable in the following cases:

- Tier relocation is being executed manually.
 - Pool-VOLs are being deleted.
 - Zero pages are being reclaimed.
1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
 2. From the **Pools** table on the right, click the row of the pool you want to change.
 3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions > Pool > Edit Pools** to open the window.
 4. Check **Multi-Tier Pool** and select **Disable** from the **Multi-Tier Pool** option.
Click **OK** in the warning message.
 5. Click **Finish**.
The **Confirm** window appears.
 6. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
 7. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Enabling active flash for a Dynamic Tiering pool

You can change a Dynamic Tiering pool to an active flash pool. However, you cannot change the pool status of Dynamic Tiering to disable in the following cases:

- Tier relocation is being executed manually.
- Pool-VOLs are being deleted.

- Zero pages are being reclaimed.

Prerequisites

- The Storage Administrator (Provisioning) role is required to perform this task.
 - Pool volumes whose drive type is SSD are installed.
1. Perform one of following to display the Pools window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right click **DPPools** of the target storage system, then select **System GUI**.
 For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
 2. From the **Pools** table on right, click the row of the pool you want to change.
 3. Perform one of following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions > Pool > Edit Pools** to open the window.
 4. Check **Active Flash** to ON.
If there is no pool volume whose drive type is SSD, the check box cannot be selected.
 5. Click **Finish**.
The Confirm window appears.
 6. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
 7. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears

Working with pools

Pools

Dynamic Provisioning requires the use of pools. A pool consists of more than one pool-VOL. Pages in the pool are assigned to store user data and control information. Four pages on a DP-VOL are required for the control information.

A storage system supports up to 128 pools, each of which can contain up to 1024 pool-VOLs and 63,232 DP-VOLs per pool. The pool for Dynamic Provisioning cannot be used in conjunction with other pools.

The 128-pool maximum per storage system applies to the total number of Dynamic Provisioning pools and Dynamic Tiering pools. The pool for Dynamic Provisioning or Dynamic Tiering cannot be used in conjunction with other pools.

A pool number must be assigned to a pool. Multiple DP-VOLs can be related to one pool.

The total pool capacity combines the capacity of all the registered Dynamic Provisioning pool-VOLs assigned to the pool. Pool capacity is calculated using the following formulas:

- $\text{capacity of the pool (MB)} = \text{total number of pages} * 42 - 4200$
4200 in the formula is the management area size of the pool-VOL with System Area.
- $\text{total number of pages} = \Sigma(\text{floor}(\text{floor}(\text{pool-VOL number of blocks} \div 512) \div 168))$ for each pool-VOL

where

- floor() means to truncate the part of the formula within the parentheses after the decimal point.

Pool-VOLs

Pool-VOLs are grouped together to create a pool. When a new pool is created, the available pool-VOLs are selected in the Select Pool VOLs window and added to the Selected Pool Volumes table. Every pool must have a pool-VOL with System Area.

When adding a volume to the pool for which Multi-Tier Pool is enabled, note the following:

- Up to three different drives types/RPM are allowed between all the pool-VOLs to be added.
- Volumes to be added to the same pool must have the same RAID level across all the same drive type/RPM pool-VOLs.
For example, you cannot add a volume whose drive type/RPM is SAS/15K and whose RAID level is 5 (3D+1P) when a volume whose drive type/RPM is also SAS/15K but whose RAID level is 5 (7D+1P) is already in the pool.
- Up to three values are allowed for Drive Type/RPM for the volume.

If you increase the pool capacity by adding a pool-VOL, a portion of the existing data in the pool automatically migrates from an older pool-VOL to the newly added pool-VOL, balancing the usage levels of all the pool-VOLs. If you do not want to automate balancing of the usage levels of pool-VOLs, call the Hitachi Data Systems customer support for assistance.

Dynamic Provisioning does not automatically balance the usage levels among pool-VOLs if the cache memory is not redundant or if the pool usage reaches the threshold.

The pool-VOLs contained in a pool can be added or deleted. Removing a pool-VOL does not delete the pool or any related DP-VOLs. You must delete all DP-

VOLs related to the pool before the pool can be deleted. When the pool is deleted, all data in the pool is also deleted.

Creating a pool

The following procedure tells how to create a pool. This procedure is for setting up Dynamic Provisioning , but optional steps are shown for setting up Dynamic Tiering , if you add tiers to your storage system.

Before creating a pool, you must install the proper amount of control memory, and you must have a V-VOL management area in control memory. When control memory is added, the V-VOL management area is automatically created. To add control memory, contact your Hitachi Data Systems representative.

One pool-VOL with system area is defined for a pool. The priority of the pool-VOL with system area is assigned according to the data drive type. The available capacity of the pool-VOL with system area is deducted from the management area capacity. The management area capacity stores the management information of software that uses the pool. If Dynamic Provisioning, Dynamic Tiering, or Thin Image is used on an open-system, 4.2 GB are used as the management area in the pool-VOL with system area.

When the pool is created, a pool-VOL with system area is assigned the priority shown in the following table.

Priority	Data drive type
1	SAS7.2K
2	SAS10K
3	SAS15K
4	SSD
5	External volume

If multiple pool-VOLs of the same data drive type exist, the priority of each is determined by the internal index of the storage system.

Dynamic Provisioning when selecting pool-VOLs manually

The Storage Administrator (Provisioning) role is required to perform this task.

To create pools by selecting pool-VOLs manually:

1. Perform one of the following to display the **Create Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**. On the **Pools** tab, select **Create Pools**.For the **General Tasks** pane in Storage Navigator:
 - On the **General Tasks** pane, select **Create Pools**.

For the **Pools** window in Storage Navigator:

- o Expand the **Storage Systems** tree and select **Pools**. On the **Pools** tab, click **Create Pools**.
- o Expand the **Storage Systems** tree and select **Pools**. Click **Actions** > **Pool** > **Create Pools** to open the window.
2. From the **Pool Type** list, select **Dynamic Provisioning**.
3. From the **Multi-Tier Pool** field, select **Disable**.
4. From the **Pool Volume Selection** field, select **Manual**.
5. Follow the steps below to select pool-VOLs.
 - a. From the **Drive Type/RPM** list, select the data drive type and RPM.
 - b. From the **RAID Level** list, select the RAID level.
If you select **External Storage** from the **Drive Type/RPM** list, a hyphen (-) appears and you cannot select the RAID level.
 - c. Click **Select Pool VOLs**.
The **Select Pool VOLs** window appears.
 - d. In the **Available Pool Volumes** table, select the pool-VOL row to be associated with a pool. Then, click **Add**.
When selecting pool-VOLs, you can select a value other than **Middle** from **External LDEV Tier Rank** and click **Add** to set another tier rank for an external volume.
The selected pool-VOL is registered in the **Selected Pool Volumes** table. Up to 1,024 volumes can be added to a pool.



Tip: Perform the following steps if necessary:

- Click **Filter** to open the menu, specify the filtering, then **Apply**.
- Click **Select All Pages** to select all pool-VOLs in the table. To cancel the selection, click **Select All Pages** again.
- Click **Options** to specify the volumes or the number of rows to be displayed.

-
- e. Click **OK**.
The information in the **Selected Pool Volumes** table is applied to **Total Selected Pool Volumes** and **Total Selected Capacity**.
 6. Enter the name in the **Pool Name** text box.
 7. Click **Options**.
 8. In the **Initial Pool ID** text box, type the number of the initial pool ID, from 0 to 127.
When you specify a pool ID that was previously registered, the smallest available ID is displayed by default. If a pool ID is unavailable, no number is displayed.
 9. In the **Subscription Limit** text box, enter an integer value from 0 to 65534 as the subscription rate (%) for the pool.
If no number is entered, the subscription rate is set to unlimited.

10. In the **Warning Threshold** text box, enter an integer value from 1 to 100 as the rate (%) for the pool. The default value is 70%.
11. In the **Depletion Threshold** text box, enter an integer value from 1 to 100 as the rate (%) for the pool. The default value is 80%.
Enter a value that is greater than the value of the **Warning Threshold**.
12. In **Protect V-VOLs when I/O fails to Blocked Pool VOL**, select **Yes** or **No**. If **Yes** is selected, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute.
13. In **Protect V-VOLs when I/O fails to Full Pool**, select **Yes** or **No**. If **Yes** is selected, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute.
14. Click **Add**.
The created pool is added to the **Selected Pools** table. If invalid values are set, an error message appears.
The **Pool Type**, **Pool Volume Selection**, and **Pool Name** must be set. If the required items are not entered or selected, you cannot click **Add**.
If you select a row and click **Detail**, the **Pool Properties** window appears. If you select a row and click **Remove**, a message appears asking whether you want to remove the selected row or rows. To remove the row, click **OK**.
15. Click **Next**.
The **Create LDEVs** window appears. Go to [Creating V-VOLs on page 5-101](#) to create LDEVs.
If **Subscription Limit** of the created pool is set to 0%, the **Create LDEVs** window does not appear.
Click **Finish**. The **Confirm** window appears.
16. In the **Confirm** window, click **Apply** to register the setting in the task.
If you select a row and click **Detail**, the **Pool Properties** window appears.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Dynamic Provisioning when selecting pool-VOLs automatically

To create pools by selecting pool-VOLs automatically:

1. Perform one of the following to display the **Create Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**. On the **Pools** tab, select **Create Pools**.
 For the **General Tasks** pane in Storage Navigator:
 - On the **General Tasks** pane, select **Create Pools**.
 For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Pools** tab, click **Create Pools**.
 - Expand the **Storage Systems** tree and select **Pools**. Click **Actions** > **Pool** > **Create Pools** to open the window.
2. From the **Pool Type** list, select **Dynamic Provisioning**.
 3. From the **Multi-Tier Pool** field, select **Disable**.
 4. From the **Pool Volume Selection** field, select **Auto**.
 5. Follow these steps to select pool-VOLs.
 - a. From the **Resource Group list**, select the resource group name of the pool-VOL.
 - b. From the **Performance** list, select the performance of the pool.
 - c. In the **Total Capacity** list, specify the capacity of the pool.
Values are displayed in **Total Pool Volumes** and **Total Capacity**. These values are greater than the specified value of the pool capacity. If you change the pool configuration, perform steps d, e, and f.
 - d. Click **Change Pool Configuration**.
The **Change Pool Configuration Pattern** window appears. You can change the pool configuration that is automatically selected.
 - e. From the **Pool Configuration Patterns** table, select the pool configuration row. Then, click **Select**.



Note:

- You can select the pool configuration on a parity group basis.
 - The priority of the pool configuration is determined by these conditions:
 - Priority 1: There is no free space in the parity group and one LDEV exists in the group.
 - Priority 2: There is no free space in the parity group and multiple LDEVs exist in the group.
 - Priority 3: There is free space in the parity group and multiple LDEVs exist in the group.
 - The following items are not displayed in the **Pool Configuration Patterns** table:
 - Parity groups with LDEVs that cannot be used as pool-VOLs.
 - Pool configuration patterns that contain more than 1,024 LDEVs.
-
- f. Click **OK**.
The information in the **Pool Configuration Patterns** table is applied to **Total Pool Volumes** and **Total Capacity**.
 6. Enter the name in the **Pool Name** text box.
 7. Click **Options**.
 8. In the **Initial Pool ID** text box, type the number of the initial pool ID, from 0 to 127.

When you specify a pool ID that was previously registered, the smallest available ID is displayed by default. If a pool ID is unavailable, no number is displayed.

9. In the **Subscription Limit** text box, enter an integer value from 0 to 65534 as the subscription rate (%) for the pool.
If no number is entered, the subscription rate is set to unlimited.
10. In the **Warning Threshold** text box, enter an integer value from 1 to 100 as the rate (%) for the pool. The default value is 70%.
11. In the **Depletion Threshold** text box, enter an integer value from 1 to 100 as the rate (%) for the pool. The default value is 80%.
Enter a value that is greater than the value of the **Warning Threshold**.
12. In **Protect V-VOLs when I/O fails to Blocked Pool VOL**, select **Yes** or **No**. If **Yes** is selected, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. At the same instant, the access attribute of the DP-VOL is changed to the Protect attribute.
13. In **Protect V-VOLs when I/O fails to Full Pool**, select **Yes** or **No**. If **Yes** is selected, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute.
14. Click **Add**.
The created pool is added to the **Selected Pools** table. If invalid values are set, an error message appears.
If an item that must be set is not entered or selected, you cannot click **Add**.
The **Pool Type**, **Pool Volume Selection**, and **Pool Name** must be set. If the required items are not entered or selected, you cannot click **Add**.
If you select a row and click **Detail**, the **Pool Properties** window appears. If you select a row and click **Remove**, a message appears asking whether you want to remove the selected row or rows. To remove the row, click **OK**.
15. Click **Next**.
The **Create LDEVs** window appears. Go to [Creating V-VOLs on page 5-101](#) to create LDEVs.
If **Subscription Limit** of the created pool is set to 0%, the **Create LDEVs** window does not appear.
Click **Finish** and the **Confirm** window appears.
16. In the **Confirm** window, click **Apply** to register the setting in the task.
If you select a row and click **Detail**, the **Pool Properties** window appears.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Dynamic Tiering or active flash pool when selecting pool-VOLs manually

To create pools by selecting pool-VOLs manually:



Note: To enable active flash, LDEVs whose drive type is SSD are created in advance.

1. Perform one of the following to display the **Create Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**. On the **Pools** tab, select **Create Pools**.For the **General Tasks** pane in Storage Navigator:
 - On the **General Tasks** pane, select **Create Pools**.For the **Pools** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Pools**. On the **Pools** tab, click **Create Pools**.
 - Expand the **Storage Systems** tree and select **Pools**. Click **Actions** > **Pool** > **Create Pools** to open the window.
2. From the **Pool Type** list, select **Dynamic Provisioning**.
3. From the **Multi-Tier Pool** field, select **Enable**.
4. If the pool for active flash is created, select the check box of **Active Flash**.



Note: If the function for active flash is used, pool volumes whose drive type is SSD must be installed in advance. If there is no pool volumes whose drive type is SSD, this check box cannot be selected.

5. From the **Pool Volume Selection** field, select **Manual**.
6. Follow the steps below to select pool-VOLs.
 - a. In the **Drive Type/RPM** list, make sure **Mixable** is selected.
 - b. In the **RAID Level** list, make sure **Mixable** is selected.
 - c. Click **Select Pool VOLs**.
The **Select Pool VOLs** window appears.
 - d. In the **Available Pool Volumes** table, select the pool-VOL row to be associated with a pool. Then, click **Add**.
The selected pool-VOL is registered in the **Selected Pool Volumes** table. Up to 1,024 volumes can be added to a pool.
You can add volumes with the same **Drive Type/RPM** and different **RAID Levels**. For example, you can add a volume that has an SAS/15K **Drive Type/RPM** and a 5(3D+1P) **RAID Level** to the same pool with a volume that has an SAS/15K **Drive Type/RPM** and a 5(7D+1P) **RAID Level**.



Note: You can select a value other than **Middle** from **External LDEV Tier Rank** and click **Add** to set another tier rank for an external volume.



Tip: Perform the following steps if necessary:

- Click **Filter** to open the menu, specify the filtering, and then click **Apply**.
 - Click **Select All Pages** to select all pool-VOLs in the table. To cancel the selection, click **Select All Pages** again.
 - Click **Options** to specify the volumes or the number of rows to be displayed.
-
- e. Click **OK**.
The information in the **Selected Pool Volumes** table is applied to **Total Selected Pool Volumes** and **Total Selected Capacity**.
7. Enter the name in the **Pool Name** text box.
 8. Click **Options**.
 9. In the **Initial Pool ID** text box, type the number of the initial pool ID, from 0 to 127.
When you specify a pool ID that was previously registered, the smallest available ID is displayed by default. If a pool ID is unavailable, no number is displayed.
 10. In the **Subscription Limit** text box, enter an integer value from 0 to 65534 as the subscription rate (%) for the pool.
If no number is entered, the subscription rate is set to unlimited.
 11. In the **Warning Threshold** text box, enter an integer value from 1 to 100 as the rate (%) for the pool. The default value is 70%.
 12. In the **Depletion Threshold** text box, enter an integer value from 1 to 100 as the rate (%) for the pool. The default value is 80%.
Enter a value that is greater than the value of the **Warning Threshold**.
 13. Configure Dynamic Tiering with the following steps.
From the **Tier Management** option, select **Auto** or **Manual**.
 - a. The selection is usually **Auto**, which allows performance monitoring and tier relocation to be performed automatically.
If you select **Manual**, use the Command Control Interface or Hitachi Device Manager - Storage Navigator to manually perform performance monitoring and tier relocation.
 - b. From the **Cycle Time** option, select the cycle for performance monitoring and tier relocation.
When you select **24 Hours** (default value):
Performance monitoring and tier relocation is performed once a day
In the **Monitoring Period** field, set the time to start and end performance monitoring. The default value is 00:00 to 23:59.
Set one or more hours between the starting and ending times. If you specify a starting time that is later than the ending time, the performance monitoring continues until the ending time on the next day.
You can view the information gathered by performance monitoring with Hitachi Device Manager - Storage Navigator or the Command Control Interface.

When you select **0.5 Hours**, **1 Hour**, **2 Hours**, **4 Hours**, or **8 Hours**:

Performance monitoring is performed every hour that is selected, starting at 00:00.

You cannot set a specific time to start performance monitoring.



Caution: When **Auto** is set, the V-VOL pages may not be completely migrated in one cycle. In the next cycle, migration starts by updating information for the last processed V-VOL. At that point, the collection of performance monitoring information is switched to the current cycle.

14. From the **Monitoring Mode** option, select **Period Mode** or **Continuous Mode**.

If you perform tier relocation in a specified cycle, **Period Mode** is selected by default. If you perform tier relocation weighted to the monitoring result of the past period, select **Continuous Mode**.

15. From the **Relocation Speed** option, select the page relocation speed to use when performing relocation.

You can set the speed to: **1(Slowest)**, **2(Slower)**, **3(Standard)**, **4(Faster)**, and **5(Fastest)**. The default is **3(Standard)**. To perform tier relocation at high speed, use the **5(Fastest)** setting. If the speed specified is slower than **3(Standard)**, the data drive load is low when tier relocation is performed.

16. In the **Buffer Space for New page assignment** text box, enter an integer value from 0 to 50 as the percentage (%) for each tier.
A default value depends on the data drive type of the pool-VOL in each tier. The default value of the SSD is 0%. The default value of a type other than SSD is 8%.

17. In the **Buffer Space for Tier relocation** text box, enter an integer value from 2 to 40 as the percentage (%) to set for each tier.
The default value is 2%.

18. Click **Add**.

The created pool is added to the **Selected Pools** table. If invalid values are set, an error message appears. If **Detail** is clicked when you select a row, the **Pool Property** window appears

The **Pool Type**, **Multi-Tier Pool**, **Pool Volume Selection**, and **Pool Name** must be set. If the required items are not registered, you cannot click **Add**.

If you select a row and click **Detail**, the **Pool Properties** window appears. If you select a row and click **Remove**, a message appears asking whether you want to remove the selected row or rows. To remove the row, click **OK**.

19. Click **Next**.

The **Create LDEVs** window appears. Go to [Creating V-VOLs on page 5-101](#) to create LDEVs.

If the **Subscription Limit** of the created pool is set to 0%, the **Create LDEVs** window does not appear.

Click **Finish** and the **Confirm** window appears.

20. In the **Confirm** window, click **Apply** to register the setting in the task.
If you select a row and click **Detail**, the **Pool Properties** window appears.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Dynamic Tiering or active flash pool when selecting pool-VOLs automatically

To create pools by selecting pool-VOLs automatically:



Note: For creating the pool for active flash, LDEVs whose drive type is SSD are created in advance.

1. Perform one of the following to display the **Create Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**. On the **Pools** tab, select **Create Pools**.For the **General Tasks** pane in Storage Navigator:
 - On the **General Tasks** pane, select **Create Pools**.For the **Pools** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Pools**. On the **Pools** tab, click **Create Pools**.
 - Expand the **Storage Systems** tree and select **Pools**. Click **Actions** > **Pool** > **Create Pools** to open the window.
2. From the **Pool Type** list, select **Dynamic Provisioning**.
3. From the **Multi-Tier Pool** field, select **Enable**.
4. If the pool for active flash is created, select the check box of **Active Flash**.



Note: If the function for active flash is used, pool volumes whose drive type is SSD must be installed in advance. If there is no pool volumes whose drive type is SSD, this check box cannot be selected.

5. From the **Pool Volume Selection** field, select **Auto**.
6. Follow the steps below to select pool-VOLs.
 - a. From the **Resource Group list**, select the resource group name of the pool.
 - b. From the **Performance** list, select the performance of the pool.
 - c. In the **Total Capacity** list, specify the capacity of the pool.
Values are displayed in **Total Pool Volumes** and **Total Capacity**.
These values are greater than the specified value of the pool capacity.
If you change the pool configuration, perform steps d, e, and f.
 - d. Click **Change Pool Configuration**.

The **Change Pool Configuration Pattern** window appears. You can change the pool configuration that is automatically selected.

- e. From the **Pool Configuration Patterns** table, select the pool configuration row. Then click **Select**.



Note:

- You can select the pool configuration on a parity group basis.
- The priority of the pool configuration is determined by these conditions:
 - Priority 1: There is no free space in the parity group and one LDEV exists in the group.
 - Priority 2: There is no free space in the parity group and multiple LDEVs exist in the group.
 - Priority 3: There is free space in the parity group and multiple LDEVs exist in the group.
- If the check box of **Active Flash** is selected, only the pool configurations that contains LDEV created by SSD are displayed.
- The following items are not displayed in the **Pool Configuration Patterns** table:
 - Parity groups with LDEVs that cannot be used as pool-VOLs.
 - Pool configuration patterns that contain more than 1,024 LDEVs.

-
- f. Click **OK**.

The information in the **Pool Configuration Patterns** table is applied to **Total Pool Volumes** and **Total Capacity**.

7. Enter the name in the **Pool Name** text box.
8. Click **Options**.
9. In the **Initial Pool ID** text box, type the number of the initial pool ID, from 0 to 127.

When you specify a pool ID that was previously registered, the smallest available ID is displayed by default. If a pool ID is unavailable, no number is displayed.
10. In the **Subscription Limit** text box, enter an integer value from 0 to 65534 as the subscription rate (%) for the pool.

If no number is entered, the subscription rate is set to unlimited.
11. In the **Warning Threshold** text box, enter an integer value from 1 to 100 as the rate (%) for the pool. The default value is 70%.
12. In the **Depletion Threshold** text box, enter an integer value from 1 to 100 as the rate (%) for the pool. The default value is 80%.

Enter a value that is greater than the value of the **Warning Threshold**.
13. In **Protect V-VOLs when I/O fails to Blocked Pool VOL**, select **Yes** or **No**. If **Yes** is selected, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute.
14. In **Protect V-VOLs when I/O fails to Full Pool**, select **Yes** or **No**. If **Yes** is selected, when the pool usage reaches the full size, DP-VOL is

protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute.

15. Configure Dynamic Tiering with the following steps.

From the **Tier Management** option, select **Auto** or **Manual**.

- a. The selection is usually **Auto**, allowing performance monitoring and tier relocation to be performed automatically.

If you select **Manual**, use the Command Control Interface or Hitachi Device Manager - Storage Navigator to manually perform performance monitoring and tier relocation.

- b. From the **Cycle Time** option, select the cycle for performance monitoring and tier relocation.

When you select **24 Hours** (default value):

Performance monitoring and tier relocation is performed once a day.

In the **Monitoring Period** field, set the time to start and end performance monitoring. The default value is 00:00 to 23:59.

Set one or more hours between the starting and ending times. If you specify a starting time that is later than the ending time, the performance monitoring continues until the ending time on the next day.

You can view the information gathered by performance monitoring with Hitachi Device Manager - Storage Navigator or the Command Control Interface.

When you select **0.5 Hours**, **1 Hour**, **2 Hours**, **4 Hours**, or **8 Hours**:

Performance monitoring is performed every hour that is selected, starting at 00:00.

You cannot set a specific time to start performance monitoring.



Caution: When **Auto** is set, the V-VOL pages may not be completely migrated in one cycle. In the next cycle, migration starts by updating information for the last processed V-VOL. At that point, the collection of performance monitoring information is switched to the current cycle.

16. From the **Monitoring Mode** option, select **Period Mode** or **Continuous Mode**.

If you perform tier relocation in a specified cycle or you do not need to specify the **Monitoring Mode** option, select **Period Mode**. If you perform tier relocation weighted to the monitoring result of the past period, select **Continuous Mode**.

17. From the **Relocation Speed** option, select the page relocation speed to use when performing relocation.

You can set the speed to: **1(Slowest)**, **2(Slower)**, **3(Standard)**, **4(Faster)**, and **5(Fastest)**. The default is **3(Standard)**. To perform tier relocation at high speed, use the **5(Fastest)** setting. If the speed specified is slower than **3(Standard)**, the data drive load is low when tier relocation is performed.

18. In the **Buffer Space for New page assignment** text box, enter an integer value from 0 to 50 as the percentage (%) for each tier.

A default value depends on the data drive type of the pool-VOL in each tier. The default value of the SSD is 0%. The default value of a type other than SSD is 8%.

19. In the **Buffer Space for Tier relocation** text box, enter an integer value from 2 to 40 as the percentage (%) to set for each tier.
The default value is 2%.
20. Click **Add**.
The created pool is added to the **Selected Pools** table. If invalid values are set, an error message appears. If **Detail** is clicked when you select a row, the **Pool Property** window appears.
The **Pool Type**, **Multi-Tier Pool**, **Pool Volume Selection**, and **Pool Name** must be set. If the required items are not registered, you cannot click **Add**.
If you select a row and click **Detail**, the **Pool Properties** window appears. If you select a row and click **Remove**, a message appears asking whether you want to remove the selected row or rows. To remove the row, click **OK**.
21. Click **Next**.
The **Create LDEVs** window appears. Go to [Creating V-VOLs on page 5-101](#) to create LDEVs.
If the **Subscription Limit** of the created pool is set to 0%, the **Create LDEVs** window does not appear.
Click **Finish** and the **Confirm** window appears.
22. In the **Confirm** window, click **Apply** to register the setting in the task.
If you select a row and click **Detail**, the **Pool Properties** window appears.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Working with DP-VOLs

DP-VOLs

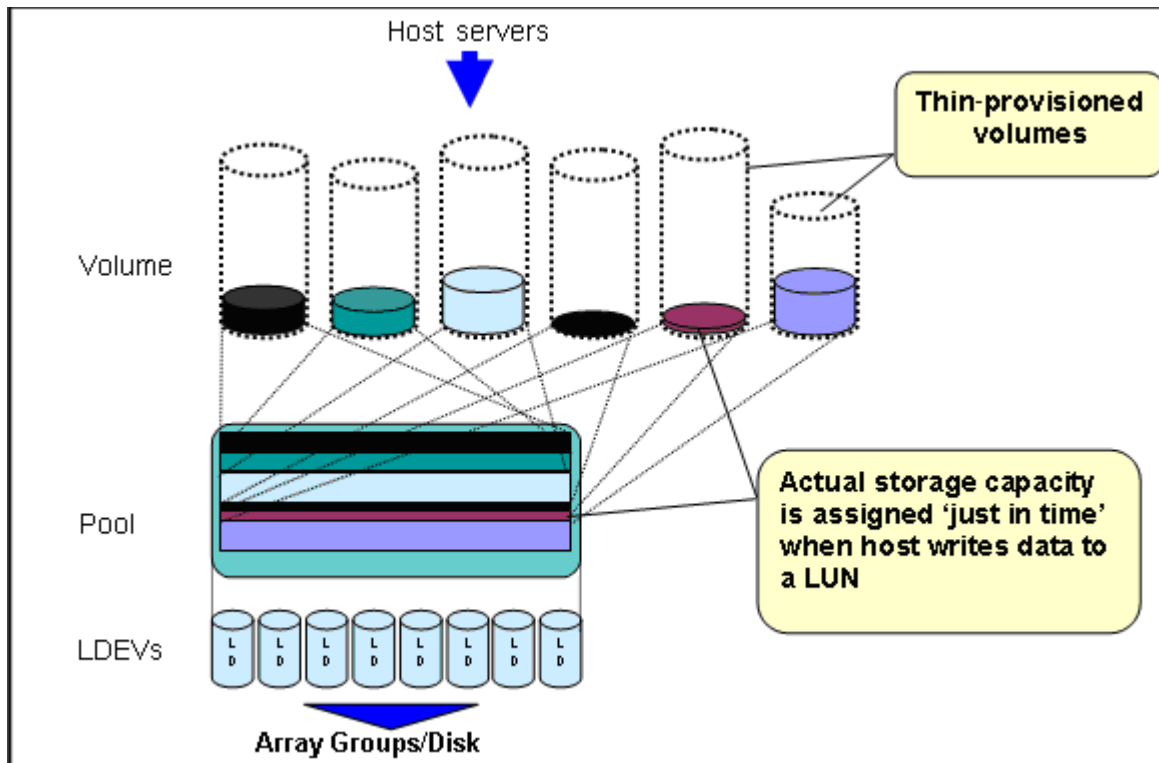
Dynamic Provisioning requires the use of DP-VOLs, which are virtual volumes with no physical memory space. In Dynamic Provisioning, multiple DP-VOLs can be created.

A DP-VOL is a volume in a thin provisioning storage system. It is the virtual volume from a DP pool. Data in the DP pool is used through a DP-VOL. A DP-VOL is a virtual LU to some hosts.

Relationship between a pool and DP-VOLs

Before you can use Dynamic Provisioning, a DP-VOL and a pool are required. Dynamic Provisioning uses the pool volumes in a pool through the DP-VOLs.

The following figure shows the relationship between a pool and DP-VOLs.



Protecting DP-VOLs

By using of the protecting function of DP-VOL, when problems occur in the pool or pool-VOLs, DP-VOLs using the pool can be protected from read and write requests, and change the access attribute of the DP-VOL to the Protect attribute. The function to protect from reading and writing of DP-VOL when the pool usage reaches the full size is displayed in the window as **Protect V-VOLs when I/O fails to Blocked Pool VOL**. The function to protect from reading and writing of DP-VOL when the pool-VOL is blocked is displayed in the window as **Protect V-VOLs when I/O fails to Blocked Pool VOL**. For details about setting items, see [Create Pools window on page D-22](#).

To use the protecting function of DP-VOL, following must be satisfied:

- Data Retention Utility must be installed.
- Pool types must be Dynamic Provisioning or Dynamic Tiering which is the multi tier pool.

When the access attribute of V-VOL was changed to Protect, if you change the access attribute other than Protect, see [Chapter 6, Configuring access attributes on page 6-1](#). The setting by the DP-VOL protection function has no connection to the access attribute status of DP-VOL. For example, even if you disabled the DP-VOL protection function to the pool while the Protect attribute was being enabled on DP-VOL, the Protect attribute would still be enabled on DP-VOL.

If you uninstall the Data Retention Utility, the V-VOL protection function setting remains in the pool. In this case, if the Data Retention Utility is

installed again, settings made before the Data Retention Utility was uninstalled would be restored in the pool.

Creating V-VOLs



Caution: The T10 PI attribute can be defined only during the initial creation of LDEVs. The defined attribute cannot be removed from LDEVs on which the T10 PI mode is already set.

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Create LDEVs** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Create LDEVs**.For the **General Tasks** pane in Storage Navigator:
 - On the **General Tasks** pane, select **Create LDEVs**.For the **Logical Devices** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, click **Create LDEVs**.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Create LDEVs** to open the window.For the **Pools** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Create LDEVs**.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Create LDEVs** to open the window.
2. From the **Provisioning Type** list, confirm **Dynamic Provisioning** is selected.
If not, select **Dynamic Provisioning** from the list.
3. From the **Multi-Tier Pool** field, select **Enable** when you create the V-VOL for Dynamic Tiering, and select **Disable** when you do not create one.
If no pool is set to **Enable** in Dynamic Tiering, **Disable** is fixed.
4. If the function for active flash is used, select the check box of **Active Flash**.



Note: If there is no pool volume whose drive type is SSD, the check box cannot be selected.

5. Select the pool according to the following steps.
 - a. From the **Drive Type/RPM** list in **Pool Selection**, select the data drive type and RPM.
 - b. From the **RAID level** list, select the RAID level.
 - c. Click **Select Pool**.
The **Select Pool** window appears.

- d. In the **Available Pools** table, select a pool.



Note: You can specify a pool when creating DP-VOLs if the pool has a status of one of the following:

- Normal status
- Exceeded Threshold status
- In progress of pool capacity shrinking

You can select only one pool. When **Enable** is selected, the Dynamic Tiering -pools appear, and when **Disable** is selected, only the non-Dynamic Tiering -pools appear.

Perform the following if necessary:

- Click **Filter** to open the menu, specify the filtering, then **Apply**.
- Click **Options** to specify the units of pools or the number of rows to be displayed.

- e. Click **OK**.

The **Select Pool** window closes. The selected pool name appears in **Selected Pool Name (ID)**, and the total capacity of the selected pool appears in **Selected Pool Capacity**.

6. To offset the specified LDEV capacity by boundary, change the default **Offset Boundary** from **OFF** to **ON**.
7. In the **LDEV Capacity** text box, enter the DP-VOL capacity to be created. You can enter the capacity within the range of figures displayed below the text box. You can enter the number with two digits after the decimal point. You can change the capacity unit from the list.
8. In the **Number of LDEVs** text box, enter the number of LDEVs to be created. You can enter the number of LDEVs within a range of the figures displayed below the text box.
9. In the **LDEV Name** text box, enter the DP-VOL name. In the **Prefix** text box, enter the alphanumeric characters, which are fixed characters of the head of the DP-VOL name. The characters are case-sensitive. In the **Initial Number** text box, type the initial number following the prefix name, which takes up to 9 digits. You can enter up to the 32 characters including the initial number.
10. Click **Option**.
11. In the **Initial LDEV ID** field, make sure that LDEV ID is set. To confirm the used number and unavailable number, click **View LDEV IDs** to display the **View LDEV IDs** window. In the table, used LDEV numbers appear in blue, unavailable numbers appear in gray, and unused numbers appear in white. LDEV numbers that are unavailable can be already in use, or already assigned to another emulation group (group by 32 LDEV numbers).
12. From the **Cache Partition** list, select CLPR.

13. From the **MP Unit** list, select an MP unit.
Select an MP unit to be used by the LDEVs. If you assign a specific MP unit, select the ID of the MP unit. If you can assign any MP unit, click **Auto**.
14. From the **Full Allocation** field, select **Enable** or **Disable**. To reserve pages in the pool that are the same size as the LDEV capacity, select **Enable**.
15. From the **Tiering Policy** field, select the tiering policy to be used by the LDEVs. If you assign a specific tiering policy, select any policy. All(0) is selected by default. You can change a level from Level1(1) to Level5(5) or from Level6(6) to Level31(31). You can specify the function when the **Multi-Tier Pool** is enabled.
16. From the **New Page Assignment Tier** list, select a new page assignment tier. You can select from levels **High**, **Middle**, and **Low**. You can specify the function when the **Multi-Tier Pool** is enabled.
17. In the **Relocation Priority** option, select a priority.
To relocate the LDEV preferentially, set **Prioritize**. You can select **Default** or **Prioritize**. You can specify this function when the **Multi-Tier Pool** is enabled.
18. In **T10 PI**, select **Enable** or **Disable**.
19. If necessary, change the settings of the V-VOLs.
 - Changing the LDEV settings
Click **Change LDEV Settings** to open the **Change LDEV Settings** window.
20. If necessary, delete a row from the **Selected LDEVs** table.
Select a row to be deleted, then click **Remove**.
21. Click **Add**.
The created V-VOLs are added to the right **Selected LDEVs** table. If invalid values are set, an error message appears.
The **Provisioning Type**, **Pool Selection**, **Drive Type/RPM**, **RAID Level**, **LDEV Capacity**, and **Number of LDEVs** fields must be set. If these required items are not registered, you cannot click **Add**.
22. Click **Finish**.
The **Confirm** window appears.
To continue the operation for setting the LU path and define LUN, click **Next**.
23. In the **Task Name** in the text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. "yymmdd-window name" is entered as a default.
24. Click **Apply**.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Changing DP-VOL settings

The Storage Administrator (Provisioning) role is required to perform this task.

Before registering a DP-VOL, you can change the DP-VOL settings.

1. In the **Selected LDEVs** table in the **Create LDEVs** window, select an LDEV, then click **Change LDEV Settings**.
2. In the **Change LDEV Settings** window, you can change the setting of **LDEV Name**, **Initial LDEV ID**, or **MP Unit**.
 - If you change **LDEV Name**, specify the prefix characters and the initial number for this LDEV.
 - If you change **Initial LDEV ID**, specify the number of LDKC, CU, DEV, and Interval. To check used LDEVs, click **View LDEV IDs** to confirm the used LDEVs. The **View LDEV IDs** window opens.
 - If you change **MP Unit**, click the list and specify the MP unit ID. If the specific MP unit is specified, select the MP unit ID. If any MP unit is specified, click **Auto**.
3. Change the settings, then click **OK**.
4. In the **Create LDEVs** window, click **Finish**.
5. In the **Confirm** window, click **Apply**.

The setting is changed.

If **Go to tasks window for status** is checked, the **Tasks** window opens.

Removing the DP-VOL to be registered

The Storage Administrator (Provisioning) role is required to perform this task.

If you do not want to register the DP-VOL, you can remove it from the registering task.

1. In the **Selected LDEVs** table in the **Create LDEVs** window, select the LDEV, then click **Remove**.

A message appears asking whether you want to remove the selected row or rows. Click **OK**.
2. Click **Finish**.
3. In the **Confirm** window, click **Apply**.

The LDEV is removed.

If **Go to tasks window for status** is checked, the **Tasks** window opens.

Formatting LDEVs in a Windows environment

In a Windows environment, both Normal Format or Quick Format are commonly used. In this environment, Quick Format consumes less thin provisioning pool capacities than Normal Format.

On Windows Server 2008, using Normal Format issues Write commands to the overall volume (for example, overall "D" drive). When Write commands are issued, pages corresponding to the overall volume are allocated,

therefore, pool capacities corresponding to the ones of the overall volume are consumed. In this case, the thin provisioning advantage of reducing capacities is lost.

Quick Format issues Write commands only to management information (for example, index information). Therefore, pages corresponding to the management information areas are allocated, but the capacities are smaller than the ones consumed by Normal Format.

Monitoring capacity and performance

Monitoring pool capacity

The storage system monitors the pool's free capacity in accordance with threshold values defined when you create pools. If the pool capacity reaches the threshold values, warnings are issued as SIMs and as SNMP traps to the open-systems host.

You can provision a larger virtual capacity beyond the pool capacity by using DP-VOLs of Dynamic Provisioning or Dynamic Tiering. However, when the pool's free capacity is depleted, you can lose access to DP-VOLs that require more pool capacity. For example, if the pool usage rate is 100% due to increased write operations, then I/O is not accepted and I/O is stopped for a DP-VOL that failed to receive needed pool capacity. Therefore, carefully monitor the pool usage or pool free capacity, as well as the level of provisioned virtual capacity.

Protecting data during pool shortages

To protect data from reading and writing to the DP-VOL when the pool is full, you can apply access attributes to a volume. Enable the use of the Hitachi Data Retention Utility, by insuring the license is installed and by using system option mode 729. This protection method applies a Protect attribute to the DP-VOL to protect volumes against write operations when the pool is full. See [Assigning an access attribute to a volume on page 6-4](#) for more details.

The Protect attribute is applied to the DP-VOL and is used in conjunction with other Hitachi software products. When the Protect attribute is applied to the DP-VOL, **Permitted** appears in the **S-VOL** field and **0 day** appears in the **Validation** field of the Hitachi Data Retention Utility window. However, when the Protect attribute is added to the DP-VOL with the S-VOL unacceptable attribute available in the Hitachi Data Retention Utility, **Not Permitted** appears in the **S-VOL** field in the Data Retention window.

Monitoring performance

You can monitor system performance using Performance Monitor. For more information, see the *Performance Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models* .

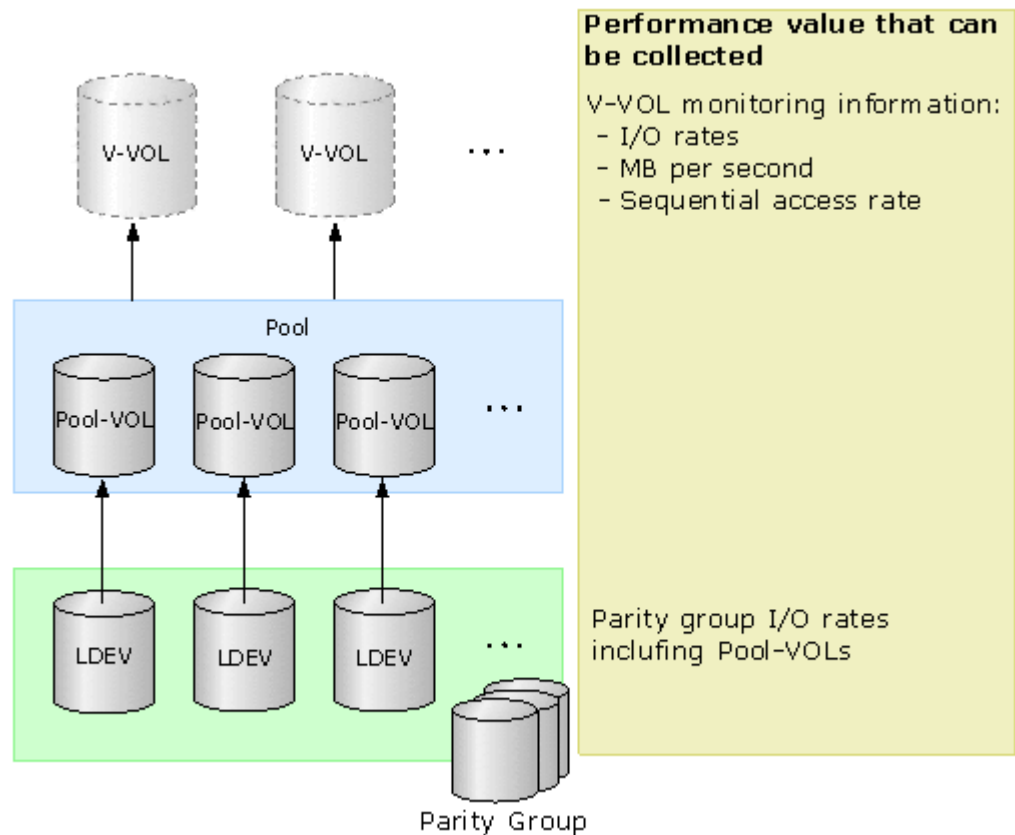
You can monitor information on pools and DP-VOLs using Command Control Interface (CCI). For more information, see the *Command Control Interface User and Reference Guide*.

The following activities help you to monitor and control performance of the DP-VOL. Collecting monitor information and subsequent tuning can increase throughput and operating rates.

- **Collecting monitor information.** Collecting the following monitor information helps you determine the pool load (including the access frequency, and the access load upon data drives) and DP-VOL load (including the access frequency). You can then use this monitor information to tune the appropriate allocation.
 - Access frequency of DP-VOL, read hit rates, and write hit rates (using Performance Monitor)
 - Usage rates of parity groups of pools (using Performance Monitor)
 - Pool usage (using Hitachi Device Manager - Storage Navigator).
 - DP-VOL usage (using Hitachi Device Manager - Storage Navigator).
 - Dynamic Tiering performance monitoring of pool storage
- **Possible tuning actions (without Dynamic Tiering).** The following techniques using ShadowImage or Hitachi Tiered Storage Manager move a DP-VOL.
 - The DP-VOL is copied using ShadowImage from a pool with an I/O bottleneck. For more information, see *Hitachi ShadowImage® User Guide*.
 - When normal volumes exist in the same parity group as the pool-VOL, Hitachi Tiered Storage Manager can move the normal volume to another parity group that is not shared with a pool-VOL.
 - ShadowImage copies a DP-VOL with a high I/O load to a pool with a lower access level to adjust the pool load.

Managing I/O usage rates example

The following figure shows an example of managing I/O usage rates.



Tuning with Dynamic Tiering

If Dynamic Tiering is active on your storage system, you can monitor access frequency and performance use while Dynamic Tiering automatically relocates data to the most suitable data drive (tier). You can configure monitoring to be automatic or manual. In both cases, relocation of the data is automatically determined based on monitoring results.

For details, see [Dynamic Tiering and active flash on page 5-19](#)

Thresholds

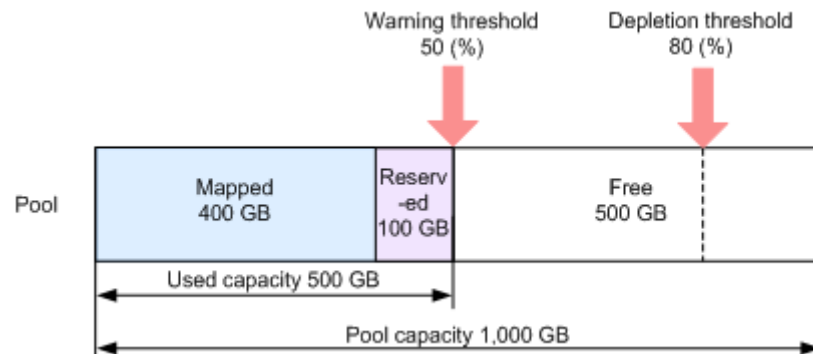
Pool usage thresholds

Dynamic Provisioning monitors pool capacity using thresholds. A threshold is the proportion (%) of used capacity of the pool to the total pool capacity. Each pool has its own pool threshold values.

- **Warning Threshold:** Set the value between 1% and 100%, in 1% increments. The default is 70%.
- **Depletion Threshold:** Set the value between 1% and 100%, in 1% increments. The default is 80%.

Pool usage over either threshold causes a warning to be issued through SIMs (Service Information Messages) to Hitachi Device Manager - Storage Navigator and SNMP (Simple Network Management Protocol) traps to the open-systems host. For more information on SNMP traps and the SNMP Manager, see the *Hitachi SNMP Agent User Guide*. See [Working with SIMs on page 5-111](#) for more information about SIMs.

The following figure shows a pool capacity of 1,000 GB, Warning Threshold of 50%, and Depletion Threshold of 80%. If the used capacity of the pool is larger than 50% (500 GB) of the total pool capacity, a SIM and an SNMP trap are reported. If the used capacity of the pool increases and exceeds the Depletion Threshold (80%), a SIM and an SNMP trap are reported.



In this scenario, if the actual pool usage percentage is 50.1%, only 50% appears on the Hitachi Device Manager - Storage Navigator window because the capacity amount is truncated after the decimal point. If the threshold is set to 50%, a SIM and an SNMP trap are reported even though the pool usage percentage appearing on the screen does not indicate an exceeded threshold.

Pool subscription limit

The value of using a subscription limit is to manage the maximum amount of over-provisioning that is acceptable for a pool. By managing the pool subscription limit, you can control the potential demand for storing data that might exceed the pool capacity.

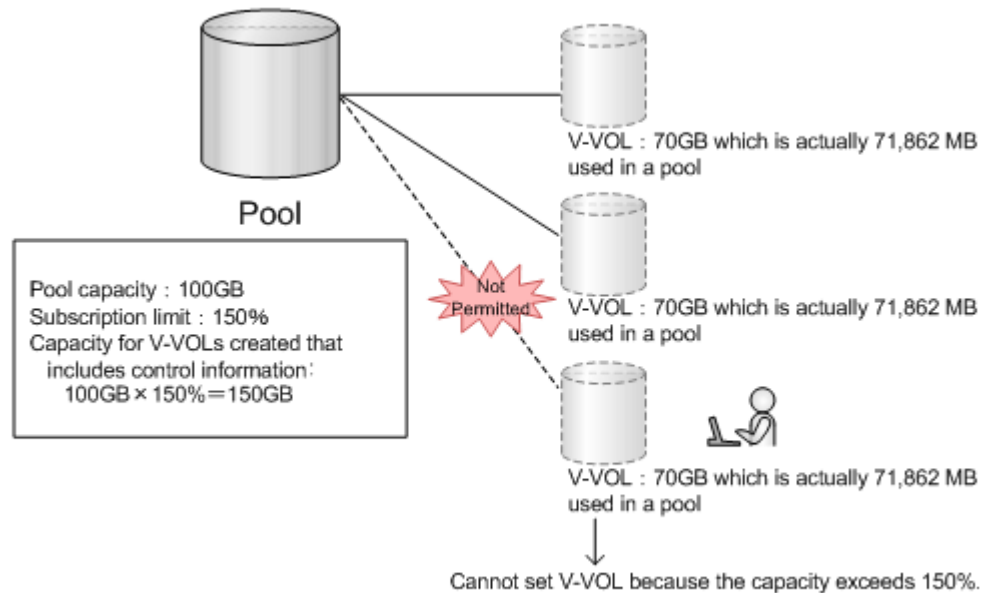
The subscription limit is the ratio (%) of the total DP-VOL capacity that has been configured to the total capacity of the pool. When the subscription limit is set, you cannot configure another DP-VOL if the new DP-VOL capacity would cause the subscription limit to be exceeded.

The subscription limit includes pages required to store user data and control information. The total capacity of DP-VOLs that are created from the pool is smaller than the subscription limit capacity. The formula used to calculate the required pages for one DP-VOL includes the control information. To determine the total pages required in a pool, multiply the number of calculated pages by the number of DP-VOLs. The value enclosed in `ceil( )` must be rounded up to the nearest whole number.

Number of pages for the DP-VOL including the control information =
`ceil((One DP-VOL capacity (MB) + ceil(One DP-VOL capacity (MB) / 3,145,548 (MB)) * 4 (Pages) * 42 (MB)) / 42 (MB))`

For example, if the pool capacity is 100 GB and the subscription limit is 150%, you can configure 150 GB of capacity to the DP-VOLs related to the pool.

The following figure depicts setting the subscription limit of pool capacity.



Monitoring total DP-VOL subscription for a pool

You can configure the Subscription Limit of total DP-VOL capacity to pool capacity. This prevents a new DP-VOL capacity that exceeds the configured subscription limit from being allocated and is associated with the pool. If you specify more than 100% as the subscription limit or the subscription limit is not set, monitor the free pool capacity because it is possible that writes to the DP-VOLs can exceed pool capacity. For details about the Subscription Limit, see [Create Pools window on page D-22](#).

The used value displayed on the cell for **Current** in the **Subscription (%)** is truncated after the decimal point of the calculated value. Therefore, the actual percentage of DP-VOL assigned to the pool can be larger than the value displayed on the window. If you create a new DP-VOL of the same size as the existing DP-VOL, the larger capacity size displayed on the **Current** cell is necessary.

For example, if 3 GB V-VOL is related to an 11.89 GB pool, the capacity (%) is calculated as follows:

$$((\text{ceil}(3,072 \text{ (MB)} / 3,145,548 \text{ (MB)}) * 4 \text{ (Pages)} * 42 \text{ (MB)}) + 3,072 \text{ (MB)}) / 12,175.36 \text{ (MB)} * 100 = 26.61 \dots (\%)$$

In this case, 26 (%) is displayed on the cell for **Current** in the **Subscription (%)**. If you create a new V-VOL of the same size as the existing V-VOL, 27 (%) or more remaining capacity is necessary.

Changing pool thresholds

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.
For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions** > **Pool** > **Edit Pools** to open the window.
4. In the **Edit Pools** window, check **Warning Threshold** or **Depletion Threshold**.
5. Type the threshold values in the text box.
The threshold value can be within the range of values indicated below the text box. The **Depletion Threshold** value can be equal to or greater than the **Warning Threshold**.
6. Click **Finish**.
7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Changing the pool subscription limit

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.
For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions** > **Pool** > **Edit Pools** to open the window.

4. In the **Edit Pools** window, check **Subscription Limit**, then type the subscription limit percentage.
If the subscription limit is blank, then it is disabled, and any amount of DP-VOLs can be created regardless of the pool free capacity.
5. Click **Finish**.
6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Working with SIMs

About SIMs

Dynamic Provisioning and Dynamic Tiering provide Service Information Messages (SIMs) to report the status of the DP-VOLs and pools. The SIM level is Moderate. If an event associated with a pool occurs, a SIM and an SNMP trap are reported.

An example of a SIM condition is if the actual pool usage rate is 50.2%, but only 50% is displayed because the capacity amount is truncated after the decimal point. If the threshold is set to 50%, a SIM and an SNMP trap are reported, even though the pool usage rate displayed on the GUI does not indicate the threshold is exceeded.

SIM reference codes

The following table provides information about SIM reference codes associated with Dynamic Provisioning or Dynamic Tiering.

SIM Code (xxx = hexadecimal pool number)	Event	Thresholds or Values	Types of reports	
			Is the report notified to the host?	Does it need operations by the operator?
620xxx	Pool usage level exceeded the Warning Threshold	1% to 100% (in 1% increments). Default: 70%	Yes	No
622xxx	Pool is full	100%	Yes	No
623xxx	Error occurred in the pool	Not applicable	Yes	Yes
624000	No space in the control memory	Not applicable	Yes	Yes
625000	Pool usage level continues to exceed the highest pool	Highest pool threshold	Yes	No

SIM Code (xxx = hexadecimal pool number)	Event	Thresholds or Values	Types of reports	
			Is the report notified to the host?	Does it need operations by the operator?
	threshold. SOM 734 must be enabled.			
626xxx	Pool usage level exceeded the Depletion Threshold	1% to 100% (in 1% increments). Default: 80%	Yes	No
627xxx	Pool-VOL is blocked	Not applicable	Yes	Yes
628000	Protect attribute of Data Retention Utility is set	Not applicable	Yes	Yes

Managing pools and DP-VOLs

Viewing pool information

The Storage Administrator (Provisioning) role is required to perform this task.

1. In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. View the pool information.
For details about the window for pool information, see [Pools window on page D-3](#) and [Pools: Volume tabs on page D-10](#).

Viewing used pool capacity

The Storage Administrator (Provisioning) role is required to perform this task.

Following procedures can be used to find used capacities of pools:

- Viewing the used capacity for each pool
- Viewing the used capacity for the Thin Image pool

Viewing the used capacity for each pool

Procedure

1. Open the **Pools** window.
In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.

- b. Expand the target storage system, right-click **DP Pools**, and then select **System GUI**.

In Device Manager - Storage Navigator:

- a. Click **Storage Systems**, and then expand the **Storage Systems** tree.
 - b. Click **Pools**.
2. The used pool capacity of pools appears on the **Used** column in the **Pools** tab.

For details about the window for pool information, see [Pools window on page D-3](#).

Viewing the used capacity of a Thin Image pool

1. Open the **Pools** window.
In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.
 - b. Expand the target storage system, right-click **DP Pools**, and then select **System GUI**.In Device Manager - Storage Navigator:
 - a. Click **Storage Systems**, and then expand the **Storage Systems** tree.
 - b. Click **Pools**.
2. Review the **Used Pool Capacity** of pools listed in the **Pools** table.

Viewing formatted pool capacity

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of a pool whose free pool capacity you are confirming.
3. Click **More Actions** to select **View Pool Management Status**.
The **View Pool Management Status** window appears.

Following are cases where the free space of the pool is not formatted. In these cases, the free space of the pool may not increase:

- Pools other than the selected pool are being formatted.

- The pool usage level reaches up to the warning threshold or the depletion threshold.
- The selected pool is blocked.
- I/O loads to the storage system are high.
- The cache memory is blocked.
- Pool-VOLs in the selected pool are blocked.
- Pool-VOLs which are external volumes in the selected pool are blocked.
- Correction access executes to the pool-VOL in the selected pool.



Note: Following are cases where the formatted pool capacity can decrease:

- New pages are being allocated.
 - LDEV format is being performed on the pool-VOL.
 - Correction copy is being executed.
-

Viewing the progress of rebalancing the usage level among parity groups

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.
 For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
 2. From the **Pools** table on the right, click the row of a pool whose progress of rebalancing the usage level among parity groups you want to confirm.
 3. Click **More Actions** to select **View Pool Management Status**.
The **View Pool Management Status** window appears.
-



Note: Following are cases where the progress ratio may not increase:

- The usage level is being rebalanced among the parity groups in pools other than the selected pool.
 - Tier relocation is performed.
-

Increasing pool capacity

The Storage Administrator (Provisioning) role is required to perform this task.

Adding the pool-VOL to the pool created for Dynamic Provisioning, Dynamic Tiering, or active flash increases the pool capacity. The amount of pool capacity registered in the pool represents the pool capacity. You need to check the pool free capacity to determine whether additional pool capacity is required. You cannot increase the pool capacity while it is being shrunk.

Notes on using Dynamic Tiering or active flash

- When pool-VOLs with the available monitoring information are added in a pool, tier relocation is performed. When pool-VOLs with no available monitoring information are added in a pool, the page usage rate is averaged in a tier.
- If the pool-VOLs are added, the tier relocation being performed stops.

To increase pool capacity:

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.
3. Perform one of the following to display the **Expand Pools** window.
 - Click **Expand Pools**.
 - Click **Actions > Pool > Expand Pools** to open the window.
4. In the **Expand Pool** window, select the pool-VOL.
 - a. Click **Select Pool VOLs**.
 - b. In the **Select Pool VOLs** window, from the **Available Pool Volumes** table, select the pool-VOL you want to assign, then click **Add**.
The selected pool-VOLs are registered in the **Selected Pool Volumes** table.
Up to 1024 volumes can be added, including the volumes already in the pool.



Note: If necessary, perform the following steps:

- From **Filter option**, select **ON** to filter the rows.
- Click **Select All Pages** to select pool-VOLs in the table.
- Click **Options** to specify the unit of volumes or the number of rows to be viewed.
- To set the tier rank of an external volume to a value other than **Middle**, select a tier rank from **External LDEV Tier Rank**, then click **Add**.
- For a pool, you can add volumes whose **Drive Type/RPM** settings are the same and whose RAID levels are different. For example, you can add the following volumes to the same pool:
Volume whose **Drive Type/RPM** is SAS/15K and whose **RAID Level** is 5 (3D+1P)

Volume whose **Drive Type/RPM** is SAS/15K and whose **RAID Level** is 5 (7D+1P)

- c. Click **OK**.
The **Select Pool VOLs** window closes. The number of the selected pool volumes appears in **Total Selected Pool Volumes**, and the total capacity of the selected pool-VOL appears in **Total Selected Capacity**.
5. Click **Finish**.
6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Changing a pool name

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of the pool you want to change.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions** > **Pool** > **Edit Pools** to open the window.
4. In the **Edit Pools** window, in **Pool Name**, specify a name for this pool.
 - a. In **Prefix**, type the characters that is come the fixed characters for the beginning of the pool name. The characters are case-sensitive.
 - b. In **Initial Number**, type the initial number that will follow the prefix name.
5. Click **Finish**.
6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Recovering a blocked pool

The Storage Administrator (Provisioning) role is required to perform this task.

This procedure is for failure recovery of a blocked pool. Ordinarily, you do not need to use this procedure. A recovered pool can be used, but the former data is lost.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.
 For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, click the row of a pool you want to change to the Dynamic Tiering setting.
3. Perform one of the following to display the **Restore Pools** window.
 - Click **More Actions** and select **Restore Pools**.
 - Click **Actions > Pool > Restore Pools** to open the window.
4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

The recovery time for pools varies depending on pool usage or DP-VOL usage. Allow roughly 20 minutes of recovery time for every 100 TB of pool or DP-VOL usage. Recovery time can vary depending on the workload of the storage system at the time of recovery.

Decreasing pool capacity

About decreasing pool capacity

You can decrease pool capacity by deleting pool-VOLs.

When you remove a pool-VOL from a pool, the used pages in the pool-VOL are moved to other pool-VOLs.

For the pool that owns DP-VOL with a disabled data direct mapping attribute, if pool-VOL is released after the pool shrinking, the released pool-VOLs (LDEVs) will be blocked. If they are blocked, format them before using them. If the blocked pool-VOL is an external volume, use Normal Format when formatting the volume.

If the pool-VOL being deleted is the external volume and is disconnected during deletion, reconnect the external volume and then retry deleting the pool-VOL.

You can decrease pool capacity for up to eight tasks at the same time. Do not execute a Command Control Interface command to decrease the capacity of the pool while its capacity is already being decreased.

You cannot decrease pool capacity when:

- Creating the pool.
- Deleting the pool.
- Increasing the pool.

- Decreasing the pool.
- Recovering the pool.
- Stopping decreasing the pool.
- Changing the threshold.
- Reclaiming zero pages.
- Creating DP-VOLs.
- Increasing DP-VOL capacity.

While the pool capacity is being decreased, if maintenance of cache memory is performed, if the cache memory fails, or if the I/O load to the DP-VOL related to the pool is high, decreasing the pool capacity process might fail. In this case, check the **Tasks** window to determine whether processing has abnormally ended.

If the processing ended abnormally, restore the cache memory and retry decreasing the pool capacity.



Note: You cannot perform the following operations on a pool while the pool volume capacity is shrinking. Wait until shrinking completes or stop the shrinking process.

- Expand Pool
- Shrink Pools
- Edit Pools
- Restore Pools

If you delete the pool-VOL with the pool's system area, the used capacity and the management area will move to other pool volumes. If you delete the pool-VOL with system area, a different system area pool-VOL is assigned automatically according to the priority shown in the following table. A pool must include one or more pool-VOLs.

Priority	Data drive type
1	SAS7.2K
2	SAS10K
3	SAS15K
4	SSD
5	External volume

If multiple pool-VOLs of the same data drive type exist, the priority of each is determined by internal index of the storage system.

If pool capacity is decreased soon after creating a pool or adding a pool-VOL, processing can take a while to complete.

Notes on using Dynamic Provisioning

You cannot delete a pool-VOL under the following conditions.

- If the pool-VOL is deleted, the used capacity of the pool-VOL exceeds the pool threshold.
- If the pool-VOL is deleted, the subscription rate of the total V-VOL capacity, including the control information, exceeds the subscription limit. For details about the formula used to calculate the required pages for one DP-VOL including the control information, see [Pool subscription limit on page 5-108](#).
- If the pool-VOL with system area is deleted, more than 4.2 GB of free space is necessary in the pool.

Notes on using Dynamic Tiering or active flash

- You cannot delete a pool-VOL under the following conditions.
 - If the pool-VOL is deleted, the used capacity of the pool-VOL exceeds the pool threshold.
 - If the pool-VOL is deleted, the subscription rate of the total V-VOL capacity, including the control information, exceeds the subscription limit. For details about the formula used to calculate the required pages for one DP-VOL including the control information, see [Pool subscription limit on page 5-108](#).
 - If the pool-VOL with system area is deleted, more than 4.2 GB of free space is necessary in the pool.
- When the pool-VOL is deleted, the pages contained in the deleted pool-VOL transfer to another pool-VOL in the same tier. If the used capacity in the tier exceeds **Rate of Free Space Newly Allocated to**, the overflowing pages transfer to another tier.
- When pool-VOLs in the tier are empty, the appropriate tier is deleted.
- Deleting the pool-VOL stops tier relocation. The process resumes after the pool-VOL is deleted.

Notes on using Thin Image

You cannot delete a pool-VOL under the following conditions.

- If the pool-VOL is deleted, the used capacity of the pool-VOL exceeds the pool threshold.
- If the pool-VOL with system area is deleted, more than 4.2 GB of free space is necessary in the pool.

Decreasing pool capacity

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**. On the **Pools** tab, select **Shrink Pool**.

For Storage Navigator:

- In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. Select the pool that contains the pool-VOLs to be deleted.
3. From the **Pool volumes**, select the pool-VOL to be deleted.
You cannot delete pool-VOLs unless **Shrinkable** is applied.
4. Perform one of the following to display the **Shrink Pool** window.
 - Click **Shrink Pool**.
 - Click **Actions > Pool > Shrink Pool** to open the window.The details of **Before Shrinking** and **After Shrinking**, including the pool capacity, the used pool capacity, and the free pool capacity, appear in **Prediction Result of Shrinking**.
5. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Stopping the decrease of pool capacity

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** window, select the pool for which you want to stop decreasing pool capacity.
3. Perform one of the following to display the **Stop Shrinking Pools** window.
 - Click **Stop Shrinking Pools**.
 - Click **Actions > Pool > Stop Shrinking Pools** to open the window.
4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Deleting a tier in a pool

The Storage Administrator (Provisioning) role is required to perform this task.

To delete a tier in a pool, you must delete all the pool-VOLs in the tier to be deleted. When pool-VOLs in the tier are empty, the appropriate tier is deleted.

If you delete a pool, its pool-VOLs (LDEVs) is blocked. If they are blocked, format them before using them.

You cannot delete the pool-VOL when:

- Creating the pool.
- Deleting the pool.
- Increasing the pool capacity.
- Decreasing the pool capacity.
- Restoring the pool.
- Stopping decreasing the pool capacity.
- Changing the threshold.
- Initializing the pool capacity.
- Changing the external LDEV tier rank.

Notes on deleting a tier in a pool

You cannot delete a pool-VOL under these conditions.

- If the pool-VOL is deleted, the used capacity of the pool-VOL exceeds the pool threshold.
- If the pool-VOL is deleted, the subscription rate of the total V-VOL capacity, including the control information, exceeds the subscription limit. For details about the formula used to calculate the required pages for one DP-VOL including the control information, see [Pool subscription limit on page 5-108](#).
- There must be 4.2 GB of free space in the pool to delete the pool-VOL with system area.

Deleting the pool-VOL stops the tier relocation. The process resumes after the pool-VOL is deleted.

To delete a tier in a pool:

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. Select the pool that contains the pool-VOLs to be deleted.
The pool information appears on the right.
3. Select the **Pool volumes** tab and select all the pool-VOLs contained in the tier to be deleted.
You cannot delete a pool-VOL unless **Shrinkable** has been applied.
4. Perform one of the following to display the **Shrink Pool** window.

- Click **Shrink Pool**.
 - Click **Actions > Pool > Shrink Pool** to open the window.
5. In the **Shrink Pool** window, verify the changes.
The details of **Before Shrinking** and **After Shrinking**, including the pool capacity, the used pool capacity and the free pool capacity, appears in **Prediction Result of Shrinking**.
 6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Deleting a pool

The Storage Administrator (Provisioning) role is required to perform this task.

For the pool that owns DP-VOL with a disabled data direct mapping attribute, if pool-VOL is released after the pool shrinking, the released pool-VOLs (LDEVs) will be blocked. If the pool-VOLs are blocked, they must be formatted before they can be reused. If the blocked pool-VOL is an external volume, select **Normal Format** when formatting the volume. You can delete a pool only when all of the DP-VOLs have been deleted.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.
 For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** table on the right, select the pool to be deleted.
3. Perform one of the following to display the **Delete Pools** window.
 - Click **More Actions - Delete Pools**.
 - Click **Actions > Pool > Delete Pools** to open the window.
 You cannot delete a pool whose usage is not 0%, or a pool for which DP-VOLs are assigned.
4. Click **Finish**.
The **Confirm** window opens.
To continue with the shredding operation and delete volume data, click **Next**. For details about the shredding operation, see *Hitachi Volume Shredder User Guide*.
If the pool is blocked, you might not be able to perform shredding operations.
5. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.



Note: When the pool-VOLs of a pool are empty, the appropriate tier is deleted.

Changing external LDEV tier rank



Note: When there are no pool-VOLs in the tier, the appropriate tier is deleted.

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pool volumes** table in the right pane, select the pool-VOL that has the external LDEV tier rank you want to change.
You cannot change the external LDEV tier rank of a pool-VOL if **External Volume** is not displayed in the **Drive Type/RPM** column.
3. Perform one of the following to display the **Edit External LDEV Tier Rank** window.
 - Click **More Actions - Edit External LDEV Tier Rank**.
 - Click **Actions > Pool > Edit External LDEV Tier Rank** to open the window.
4. From the **Selected Pool volumes** table, select the pool-VOL with the external LDEV tier rank you want to change.
5. Click **Change** and select the tier rank.
6. Click **Finish**.
The **Confirm** window appears.
7. In the **Task Name** text box, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. "date-window name" is entered by default.
8. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Increasing DP-VOL capacity

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Expand V-VOLs** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Expand V-VOLs**.

For the **Logical Devices** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be edited, click **More Actions**, then select **Expand V-VOLs**.
- Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Expand V-VOLs** to open the window.

For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be edited, click **Expand V-VOLs**.
- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Expand V-VOLs** to open the window.

- Select **Specify Total Capacity** or **Specify Additional capacity**.
- To offset the specified LDEV capacity by boundary, change the default **Offset Boundary** from **OFF** to **ON**.
- In **Capacity**, type the capacity amount.
Enter the LDEV capacity to two decimal places within the range of values indicated below the text box.
- Click **Finish**.
The **Confirm** window opens.
- In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Changing the name of a DP-VOL

The Storage Administrator (Provisioning) role is required to perform this task.

- Perform one of the following to display the **Edit LDEVs** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Edit LDEVs**.
 For the **Logical Devices** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be edited, click **Edit LDEVs**.
 - Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Edit LDEVs** to open the window.
 For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be edited, click **More Actions**, then **Edit LDEVs**.
 - Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Edit LDEVs** to open the window.
2. Check **LDEV Name** and change the LDEV name, if necessary.
 - a. In **Prefix**, type the characters that iscome the fixed characters for the beginning of the LDEV name. The characters are case-sensitive.
 - b. In **Initial Number**, type the initial number that will follow the prefix name.
 3. Click **Finish**.
 4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Releasing pages in a DP-VOL

Releasing pages in a DP-VOL frees up pool capacity. When a page in the DP-VOL contains zero data, the free capacity of a pool increases after the pages are released. You can perform the operation to reclaim zero pages on each V-VOL and monitor progress. For details, see [View Pool Management Status window on page D-71](#). If you stop the operation to reclaim zero pages, the zero pages that have been reclaimed cannot be restored.

Logically, there is no difference between a page with zero data and the area of a DP-VOL without a page allotted. Both are effectively identical. However, the former uses pool capacity and the latter does not.

Zero pages can be reclaimed when all the following conditions are satisfied:

- The DP-VOL is not used in conjunction with another VSP G200, G400, G600, G800 or VSP F400, F600, F800 product which does not support reclaiming zero pages.
See [Using Dynamic Provisioning, Dynamic Tiering, or active flash with other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products on page 5-11](#).
- LDEV formatting is not being performed on the DP-VOL.
- The DP-VOL is not blocked.
- The DP-VOL is not the DP-VOL of the data direct mapping attribute.
- The DP-VOL is associated with a pool.
- The pool associated with the DP-VOL is not blocked, or is full and blocked.
- The LUN path is not defined between DP-VOL and the host group whose host model option 97 is enabled.

Pages that include control cylinders are not processed when releasing pages in a DP-VOL.

Pages that include file system metadata cannot be reclaimed. Refer to [Operating system and file system capacity on page 5-10](#) for a table of the Pool Capacity Consumed by the file system.

While releasing pages from a DP-VOL, performance of the host I/O to the DP-VOL can temporarily decrease due to scanning for non-zero data.

If you stop an operation to reclaim zero pages in mid-stream, the pages that have been released will remain as free pool capacity.

After an operation to reclaim zero pages, Dynamic Provisioning automatically balances usage levels among parity groups in the pool. This rebalancing is performed on parity groups related to the pool. If you do not want automatic balancing of the usage levels of parity groups, call the Hitachi Data Systems customer support to change your configuration.

Dynamic Provisioning does not automatically balance the usage levels among parity groups if the cache memory is not redundant or if the pool usage reaches the threshold.

If all the tracks that belong to a page assigned to a DP-VOL have no records written, you can reclaim the page and return it to the pool's available capacity.



Caution: In the following cases, an operation of the reclaim zero pages stops and DP-VOL pages might be not released.

- The pool-VOL accessed by the target DP-VOL is blocked.
 - The pool associated with the target DP-VOL is blocked while the operation to reclaim zero pages is in progress.
 - Cache memory failure occurs while the operation to reclaim zero pages is in progress.
 - While the operation to reclaim zero pages is in progress, the initial copy operation of the TrueCopy pair, the Universal Replicator pair, the global-active device pair, or the ShadowImage pair is performed on the DP-VOL.
 - The LUN path is defined between DP-VOL and the host group whose host mode 97 is enabled while the operation to reclaim zero pages is in progress.
-

Reclaiming zero pages in a DP-VOL

The Storage Administrator (Provisioning) role is required to perform this task.

You can reclaim pages in a DP-VOL to free pool capacity. If a page assigned to a DP-VOL contains only zero binary data, you can reclaim the page by performing the operation to release zero pages. Reclaiming the page decreases the used capacity of the pool.

Before releasing pages in a DP-VOL, see [Releasing pages in a DP-VOL on page 5-125](#)). If the operation to release zero pages is performed on V-VOLs enabled for full allocation, the used capacity of the pool is not changed before the operation to release zero pages is performed.

To release pages in a DP-VOL:

1. Perform one of the following to display the **Reclaim Zero Pages** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Reclaim Zero Pages**.

For the **Logical Devices** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be operated, click **More Actions**, then click **Reclaim Zero Pages**.
- Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Reclaim Zero Pages** to open the window.

For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be operated, click **More Actions**, then **Reclaim Zero Pages**.
- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Reclaim Zero Pages** to open the window.

You cannot release pages in a DP-VOL when the DP-VOL is not in a normal status or the DP-VOL is reclaiming zero pages.

2. In **Task Name** type a unique name for this task or accept the default, then click **Apply**.

If **Go to tasks window for status** is checked, the **Tasks** window opens.

After the operation to reclaim zero pages is complete, refresh the display to update the **Page Status**. If the **Page Status** is not immediately updated, wait a while, then refresh the display.



Note: **Completed** is displayed as the **Page Status** even when no pages can be reclaimed.

If you have started the reclaiming zero pages operation, and the storage system is powered off, the reclaiming zero pages operation does not automatically continue after the storage system restarts.

In any of the following cases, the reclaiming zero pages will stop, and DP-VOL pages will not be released:

- LDEV formatting was performed while reclaiming zero pages.
- The pool-VOL that is being accessed by the target DP-VOL was blocked.
- The pool associated with the target DP-VOL was blocked while reclaiming zero pages.
- Cache memory failure occurred while reclaiming zero pages.
- The DP-VOL was deleted when zero pages were reclaimed.

- The initial copy operation between the TrueCopy pair or the Universal Replicator pair was performed on the DP-VOL in which zero pages were being reclaimed.

Stopping the release of pages in a DP-VOL

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Reclaim Zero Pages** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Stop Reclaiming Zero Pages**.

For the **Logical Devices** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be operated, click **More Actions**, then click **Stop Reclaiming Zero Pages**.
- Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Stop Reclaiming Zero Pages** to open the window.

For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be operated, click **More Actions**, then **Stop Reclaiming Zero Pages**.
- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Stop Reclaiming Zero Pages** to open the window.

You cannot stop releasing the pages in a DP-VOL where zero pages are not being reclaimed.

2. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Changing full allocation settings in DP-VOLs

You can use the procedure in this section to change full allocation settings in DP-VOLs.

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.

Procedure

1. Open the **Pools** window.
In Hitachi Command Suite:

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

In Device Manager - Storage Navigator:

- a. Click **Storage Systems**, and then expand the **Storage Systems** tree.
 - b. Click **Pools**.
2. On the **Pools** tab, click the link of the **Pool Name** associated with the volume that has settings that you want to change.
 3. Select the **Virtual Volumes** tab, click **More Actions**, then **Edit LDEVs**. The **Edit LDEVs** window opens.
 4. In the **Edit LDEVs window**, check **Full Allocation** and select **Enable** or **Disable**.
 - o **Enable**: All pages of a DP-VOL are allocated to the current pool.
 - o **Disable**: All pages of a DP-VOL might not be allocated to the current pool.
 5. Click **Finish**.
The **Confirm** window appears.
 6. In the **Task Name** text box, type a unique name for the task or accept the default.
You can enter up to 32 ASCII characters and symbols, with the exception of: \ / : , ; * ? " < > |. The value "date-window name" is entered by default.
 7. Click **Apply**.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Enabling/disabling tier relocation of a DP-VOL

The Storage Administrator (Provisioning) role is required to perform this task.

You can enable or disable tier relocation of individual DP-VOLs or on all DP-VOLs.

DP-VOLs on which tier relocation is disabled are excluded from the targets for the tier range calculation, and are not reflected in the performance information of pools. If tier relocation is disabled on all DP-VOLs in a pool, performance information of a pool is unavailable in the **View Tier Properties** window.

1. Perform one of the following to display the **Edit LDEVs** window.
For Hitachi Command Suite:
 - o On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Edit LDEVs**.

For the **Logical Devices** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be edited, and click **Edit LDEVs**.
- Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Edit LDEVs** to open the window.

For the **Pools** window in Storage Navigator:

- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be edited, click **More Actions**, and click **Edit LDEVs**.
 - Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Edit LDEVs** to open the window.
2. In the **Edit LDEVs** window, check **tier relocation** and select **Enable** or **Disable**.
Enable allows tier relocation to be performed to the DP-VOL.
Disable do not allow tier relocation to be performed on the DP-VOL in the case of both automatic and manual tier relocation.
 3. Click **Finish**.
 4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Deleting a DP-VOL



Caution: The following operations must be performed before deleting the DP-VOL with the data direct mapping attribute:

1. Using the **Block LDEVs** window, delete the Block DP-VOL with the data direct mapping attribute.
2. Using the **Disconnect External Storage Systems** window or the **Disconnect External Volumes** window, disconnect the DP-VOL that has the data direct mapping attribute from the external volume that has the data direct mapping attribute assigned with the DP-VOL.

The Storage Administrator (Provisioning) role is required to perform this task.

You cannot delete a DP-VOL if the status is *online*.

1. Perform one of the following to display the **Delete LDEVs** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Parity Groups** of the target storage system, then select **System GUI**. On the **LDEVs** tab, select **Delete LDEVs**.
For the **Logical Devices** window in Storage Navigator:
 - Expand the **Storage Systems** tree and select **Logical Devices**. On the **LDEVs** tab, select the LDEV to be deleted, click **More Actions**, then click **Delete LDEVs**.

- Expand the **Storage Systems** tree and select **Logical Devices**. Click **Actions > Logical Device > Delete LDEVs** to open the window.
- For the **Pools** window in Storage Navigator:
- Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, select the LDEV to be deleted, click **More Actions**, then click **Delete LDEVs**.
 - Expand the **Storage Systems** tree and select **Pools**. On the **Virtual Volumes** tab, click **Actions > Logical Device > Delete LDEVs** to open the window.
2. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Starting pool monitoring manually

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.
 For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** window, click the row of a pool.
3. Perform one of the following to display the **Monitor Pools** window.
 - Click **More Actions** to select **Monitor Pools**.
 - Click **Actions > Pool > Monitor Pools** to open the window.
4. In the **Task Name** text box of the **Monitor Pools** window, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. "date-window name" is entered by default.
5. In the **Monitor Pools** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Stopping pool monitoring manually

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.

For Storage Navigator:

 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
- 2. From the **Pools** window , click the row of a pool.
- 3. Perform one of the following to display the **Stop Monitoring Pools** window.
 - Click **More Actions** to select **Stop Monitoring Pools**.
 - Click **Actions** > **Pool** > **Stop Monitoring Pools** to open the window.
- 4. In the **Task Name** text box of the **Stop Monitoring Pools** window, enter the task name.
 You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. "date-window name" is entered by default.
- 5. In the **Stop Monitoring Pools** window, click **Apply** to register the setting in the task.
 If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Starting tier relocation manually

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
 For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.

For Storage Navigator:

 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools** window, click the row of a pool.
3. Perform one of the following to display the **Start Tier Relocation** window.
 - (1) Click **More Actions** to select **Start Tier Relocation**.
 - (2) Click **Actions** > **Pool** > **Start Tier Relocation** to open the window.
4. In the **Task Name** text box of the **Start Tier Relocation** window, enter the task name.
 You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. "date-window name" is entered by default.
5. In the **Start Tier Relocation** window, click **Apply** to register the setting in the task.
 If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Stopping tier relocation manually

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Pools** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **DP Pools** of the target storage system, then select **System GUI**.For Storage Navigator:
 - In the **Storage Systems** tree on the left pane of the main window, select **Pools**.
2. From the **Pools**, click the row of a pool.
3. Perform one of the following to display the **Stop Tier Relocation** window.
 - Click **More Actions** to select **Stop Tier Relocation**.
 - Click **Actions > Pool > Stop Tier Relocation** to open the window.
4. In the **Task Name** text box of the **Stop Tier Relocation** window, enter the task name.
You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. "date-window name" is entered by default.
5. In the **Stop Tier Relocation** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Creating the external volume, pool, or DP-VOL of the data direct mapping attribute

Creating the external volume of the data direct mapping attribute

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.

Procedure

1. Open the **Logical Devices** window.
In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems** and the target storage system.
 - b. Right-click **Volumes** and then select **System GUI**.In Device Manager - Storage Navigator

- a. Click **Storage Systems**, and then expand the **Storage Systems** tree.
 - b. Click **Logical Devices**.
2. In the **LDEVs** pane of the **Logical Devices** window, click **Create LDEVs**.
3. In the **Create LDEVs** window, from the **Provisioning Type** list, select **External** as a provisioning type for the LDEV to be created.
4. In **Data Direct Mapping**, select **Enable**.
5. Click **Select Free Spaces**.
6. In the **Select Free Spaces** window, in the **Available Free Spaces** table, select the free space to be assigned to the volumes.
Do the following, if necessary:
 - To specify the conditions and show the free space, click **Filter**, specify the conditions, and then click **Apply**.
 - To specify the unit for capacity and the number of rows to view, click **Options**.
7. Click **View Physical Location**.
8. In the **View Physical Location** window, confirm where the selected free space is physically located, and then click **Close**.
9. In the **Select Free Spaces** window, if the selected free spaces have no issues, click OK.
10. In the **Number of LDEVs per External Volume**, confirm that 1 is displayed.
11. In **LDEV Name**, specify a name for this LDEV.
 - a. In **Prefix**, type the characters that will become the fixed characters for the beginning of the LDEV name. The characters are case-sensitive.
 - b. In **Initial Number**, type the initial number that will follow the prefix name.
12. In **Format Type**, select the format type for the LDEV from the list.
For an external volume, if you create the LDEV whose emulation type is the open system, select **Normal Format** or **No Format**.
If the external volume can be used as it is, select **No Format**. The created LDEV can be used without formatting.
If the external volume needs to be formatted, select **No Format**, and then format the volume with the external storage system, or select **Normal Format**.
13. Click **Options** to show more options.
14. In **Initial LDEV ID**, make sure that an LDEV ID is set. To confirm the used number and unavailable number of LDEV IDs, click **View LDEV IDs** to open the **VIEW LDEV ID** window.
 - a. In **Initial LDEV ID** in the **Create LDEVs** window, click **View LDEV IDs**.

In the View LDEV IDs window, the matrix vertical scale represents the second-to-last digit of the LDEV number and the horizontal scale represents the last digit of the LDEV number. The LDEV IDs table shows the available, used, and disabled LDEV IDs. In the table, used LDEV numbers appear in blue, unavailable numbers appear in gray, and unused number appear in white. LDEV numbers that are unavailable may already be in use, or already assigned to another emulation group (group by 32 LDEV numbers).

- b. Click **Close**.
15. In the **Create LDEVs** window, from the **MP Unit ID**, select a MP unit to be used by the LDEVs.
 - If you assign a specific MP unit, select the ID of the MP unit.
 - If you can assign any MP unit, click **Auto**.
16. Click **Add**.

The created LDEVs are added to the **Selected LDEVs** table.

If these required items are not registered, you cannot click **Add**.
17. If necessary, click **Change LDEV Settings** to open the **Change LDEV Settings** window.

This will allow you to make necessary changes to the LDEV settings.
18. If necessary, delete an LDEV from the **Selected LDEVs** table.

Select an LDEV to delete and then click **Remove**.
19. Click **Finish**.

The **Confirm** window appears.

To continue the operation for setting the LU path and defining a logical unit, click **Next**.
20. In the **Task Name** text box, type a unique name for the task or accept the default.

You can enter up to 32 ASCII characters and symbols, with the exception of: \ / : , ; * ? " < > |.

The value "date-window name" is entered by default.
21. Click **Apply**.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Creating the pool of the data direct mapping attribute

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.

Procedure

1. Open the **Create Pools** window.

In Hitachi Command Suite:

- a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems** and the target storage system.
 - b. Right-click **DP Pools** and then select **System GUI**.
- In Device Manager - Storage Navigator
- a. Click **Storage Systems**, and then expand the **Storage Systems** tree.
 - b. Click **Pools**.
 - c. Click **Create Pools**.
2. From the **Pool Type** list, select **Dynamic Provisioning**.
 3. From the **Multi-Tier Pool** field, select **Disable**.
 4. From the **Data Direct Mapping** field, select **Enable**.
 5. Follow the steps below to select pool-VOLs:
 - a. From the **Drive Type/RPM** list, select a data drive type and RPM.
 - b. From the **RAID Level** list, select RAID level.
If you select **External Storage** from the **Drive Type/RPM** list, a hyphen (-) appears and you cannot select the RAID level.
 - c. Click **Select Pool VOLs**.
The **Select Pool VOLs** window appears.
 - d. In the **Available Pool Volumes** table, select the pool-VOL row to be associated with a pool, then click **Add**.
Select one or more volumes to use as pool-VOLs with system area. For the attribute of the volume which can be used as the pool-VOLs with system area, a hyphen (-) appears in the **Attribute** column. In addition, the external volume of the data direct mapping attribute can be selected optionally. For the attribute of the external volume of the data direct mapping attribute, **Data Direct Mapping** appears in the **Attribute** column. After creating the pool, you can also add the external volume of the data direct mapping attribute.
You can select a value other than **Middle** from **External LDEV Tier Rank** and click **Add** to set another tier rank for an external volume. The selected pool-VOL is registered in the **Selected Pool Volumes** table. Up to 1,024 volumes can be added to a pool.
-
-  **Tip:** Perform the following steps if necessary:
- Click **Filter** to open the menu, specify the filtering conditions, and click Apply.
 - Click **Select All Pages** to select all pool-VOLs in the table. To cancel the selection, click **Select All Pages** again.
-
- e. Click **OK**.
The information in the **Selected Pool Volumes** table is applied to **Total Selected Pool Volumes** and **Total Selected Capacity**.
 6. Enter the name in the **Pool Name** text box.
 7. Click **Options**.

8. In the **Initial Pool ID** text box, type the number of the initial pool ID, from 0 to 127.
When you specify a pool ID that was previously registered, the smallest available ID is displayed by default instead of the value you entered. If a pool ID is unavailable, no number is displayed.
9. In the **Subscription Limit** text box, enter an integer value from 0 to 65534 as the subscription rate (%) for the pool. If no number is entered, the subscription rate is set to unlimited.
10. In **Protect V-VOLs when I/O fails to Blocked Pool VOL**, select **Yes** or **No**. If **Yes** is selected, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the **Protect** attribute.
11. In **Protect V-VOLs when I/O fails to Full Pool**, select **Yes** or **No**. If **Yes** is selected, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the **Protect** attribute.
12. Click **Add**.
The created pool is added to the **Selected Pools** table. If invalid values are set, an error message appears.
The **Pool Type**, **Pool Volume Selection**, and **Pool Name** must be set. If the required items are not entered or selected, you cannot click **Add**.
If you select a row and click **Detail**, the Pool Properties window appears. If you select a row and click **Remove**, the message appears asking whether you want to remove the selected row or rows. If you want to remove the row, click OK.
13. Click **Next**.
The **Create LDEVs** window appears. Go to [Creating V-VOLs on page 5-101](#) to create LDEVs. If **Subscription Limit** of the created pool is set to 0%, the **Create LDEVs** window does not appear.
14. Click **Finish** and the **Confirmation** window appears.
15. Check the settings in the **Confirmation** window, and then enter the task name in **Task Name**.
Select the pool radio button and then click **Details**. The **Pool Properties** window appears.
16. Click **Apply**.
The tasks are registered. If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Creating the DP-VOL of the data direct mapping attribute

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.

Procedure

1. Click **Create LDEVs**.

- The **Create LDEVs** window appears.
2. From the **Provisioning Type** list, select **Dynamic Provisioning**, if it is not already selected.
 3. From the **Data Direct Mapping** field, select **Enable**.
 4. From the **Multi-Tier Pool** field, select **Disable**.
 5. From the **Available Volumes** table, select LDEV.
 6. In the **LDEV Name** text box, enter the DP-VOL name.
In the **Prefix** text box, enter the alphanumeric characters, which are fixed characters of the head of the DP-VOL name. The characters are case-sensitive.
In the **Initial Number** text box, type the initial number following the prefix name, which can be up to 9 digits.
You can enter up to the 32 characters, including the initial number.
 7. Click **Option**.
 8. In the **Initial LDEV ID** field, make sure that the LDEV ID is set.
To confirm the used number and unavailable number, click **View LDEV IDs** to display the **View LDEV IDs** window.
In the table, used LDEV numbers appear in blue, unavailable numbers appear in gray, and unused numbers appear in white. LDEV numbers that are unavailable may be already in use, or already assigned to another emulation group (group by 32 LDEV numbers).
 9. From the **Cache Partition** list, select CLPR.
 10. From the **MP Unit ID**, select a MP unit.
Select an MP unit to be used by the LDEVs. If you assign a specific MP unit, select the ID of the MP unit. If you can assign any MP unit, click **Auto**.
 11. If necessary, change the settings of the V-VOLs.
Click **Change LDEV Settings** to open the **Change LDEV Settings** window.
Make changes to the LDEV settings as necessary.
 12. If necessary, delete a row from the **Selected LDEVs** table.
Select a row to be deleted, then click **Remove**.
 13. Click **Add**.
The created V-VOLs are added to the correct **Selected LDEVs** table. If invalid values are set, an error message appears.
The **Provisioning Type**, **Pool Selection**, **Drive Type/RPM**, **RAID Level**, **LDEV Capacity**, and **Number of LDEVs** fields must be set. If these required items are not registered, you cannot click **Add**.
 14. Click **Finish**.
The **Confirm** window appears.
To continue the operation for setting the LU path and define LUN, click **Next**.
 15. In the **Task Name** in the text box, enter the task name.

You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. "yymmdd-window name" is entered as a default.

16. Click **Apply**.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Editing the pool of the data direct mapping attribute

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.



Note: To change the pool of the data direct mapping attribute to the pool of Dynamic Tiering or Active Flash, operate as follows:

1. In the operation target pool, open the **Edit Pools** window, then select **Disable** from the **Data Direct Mapping** field.
2. Apply the setting to the storage system.
3. In the operation target pool, open the **Edit Pools** window, then select **Enable** from the **Multi-Tier Pool** field.
4. Apply the setting to the storage system.

Procedure

1. Open the **Pools** window.
In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems** and the target storage system.
 - b. Right-click **DP Pools** and then select **System GUI**.In Device Manager - Storage Navigator
 - a. Click **Storage Systems**, and then expand the **Storage Systems** tree.
 - b. Click **Pools**.
2. From the **Pools** table, click the row of a pool you want to change to the data direct mapping attribute.
3. Perform one of the following to display the **Edit Pools** window.
 - Click **More Actions** and select **Edit Pools**.
 - Click **Actions**, then **Pool**, then **Edit Pools** to open the window.
4. Select the **Data Direct Mapping** checkbox.
5. Select **Enable** or **Disable**.
6. Click **Finish**.
The **Confirm** window appears.
7. In the **Task Name** text box, enter the task name.

You can enter up to 32 ASCII characters and symbols in all, except for \ / : , ; * ? " < > |. The value "date-window name" is entered by default.

8. In the **Confirm** window, click **Apply** to register the setting in the task.
If the **Go to tasks window for status** checkbox is selected, the **Tasks** window appears.

Configuring access attributes

After provisioning your system, you can assign access attributes to open-system volumes to protect the volume against read, write, and copy operations and to prevent users from configuring LU paths and command devices.

Data Retention Utility software is required to assign access attributes to volumes.

- ☐ [Access attributes](#)
- ☐ [Access attribute requirements](#)
- ☐ [Access attributes and permitted operations](#)
- ☐ [Access attribute restrictions](#)
- ☐ [Access attributes work flow](#)
- ☐ [Assigning an access attribute to a volume](#)
- ☐ [Changing an access attribute to read-only or protect](#)
- ☐ [Changing an access attribute to read/write](#)
- ☐ [Enabling or disabling the expiration lock](#)
- ☐ [Disabling an S-VOL](#)
- ☐ [Reserving volumes](#)

Access attributes

Open-systems volumes, by default, are subject to read and write operations by open-systems hosts. With open-system volumes in this default condition, data might be damaged or lost if an open-systems host performs erroneous write operations. In addition, confidential data on open-systems volumes might be stolen if a malicious operator performs read operations on open-systems hosts.

Therefore, it is recommended that you change the default read and write conditions by assigning an access attribute to each logical volume. Access attributes can be set to read/write, read-only, or protect.

By assigning access attributes, you can:

- Protect a volume against both read and write operations of all hosts.
- Protect a volume against write operations of all hosts, but allow read operations.
- Protect a volume against erroneous copy operations, but allow other write operations.
- Prevent other users from configuring LU paths and command devices.

One of the following access attributes can be assigned to each logical volume:

- Read/write
If a logical volume has the read/write attribute, open-systems hosts can perform both read and write operations on the logical volume.
You can use replication software to copy data to logical volumes that have read/write attribute. However, if necessary, you can prevent copying data to logical volumes that have read/write attribute.
All open-systems volumes have the read/write attribute by default.
- Read-only
If a logical volume has the read-only access attribute, open-systems hosts can perform read operations but cannot perform write operations on the logical volume.
- Protect
If a logical volume has the protect access attribute, open-systems hosts cannot access the logical volume. Open-systems hosts cannot perform either read or write operations on the logical volume.

Access attribute requirements

To assign access attributes, the Hitachi Data Retention Utility software must be installed. The Hitachi Data Retention Utility software performs on the secondary window of Hitachi Device Manager - Storage Navigator. For more information about the setting for the secondary window, see *System Administrator Guide*.

Access attributes and permitted operations

Access Attribute	Read Operations from Hosts	Write Operations from Hosts	Specified as P-VOL	Specified as S-VOL
Read/Write	Yes	Yes	Yes	Yes
Read-only	Yes	No	Depends on the replication software	No
Protect	No	No	Depends on the replication software	No
Read/Write and S-VOL disable	Yes	Yes	Yes	No

Access attribute restrictions

Some restrictions apply when you use the following VSP G200, G400, G600, G800 or VSP F400, F600, F800 products or functions on a volume that has an access attribute assigned to it.

Virtual LUN

- You cannot convert into spaces volumes that do not have the read/write attribute.
- You cannot initialize customized volumes that do not have the read/write attribute.

Command Control Interface

- You can use Command Control Interface to make some Data Retention Utility settings. You can view some of the CCI settings in the Data Retention Utility user interface.
- When viewing the Data Retention window, another user might be using CCI to change an access attribute of a volume. If the CCI user changes an access attribute of a volume when you are viewing the Data Retention window, you are unable to change the access attribute of the volume by using Data Retention Utility. If you attempt to change the access attribute of the volume by using the Data Retention Utility, an error occurs. If the error occurs, refresh the display, then retry changing the access attribute of the volume.

Automatically started software

If any software that can start automatically is enabled, you must do one of the following:

- Perform Data Retention Utility operations when the program is not running.

- Cancel the setting of the program start time.

Some software is likely to start automatically at the time specified by the user. For example, if a Volume Migration user or a Performance Monitoring user specifies the time for starting the monitor, the monitor will automatically start at the specified time.

Access attributes work flow

Access attribute workflow includes the following steps:

1. [Changing an access attribute to read-only or protect on page 6-5](#)
2. [Changing an access attribute to read/write on page 6-6](#)
3. [Enabling or disabling the expiration lock on page 6-7](#)
4. [Disabling an S-VOL on page 6-8](#)
5. [Reserving volumes on page 6-9](#)

Assigning an access attribute to a volume

To protect volumes against both read and write operations from hosts, change the access attribute to protect. To protect volumes against write operations from hosts and allow read operations, change the access attribute to read-only. In both ways, if you set the attribute to a volume using the GUI, S-VOL Disable is automatically set to prevent data in a volume from being overwritten by replication software. If you use Command Control Interface to set the attribute to a volume, you can select whether the S-VOL Disable is set. If you set the Protect attribute to the volume when the Dynamic Provisioning pool is full, the S-VOL Disable is not set to the volume.

After you change an access attribute to read-only or protect, the access attribute cannot be changed to read/write for a certain period of time. You can specify the length of this period (retention term) when changing the access attribute to read-only or protect. The retention term can be extended but cannot be shortened.

During the retention term

- Read-only access can be changed to protect, and protect can be changed to read-only.
- If you need to change an access attribute to read/write, you must ask the maintenance personnel.

After the retention term is over

- The access attribute can be changed to read/write.
- The access attribute remains read-only or protect until changed back to read/write.

Changing an access attribute to read-only or protect

When changing an access attribute to read-only or protect, observe the following:

- Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. Select **Modify** from the **Data Retention** secondary window to set access attributes and prevent other users or programs from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.
- Do not assign an access attribute to a volume if any job is manipulating data on the volume. If you assign an access attribute to such a volume, the job will possibly end abnormally.
- The volume must *not* be one of the following:
 - Volumes that do not exist
 - Volumes that are configured as command devices
 - TrueCopy secondary volumes (*)
 - Universal Replicator secondary volumes (*) or journal volumes
 - ShadowImage secondary volumes (*)
 - Thin Image secondary volumes (*)
 - Pool volume
 - Thin Image virtual volume

*Note: The access attribute of secondary volumes can be changed depending on the pair status.

To change an access attribute to read-only or protect:

1. Perform one of the following to display the **Data Retention** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions** > **Other Function** > **Data Retention** to open the **Data Retention** window.
For Storage Navigator:
 - Click **Actions** > **Other Function** > **Data Retention** to open the **Data Retention** window.
2. Click  to change to **Modify** mode.
3. Select an LDKC number in the **LDKC** list, select a group which the CU belongs to, in the **CU Group** list, then click a CU in the tree.
4. Right-click a volume whose access attribute you want to change. You can select multiple volumes.
5. Select **Attribute**, then select **Read Only** or **Protect**.

04	Read/Write	OPEN-V	10.00 GB	Enabl
05	Attribute	Read/Write	10.00 GB	Enabl
06	S-VOL	Read Only	10.00 GB	Enabl
07	Reserved	Protect	10.00 GB	Enabl
08	Retention Term...	OPEN-V	10.00 GB	Enabl
09	Volume Detail...	OPEN-V	10.00 GB	Enabl
0A		OPEN-V	10.00 GB	Enabl
0B		OPEN-V	10.00 GB	Enabl
0C	Read/Write	OPEN-V	10.00 GB	Enabl

6. In the **Term Setting** dialog box, specify the retention term. During this period, the access attribute cannot be changed to read/write. You can enter the number of years and days, or select Unlimited. The retention term can be extended but cannot be shortened.
 - years: Specify the number of years within the range of 0 to 60. One year is counted as 365 days, whether the year is a leap year.
 - days: Specify the number of days within the range of 0 to 21,900. For example, if 10 years 5 days or 0 years 3,655 days is specified, the access attribute of the volume cannot be changed to read/write in the next 3,655 days.
7. Click **OK** to close the dialog box.
8. In the Data Retention window, click **Apply** to apply the setting.

To extend the retention term later, open the **Data Retention** window, right-click the volume, then select **Retention Term**.

Changing an access attribute to read/write

Before changing the access attribute from read-only or protect to read/write, considering the following:

- Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. Select **Modify** from the **Data Retention** secondary window to set access attributes and prevent other users or programs from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.
- Do not assign an access attribute to a volume if any job is manipulating data on the volume. If you assign an access attribute to such a volume, the job can end abnormally.
- Make sure that the retention term is expired. If expired, the **Retention Term** column in the **Data Retention** window shows 0. To change the access attribute to read/write within the retention term, contact the Hitachi Data Systems customer support.
- Make sure that the **Expiration Lock** indicates **Disable > Enable**. If it indicates **Enable > Disable**, changing to read/write is restricted. Contact your system administrator to change the access attribute. (See [Enabling or disabling the expiration lock on page 6-7](#))

To change an access attribute to read/write:

1. Perform one of the following to display the **Data Retention** window.

For Hitachi Command Suite:

- a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
- b. Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.

For Storage Navigator:

- Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.

2. Click  to change to **Modify** mode.
3. Select an LDKC number in the **LDKC** list, select a group in which the CU belongs in the **CU Group** list, then click a CU in the tree.
4. Right-click a volume for which you want to change access attributes. You can select multiple volumes, select **Attribute**, then click **Read/Write**.
5. Click **Apply** to apply the setting.

Enabling or disabling the expiration lock

The expiration lock provides enhanced volume protection. Enabling the expiration lock ensures that read-only volumes and protect volumes cannot be changed to read/write volumes, even after the retention term ends. Disabling the expiration lock changes the access attribute to read/write after the retention term ends.

This setting applies to all volumes in the storage system with the read-only and protect attribute.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Data Retention** secondary window to enable or disable the expiration lock, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

To enable the expiration lock:

1. Perform one of the following to display the **Data Retention** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.
For Storage Navigator:
 - Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.

2. Click  to change to **Modify** mode.
3. In the **Data Retention** window, verify which button appears beside **Expiration Lock**.
 - If **Disable > Enable** appears, go to the next step.
 - If **Enable > Disable** appears, the expiration lock is enabled. You do not need to follow the rest of this procedure because attempts to change access attributes to read/write are already prohibited.
4. Click **Disable > Enable**. A confirmation message appears.
5. Click **OK**. The button changes to **Enable > Disable**, and the expiration lock is enabled. When the expiration lock is enabled, access attributes of volumes cannot be changed to read/write after the retention term ends.

To disable the expiration lock, click **Enable > Disable**. The access attribute can be changed to read/write after the retention term ends.

Disabling an S-VOL

Assigning a read-only or protect attribute is one way to prevent data in a volume from being overwritten by replication software. Volumes having the read-only or the protect attribute are not only protected against these copy operations, but are also protected against any other form of write operations.

To protect a volume only from copy operations, you must ensure that the volume has the read/write attribute then assign the S-VOL Disable attribute to the volume. This setting prohibits the volume from being used as a secondary volume for copy operations.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Data Retention** secondary window to disable an S-VOL, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

To disable an S-VOL:

1. Perform one of the following to display the **Data Retention** window.
 - For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.
 - For Storage Navigator:
 - Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.

2. Click  to change to **Modify** mode.
3. Select an LDKC number in the **LDKC** list, select a group that the CU belongs in the **CU Group** list, then click a CU in the tree.
4. Right-click a volume for which the **S-VOL** column shows **Enable**. You can select multiple volumes.
5. Select **S-VOL > Disable**.
6. Click **Apply** to apply the setting.

To use a volume as an S-VOL, ensure that the volume has the read/write attribute then assign the S-VOL Enable attribute to the volume.

Reserving volumes

By default, all Hitachi Device Manager - Storage Navigator users with proper permissions can make LU path settings and command device settings. If you perform the following procedure in Hitachi Device Manager - Storage Navigator, all users, including you, cannot make LU path settings and command device settings on the specified volume. Command Control Interface users can still make LU path settings and command device settings on the volume.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Data Retention** secondary window to disable an S-VOL, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

To reserve volumes:

1. Perform one of the following to display the **Data Retention** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.
 For Storage Navigator:
 - o Click **Actions > Other Function > Data Retention** to open the **Data Retention** window.
2. Click  to change to **Modify** mode.
3. In the Data Retention window, select an LDKC number in the **LDKC** list, select a group the CU belongs to, in the **CU Group** list, then click a CU in the tree.
4. Select a volume where the **Reserved** column contains a hyphen. You can select multiple volumes.

5. Right-click the selected volume or volumes, then select **Reserved** > **Set**.
6. Click **Apply** to apply the setting.

To permit users to make LU path settings and command device settings on a volume, follow the previous steps and select **Reserved** > **Release**. Then call the Hitachi Data Systems customer support to ask for Storage Navigator settings.

Managing logical volumes

After provisioning your system, you can begin to manage open-system logical volumes. Managing logical volumes includes tasks such as configuring hosts and ports, configuring LU paths, setting LUN security on ports, and setting up Fibre Channel authentication.

LUN Manager is required to manage logical volumes.

- ☐ [LUN Manager overview](#)
- ☐ [Managing logical units workflow](#)
- ☐ [Configuring hosts and Fibre Channel ports](#)
- ☐ [Configuring Fibre Channel ports](#)
- ☐ [Configuring hosts](#)
- ☐ [Configuring LU paths](#)
- ☐ [Releasing LUN reservation by host](#)
- ☐ [LUN security on ports](#)
- ☐ [Setting Fibre Channel authentication](#)
- ☐ [Managing hosts for Fibre Channel](#)
- ☐ [Setting T10 PI mode to the port](#)
- ☐ [Overview for iSCSI](#)
- ☐ [Creating iSCSI targets and registering hosts in the iSCSI target](#)

- ☐ [Editing ports setting](#)
- ☐ [Adding CHAP users](#)
- ☐ [Editing CHAP users](#)
- ☐ [Removing CHAP users](#)
- ☐ [Removing target CHAP users](#)
- ☐ [Removing port CHAP users](#)
- ☐ [Defining LU paths](#)
- ☐ [Defining alternate LU paths](#)
- ☐ [Managing hosts for iSCSI](#)

LUN Manager overview

LUN Manager function

Fibre security control and host group (Fibre Channel interface), or iSCSI security control and target (iSCSI interface).

- The Fibre security control function controls the access from specific hosts or specific commands.
- The host group function also enables the storage system to make a suitable response to each host connected, even within the same port, by grouping connected hosts within a port and setting the logical unit mapping and the host connection mode for each host group. Up to 255 host groups on a port basis can be set.
- The iSCSI security function controls the access from specified hosts or specific commands.
- The iSCSI target function enables the storage system to respond to each connected host, even within the same port, by grouping the connected hosts within a port and setting LUs and the host option mode for each group. Up to 255 iSCSI targets can be set for one port. Authentication can be performed for each target by using the CHAP authentication concurrently.

LUN Manager operations

The VSP G200, G400, G600, G800 or VSP F400, F600, F800 storage system can be connected to open-system server hosts of different platforms (for example, UNIX servers and PC servers). To configure a system that includes open-system hosts and your storage system, use LUN Manager to configure logical volumes and ports.

One of the most important tasks when configuring logical volumes is to define I/O paths from hosts to logical volumes. When paths are defined, the hosts can send commands and data to the logical volumes and also can receive data from the logical volumes.

After the system begins operating, you may need to modify the system configuration. For example, if hosts or disks are added, add new I/O paths. You can modify the system configuration with LUN Manager when the system is running. You do not need to restart the system after modifying the system configuration.

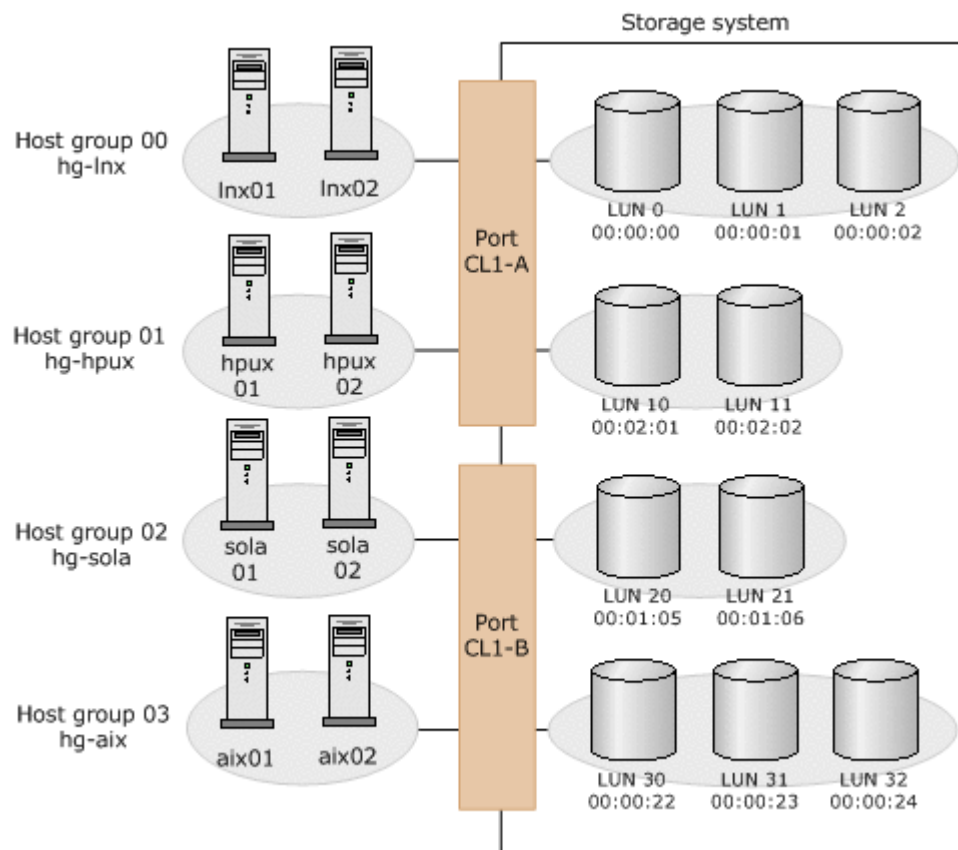
Fibre Channel operations

After open-system hosts and the storage system use LUN Manager to establish I/O paths between the hosts and the logical volumes. This defines which host can access which logical volume. Logical volumes that can be accessed by open-system hosts are referred to as *logical units (LUs)*. The paths between the open-system hosts and the LUs are referred to as *LU paths*.

Before defining LU paths, you must classify server hosts by *host groups*. For example, if Linux hosts and Windows hosts are connected to the storage system, you must create one host group for the Linux hosts and another host group for the Windows hosts. Then, you must register the host bus adapters of the Linux hosts in the Linux host group. You must also register the host bus adapters of the Windows hosts in the Windows host group.

A host group can only contain hosts connected to the same port, and cannot contain hosts that are connected to different ports. For example, if two Windows hosts are connected to port 1A and three Windows hosts are connected to port 1B, you cannot register all five Windows hosts in one host group. You must register the first two Windows hosts in one host group, then register the remaining three Windows hosts in another host group.

After server hosts are classified into host groups, you associate the host groups with logical volumes. The following figure shows LU paths configuration in a Fibre Channel environment. The figure shows host group `hg-lnx` associated with three logical volumes (00:00:00, 00:00:01, and 00:00:02). LU paths are defined between the two hosts in the `hg-lnx` group and the three logical volumes.



You can define paths between a single server host and multiple LUs. The figure shows that each of the two hosts in the host group `hg-lnx` can access the three LUs.

You can also define paths between multiple server hosts and a single LU. The figure shows that the LU identified by the LDKC:CU:LDEV number 00:00:00 is accessible from the two hosts that belong to the `hg-lnx` host group.

The figure also shows that the LUs associated with the `hg-1nx` host group are addressed by numbers 0 to 2. The address number of an LU is referred to as a *LUN (logical unit number)*. When software manipulates LUs, the software use LUNs to specify the LUs to be manipulated.

You can add, change, and delete LU paths when the system is in operation. For example, if new disks or server hosts are added to your storage system, you can add new LU paths. If an existing server host is to be replaced, you can delete the LU paths that correspond to the host before replacing the host. You do not need to restart the system after you add, change, or delete LU paths.

If a hardware failure (such as a CHA failure) occurs, some LU paths can be disabled and some I/O operations can be stopped. To avoid such a situation, you can define *alternate LU paths*; if one LU path fails, the alternate path takes over the host I/O. For information, see [Defining LU paths on page 7-21](#) and [Defining alternate LU paths on page 7-24](#).

LUN Manager license requirements

Use of LUN Manager on your storage system requires the following:

- A license key for LUN Manager software.

LUN Manager rules, restrictions, and guidelines

Rules

- In a Fibre Channel environment, up to 2,048 LU paths can be defined for one host group and up to 2,048 LU paths can be defined for one port.
- In an iSCSI environment, up to 2,048 LU paths can be defined for one iSCSI target and up to 2,048 LU paths can be defined for one port.
- Up to 255 host groups can be created for one Fibre Channel port.
- Up to 255 iSCSI targets can be created for one iSCSI port.
- In one LDEV of the ALU attribute, you can define the LU path to only one host group.
- In one LDEV of the ALU attribute, you can define the LU path to only one iSCSI target.

Restrictions

- You cannot define an LU path to journal volumes.
- You cannot define an LU path to pool volumes.
- When defining LU paths, you must not use Command Control Interface and Hitachi Device Manager - Storage Navigator at the same time. If both programs are used simultaneously, operations can not be performed in the expected order and the storage configuration might be defined incorrectly.

- If an LDEV of the ALU attribute is binding to LDEVs with the SLU attribute, the LU path cannot be removed.
- You cannot define an LU path to the external volume of the data direct mapping attribute.
- If an LDEV of the ALU attribute is binding to LDEVs with the SLU attribute, the LU path cannot be removed.
- You cannot define an LU path to the external volume of the data direct mapping attribute.

Guidelines

- If you attempt to apply many settings in the LUN Manager windows, Storage Navigator might be unable to continue processing. Therefore, do not make more than 1,000 settings. Many settings are likely to be made when defining alternate paths (see [Defining alternate LU paths on page 7-24](#)), even though only two commands are required for defining alternate paths.
- Do not perform the following when host I/O is in progress and hosts are in reserved status (mounted):
 - Remove LU paths (see [Deleting LU paths on page 7-26](#))
 - Disable LUN security on a port (see [Disabling LUN security on a port on page 7-32](#))
 - Change the data transfer speed for Fibre Channel ports
 - Change AL-PAs or loop IDs
 - Change the settings of fabric switches
 - Change the topology
 - Change the host modes
 - Remove host groups
 - Remove iSCSI targets
 - Set command devices

Managing logical units workflow

1. Configure Fibre Channel ports.
2. Configure hosts.
3. Configure LU paths.
4. Enable LUN security.
5. Set Fibre Channel authentication.
6. Manage hosts.

Configuring hosts and Fibre Channel ports

When provisioning your system, configure hosts and Fibre Channel ports using LUN Manager. You can manage hosts, modify the host configuration, and modify the port configuration when the system is in operation.

- [Configuring Fibre Channel ports on page 7-7](#)
- [Configuring hosts on page 7-12](#)

Configuring Fibre Channel ports

Setting the data transfer speed on a Fibre Channel port

The Storage Administrator (Provisioning) role is required to perform this task.

As the system operation continues, you may notice that a large amount of data is transferred at some ports, but a small amount of data is transferred at other ports. You can optimize system performance on a Fibre Channel port by setting a faster data transfer speed on ports where a large amount of data is transferred, and setting a slower data transfer speed on ports where a small amount of data is transferred.

To set the data transfer speed on a Fibre Channel port:

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.For Storage Navigator:
 - In the storage system tree, select **Ports / Host Groups / iSCSI Targets**.
2. Select the **Ports** tab.
3. Select the desired port.
4. Click **Edit Ports**.
5. In the **Edit Ports** window, select the **Port Speed** check box, then select the desired port speed.
Select the speed of the Fibre Channel port. If Auto is selected, the storage system automatically sets the speed to 2, 4, 8, or 16 Gbps.



Caution: Observe the following cautions when setting speed on a Fibre Channel port:

- If the Host Bus Adapters (HBAs) and switches support 2 Gbps, use the fixed speed of 2 Gbps for the CHB(FC) (channel board for Fibre Channel) port speed. If they support 4, 8, or 16 Gbps, use 4, 8, or 16 Gbps for the CHB(FC) port speed, respectively.

- If the Auto Negotiation setting is required, some links may not be available when the server is restarted. Check the channel lamp. If it is flashing, disconnect the cable, then reconnect it to recover from the link-down state.
- If the CHB(FC) port speed is set to Auto, some equipment might not be able to transfer data at the maximum speed.
- When you start a storage system, HBA, or switch, check the host speed appearing in the Port list. If the transfer speed is different from the maximum speed, select the maximum speed from the list on the right, or disconnect, then reconnect the cable.
- The available port speed which is specified in **Port Speed** is limited due to the combination of the type of the Fibre Channel port and the topology which is specified in **Connection Type**. For feasible combinations, see [Combination of data-transfer speed and connection type on page 7-8](#).

6. Click **Finish**.
7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Combination of data-transfer speed and connection type

The available port speed which is specified in Port Speed is limited due to the combination of the type of Fibre Channel port and the topology which is specified in Connection Type. For the feasible combinations, see following tables.

When 8 Gbps Fibre Channel ports are installed in the storage system, combinations between data-transfer speeds and connection types are as follows:

Connection Type	Port Speed				
	2 Gbps	4 Gbps	8 Gbps	16 Gbps	Auto
FC-AL	Available	Available	Available	Not Available	Available (Default)
P-to-P	Available	Available	Available	Not Available	Available

When 16 Gbps Fibre Channel ports are installed in the storage system, combinations between data-transfer speeds and connection types are as follows:

Connection Type	Port Speed				
	2 Gbps	4 Gbps	8 Gbps	16 Gbps	Auto
FC-AL	Not Available	Available	Available	Not Available	Available *1

Connection Type	Port Speed				
	2 Gbps	4 Gbps	8 Gbps	16 Gbps	Auto
P-to-P	Not Available	Available	Available	Not Available	Available(Default *2)

*1: If this combination is specified, the maximum transfer speed which is automatically specified is 8 Gbps.

*2: If this default value is set, the item of **Fabric** is set to **ON** automatically.

Setting the Fibre Channel port address

The Storage Administrator (Provisioning) role is required to perform this task.

When configuring your storage system, set addresses for Fibre Channel ports. When addressing Fibre Channel ports, use AL-PA (arbitrated-loop physical address) or loop IDs as the addresses. See [Addresses for Fibre Channel ports on page 7-9](#) for information about available addresses.

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.
 For Storage Navigator:
 - In the storage system tree, select **Ports / Host Groups / iSCSI Targets**.
2. Select the **Ports** tab.
3. Select the desired port.
4. Select **Edit Ports**.
5. In the **Edit Ports** window, select the **Address (Loop ID)** check box, then select the address.
6. Click **Finish**.
7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Addresses for Fibre Channel ports

The following addresses are available for setting Fibre Channel ports.

AL-PA	Loop ID (0~29)	AL-PA	Loop ID (30~59)	AL-PA	Loop ID (60~89)	AL-PA	Loop ID (90~119)	AL-PA	Loop ID (120~125)
EF	0	B4	30	76	60	49	90	10	120
E8	1	B3	31	75	61	47	91	0F	121
E4	2	B2	32	74	62	46	92	08	122
E2	3	B1	33	73	63	45	93	04	123
E1	4	AE	34	72	64	43	94	02	124
E0	5	AD	35	71	65	3C	95	01	125
DC	6	AC	36	6E	66	3A	96	-	-
DA	7	AB	37	6D	67	39	97	-	-
D9	8	AA	38	6C	68	36	98	-	-
D6	9	A9	39	6B	69	35	99	-	-
D5	10	A7	40	6A	70	34	100	-	-
D4	11	A6	41	69	71	33	101	-	-
D3	12	A5	42	67	72	32	102	-	-
D2	13	A3	43	66	73	31	103	-	-
D1	14	9F	44	65	74	2E	104	-	-
CE	15	9E	45	63	75	2D	105	-	-
CD	16	9D	46	5C	76	2C	106	-	-
CC	17	9B	47	5A	77	2B	107	-	-
CB	18	98	48	59	78	2A	108	-	-
CA	19	97	49	56	79	29	109	-	-
C9	20	90	50	55	80	27	110	-	-
C7	21	8F	51	54	81	26	111	-	-
C6	22	88	52	53	82	25	112	-	-
C5	23	84	53	52	83	23	113	-	-
C3	24	82	54	51	84	1F	114	-	-
BC	25	81	55	4E	85	1E	115	-	-
BA	26	80	56	4D	86	1D	116	-	-
B9	27	7C	57	4C	87	1B	117	-	-
B6	28	7A	58	4B	88	18	118	-	-
B5	29	79	59	4A	89	17	119	-	-

Setting the fabric switch

The Storage Administrator (Provisioning) role is required to perform this task.

When you configure your storage system, specify whether the hosts and the storage system are connected through a fabric switch.

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.For Storage Navigator:
 - In the storage system tree, select **Ports / Host Groups / iSCSI Targets**.
2. Select the **Ports** tab.
3. Select the desired port.
4. Click **Edit Ports**.
5. Select a check box of **Fabric**, and select **ON** if you set the fabric switch. If you do not set the fabric switch, select **OFF**.
6. Click **Finish**.
7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Fibre Channel topology

The term *fibre channel topology* indicates how devices are connected to each other. Fibre Channel provides the following types of topology:

- **Fabric:** Uses a fabric switch to connect a large number of devices (up to 16 million) together.
- **FC-AL (Fibre Channel-Arbitrated Loop):** A shared interface that can connect up to 126 devices (AL-ports) together.
- **Point-to-point:** The simplest fibre topology connects two devices directly together.

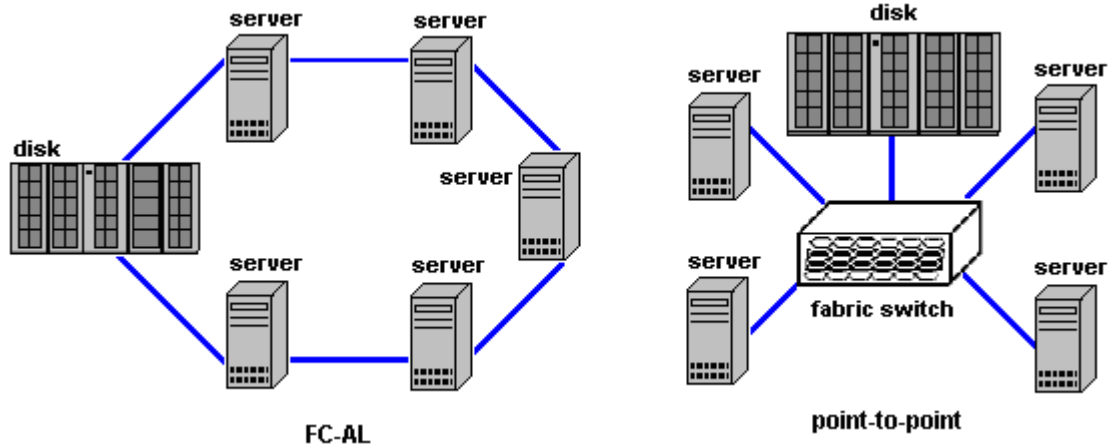
When configuring your storage system, use the LUN Manager window to specify whether the hosts and the storage system are connected using a fabric switch (see [Example of FC-AL and point-to-point topology on page 7-12](#)).

If a fabric switch is used, specify FC-AL or point-to-point in the LUN Manager window. If a fabric switch is used, consult the documentation for the fabric switch to learn whether FC-AL or point-to-point should be used. Some fabric switches require you to specify point-to-point to get the system running.

If no fabric switch is used, specify FC-AL.

The combination of the topology which is specified in Connection Type and the port speed which is specified in Port Speed is restricted. For details, see [Combination of data-transfer speed and connection type on page 7-8](#)

Example of FC-AL and point-to-point topology



Setting the Fibre Channel topology

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** tab.
For Hitachi Command Suite:
On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.
For Storage Navigator:
In the storage system tree, select **Ports / Host Groups / iSCSI Targets**.
2. Select the **Ports** tab.
3. Select the desired port.
4. Click **Edit Ports**.
5. Select **FC-AL** or **P-to-P** check box under **Connection Type**.
6. Click **Finish**.
7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Configuring hosts

You can configure hosts in your storage system. You can also modify the host configuration with LUN Manager when the system is in operation.

Before configuring hosts, read the following topics:

- [Host modes on page 7-13](#)
- [Host mode options on page 7-14](#)

Configuring hosts includes the following tasks:

- [Find WWN of the host bus adapter on page 7-18](#)

- [Creating a host group and registering hosts in the host group \(in a Fibre Channel environment\) on page 7-18](#)

Configure hosts workflow

1. Determine the host modes and host mode options.
2. Determine the WWN of the host bus adapters.
3. Create host groups.
4. Register host groups.

Host modes

The following table lists the host modes that are available on the VSP G200, G400, G600, G800 or VSP F400, F600, F800 storage system. Carefully review and determine which host modes you will need to use when configuring your system and observe the cautions about using certain host modes. Host modes and host mode options must be set on the port before the host is connected. If you change host modes or host mode options after the host is connected, the host (server) will not recognize it.

Host mode	When to select this mode
00 Standard	When registering Red Hat Linux server hosts or IRIX server hosts
01 VMware	When registering VMware server hosts ¹
03 HP	When registering HP-UX server hosts
05 OpenVMS	When registering OpenVMS server hosts
07 Tru64	When registering Tru64 server hosts
09 Solaris	When registering Solaris server hosts
0A NetWare	When registering NetWare server hosts
0C Windows	When registering Windows server hosts ²
0F AIX	When registering AIX server hosts
21 VMware Extension	When registering VMware server hosts. If the virtual host on VMware recognizes LUs by the Raw Device Mapping (RDM) method, set the host mode related to OS of the virtual host. Example: If a LUN/LDEV is formatted as VMFS (where virtual machines and their VMDK's usually reside), it should be set with HMO 21. However, if a LUN/LDEV is formatted as a specific file system format (for example, NTFS) and has application requirements to be presented directly to a virtual machine as an RDM, it should be set to the HMO specific to that OS/filesystem (e.g., such as HMO 2C for Windows). A common example of VM's with this mix would be: C: drive – OS VMDK on VMFS D: drive – RDM for application data In this example, 2 different Host Groups should be created for a single host with different HMO and LUN's assigned.

Host mode	When to select this mode
2C Windows Extension	When registering Windows server hosts
¹ There are no functional differences between host mode 01 and 21. When you first connect a host, it is recommended that you set host mode 21. ² There are no functional differences between host mode 0C and 2C. When you first connect a host, it is recommended that you set host mode 2C.	

Host mode options

The following table lists host mode options that are available to use for configuring hosts on your storage system.

No.	Host mode options	When to select this option
2	VERITAS Database Edition/ Advanced Cluster	Select this option when VERITAS Database Edition/ Advanced Cluster for Real Application Clusters or VERITAS Cluster Server 4.0 or later (I/O fencing function) is used.
6	TPRLO	Select this option when all of the following conditions are satisfied: - The host mode 0C Windows or 2C Windows Extension is used. - The Emulex host bus adapter is used. - The mini-port driver is used. - TPRLO=2 is specified for the mini-port driver parameter of the host bus adapter.
7	Automatic recognition function of LUN	Select this option when all of the following conditions are satisfied: - The host mode 00 Standard or 09 Solaris is used. - SUN StorEdge SAN Foundation Software Version 4.2 or higher is used. - You want to automate recognition of increase and decrease of devices when genuine SUN HBA is connected.
12	No display for ghost LUN	Select this option when all of the following conditions are satisfied: - The host mode 03 HP is used. - You want to suppress creation of device files for devices to which paths are not defined.
13	SIM report at link failure ¹	Select this option when you want to be informed by SIM (service information message) that the number of link failures detected between ports exceeds the threshold.
14	HP TruCluster with TrueCopy function	Select this option when all of the following conditions are satisfied: The host mode 07 Tru64 is used.

No.	Host mode options	When to select this option
		You want to use TruCluster to set a cluster to each of primary volume and secondary volume for TrueCopy or Universal Replicator.
15	HACMP	Select this option when all of the following conditions are satisfied: - The host mode 0F AIX is used. - HACMP 5.1 Version 5.1.0.4 or later, HACMP4.5 Version 4.5.0.13 or later, or HACMP5.2 or later is used.
22	Veritas Cluster Server	Select this option when Veritas Cluster Server is used.
23	REC Command Support ¹	Select this option when you want to shorten the recovery time on the host side if the data transfer failed.
25	Support SPC-3 behavior on Persistent Reservation	Select this option when one of the following conditions are satisfied: - Using Windows Server Failover Clustering (WSFC) - Using Microsoft Failover Cluster (MSFC) - Using Symantec Cluster Server, also known as Veritas Cluster Server (VCS) - Using a configuration other than above with the PERSISTENT RESERVE OUT (Service Action=REGISTER AND IGNORE EXISTING KEY) command, change the status response from Reservation-Conflict to Good-Status when there is no registered key to be deleted.
33	Set/Report Device Identifier enable	Select this option when all of the following conditions are satisfied: - Host mode 03 HP or 05 OpenVMS² is used. - You want to enable commands to assign a nickname of the device. - You want to set UUID to identify a logical volume from the host.
39	Change the nexus specified in the SCSI Target Reset	Select this option when you want to control the following ranges per host group when receiving Target Reset: - Range of job resetting. - Range of UAs (Unit Attentions) defined.
40	V-VOL expansion	Select this option when all of the following conditions are satisfied: - The host mode 0C Windows or 2C Windows Extension is used. - You want to automate recognition of the DP-VOL capacity after increasing the DP-VOL capacity.
41	Prioritized device recognition command	Select this option when you want to execute commands to recognize the device preferentially.
43	Queue Full Response	Select this option when the command queue is full in the storage system connecting with the HP-UX host, and To

No.	Host mode options	When to select this option
		respond Queue Full , instead of Busy , from the storage system to the host.
49	BB Credit Set Up Option1	Select this option when you want to adjust the number of buffer-to-buffer credits (BBCs) to control the transfer data size by the Fibre Channel, for example when the distance between MCU and RCU of the TrueCopy (or global-active device) pair is long (approximately 100 kilometers) and the Point-to-Point topology is used. Use the combination of this host mode option and the host mode option 50.
50	BB Credit Set Up Option2	Select this option when you want to adjust the number of buffer-to-buffer credits (BBCs) to control the transfer data size by the Fibre Channel, for example when the distance between MCU and RCU of the TrueCopy (or global-active device) pair is long (approximately 100 kilometers) and the Point-to-Point topology is used. Use the combination of this host mode option and the host mode option 49.
51	Round Trip Set Up Option ³	Select this option to adjust the response time of the host I/O, for example when the distance between MCU and RCU of the TrueCopy (or global-active device) pair is long (approximately 100 kilometers) and the Point-to-Point topology is used.
54	(VAAI) Support Option for the EXTENDED COPY command	Select this option when the VAAI (vStorage API for Array Integration) function of VMware ESX/ESXi 4.1 is used.
60	LUN0 Change Guard	Select this option when HP-UX 11.31 is used, and when you want to prevent adding or deleting of LUN0.
63	(VAAI) Support Option for vStorage APIs based on T10 standards	Select this option when you connect the storage system to VMware ESXi 5.0 or later and use the VAAI function for T10.
67	Change of the ED_TOV value	Select this option when the OPEN Fibre Channel port configuration applies that the topology is the Fibre Channel direct connection.
68	Support Page Reclamation for Linux	Select this option when using the Page Reclamation function from the environment which is being connected to the Linux host.
71	Change the Unit Attention for Blocked Pool-VOLs	Select this option when you want to change the unit attention (UA) from NOT READY to MEDIUM ERROR during the pool-VOLs blockade.
72	AIX GPFS Support	Select this option when using General Parallel File System (GPFS) in the storage system connecting to the AIX host.
73	Support Option for WS2012	Select this option when using following functions provided by Windows Server 2012 (WS2012) from the environment which is being connected to the WS2012 host. • Thin Provisioning function • Offload Data Transfer (ODX) function

No.	Host mode options	When to select this option
78	The non-preferred path option	Select this option when all of following conditions are satisfied: - Global-active device is used in the configuration with the data centers (Metro configuration). - Hitachi Dynamic Link Manager is used as the alternative path software. - The host group is on the non-optimized path of Hitachi Dynamic Link Manager. - The performance deterioration of I/O responses can be avoided without I/O using the non-optimized path of Hitachi Dynamic Link Manager.
80	Multi Text OFF	By using the iSCSI interface, select this option if the storage system connects with the host of which OS is not supported of the Multi Text function. (For instance, connecting the storage system and the host of RHEL5.0 which does not support the MultiText-function).
81	NOP-In Suppress Mode	In the environment by iSCSI connection, the delay replying of the Delayed Acknowledgment function which is located on the upper layer is restrained by sending NOP-IN of executing of sense commands such as Inquiry, Test unit ready, or Mode sense. However, select this option when connecting the storage system and the host which is not necessary of the NOP-IN sending. However, when connecting the storage system and the host which does not need of the NOP-IN sending, select this option. For instance: - When connecting the storage system and the Open Enterprise Server of Novell Co., Ltd.. - When connecting the storage system and winBoot/i of emBoot Co., Ltd..
82	Discovery CHAP Mode	Select this option when the CHAP authentication is performed at the time of the discovery login In the iSCSI connection environment. For instance: When the CHAP authentication is performed at the time of the discovery login in the iSCSI environment of the VMware host and storage system.
83	Report iSCSI Full Portal List Mode	Select this option when configuring alternate paths in the environment of connecting the VMware host and storage system: If waiting of replying of the target information from the host option mode 83 enabled port other than ports of discovery login, select this host mode option. When both of the following are satisfied, select this host mode option: - Configuring alternate paths in the environment of connecting the VMware host and storage system - Waiting for replying of the target information from the ports other than ports of discovery login
97	Proprietary ANCHOR command support	Select this option when connecting to Hitachi NAS Platform.

No.	Host mode options	When to select this option
Notes: 1. Configure these host mode options only when requested to do so. 2. Set the UUID when you set host mode option 33 and host mode 05 openvms is used. 3. Set the host mode option 51 for ports on the remote site of the TrueCopyTrueCopy for Mainframe pair or the global-active device pair.		

Find WWN of the host bus adapter

Before physically attaching the storage system to hosts, some preparation work needs to be performed. When configuring a Fibre Channel environment, first verify that the fibre adapters and the Fibre Channel device drivers are installed on the open-system hosts. Next, find the *World Wide Name (WWN)* of the host bus adapter that is used in each open-system host.

The WWN is a unique identifier for a host bus adapter in an open-system host, consisting of 16 hexadecimal digits. The following topics describe how to find the WWN of a host on different operating systems. It is best to make a record of the WWNs of the hosts in your storage system, because you will need to enter these WWNs in LUN Manager dialog boxes to specify the hosts used in your storage system.

Creating a host group and registering hosts in the host group (in a Fibre Channel environment)

The Storage Administrator (Provisioning) role is required to perform this task.

After discovering the WWNs of the host bus adapters, create a host group and register hosts in the host groups in a Fibre Channel environment.

You can connect multiple server hosts of different platforms to one port of your storage system. When configuring your storage system, group server hosts connected to the storage system by *host groups*. For example, if HP-UX hosts and Windows hosts are connected to a port, create one host group for HP-UX hosts and create another host group for Windows hosts. Then register HP-UX hosts to the corresponding host group and register Windows hosts to the other host group.



Note: The above example relates to configurations in which all HP-UX hosts are on the same cluster.

Before you can set LU paths, you must register the hosts in host groups. For example, if HP-UX hosts and Windows hosts are connected to a port, register HP-UX hosts and Windows hosts separately in two different host groups.

When registering a host, you must also specify the WWN of the host bus adapters.

When registering hosts in multiple host groups, set the security switch (LUN security) to enabled, then specify the WWN of the host bus adapter.

When registering a host, you can assign a nickname to the host bus adapter. If you assign a nickname, you can easily identify each host bus adapter in the LUN Manager window. Although WWNs are also used to identify each host bus adapter, the nickname that you assign is more helpful because you can name host bus adapters after the host installation site or for the host owners.

1. Perform one of the following to display the **Create Host Groups** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Host Groups / iSCSI Targets** tab, click **Create Host Groups**.

For Storage Navigator:

- On the **General Tasks** in Hitachi Device Manager - Storage Navigator, select **Create Host Groups**.
- To display all host groups in the storage system, in the **Storage Systems** tree, click **Ports / Hosts Groups / iSCSI Targets**. In the **Host Groups / iSCSI Target** tab, click **Create Host Groups**.
- To display host groups related to each port, in the **Storage Systems** tree, click **Ports / Hosts Groups / iSCSI Targets**, then click the relevant port. In the **Host Groups** tab, click **Create Host Groups**.
- From the **Actions** menu, select **Ports / Host Groups, Fibre**, then **Create Host Groups**.

2. Enter the host group name in the **Host Group Name** box.

- It is convenient if you name each host group after the host platform.
- A host group name can consist of up to 32 ASCII characters (letters, numerals, and symbols). However, you cannot use the following symbols for host group names: \ / : , ; * ? " < > |
- You cannot use space characters for the first and the last characters in host group names.
- Host group names are case-sensitive. For example, the host group names **wnt** and **Wnt** represent different host groups.

3. Select the resource group in which a host group is created.

If you select **Any**, ports to which you can add host groups within all ports assigned to a user are displayed in the **Available Ports** list. If you select other than **Any**, ports to which you can add host groups within the ports assigned to the selected resource group are displayed in the **Available Ports** list.

4. Select a host mode from the **Host Mode** list. When selecting a host mode, you must consider the platform and some other factors.

5. Select hosts to be registered in a host group.

If the desired host has ever been connected with a cable to another port in the storage system, select the desired host bus adapter from the **Available Hosts** list.

If there is no host to be registered, skip this step and move to the next step. Otherwise, a host group with no host would be created.

If the desired host has never been connected through a cable to any port in the storage system, perform the following steps:

- a. Click **Add New Host** under the **Available Hosts** list.
The **Add New Host** dialog box opens.
- b. Enter the desired WWN in the **HBA WWN** box.
- c. If necessary, enter a nickname for the host bus adapter in the **Host Name** box.
- d. Click **OK** to close the **Add New Host** dialog box.
- e. Select the desired host bus adapter from the **Available Hosts** list.
6. Select the port to which you want to add the host group. For details about host modes, see [Host modes on page 7-13](#).
If you select multiple ports, you can add the same host group to multiple ports by one operation.
7. If necessary, click **Option** and select host mode options. For details about host mode options, see [Host mode options on page 7-14](#).



Note: When you click **Option**, the dialog box expands to display the list of host mode options. The **Mode No.** column indicates option numbers. Select an option you want to specify and click **Enable**.

8. Click **Add** to add the host group.
By repeating steps from 2 to 8, you can create multiple host groups.
If you select a row and click **Detail**, the **Host Group Properties** window appears. If you select a row and click **Remove**, a message appears asking whether you want to remove the selected row or rows. To remove the row, click **OK**.
9. Click **Finish** to display the **Confirm** window.
To continue to add LUN paths, click **Next**.
10. Confirm the settings and enter the task name in the **Task Name** box.
A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.
If you select a row and click **Detail**, the **Host Group Properties** window appears.
11. Click **Apply** in the **Confirm** window.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Configuring LU paths

When provisioning your storage system, and after configuring ports, hosts, and host groups, you must configure Fibre Channel LU paths. LUN Manager is required for these tasks. You can also modify the LU paths configuration when the system is in operation.

Configure LU paths workflow

- Define LU paths.
- Set a UUID, if desired.
- Define alternate LU paths.

Defining LU paths

The Storage Administrator (Provisioning) role is required to perform this task.

In a Fibre Channel environment, you must define LU paths and associate host groups with logical volumes. For example, if you associate a host group consisting of three hosts with logical volumes, LU paths are defined between the three hosts and the logical volumes.

To define LU paths:

1. Perform one of the following to display the **Add LUN Paths** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Host Groups / iSCSI Targets** tab, click **Add LUN Paths**.For Storage Navigator:
 - On the **General Tasks** in Hitachi Device Manager - Storage Navigator, select **Add LUN Paths**.
 - To display all host groups in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. On the **Host Groups / iSCSI Target** tab, click **Add LUN Paths**.
 - To display host groups related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**, select the relevant port. In the **Host Groups** tab, click **Add LUN Paths**.
 - To display all host groups in the storage system, expand the **Storage Systems** tree and select **Ports/Hosts Groups/iSCSI Targets**. Click **Actions > Logical Device > Add LUN Paths** to open the window.
2. Select the desired LDEVs from the **Available LDEVs** table, then click **Add**.
Selected LDEVs are listed in the **Selected LDEVs** table.
3. Click **Next**.
4. In **Selection Object**, click **Fibre**.
5. Select the desired host groups from the **Available Host Groups** table, then click **Add**.
Selected host groups are listed in the **Selected Host Groups** table.
6. Click **Next**.
7. Confirm the defined LU paths.

- To change the LU path settings, click **Change LUN IDs** and type the LUN ID that you want to change.
 - To change the LDEV name, click **Change LDEV Settings**. In the **Change LDEV Settings** window, change the LDEV name.
8. Click **Finish**.
 9. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Setting a UUID

The Storage Administrator (Provisioning) role is required to perform this task.

You can set an arbitrary ID to identify a logical volume from the host using LUN Manager when host mode option 33 is set to on. The ID is referred to as the UUID (user-definable LUN identifier) and is typically composed of a Prefix and an Initial Number.

Note the following when setting a UUID:

- If host mode **05 OpenVMS** is used, the host mode option 33 is set to ON, LUs that do not have UUID settings are inaccessible.
- If host mode **05 OpenVMS** is used with host mode option 33 set to OFF, LUs that have UUID settings are inaccessible.

The following rules apply to setting a UUID:

- These characters cannot be used for UUID: \ / : , ; * ? " < > |
- A space character cannot be used as the first or the last character of a UUID.
- UUID is case-sensitive. For example, **Abc** and **abc** are different UUIDs.

To keep track of device information, create a correspondence table similar to the example in [Correspondence table for defining devices on page 7-23](#).

To set a UUID:

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.
 For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the port.
The host group that correspond to the port appear.
3. Select the host group.

Information about the selected host group appears on the right side of the window.

4. Select the **LUNs** tab.

Information about LU paths associated with the selected host group appears.

5. Select one or more logical units to which volumes are assigned (if a volume is assigned to an LU, the columns on the right of the LUN column are not empty).

When multiple LUs are selected, the same UUID is set to all selected LUs.

6. Click **More Actions**, then select **Edit UUIDs**.

7. In the **Edit UUIDs** window, in **Prefix**, type the UUID.

If a UUID is already specified, you can change it. The UUID before changing appears in **UUID** in the **Edit UUIDs** window. However, if multiple LUs, or **N/As** are selected, the **Prefix** box is blank.

For an OpenVMS server host, enter a UUID composed of a **Prefix** and an **Initial Number**. The **Prefix** can include up to 5 digits, from 1 to 32767, and the **Initial Number** can include up to 5 digits, from 0 to 32767.

For a server host other than OpenVMS, enter a UUID composed of a **Prefix** and an **Initial Number**. The **Prefix** can include up to 64 ASCII characters (letters, numerals and symbols) and the **Initial Number** can include up to 9 digits.

When changing the server host OS from HP-UX to Open VMS, or from Open VMS to HP-UX, the same UUID cannot be used continuously. Clear the UUID setting (see [Clearing a UUID setting on page 7-27](#)), then set the proper UUID for a server host.

8. To sequentially number the UUIDs, type the first digit in the **Initial Number** box. The following rules apply to the Initial Number:

1: Up to 9 numbers are added (1, 2, 3, ... 9).

08: Up to 92 numbers are added (08, 09, 10, ... 99).

If the host mode is set to OpenVMS, the numbers are as follows:

8, 9, 10, ... 99

23: Up to 77 numbers are added (23, 24, 25, ... 99).

9. Click **Finish**.

10. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.

If **Go to tasks window for status** is checked, the **Tasks** window opens.

Correspondence table for defining devices

When configuring the storage system, you will need definition information about devices set by LUN Manager, for example, LUs, LDKC:CU:LDEV, or UUID. A correspondence table similar to the example below is useful and recommended when collecting this information.

Port	LU	LDKC:CU:LDEV	UUID	OpenVMS device file name
BR	0000	00:00:30	148	\$1\$dga148

Port	LU	LDKC:CU:LDEV	UUID	OpenVMS device file name
BR	0001	00:00:31	149	\$1\$dga149
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

Defining alternate LU paths

The Storage Administrator (Provisioning) role is required to perform this task.

You can want to define alternate LU paths so that if one LU path fails, you is able to switch to its alternate path.

To create an alternate LU path, copy the original LU path from one port to another. For example, To define an alternate for the LU path from the CL1-A port to logical volume 00:00:01, copy the LU path from the CL1-A port to another port.

Use one of these methods to copy LU paths:

- Copy all the LU paths defined in a host group
- Copy one or more (but not all) LU paths defined in a host group

Before taking the following steps:

- See [LUN Manager rules, restrictions, and guidelines on page 7-5](#) for important information.
- To define alternate paths when LUN security is disabled, you must redefine the LU path.

Copying all LU paths defined in a host group

1. Perform one of the following to display the tab.

For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Host Groups / iSCSI Targets** tab.

For Storage Navigator:

- To display all host groups in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab.
- To display host groups related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Host Groups** tab.

2. On the **Host Groups / iSCSI Targets** tab or the **Host Groups** tab, select the host group.

3. Click **More Actions** and select **Create Alternative LUN Paths**.
4. In the **Create Alternative LUN Paths** window, select the copy destination port from the **Available Ports** table, then click **Add**. The selected ports appear in the **Selected Ports** table.
5. Click **Finish**.
6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**. If **Go to tasks window for status** is checked, the **Tasks** window opens.

Copying one or more (but not all) LU paths defined in a host group

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.
 For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the port.
The host groups corresponding to the port appear.
3. Select the host group.
Information about the selected host group appears on the window.
4. Select the **LUNs** tab.
Information about LU paths associated with the selected host group appears.
5. Select one or more logical units to which volumes are assigned (if a volume is assigned to a logical unit, the columns on the right of the LUN column are not empty).
6. Select **Copy LUN Paths**.
7. In the **Copy LUN Paths** window, select the host group to which you want to paste paths from the **Available Host Groups** table, then click **Add**. The selected host groups appear in the **Selected Host Groups** table.
8. Click **Finish**.
9. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**. If **Go to tasks window for status** is checked, the **Tasks** window opens.

Managing LU paths

You can modify the LU paths configuration with LUN Manager when the system is in operation, but not when host I/O is in progress. Managing LU paths includes the following tasks:

- [Deleting LU paths on page 7-26](#)

- [Clearing a UUID setting on page 7-27](#)
- [Viewing LU path settings on page 7-27](#)

Deleting LU paths

The Storage Administrator (Provisioning) role is required to perform this task.



Caution: Do not delete LU paths when host I/O is in progress.

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select each port and each host group. Display the **LUN** tab.
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select each port and each iSCSI target. Display the **LUN** tab.

For Storage Navigator:

In the **Storage Systems** tree on the left pane of the main window, select the LDEVs using either of the following methods.

- Select **Logical Devices**, then select the **LDEVs** tab.
- Select **Pools**, select a pool, then select the **Virtual Volumes** tab.

Or, select logical units using the following method.

- Expand the **Ports / Host Groups / iSCSI Targets**, select a port and a host group. Select the **LUNs** tab.
- Expand the **Ports / Host Groups / iSCSI Targets**, select a port and a iSCSI target. Select the **LUNs** tab.



Caution: When an LDEV is selected and **Delete LUN Paths** is performed, all LUN paths of the selected LDEV are deleted by default.

2. Select the LDEVs
3. Click **More Actions** and select **Delete LUN Paths**.
4. In the **Delete LUN Paths** window, confirm that the LU paths that you want to delete are listed in **Selected LUN Paths**.
If LU paths that you do not want to delete are listed, select the LU path you do not want to delete, then click **Remove from Delete process**.
5. If necessary, check the **Delete all defined LUN paths to above LDEVs** check box. When checked, all additional LU paths on the selected LDEVs is deleted.
6. Click **Finish** to open the **Confirm** window.

To start shredding operations to delete the data of the volume, click **Next**. For detailed information about shredding operations, see the *Hitachi Volume Shredder User Guide*.

7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

If you delete many paths at one time, the deletion process can take time and the dialog box can seem to hang temporarily.

Clearing a UUID setting

The Storage Administrator (Provisioning) role is required to perform this task.

You can clear the UUID setting that has been set to identify a logical volume from the host.

1. Perform one of the following to display the **LDEVs** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. Right-click **Volumes** of the target storage system, then select **System GUI**. Displays the **LDEVs** tab.For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Logical Devices** then select the **LDEVs** tab.
2. Select the LDEVs for which you want to clear the UUID setting.
3. Select **Delete UUIDs**. The **Delete UUIDs** window opens.
4. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Viewing LU path settings

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the port.
Host groups or iSCSI targets corresponding to the port appear.
3. Select the host group or the iSCSI targets.

Information about the selected host group or iSCSI target appears on the right side of the window.

4. Select the **LUNs** tab.
Information about LU paths associated with the selected host group or iSCSI target appear.
5. In the **LUN ID** column, click the LUN to open the **LUN Properties** window.

Releasing LUN reservation by host

The following explains how to release forcibly a LUN reservation by a host.

Prerequisites

- You must have the Storage Administrator (System Resource Management) role to perform this task.



Caution: If you perform the releasing a LUN reservation by a host, the host which is connected to LDEV by LUN path is affected.

To release a LUN reservation by a host:

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the port.
Host groups or iSCSI targets corresponding to the port appear.
3. Select the host group or iSCSI target.
Information about the selected host group (iSCSI target) appears on the window.
4. Select the **LUNs** tab.
Information about LU paths associated with the selected host group appears.
5. On the menu bar, click **Actions, Ports/Hosts Groups > Fibre (or iSCSI) > View Host-Reserved LUNs**. Or, select **View Host-Reserved LUNs** from the lower right of the window. The **Host-Reserved LUNs** window opens.
6. In the **Host-Reserved LUNs** window, select LUN to release the reservation by the host, then select **Release Host-Reserved LUNs**. The **Release Host-Reserved LUNs** window opens.

7. Confirm the settings and enter the task name in the **Task Name** box.
A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.
8. Click **Apply** in the **Release Host-Reserved LUNs** window.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

LUN security on ports

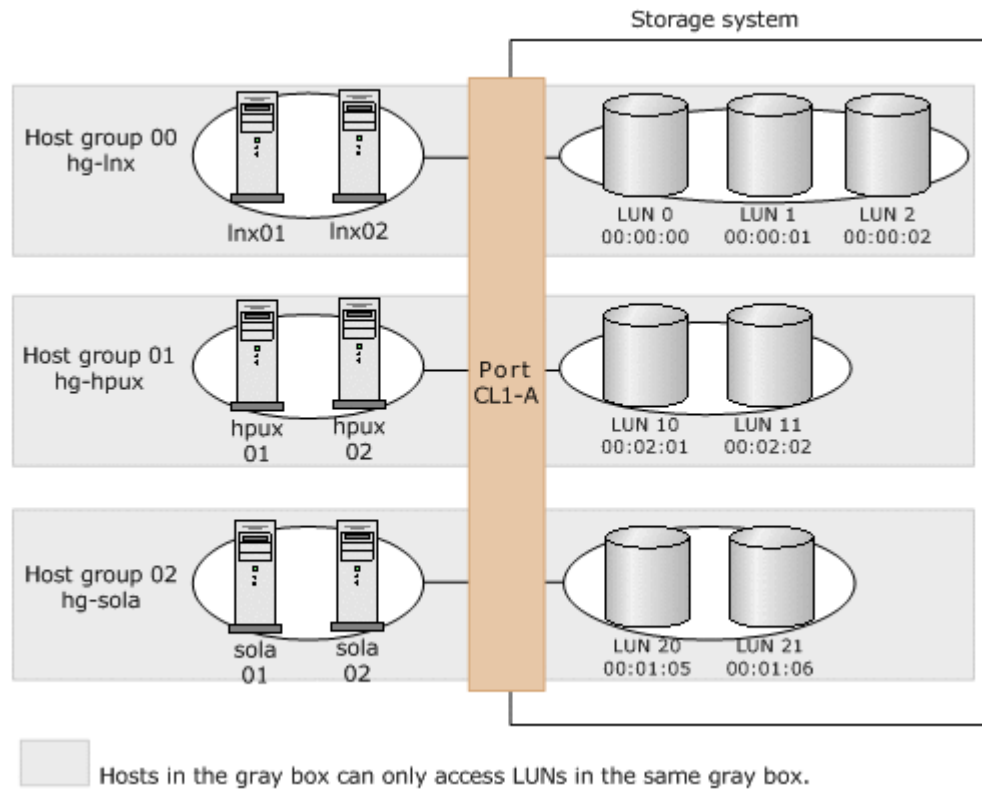
To protect mission-critical data in your storage system from illegal access, apply security policies to logical volumes. Use LUN Manager to enable LUN security on ports to safeguard LUs from illegal access.

If LUN security is enabled on ports, host groups affect which host can access which LUs. Hosts can access only the LUs associated with the host group to which the hosts belong. Hosts cannot access LUs associated with other host groups. For example, hosts in the *hp-ux* host group cannot access LUs associated with the *windows* host group. Also, hosts in the *windows* host group cannot access LUs associated with the *hp-ux* host group.

Examples of enabling and disabling LUN security on ports

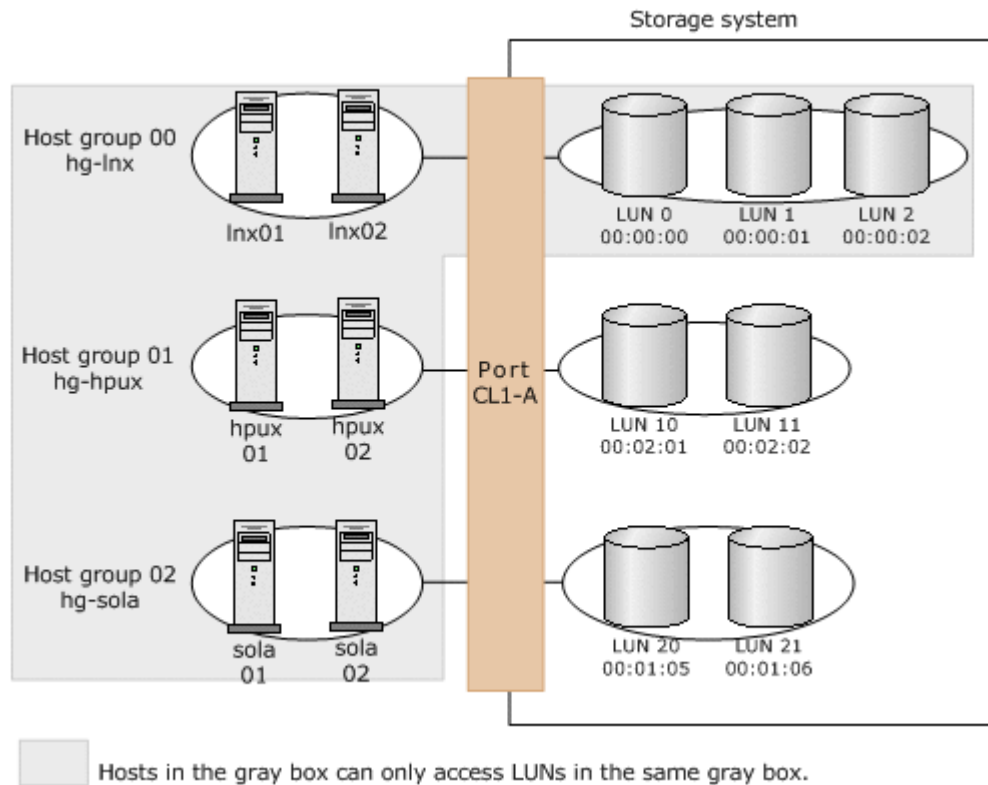
Enabling LUN security

In the following example, LUN security is enabled on port CL1-A. The two hosts in the `hg-lnx` host group can access only three LUs (00:00:00, 00:00:01, and 00:00:02). The two hosts in the `hg-hpux` host group can access only two LUs (00:02:01 and 00:02:02). The two hosts in the `hg-solar` host group can access only two LUs (00:01:05 and 00:01:06).



Disabling LUN security

Typically, you do not need to disable LUN security on ports. For example, if LUN security is disabled on a port, the connected hosts can access only the LUs associated with *host group 0*, and cannot access LUs associated with any other host group.



Host group 0 is the only host group reserved, by default, for each port. If you use the LUN Manager window to view a list of host groups in a port, host group 0, indicated by *00*, usually appears at the top of the list.

The default name of host group 0 consists of the port name, a hyphen, and the number *00*. For example, the default name of host group 0 for port 1A is 1A-G00. However, you can change the default name of the host group 0.

LUN security is disabled, by default, on each port. When you configure your storage system, you must enable LUN security on each port to which hosts are connected.

Enabling LUN security on a port

One of the following roles is required to perform this task:

- Storage Administrator (System Resource Management)
- Storage Administrator (Provisioning)

To protect mission-critical data in your storage system from illegal access, secure the logical volumes in the storage system. Use LUN Manager to secure LUs from illegal access by enabling LUN security on ports.

By default, LUN security is disabled on each port. When registering hosts in multiple host groups, you must enable LUN security (set the switch to enabled). When you change LUN security from disabled to enabled, you must specify the WWN of the host bus adapter.



Caution: It is best to enable LUN security on each port when configuring your storage system. Although you can enable LUN security on a port when host I/O is in progress, I/O is rejected with a security guard after enabling.

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the **Ports** tab.
3. Select the desired port.
4. Select **Edit Ports**. The **Edit Ports** window opens.
5. Select the **Port Security** check box, then select **Enable**.
6. Click **Finish**. A message appears, confirming whether to switch the LUN security. Clicking **OK** opens the **Confirm** window.
7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Disabling LUN security on a port

The Storage Administrator (Provisioning) role is required to perform this task.



Caution: Do not disable LUN security on a port when host I/O is in progress.

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the **Ports** tab.
3. Select the desired port.
4. Select **Edit Ports**. The **Edit Ports** window opens.
5. Select the **Port Security** check box, then select **Disable**.
6. Click **Finish**. If disabling LUN security, a message appears, indicating that only host group 0 (the group whose number is 00) is to be enabled. Clicking **OK** opens the **Confirm** window.

7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Setting Fibre Channel authentication

When configuring a Fibre Channel environment, use the **Authentication** window to set user authentication on host groups, Fibre Channel ports, and fabric switches of the storage system.



Note: The **Authentication** window performs on the secondary window of Hitachi Device Manager - Storage Navigator. For more information about the setting for the secondary window, see *System Administrator Guide*

The hosts to be connected must be configured for authentication by host groups (and for authentication of host groups by the host, if required). For details about configuring the host for CHAP authentication, see the documentation of the operating system and Fibre Channel driver in your environment.

The following topics provide information for managing user authentication on host groups, Fibre Channel ports, and fabric switches:

- [User authentication on page 7-33](#)
- [Fibre Channel authentication on page 7-41](#)
- [Fibre Channel port authentication on page 7-47](#)
- [Setting Fibre Channel port authentication on page 7-47\)](#)
- [Registering user information on a Fibre Channel port on page 7-48\)](#)
- [Registering user information on a fabric switch on page 7-49\)](#)
- [Clearing fabric switch user information on page 7-50\)](#)
- [Setting the fabric switch authentication mode on page 7-51\)](#)
- [Enabling or disabling fabric switch authentication on page 7-52\)](#)

User authentication

When configuring a Fibre Channel environment, use LUN Manager to set user authentication for ports between your storage system and hosts. In a Fibre Channel environment, the ports and hosts use *Null DH-CHAP* or *CHAP* (Challenge Handshake Authentication Protocol with a Null Diffie-Hellmann algorithm) as the authentication method.

User authentication is performed in a Fibre Channel environment in three phases:

1. A host group of the storage system authenticates a host that attempts to connect (authentication of hosts).
2. The host authenticates the connection-target host group of the storage system (authentication of host groups).



Caution: Because the host bus adapters at present do not support this function, this authentication phase is unusable in the Fibre Channel environment.

3. A target port of the storage system authenticates a fabric switch that attempts to connect (authentication of fabric switches).

The storage system performs user authentication by host groups. Therefore, the host groups and hosts need to have their own user information for performing user authentication.

When a host attempts to connect to the storage system, the *authentication of hosts* phase starts. In this phase, first it is determined whether the host group requires authentication of the host. If it does not, the host connects to the storage system without authentication. If it does, authentication is performed for the host, and when the host is authenticated successfully, processing goes on to the next phase.

After successful authentication of the host, if the host requires user authentication for the host group that is the connection target, the *authentication of host groups* phase starts. In this way, the host groups and hosts authenticate with each other, that is, *mutual authentication*. In the authentication of host groups phase, if the host does not require user authentication for the host group, the host connects to the storage system without authentication of the host group.

The settings for authentication of host groups are needed only when you want to perform mutual authentication. The following topics explain the settings required for user authentication.

- [Settings for authentication of hosts on page 7-34](#)
- [Settings for authentication of ports \(required if performing mutual authentication\) on page 7-35](#)

Settings for authentication of hosts

On the storage system, use LUN Manager to specify whether to authenticate hosts on each host group.

On a host group that performs authentication, register user information (group name, user name, and secret) of the hosts that are allowed to connect to the host group. A *secret* is a password used in CHAP authentication. When registering user information, you can also specify whether to enable or disable authentication on a host basis.

On hosts, configure the operating system and Fibre Channel host bus adapter driver for authentication by host groups with CHAP. You need to specify the user name and secret of the host used for CHAP. For details, see the documentation of the operating system and Fibre Channel host bus adapter driver in your environment.

Settings for authentication of ports (required if performing mutual authentication)

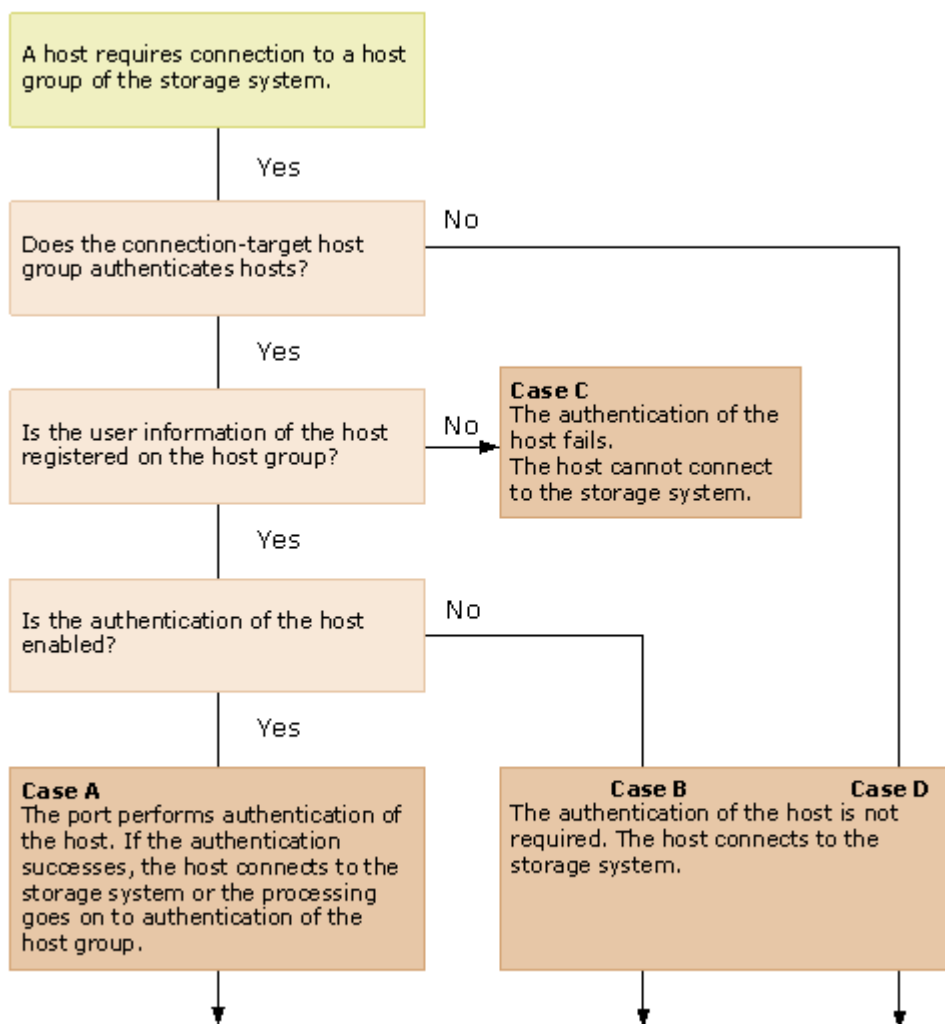
On the storage system, use LUN Manager to specify user information (user name and secret) of each host group.

On hosts, configure the operating system and Fibre Channel host bus adapter driver for authenticating host groups with CHAP. You need to specify the user name and secret of the host group that is the connection target. For details, see the documentation of the operating system and Fibre Channel host bus adapter driver in your environment.

Host and host group authentication

When a host attempts to connect to the storage system, the connection results of the authentication of the host differ depending on the host group settings.

The following diagram shows the flow of authentication of hosts in a Fibre Channel environment. The connection uses cases are detailed below the diagram.



Authenticating hosts (Cases A, B, and C)

The following cases describe the examples of performing authentication of host groups

Case A - The user information of the host is registered on the host group, and authentication of the host is enabled.

The host group authenticates the user information sent from the host. If authentication of the host is successful, either of the following occurs:

- When the host is configured for mutual authentication, authentication of the host group is performed.
- When the host is not configured for mutual authentication, the host connects to the storage system.

If the host is not configured for authentication by host groups with CHAP, the authentication fails and the host cannot connect to the storage system.

Case B - The user information of the host is registered on the host group, but authentication of the host is disabled.

The host group does not perform authentication of the host. The host will connect to the storage system without authentication regardless of whether the host is configured for authentication by host groups with CHAP.

Case C - The user information of the host is not registered on the host group.

Regardless of the setting on the host, the host group performs authentication of the host, but results in failure. The host cannot connect to the storage system.

Not authenticating hosts (Case D)

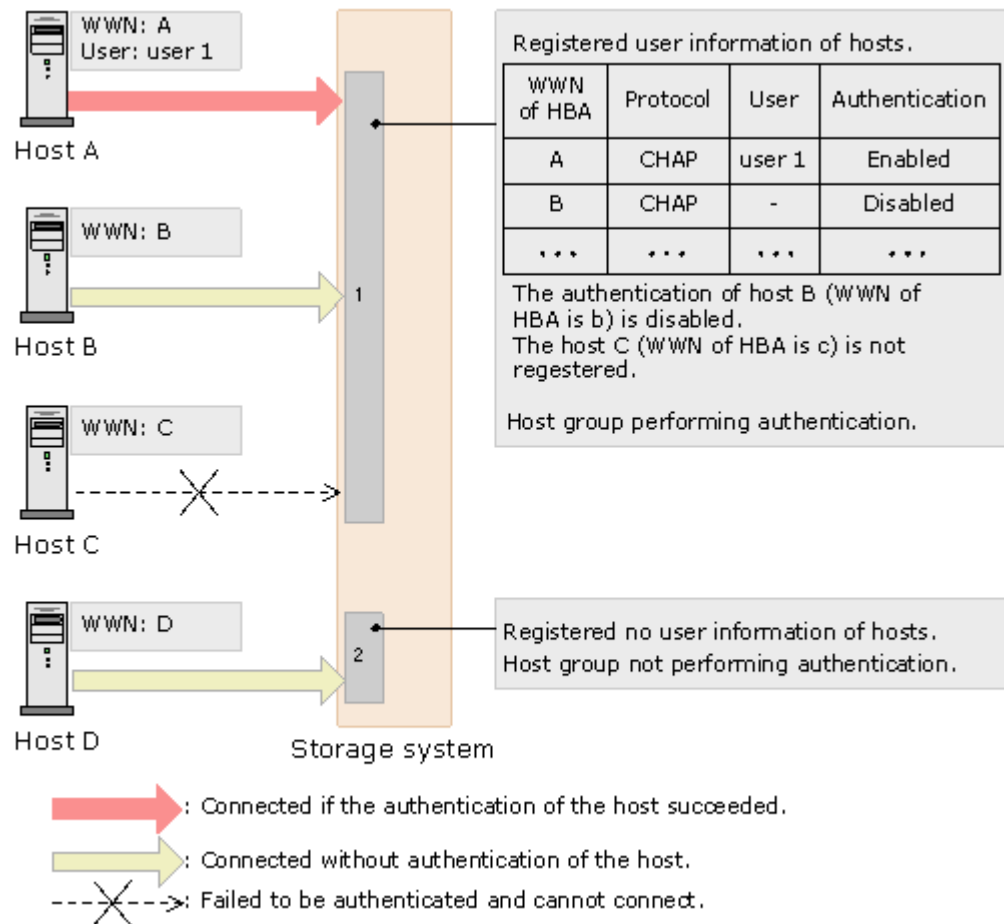
Case D is an example of connecting through a host group that does not perform authentication of hosts. The host will connect to the storage system without authentication of the host regardless of whether the host is configured for authentication by host groups with CHAP. In this case, though you need not register user information of the host on the host group, you can register it.

Register user information of all the hosts to be connected to a host group that performs authentication of hosts. To allow a specific host to connect to such a host group without authentication, configure the host group and the host as follows.

On the host group: Register the user information of the host you want to allow to connect without authentication, then disable the authentication setting of the host.

Example of authenticating hosts in a Fibre Channel environment

Following is an example of authentication of hosts in a Fibre Channel environment. In this figure, WWNs of host bus adapters (HBAs) are abbreviated, such as A, B, and so on.



In the example, host group 1 performs authentication of hosts, and host group 2 does not.

The user information of host A is registered on the host group 1, and the authentication setting is enabled. Therefore, if the authentication of the host is successful, host A can connect to the storage system (or, the processing goes on to the authentication of the host group). As a precondition of successful authentication, host A should be configured for authentication by host groups with CHAP.

The user information of host B is also registered on the host group 1, but the authentication setting is disabled. Therefore, host B can connect to the storage system without authentication.

The user information of host C is not registered on the host group 1. Therefore, when host C tries to connect to the storage system, the authentication fails and the connection request is denied regardless of the setting on host C.

Host D is attached to the host group 2 that does not perform authentication of hosts. Therefore, host D can connect to the storage system without authentication.

During authentication of hosts, the connection result is determined depending on the combination of the following host group settings:

- Setting of the host group in the **Port** tree: enable () or disable ()
- Whether the user information of the host that attempts to connect is registered on the host group

Port settings and connection results

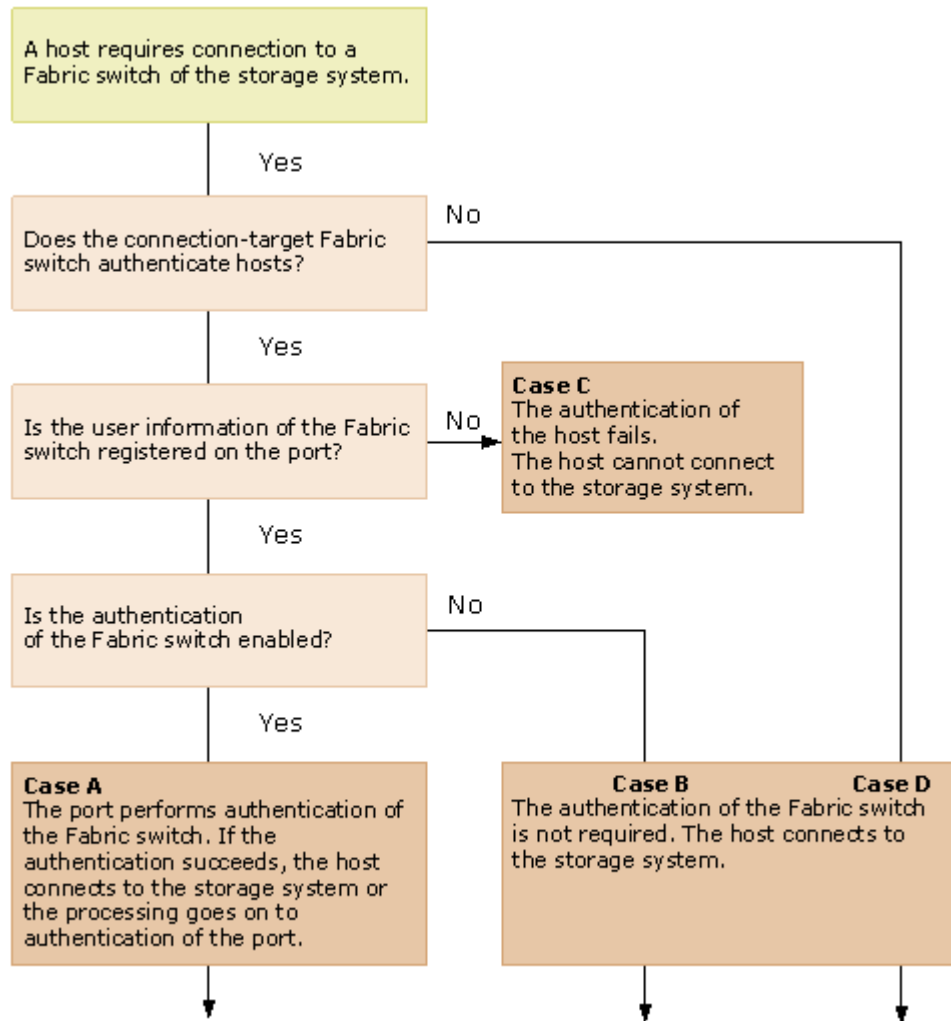
The following table shows the relationships between host group settings and the connection results in authentication of hosts. Unless otherwise noted, connection results are as described regardless of whether the host is configured for authentication by ports with CHAP.

Port settings		Host settings	Connection results
Authentication at host group	User information of host		
Enabled	Registered	Registered	Connected if the authentication of the host succeeded
Enabled	Registered	Not registered	Failed to be authenticated and cannot be connected
Enabled	Not registered	Registered	Failed to be authenticated and cannot be connected
Disabled	---	---	Connected without authentication of the host If a host is configured for authentication by ports with CHAP, authentication of the host will fail. To allow such a host to connect to the port without authentication, do not configure it for authentication by ports with CHAP.
---: This item does not affect the connection results, or cannot be specified.			

Fabric switch authentication

When a host attempts to connect to the storage system, the connection results of the authentication of the fabric switch differs depending on the fabric switch setting related to each port.

The following figure shows the flow of authentication between fabric switch settings and the connection results. The setting of fabric switch authentication is independent from the setting of host authentication. The connection use cases are detailed below the diagram.



Authenticating fabric switches by ports (Cases A, B, and C)

- *If the user information of the fabric switch is registered on the port, and authentication of the fabric switch is enabled (Case A)*

Each port authenticates the fabric switch. If the authentication of the fabric switch ends successfully, either of the following actions occurs:

- When the fabric switch is configured for mutual authentication, processing continues to authentication of the port.
- When the fabric switch is not configured for mutual authentication, the fabric switch connects to the storage system.

If the fabric switch of the port is not configured for authentication with CHAP, the authentication fails and the fabric switch cannot connect to the storage system.

- *If the user information of the fabric switch is registered on the port, but authentication of the fabric switch is disabled (Case B)*

Each port does not perform authentication of the fabric switch. The fabric switch connects to the storage system without authentication regardless of whether the fabric switch is configured for authentication with CHAP.

- If the user information of the fabric switch is not registered on the port (Case C)

Regardless of the setting on the fabric switch, the port performs authentication of the fabric switch, but results in failure. The fabric switch cannot connect to the storage system.

Not authenticating fabric switches by ports (Case D)

The fabric switch connects to the storage system without authentication of the host regardless of whether the fabric switch is configured for authentication with CHAP. In this case, though you need not register the user information of the fabric switch on the port, you can register it.

During authentication of hosts, the connection result is determined depending on the combination of the following port settings:

- Setting of the port in the **Port** tree: enable () or disable ()
- Whether the user information of the fabric switch that attempts to connect is registered on the port

Fabric switch settings and connection results

The following table shows the relationship between the combinations of port settings and the connection results in authentication of fabric switches. Unless otherwise noted, connection results are as described regardless of whether the host is configured for authentication by fabric switches with CHAP.

Port Settings		fabric switch settings	Connection results
Authentication at fabric switch	User information of fabric switch		
Enabled	Registered	Registered	Connected if the authentication of the fabric switch succeeded
Enabled	Registered	Not registered	Failed to be authenticated and cannot be connected
Enabled	Not registered	Registered	Failed to be authenticated and cannot be connected
Disabled	---	---	Connected without authentication of the fabric switch If a fabric switch is configured for authentication by ports with CHAP, authentication of the host will fail. To allow such a fabric switch to connect to the port without authentication, do not configure it for authentication by ports with CHAP.
---: This item does not affect the connection results, or cannot be specified.			

Mutual authentication of ports

If mutual authentication is required, when authentication of a host is successful, the host in return authenticates the port. In authentication of ports, when user information (user name and secret) specified on the port side matches with that stored on the host, the host allows the host group to connect.

Fibre Channel authentication

Enabling or disabling host authentication on a host group

You can specify whether to authenticate hosts on each host group. Change the user authentication settings of host groups to enable or disable authentication of hosts. By default, user authentication is disabled.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to enable or disable host authentication, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

To enable host authentication on a host group

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Ports/Host Groups** to open the **Authentication** window.
For Storage Navigator:
 - o Click **Actions > Ports/Host Groups > Fibre** then **> Authentication** to open the **Authentication** window.
2. In the **Authentication** window, click  to change to **Modify** mode.
3. In the **Port** tree, double-click the **Storage System** folder.
If the storage system contains any Fibre Channel boards, the **Fibre** folder appears below the **Storage System** folder.
4. Double-click the **Fibre** folder and Fibre Channel port icon under the **Fibre** folder.
When you double-click the **Fibre** folder, the Fibre Channel ports contained in the storage system appear as icons. If you double-click the Fibre Channel ports, host groups appear as icons. On the right of each icon appears the host group name.
 indicates the host group authenticates hosts. This is the default.
 indicates the host group does not authenticate hosts.

5. Right-click a host group that appears with  and select **Authentication:Disable > Enable**. The host group icon  changes to , and the port name appears in blue.
6. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.
7. Click **OK** to close a message. The settings are applied to the storage system.

To return the host group setting to , perform the same operation, except select the **Authentication:Enable > Disable** menu in step 4.

Registering host user information

On a host group that performs authentication of hosts, register user information of all hosts that you allow to connect.

Register user information of all the hosts to be connected to a host group that performs authentication of hosts. To allow a specific host to connect to such a host group without authentication, configure the host group and the host as follows.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to register host user information, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

On the host: It does not matter whether you configure the host for authentication by ports with CHAP.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Ports/Host Groups** to open the **Authentication** window.

For Storage Navigator:

- o Click **Actions > Ports/Host Groups > Fibre** then **Authentication** to open the **Authentication** window.
2. In the **Authentication** window, click  to change to **Modify** mode.
3. In the **Port** tree, select a port or host group on which you want to register user information of a host.
The user information of hosts currently registered on the selected port or host group appears in the **Authentication Information (Host)** list below the **Authentication Information (Target)** list.

You can register user information of a host even if the port status is . In this case, however, the registered user information of a host is ignored.

4. Right-click any point in the **Authentication Information (Host)** list and select **Add New User Information**. The **Add New User Information (Host)** dialog box opens.
5. In this dialog box, specify the following user information of the host you want to allow connection.
 - **Group Name:** Specify the group name of host bus adapter. Select one from the list. In the list, all the group names of host bus adapters connected to the selected port by the cable appear.
 - **User Name:** Specify the WWN of the host bus adapter with up to 16 characters. You can use hexadecimal characters in a user name. User names are not case-sensitive.
 - **Secret:** Specify the secret (that is, a password used in CHAP authentication) between 12 to 32 characters.
You can use alphanumeric characters, spaces, and the following symbols in a secret: . - + @ _ = : [] , ~
 - **Re-enter Secret:** Specify the secret, again, for confirmation.
 - **Protocol:** Specify the protocol used in the user authentication. This protocol is fixed to **CHAP**.
6. Click **OK** to close the **Add New User Information (Host)** dialog box. The specified user information of the host is added in blue in the **Authentication Information (Host)** list of the **Authentication** window.
7. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.
8. Click **OK** to close a message. The settings are applied to the storage system.

Changing host user information registered on a host group

You can change the registered user name or secret of a host, and enable and disable authentication settings after registration.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to change host user information, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

You cannot change the WWN when you change user information.

To change host user information registered on a host group:

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:

- a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
- b. Click **Actions > Ports/Host Groups** to open the **Authentication** window.

For Storage Navigator:

- o Click **Actions > Ports/Host Groups > Fibre** then **Authentication** to open the **Authentication** window.

2. In the **Authentication** window, click  to change to **Modify** mode.
3. In the **Port** tree, expand the **Fibre** folder and select a port or host group on which the user information you want to change is registered.
All the user information of the hosts registered on the selected port or host group appears in the **Authentication Information (Host)** list below the **Authentication Information (Target)**.
4. In the **User Information (Host)** list, right-click a user information item that you want to change and select **Change User Information**. The **Change User Information (Host)** dialog box opens.
5. Change the user information of the host in the **Change User Information (Host)** dialog box. You can change the specifications of **User Name**, and **Secret**.
6. Click **OK** to close the **Change User Information (Host)** dialog box. The user information of the host is changed in blue in the **Authentication Information (Host)** list of the **Authentication** window.
7. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.
8. Click **OK** to close a message. The settings are applied to the storage system.

Deleting host user information

You can delete registered user information from a host group.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to delete host user information, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Ports/Host Groups** to open the **Authentication** window.

For Storage Navigator:

- o Click **Actions > Ports/Host Groups > Fibre** then **Authentication** to open the **Authentication** window.
- 2. In the **Authentication** window, click  to change to **Modify** mode.
- 3. In the **Port** tree, expand the **Fibre** folder and select a port or host group on which the user information you want to delete is registered.
The user information of hosts currently registered on the selected port or host group appears in the **Authentication Information (Host)** list below the **Authentication Information (Target)**.
- 4. In the **Authentication Information (Host)** list, right-click a user information item that you want to delete.
- 5. Select **Delete User Information**. The **Delete Authentication Information** dialog box opens asking whether to delete the selected host user information.
- 6. Click **OK** to close a message.
- 7. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the setting to the storage system.
- 8. Click **OK** to close a message. The setting is applied to the storage system.

Registering user information for a host group (for mutual authentication)

You can perform mutual authentication by specifying user information for host groups on the storage system ports. Specify unique user information for each host group. You can change the specified user information for host groups in the same way you initially specify it.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to register user information, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

To specify user information for a host group:

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Ports/Host Groups** to open the **Authentication** window.
 For Storage Navigator:
 - o Click **Actions > Ports/Host Groups > Fibre** then **Authentication** to open the **Authentication** window.
2. In the **Authentication** window, click  to change to **Modify** mode.

3. In the **Port** tree, select a port or host group whose user information you want to specify.
The currently registered user information of the selected port or host group appears in the **Authentication Information (Target)** list.
4. Right-click any point in the **Authentication Information (Target)** list and select **Specify Authentication information**.
5. In the Specify Authentication Information dialog box, specify the user information of the port or host group selected in the **Port** tree.
 - **Port Name:** The port name of the selected port appears. You cannot change the port name.
 - **User Name:** Specify the user name of the host group with up to 16 characters. You can use specified hexadecimal characters. User names are not case-sensitive.
 - **Secret:** Specify the secret (that is, a password used in CHAP authentication) between 12 to 32 characters. You can use alphanumeric characters, spaces, and the following symbols in a user name: . - + @ _ = : / [] , ~
 - **Re-enter Secret:** Specify the secret, again, for confirmation.
6. Click **OK** to close the **Specify Authentication Information** dialog box. The specified user information of the port appears in blue in the **Authentication Information (Target)** list of the **Authentication** window.
7. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.
8. Click **OK** to close a message. The settings are applied to the storage system.

Clearing user information from a host group

You can clear user information from a host group.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to clear user information from a host group, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions** > **Ports/Host Groups** to open the **Authentication** window.

For Storage Navigator:

- o Click **Actions** > **Ports/Host Groups** > **Fibre** then > **Authentication** to open the **Authentication** window.
- 2. In the **Authentication** window, click  to change to **Modify** mode.
- 3. In the **Port** tree, expand the **Fibre** folder and select a port or host group whose user information you want to clear.
The currently registered user information of the port or host group appears in the **Authentication Information (Target)**.
- 4. Right-click any point in the **Authentication Information (Target)** list and select **Clear Authentication information**. The **Clear Authentication Information** dialog box opens asking whether to clear the user information of the selected host group.
- 5. Click **OK** to close the **Clear Authentication Information** dialog box. The user information of the selected host group disappears from the **Authentication Information (Target)** list.
- 6. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the setting to the storage system.
- 7. Click **OK** to close a message. The setting is applied to the storage system.

Fibre Channel port authentication

Setting Fibre Channel port authentication

You can perform user authentication in a Fibre Channel environment by specifying authentication information on the Fibre Channel ports of the storage system.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to set port information, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions** > **Ports/Host Groups** to open the **Authentication** window.
 For Storage Navigator:
 - o Click **Actions** > **Ports/Host Groups** > **Fibre** then > **Authentication** to open the **Authentication** window.
2. In the **Authentication** window, click  to change to **Modify** mode.
3. In the **Port** tree, double-click the **Storage System** folder.

If the storage system contains any Fibre Channel boards, the **Fibre** folder appears below the **Storage System** folder. Information about the port appears in the **Port Information** list of the **Authentication** window.

4. Right-click any point in the **Port Information** list and select **Set Port Information**.
5. In the **Set Port Information** dialog box, specify the port information.
 - **Time out**: Specify the period of time from when authentication fails to when the next authentication session is ended. This period of time is between 15 to 60 seconds. The initial value of the **Time out** is 45 seconds.
 - **Refusal Interval**: Specify the interval from when connection to a port fails to when the next authentication session starts, with up to 60 minutes. The initial value of the **Refusal Interval** is 3 minutes.
 - **Refusal Frequency**: Specify the number of times of authentication allowable for connection to a port with up to 10 times. The initial value of the **Refusal Frequency** is 3 times.
6. Click **OK** to close the **Set Port Information** dialog box.
7. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.
8. Click **OK** to close a message. The settings are applied to the storage system.

Registering user information on a Fibre Channel port

You can perform user authentication in a Fibre Channel environment by registering user information on the Fibre Channel ports of the storage system.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to register user information, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions** > **Ports/Host Groups** to open the **Authentication** window.
For Storage Navigator:
 - Click **Actions** > **Ports/Host Groups** > **Fibre** then > **Authentication** to open the **Authentication** window.
2. In the **Authentication** window, click  to change to **Modify** mode.

3. In the **Port** tree, double-click the **Storage System** folder.
If the storage system contains any Fibre Channel boards, the **Fibre** folder appears below the **Storage System** folder.
4. In the **Port** tree, double-click the **Fibre** folder. Information about the port appears in the tree of the **Authentication** window.
5. Right-click any icon of port in the **Port** tree and select **Default Setting(User Name / Secret)**.
6. In the **Default Setting(User Name/Secret)** dialog box, specify the user information.
 - o **User Name:** Specify the user name of Fibre Channel with up to 16 characters. You can use hexadecimal characters in a user name. User names are not case-sensitive.
 - o **Secret:** Specify the secret (that is, a password used in CHAP authentication) between 12 to 32 characters.
You can use alphanumeric characters, spaces, and the following symbols in a secret: . - + @ _ = : / [] , ~
 - o **Re-enter Secret:** Specify the secret, again, for confirmation.
7. Click **OK** to close the **Default Setting (User Name/Secret)** dialog box.
8. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the setting to the storage system.
9. Click **OK** to close a message. The setting is applied to the storage system.

Registering user information on a fabric switch

You can perform user authentication in a Fibre Channel environment by registering user information on the fabric switch of the storage system.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to specify authentication information, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Ports/Host Groups** to open the **Authentication** window.
 For Storage Navigator:
 - o Click **Actions > Ports/Host Groups > Fibre** then **> Authentication** to open the **Authentication** window.
2. In the **Authentication** window, click  to change to **Modify** mode.

3. In the **Port** tree, double-click the **Storage System** folder.
If the storage system contains any fibre channel boards, the **Fibre** folder appears below the **Storage System** folder.
4. In the **Port** tree, double-click the **Fibre** folder. Information about the fabric switch appears in the **Fabric Switch Information** list below the **Port Information** list.
5. Right-click any point in the **Fabric Switch Information** list and select **Specify User Information**.
6. In the **Specify Authentication Information** dialog box, specify the user information of the host you want to allow connection.
 - o **User Name:** Specify the user name of the fabric switch with up to 16 characters. You can use hexadecimal characters in a user name. User names are not case-sensitive.
 - o **Secret:** Specify the secret (that is, a password used in CHAP authentication) between 12 to 32 characters.
You can use alphanumeric characters, spaces, and the following symbols in a secret: . - + @ _ = : / [] , ~
 - o **Re-enter Secret:** Specify the secret, again, for confirmation.
7. Click **OK** to close the **Specify Authentication Information** dialog box.
8. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.
9. Click **OK** to close a message. The settings are applied to the storage system.

Clearing fabric switch user information

You can clear the specified user information of a fabric switch from the storage system.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to clear authentication information, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions** > **Ports/Host Groups** to open the **Authentication** window.
 For Storage Navigator:
 - o Click **Actions** > **Ports/Host Groups** > **Fibre** then > **Authentication** to open the **Authentication** window.

2. In the **Authentication** window, click  to change to **Modify** mode.
3. In the **Port** tree, double-click the **Storage System** folder.
If the storage system contains any fibre channel boards, the **Fibre** folder appears below the **Storage System** folder.
4. In the **Port** tree, double-click the **Fibre** folder. Information about the fabric switch appears in the **Fabric Switch Information** list below the **Port Information** list.
5. Right-click any point in the **Fabric Switch Information** list and select **Clear Authentication information**. The **Clear Authentication Information** dialog box opens asking whether to clear the user information of the selected fabric switch.
6. Click **OK** to close the **Clear Authentication Information** dialog box.
7. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.
8. Click **OK** to close a message. The settings are applied to the storage system.

Setting the fabric switch authentication mode

You can specify the authentication mode of a fabric switch.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to set the fabric switch authentication mode, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions** > **Ports/Host Groups** to open the **Authentication** window.
 For Storage Navigator:
 - Click **Actions** > **Ports/Host Groups** > **Fibre** then > **Authentication** to open the **Authentication** window.
2. In the **Authentication** window, click  to change to **Modify** mode.
3. In the **Port** tree, double-click the **Storage System** folder.
If the storage system contains any fibre channel boards, the **Fibre** folder appears below the **Storage System** folder.
4. In the **Port** tree, double-click the **Fibre** folder. Information about the fabric switch appears in the **Fabric Switch Information** list below the **Port Information** list.

5. Right-click any point in the **Fabric Switch Information** list and select **Authentication Mode: unidirectional > bi-directional**.
6. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.
7. Click **OK** to close a message. The settings are applied to the storage system.

To return the Fibre Channel setting, perform the same operation, except that you must select the **Authentication Mode: bi-directional > unidirectional** menu in step 4.

Enabling or disabling fabric switch authentication

By default, the fabric switch authentication is disabled. To enable fabric switches to authenticate hosts, enable the user authentication settings of fabric switches.

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from the **Authentication** secondary window to enable or disable fabric switch authentication, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

1. Perform one of the following to display the **Authentication** window.
For Hitachi Command Suite:
 - a. On the **Resource** tab, expand the **Storage Systems** tree. Right-click the target storage system, then select **Other Function**.
 - b. Click **Actions > Ports/Host Groups** to open the **Authentication** window.
 For Storage Navigator:
 - o Click **Actions > Ports/Host Groups > Fibre** then **> Authentication** to open the **Authentication** window.
2. In the **Authentication** window, click  to change to **Modify** mode.
3. In the **Port** tree, double-click the **Storage System** folder.
If the storage system contains any fibre channel boards, the **Fibre** folder appears below the **Storage System** folder.
4. In the **Port** tree, double-click the **Fibre** folder. Information about the fabric switch appears in the **Fabric Switch Information** list below the **Port Information** list.
5. Right-click any point in the **Fabric Switch Information** list and select **Authentication:Disable > Enable**.
6. Click **Apply** in the **Authentication** window. A message appears asking whether to apply the settings to the storage system.

7. Click **OK** to close a message. The settings are applied to the storage system.

To return the fabric switch setting so that the switch cannot authenticate hosts, perform the same operation, except select the **Authentication:Enable > Disable** menu in step 4.

Managing hosts for Fibre Channel

Changing WWN or nickname of a host bus adapter

The Storage Administrator (Provisioning) role is required to perform this task.

In Fibre Channel environments, host bus adapters can be identified by WWNs or nicknames.

1. Perform one of the following to display the **Hosts** tab.

For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Hosts** tab.

For Storage Navigator:

- To display all hosts in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Hosts** tab.
- To display hosts related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Hosts** tab.
- To display hosts related to each host group, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets** and the port. Select the host group, and select the **Hosts** tab.

2. Select the host bus adapter you want to change from the list of hosts.
3. Select **Edit Host**. The **Edit Host** window opens.
4. To change the WWN, select the **HBA WWN** check box, then type a new WWN in **HBA WWN**.

To change the nickname, select the **Host Name** check box, then type a new nickname in **Host Name**.

5. If necessary, check **Apply same settings to the HBA WWN in all ports**.

If checked, new settings affect other ports. For example, if the same host bus adapter (the same WWN) is located below ports CL1-A and CL2-A in the tree, when you select the host bus adapter (or the WWN) from below one of the ports and change the nickname to hba1, the host bus adapter below the other port will also be renamed hba1.

However, new settings will not affect any port if:

- The resulting nickname is already used as the nickname of a host bus adapter connected to the port, or
 - The resulting WWN exists in the port.
6. Click **Finish**.
 7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Apply same settings to the HBA WWN in all ports** is checked, a dialog box opens listing the host bus adapter to be changed. Confirm the changes and click **OK**. Otherwise, click **Cancel**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Changing the name or host mode of a host group

The Storage Administrator (Provisioning) role is required to perform this task.
Use LUN Manager to change the name or host mode of a host group.



Caution: Before changing the host mode of a host group, you should back up data on the port to which the host group belongs. Setting host mode should not be destructive, but data integrity cannot be guaranteed without a backup.

To change the name or the host mode of a host group:

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Host Groups / iSCSI Targets** tab.
 For Storage Navigator:
 - To display all host groups in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab.
 - To display host groups related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Host Groups** tab.
 - To display each host group, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets** and the port. Select the host group, and select the **Host Mode Options** tab.
2. Select the host group.
3. Click **More Actions** and select **Edit Host Groups**. The **Edit Host Groups** window opens.
4. To change the name of the host group, select the **Host Group Name** option, then type a new host group name.
5. To change the host mode, select the **Host Mode** option, then select the new host mode from the **Host Mode** table. The **Mode No.** column

indicates option numbers. Select the option you want to specify, then click **Enable**.

6. If necessary, select an option you want to specify in the **Host Mode Options**. For detailed information about host mode options, see [Host mode options on page 7-14](#).
7. Click **Finish**.
8. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Initializing host group 0

The Storage Administrator (Provisioning) role is required to perform this task.

Use this procedure to set host group 0 (zero) to its initial state. This removes all the WWNs from host group 0 and also removes all the LU paths related to host group 0. This procedure also changes the host mode of host group 0 to Standard and initializes the host group name. For example, if you initialize host group 0 for the port CL1-A, the name of host group 0 will change to 1A-G00.

To initialize host group 0:

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Host Groups / iSCSI Targets** tab.
For Storage Navigator:
 - To display all host groups in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab.
 - To display host groups related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Host Groups** tab.
2. Select the host group 0 which is displayed as host group (00).
3. On the menu bar, click **Actions, Ports/Host Groups, Fibre**, then **Delete Host Groups**. Or, click **More Actions** and select **Delete Host Groups** from the lower right of the window. The **Delete Host Groups** window opens.
4. Confirm the settings and enter the task name in the **Task Name** box.
A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.
5. Click **Apply** in the **Delete Host Groups** window.
A message appears, asking whether to delete it.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

6. Click **OK** to close a message.

Deleting a host bus adapter from a host group

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Hosts** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Hosts** tab.For Storage Navigator:
 - To display all hosts in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Hosts** tab.
 - To display hosts related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Hosts** tab.
 - To display hosts related to each host group, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets** and the port. Select the host group, and select the **Hosts** tab.
2. Select a host bus adapter.
3. Select **Remove Hosts**.
 - Click **Remove Hosts**.
 - Click **More Actions**, then select **Remove Hosts(Fibre)**.
 - From the **Actions** menu, select **Ports/Host Groups, Fibre**, then **Remove Hosts**.
4. In the **Remove Hosts** window, if necessary, check **Remove selected hosts from all host groups containing the hosts in the storage system**.
If this check box is selected, selected hosts are removed from all host groups containing the hosts in the storage system.
5. Click **Finish**.
6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
A message appears asking whether to delete it.
If **Go to tasks window for status** is checked, the **Tasks** window opens.
7. Click **OK** to close a message.

Deleting WWNs from the WWN table

The Storage Administrator (Provisioning) role is required to perform this task.

If you disconnect a host that has been connected through a cable to your storage system, the WWN for the host will remain in the WWN list of the LUN Manager window. Use LUN Manager to delete from the WWN list a WWN for a host that is no longer connected to your storage system.

To delete WWNs from the WWN table:

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the **Login WWNs/iSCSI Names** tab.
To confirm the statuses of WWNs, click **View Login WWN Statuses** window.
3. Select the WWNs you want to delete.
4. Select **Delete Login WWNs**. The **Delete Login WWNs** window opens.
5. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
A message appears asking whether to delete it.
If **Go to tasks window for status** is checked, the **Tasks** window opens.
6. Click **OK** to close a message.

Deleting a host group

The Storage Administrator (Provisioning) role is required to perform this task.

Use LUN Manager to delete a host group.

If host group 0 (zero) is deleted, all WWNs that belong to host group 0 are deleted and all LU paths that correspond to host group 0 are deleted. The host mode of host group 0 becomes Standard, and the host group name is initialized. To remove all the WWNs and LU paths from host group 0, you must initialize host group 0. For details, see [Initializing host group 0 on page 7-55](#).

To delete a host group:

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Host Groups / iSCSI Targets** tab.For Storage Navigator:

- To display all host groups in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab.
 - To display host groups related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Host Groups** tab.
- 2. Select the host group.
- 3. Select **Delete Host Groups**.
- 4. In the **Delete Host Groups** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**. If **Go to tasks window for status** is checked, the **Tasks** window opens.
- 5. Click **OK** to close a message.

Adding a selected host to a host group

The Storage Administrator (Provisioning) role is required to perform this task.

To add a host to a host group:

1. Perform one of the following to display the **Hosts** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Hosts** tab.
 For Storage Navigator:
 - To display all hosts in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Hosts** tab.
 - To display hosts related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Hosts** tab.
 - To display hosts related to each host group, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets** and the port. Select the host group, and select the **Hosts** tab.
2. Select a host which you want to add.
3. Select **Add to Host groups**.
4. Select the desired host groups from the **Available Host Groups** table, then click **Add**.
Selected host groups are listed in the **Selected Host Groups** table.
If you select a row and click **Detail**, the **Host Group Properties** window appears.
5. Click **Finish**.
The **Confirm** window appears.
6. In the **Add to Host groups** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.

- If **Go to tasks window for status** is checked, the **Tasks** window opens.
- Click **OK** to close a message.

Adding a host to the selected host group

The Storage Administrator (Provisioning) role is required to perform this task.

To add a host to the selected host group:

- Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Host Groups / iSCSI Targets** tab.
For Storage Navigator:
 - To display all host groups in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab.
 - To display host groups related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Host Groups** tab.
 - To display each host group, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets** and the port. Select the host group, and select the **Hosts** tab.
- Select the host group.
- Select **Add to Hosts**.
- Select the desired host from the **Available Hosts** table, then click **Add**.
Selected host groups are listed in the **Selected Hosts** table.
If the desired host has never been connected with a cable to any port in the storage system, perform the following steps:
 - Click **Add New Host** under the **Available Hosts** list.
The **Add New Host** dialog box opens.
 - Enter the desired WWN in the **HBA WWN** box.
 - If necessary, enter a nickname for the host bus adapter in the **Host Name** box.
 - Click **OK** to close the **Add New Host** dialog box.
 - Select the desired host bus adapter from the **Available Hosts** list.
- Click **Finish**.
The **Confirm** window appears.
- In the **Add to Host groups** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.
- Click **OK** to close a message.

Setting T10 PI mode to the port

Prerequisite

The following prerequisites are required to perform this task:

- Storage Administrator (Provisioning) role
- Accessibility to CHB(FC) (Fibre Channel Board) port
- Port speed must be 16 Gbps



Caution: If you change the T10 PI mode of one port, the T10 PI mode of the other port paired with the changed port will also be changed. You must verify the mode of each port in the pair before changing T10 PI mode. Make sure the ports in each pair are the same in the resource group. The following shows pairs of port IDs.

If you change the setting on one of the ports in the pair, the setting on the other port in the pair will also be changed:

- Port IDs 1x and 3x (where x is a letter from A to R). For example, 1A and 3A can be paired with each other.
- Port IDs 2x and 4x (where x is a letter from A to R). For example, 2B and 4B can be paired with each other.



Note: If the T10 PI mode is enabled between the path of the target port and LDEV, you cannot disable the T10 PI mode of the port.

-
1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
 - For Hitachi Command Suite, on the **Resource** tab, expand the **Storage Systems** tree. Then, on the target storage system, click **Port / Host Group**.
 - For Storage Navigator, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
 2. Select the **Ports** tab.
 3. Select the desired port.



Note: To collectively change the T10 PI mode of ports, do not intermix ports with enabled or disabled T10 PI modes.

-
4. Display the **Edit Ports** window by performing one of the following:
 - Click **Edit Ports**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Edit Ports**.
 5. Click **OK** on the message window.
 6. Select **Enable** or **Disable** on the **Edit T10 PI Mode** window.
 7. Click **Finish**. The Confirm window appears.
 8. In the **Confirm** window, confirm the settings. In **Task Name**, type a unique name for this task or accept the default, then click **Apply**.

If **Go to tasks window for status** is checked, the **Tasks** window opens.

Overview for iSCSI

iSCSI (Internet SCSI) is a protocol for sending and receiving a SCSI command through an IP network. iSCSI transfers data in block units. An IP-SAN that uses an existing Ethernet can be constructed by using iSCSI. In the network for iSCSI, LUN Manager manages access paths between hosts and volumes, for each port in your storage system. LUN Manager has the following features:

- Connecting multiple hosts to a port
With LUN Manager, you can connect more than one host to a port on your storage system.
When setting up host connections in LUN Manager, for each host you specify the settings for host mode, volume, and iSCSI target. Each host can access a volume simulating a dedicated port to the host even if that host shares the port with other hosts.
- Mapping volumes to hosts
With LUN Manager, you can map or assign volumes to the hosts on your network. You have complete flexibility to share or restrict volume access among the hosts.
- Network security
With LUN Manager, you can enable or disable CHAP (Challenge Handshake Authentication Protocol), a security protocol that requires users to enter a secret for access.

Network configuration for iSCSI

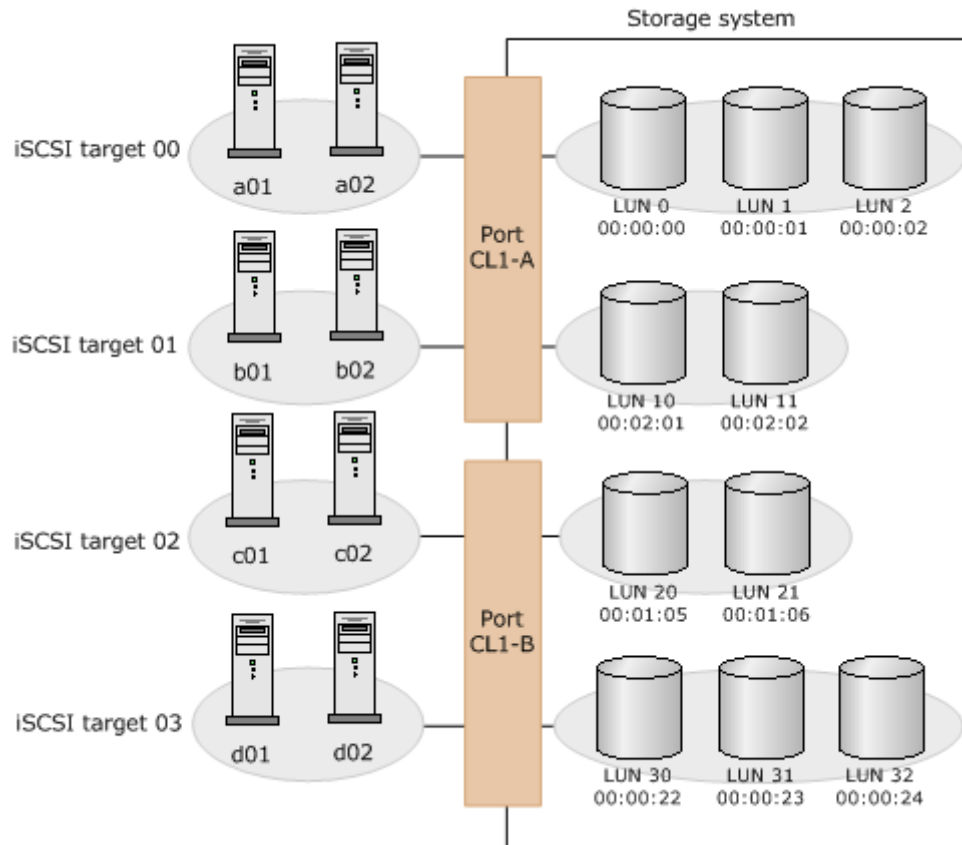
iSCSI makes it possible to construct an IP-SAN by connecting many hosts and storage systems at a low cost. However, iSCSI greatly increases the I/O workload of the network and the storage system. When using iSCSI, it is very important that you configure the network so that the workload among the network, port, controller, and drive is properly distributed.

Even though the LAN switches and NICs are the same, there are some important differences when you use iSCSI, particularly regarding the LAN connection. You need to pay particular attention to the following:

- iSCSI consumes almost all of the available Ethernet bandwidth, unlike a conventional LAN connection. This can significantly degrade the performance of both the iSCSI traffic and the LAN. Therefore, it is very important that you separate the iSCSI IP-SAN and the office LAN.
- Host I/O load will affect the iSCSI response time. In general, the greater the I/O traffic is, the lower the iSCSI performance.
- You need to have a failover path between host and iSCSI, so that you can update the firmware without stopping the system.

The following figure shows LU paths configuration in a Fibre Channel environment. The figure shows the iSCSI target 00 associated with three

logical volumes (00:00:00, 00:00:01, and 00:00:02). LU paths are defined between the two hosts in the iSCSI target 00 and the three logical volumes.



You can define paths between a single server host and multiple LUs. The figure shows that each of the two hosts in the iSCSI target 00 can access the three LUs.

You can also define paths between multiple server hosts and a single LU. The figure shows that the LU identified by the LDKC:CU:LDEV number 00:00:00 is accessible from the two hosts that belong to the iSCSI target 00.

Creating iSCSI targets and registering hosts in the iSCSI target

To perform this task, following roles are required:

- Storage Administrator (Provisioning) role
- Security Administrator (View and Modify) role

1. Perform one of the following to display the **Create iSCSI Targets** window.

For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Host Groups / iSCSI Targets** tab, click **Create iSCSI Targets**.

For Storage Navigator:

- On the **General Tasks** in Hitachi Device Manager - Storage Navigator, select **Create iSCSI Targets**.
 - To display all iSCSI targets in the storage system, in the **Storage Systems** tree, click **Ports / Hosts Groups / iSCSI Targets**. In the **Host Groups / iSCSI Target** tab, click **Create iSCSI Targets**.
 - To display iSCSI targets related to each port, in the **Storage Systems** tree, click **Ports / Hosts Groups / iSCSI Targets**, then click the relevant port. In the **Host Groups** tab, click **Create iSCSI Targets**.
 - From the **Actions** menu, select **Ports / Host Groups, iSCSI**, then **Create iSCSI Targets**.
2. Enter the iSCSI alias in the **iSCSI Target Alias** box.
If the **Use Default Name** check box is selected, the iSCSI target alias is input by default.
 3. Enter the iSCSI target name in the **iSCSI Target Name** box.
Select the format from **iqn** or **eui**. If the **Use Default Name** check box is selected, the iSCSI target name is input by default.
 4. Select the resource group in which an iSCSI target is created.
If you select **Any**, ports to which you can add iSCSI targets within all ports assigned to a user are displayed in the **Available Ports** list. If you select other than **Any**, ports to which you can add iSCSI targets within the ports assigned to the selected resource group are displayed in the **Available Ports** list.
 5. Select a host mode from the **Host Mode** list. When selecting a host mode, you must consider the platform and some other factors. For details about host modes, see [Host modes on page 7-13](#).
 6. If necessary, click **Host Mode Options** and select host mode options. For details about host mode options, see [Host mode options on page 7-14](#).



Note: When you click **Host Mode Options**, the dialog box expands to display the list of host mode options. The **Mode No.** column indicates option numbers. Select an option you want to specify and click **Enable**.

7. Select hosts to be registered in an iSCSI target.
If the desired host has ever been connected with a cable to another port in the storage system, select the desired host bus adapter from the **Available Hosts** list.
If there is no host to be registered, skip this step and move to the next step. Otherwise, an iSCSI target with no host would be created.
If the desired host has never been connected through a cable to any port in the storage system, perform the following steps:
 - a. Click **Add New Host** under the **Available Hosts** list.
The **Add New Host** dialog box opens.
 - b. Select the format from **iqn** or **eui**.
 - c. Enter the desired HBA iSCSI name in the **HBA iSCSI Name** box.

- d. If necessary, enter a nickname for the host bus adapter in the **Host Name** box.
- e. Click **OK** to close the **Add New Host** dialog box.
- f. Select the desired host bus adapter from the **Available Hosts** list.
8. Select the port to which you want to add the iSCSI target.
If you select multiple ports, you can add the same iSCSI target to multiple ports by one operation.
9. Select **CHAP**, **None**, or **Comply with Host Setting** in the **Authentication Method** list.
If **CHAP** is selected, specify following:
 - o **Mutual CHAP**: Select **Enable** or **Disable**. If **Enable** is selected, the mutual authentication mode is performed. If **Disable** is selected, the unidirectional authentication mode is performed.
 - o **User Name**: If **Disable** is selected in **Mutual CHAP**, this item is optionally specified. If **Enable** is selected in **Mutual CHAP**, this item must be specified.
 - o **Secret** and **Re-enter Secret**: If **Disable** is selected in **Mutual CHAP**, this item is optionally specified. If **Enable** is selected in **Mutual CHAP**, this item must be specified.
10. Select CHAP users to be registered in an iSCSI target.
If the CHAP user has ever been connected with a cable to another port in the storage system, select the desired host bus adapter from the **Available CHAP Users** list.
If there is no host to be registered, skip this step and move to the step 11. Otherwise, an iSCSI target with no CHAP user would be created.
If the desired CHAP user has never been connected through a cable to any port in the storage system, perform the following steps:
 - a. Click **Add New CHAP User** under the **Available CHAP Users** list.
The **Add New CHAP User** dialog box opens.
 - b. Specify an user name, and secret.
 - c. Click **OK** to close the **Add New CHAP User** dialog box.
 - d. Select the desired CHAP user from the **Available CHAP Users** list.
11. Click **Add** to add the iSCSI target.
By repeating steps from 2 to 10, you can create multiple iSCSI targets.
If you select a row and click **Detail**, the **iSCSI Target Properties** window appears. If you select a row and click **Remove**, a message appears asking whether you want to remove the selected row or rows. To remove the row, click **OK**.
12. Click **Finish** to display the **Confirm** window.
To continue to add LUN paths, click **Next**.
13. Confirm the settings and enter the task name in the **Task Name** box.
A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.

If you select a row and click **Detail**, the **iSCSI Target Properties** window appears.

14. Click **Apply** in the **Confirm** window.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Editing ports setting

Roles required to perform this task:

- Storage Administrator (System Resource Management)
- Storage Administrator (Provisioning)*

*To change the LUN security setting, you can change the setting with this role.



Caution: It is best to enable LUN security on each port when configuring your storage system. Although you can enable LUN security on a port when host I/O is in progress, I/O is rejected with a security guard after enabling.

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.

For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.

For Storage Navigator:

- Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.

2. Select the **Ports** tab.
3. Select the desired port.
4. Display the **Edit Ports** window by performing one of the following:
 - Click **Edit Ports**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Edit Ports**.
5. Select the check box to change the option and specify values. Items that can be changed are as follows:
 - **IPv4 Settings:** Specifies **IP Address**, **Subnet Mask**, or **Default Gateway**.
 - **IPv6 Mode:** Specifies enable or disable of this mode.
 - **IPv6 Settings:** Specifies **Link Local Address**, **Global Address**, or **Default Gateway** if **IPv6 Mode** is selected to **Enable**.
 - **Port Security:** Specifies enable or disable.
 - **Port Speed:** Specifies the data transfer speed.
 - **TCP Port Number:** Specifies the TCP port number.
 - **Selective ACK:** Specifies enable or disable.

- **Delayed ACK:** Specifies enable or disable.
 - **Maximum Window Size:** Specifies the size of the maximum window.
 - **Ethernet MTU Size:** Specifies the MTU size.
 - **Keep Alive Timer:** Specifies the keep alive timer.
 - **VLAN Tagging Mode:** Specifies enable or disable.
 - **iSNS Server:** Specifies enable or disable. If this option is selected to **Enable**, specify **IP Address** or **TCP Port Number**.
 - **CHAP User Name:** Specifies the CHAP user name.
 - **Secret and Re-enter Secret:** Specifies the secret which is used for host authentication.
6. Click **Finish**. A message appears, confirming whether to switch the LUN security. Clicking **OK** opens the **Confirm** window.
 7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Adding CHAP users

To perform this task, following roles are required:

- Storage Administrator (Provisioning) role
 - Security Administrator (View and Modify) role
1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Host Groups / iSCSI Targets** tab.
 For Storage Navigator:
 - To display all iSCSI targets in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab.
 - To display iSCSI targets related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **iSCSI Targets** tab on a port.
 2. Select the iSCSI target to register CHAP users.
 3. Display the **Add CHAP Users** window by performing one of the following:
 - Click **More Actions**, select **Add CHAP Users**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI, Authentication**, then **Add CHAP Users**.
 4. In the **Available CHAP Users** table, select the CHAP user row. Click **Add**.

The selected CHAP user registered in the **Selected CHAP Users** table.
If the CHAP user does not exist, perform following to register a new CHAP user:

- a. Click **Add New CHAP User** under the **Available CHAP Users** table.
The **Add New CHAP User** dialog box opens.
- b. Specify **User Name** and **Secret**.
- c. Click **OK** to close the **Add New CHAP User** dialog box.
5. Click **Finish** to display the **Confirm** window.
6. Confirm the settings and enter the task name in the **Task Name** box.
A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.
7. Click **Apply** in the **Confirm** window.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Editing CHAP users

To perform this task, following roles are required:

- Storage Administrator (Provisioning) role
 - Security Administrator (View and Modify) role
1. Perform one of the following to display the **CHAP Users** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Port / Host Groups / iSCSI Targets** window, click **Create Host Groups** tab.
For Storage Navigator:
 - To display all **CHAP** users in the storage system, in the **Storage Systems** tree, click the **Ports/Hosts Groups/ iSCSI Targets**, select the **CHAP Users** tab.
 - To display **CHAP** users related to each port, in the **Storage Systems** tree, expand the **Ports/Hosts Groups/ iSCSI Targets** node, select each port. Select the **CHAP Users** tab.
 - To display **CHAP** users related to each iSCSI target, in the **Storage Systems** tree, expand the **Ports/Hosts Groups/ iSCSI Targets** node, select each port and each iSCSI target. Select the **CHAP Users** tab.
 2. Select the **CHAP** user.
 3. Display the **Edit CHAP Users** window by performing one of the following:
 - Click **Edit CHAP Users**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI, Authentication**, then **Edit CHAP Users**.

4. Specify **User Name** and **Secret**.
5. Click **Finish** to display the **Confirm** window.
6. Confirm the settings and enter the task name in the **Task Name** box.
A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.
7. Click **Apply** in the **Confirm** window.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Removing CHAP users

To perform this task, following roles are required:

- Storage Administrator (Provisioning) role
 - Security Administrator (View and Modify) role
1. Perform one of the following to display the **CHAP Users** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Port / Host Groups / iSCSI Targets** window, click **Create Host Groups** tab.
 For Storage Navigator:
 - To display all **CHAP** users in the storage system, in the **Storage Systems** tree, click the **Ports/Hosts Groups/ iSCSI Targets**, select the **CHAP Users** tab.
 - To display **CHAP** users related to each port, in the **Storage Systems** tree, expand the **Ports/Hosts Groups/ iSCSI Targets** node, select each port. Select the **CHAP Users** tab.
 - To display **CHAP** users related to each iSCSI target, in the **Storage Systems** tree, expand the **Ports/Hosts Groups/ iSCSI Targets** node, select each port and each iSCSI target. Select the **CHAP Users** tab.
 2. Select the **CHAP** user.
 3. Display the **Remove CHAP Users** window by performing one of the following:
 - Click **Remove CHAP Users**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI, Authentication**, then **Remove CHAP Users**.
 4. Specify **User Name** and **Secret**.
 5. Click **Finish** to display the **Remove CHAP Users** window.
 6. Confirm the settings and enter the task name in the **Task Name** box.

A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.

7. Click **Apply** in the **Confirm** window.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Removing target CHAP users

To perform this task, following roles are required:

- Storage Administrator (Provisioning) role
- Security Administrator (View and Modify) role

1. Perform one of the following to display the tab.

For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. Select the **Host Groups / iSCSI Targets** tab.

For Storage Navigator:

- To display all iSCSI targets in the storage system, in the **Storage Systems** tree, click the **Ports/Hosts Groups/ iSCSI Targets**, select the **Host Groups / iSCSI Targets** tab.
- To display iSCSI targets related to each port, in the **Storage Systems** tree, expand the **Ports/Hosts Groups/ iSCSI Targets** node, select each port. Select the **iSCSI Targets** tab.

2. Select the iSCSI target.
3. Display the **Remove Target CHAP Users** window by performing one of the following:

- Click **More Actions, Remove Target CHAP Users**.
- From the **Actions** menu, select **Ports/Host Groups, iSCSI, Authentication**, then **Remove Target CHAP Users**.

4. Confirm the settings and enter the task name in the **Task Name** box.
A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.

5. Click **Apply** in the **Confirm** window.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Removing port CHAP users

To perform this task, following roles are required:

- Storage Administrator (Provisioning) role

- Security Administrator (View and Modify) role
1. Perform one of the following to display the **Ports** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. Select the **Ports** tab.
 For Storage Navigator:
 - In the **Storage Systems** tree, click **Ports/Hosts Groups/ iSCSI Targets**, select the **Host Groups / iSCSI Targets** tab.
 - In the **Storage Systems** tree, expand **Ports/Hosts Groups/ iSCSI Targets**, select the **Ports** tab.
 2. Select the port.
 3. Display the **Remove Port CHAP Users** window by performing one of the following:
 - Click **Remove Port CHAP Users**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI, Authentication**, then **Remove Port CHAP Users**.
 4. Confirm the settings and enter the task name in the **Task Name** box.
A task name can consist of up to 32 ASCII characters (letters, numerals, and symbols). Task names are case-sensitive. (date) - (task name) is input by default.
 5. Click **Apply** in the **Confirm** window.
If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Defining LU paths

The Storage Administrator (Provisioning) role is required to perform this task.

To define LU paths:

1. Perform one of the following to display the **Add LUN Paths** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Host Groups / iSCSI Targets** tab, click **Add LUN Paths**.
 For Storage Navigator:
 - On the **General Tasks** in Hitachi Device Manager - Storage Navigator, select **Add LUN Paths**.
 - In the **Storage Systems** tree, click **Ports / Hosts Groups / iSCSI targets**. On the **Host Groups / iSCSI Targets** tab, click the **Add LUN Paths**.

- In the **Storage Systems** tree, expand the **Ports / Hosts Groups / iSCSI Targets** node and select the port. On the **Host Groups / iSCSI Targets** tab, click the **Add LUN Paths**.
 - In the **Storage Systems** tree, expand the **Ports / Hosts Groups / iSCSI Targets** node and select each port and each iSCSI target. On the **LUN** tab, click the **Add LUN Paths**.
 - Expand the **Storage Systems** tree and select **Ports/Hosts Groups/iSCSI Targets**. Click **Actions > Logical Device > Add LUN Paths** to open the window.
2. Select the desired LDEVs from the **Available LDEVs** table, then click **Add**.
Selected LDEVs are listed in the **Selected LDEVs** table.
 3. Click **Next**.
 4. In **Selection Object**, click **iSCSI**.
 5. Select the desired iSCSI targets from the **Available iSCSI Targets** table, then click **Add**.
Selected iSCSI targets are listed in the **Selected iSCSI Targets** table. If you select a row and click **Detail**, the **iSCSI Target Properties** window appears.
 6. Click **Next**.
 7. Confirm the defined LU paths.
 - To change the LU path settings, click **Change LUN IDs** and type the LUN ID that you want to change.
 - To change the LDEV name, click **Change LDEV Settings**. In the **Change LDEV Settings** window, change the LDEV name.
 8. Click **Finish**.
 9. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Defining alternate LU paths

The Storage Administrator (Provisioning) role is required to perform this task.

You can want to define alternate LU paths so that if one LU path fails, you is able to switch to its alternate path.

To create an alternate LU path, copy the original LU path from one port to another. For example, To define an alternate for the LU path from the CL1-A port to logical volume 00:00:01, copy the LU path from the CL1-A port to another port.

Use one of these methods to copy LU paths:

- Copy all the LU paths defined in an iSCSI target
- Copy one or more (but not all) LU paths defined in an iSCSI target

Copying all LU paths defined in an iSCSI target

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. Select the **Host Groups / iSCSI Targets** tab.For Storage Navigator:
 - To display all iSCSI targets in the storage system, in the **Storage Systems** tree, click the **Ports/Hosts Groups/ iSCSI Targets**, select the **Host Groups / iSCSI Targets** tab.
 - To display iSCSI targets related to each port, in the **Storage Systems** tree, expand the **Ports/Hosts Groups/ iSCSI Targets** node, select each port. Select the **iSCSI Targets** tab.
2. Select the iSCSI target.
3. Display the **Create Alternative LUN** window by performing one of the following:
 - Click **More Actions** and select **Create Alternative LUN**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Create Alternative LUN Paths**.
4. In the **Create Alternative LUN Paths** window, select the copy destination port from the **Available Ports** table, then click **Add**.
The selected ports appear in the **Selected Ports** table.
5. Click **Finish**.
6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Copying one or more (but not all) LU paths defined in an iSCSI target

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.For Storage Navigator:
 - Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the port.
The iSCSI targets corresponding to the port appear.
3. Select the iSCSI target.
Information about the selected iSCSI target appears on the right side of the window.
4. Select the **LUNs** tab.

Information about LU paths associated with the selected iSCSI target appears.

5. Select one or more logical units to which volumes are assigned (if a volume is assigned to a logical unit, the columns on the right of the LUN column are not empty).
6. Display the **Copy LUN Paths** window by performing one of the following:
 - Click **Copy LUN Paths**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Copy LUN Paths**.
7. In the **Selection Object**, select **iSCSI Target**.
8. In the **Copy LUN Paths** window, select the iSCSI target to which you want to paste paths from the **Available iSCSI Targets** table, then click **Add**.

The selected iSCSI targets appear in the **Selected iSCSI Targets** table.
9. Click **Finish**.
10. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.

If **Go to tasks window for status** is checked, the **Tasks** window opens.

Managing hosts for iSCSI

Changing HBA iSCSI name or nickname of a host bus adapter

The Storage Administrator (Provisioning) role is required to perform this task.

In iSCSI environments, host bus adapters can be identified by HBA iSCSI names or nicknames.

1. Perform one of the following to display the **Hosts** tab.

For Hitachi Command Suite:

 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Hosts** tab.

For Storage Navigator:

 - To display all hosts in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Hosts** tab.
 - To display hosts related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Hosts** tab.
 - To display hosts related to each iSCSI target, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets** and the port. Select the iSCSI target, and select the **Hosts** tab.
2. Select the host bus adapter you want to change from the list of hosts.

3. Display the **Edit Host** window by performing one of the following:
 - Click **Edit Host**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Edit Host**.
4. To change the HBA iSCSI name, select the **HBA iSCSI Name** check box. Select **iqn** or **eui**, then type a new name in the text box.
To change the nickname, select the **Host Name** check box, then type a new nickname in **Host Name**.
5. If necessary, check **Apply same settings to the HBA iSCSI Name in all ports**.
If checked, new settings affect other ports. For example, if the same host bus adapter (the same iSCSI Name) is located below ports CL1-A and CL2-A in the tree, when you select the host bus adapter (or the iSCSI Name) from below one of the ports and change the nickname to hba1, the host bus adapter below the other port will also be renamed hba1. However, new settings will not affect any port if:
 - The resulting nickname is already used as the nickname of a host bus adapter connected to the port, or
 - The resulting iSCSI Name exists in the port.
6. Click **Finish**.
7. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Apply same settings to the HBA WWN in all ports** is checked, a dialog box opens listing the host bus adapter to be changed. Confirm the changes and click **OK**. Otherwise, click **Cancel**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.

Changing iSCSI target setting



Caution:

- Before changing the host mode of an iSCSI target, back up data on the port to which the iSCSI target belongs. Setting host mode should not be destructive, but data integrity cannot be guaranteed without a backup.
- When a secret is changed two times or more for the same iSCSI target successively, perform the next change after waiting for the completion of the task that has been applied. If the secret is changed without waiting for the completion of the task that has been applied, the user name which you expected to be changed can not be incorporated.

To perform this task, following roles are required:

- Storage Administrator (Provisioning) role
 - Security Administrator (View and Modify) role
1. Perform one of the following to display the tab.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Host Groups / iSCSI Targets** tab.

For Storage Navigator:

- To display all iSCSI targets in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab.
 - To display iSCSI targets related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **iSCSI Targets** tab.
 - To display each iSCSI target, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets** and the port. Select the iSCSI target, and select the **Host Mode Options** tab.
- Display the **Edit iSCSI Targets** window by performing one of the following:
 - Click **Edit iSCSI Targets**.
 - Click **More Actions**, then select **Edit iSCSI Targets**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Edit iSCSI Targets**.
 - In the **Edit iSCSI Targets** window, select **ON** and specify the values. The following setting items can be modified.
 - iSCSI Target Alias**: Specifies the alias of the iSCSI target,
 - iSCSI Target Name**: Selects the format from **iqn** or **eui**, and specifies the name of the iSCSI target.
 - Host Mode**: Selects the host mode and the host mode option. For detailed information about host mode options, see [Host mode options on page 7-14](#).
 - Authentication Method**: Selects the CHAP authentication mode from **Comply with Host Setting**, **CHAP**, or **None**.
 - Mutual CHAP**: Selects **Enable** or **Disable**. If **Enable** is selected, the mutual authentication mode is performed. If **Disable** is selected, the unidirectional authentication mode is performed.
 - User Name**: Specifies the user name. You can use case-sensitive alphanumeric characters, spaces, and the following symbols: . - + @ _ = : [] , ~
 - Secret**: Specifies the password. You can use alphanumeric characters, spaces, and the following symbols in a secret: . - + @ _ = : [] ~
 - Click **Finish**.
 - In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**. If **Go to tasks window for status** is checked, the **Tasks** window opens.

Remove hosts from iSCSI targets

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the **Hosts** tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Hosts** tab.For Storage Navigator:
 - To display all hosts in the storage system, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the **Hosts** tab.
 - To display hosts related to each port, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**. Select the port in the tree, and select the **Hosts** tab.
 - To display hosts related to each iSCSI target, expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets** and the port. Select the iSCSI target, and select the **Hosts** tab.
2. Select hosts in the **Hosts** tab.
3. Display the **Remove Hosts** window by performing one of the following:
 - Click **Remove Hosts**.
 - Click **Remove Hosts (iSCSI)**.
 - Click **More Actions**, then select **Remove Hosts(iSCSI)**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Remove Hosts**.
4. Click **Finish**.
5. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
A message appears asking whether to delete it.
If **Go to tasks window for status** is checked, the **Tasks** window opens.
6. Click **OK** to close a message.

Deleting login iSCSI names

The Storage Administrator (Provisioning) role is required to perform this task.

If you disconnect a host that has been connected through a cable to your storage system, the iSCSI name for the host will remain in the **Login WWNs/iSCSI Names** tab. Use the **Delete Login WWNs** window to delete from the **Login WWNs/iSCSI Names** tab. A login iSCSI name for a host that is no longer connected to your storage system.

1. Perform one of the following to display the **Ports / Host Groups / iSCSI Targets** window.
For Hitachi Command Suite:

- On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**.
- For Storage Navigator:
- Expand the **Storage Systems** tree and select **Ports / Hosts Groups / iSCSI Targets**.
2. Select the **Login WWNs/iSCSI Names** tab.
To confirm the statuses of iSCSI names, click **View Login iSCSI Name Statuses** window.
 3. Select the iSCSI names you want to delete.
 4. Display the **Delete Login iSCSI Names** window by performing one of the following:
 - Click **Delete Login iSCSI Names**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Delete Login iSCSI Names**.
 5. In the **Delete Login iSCSI Names** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
A message appears asking whether to delete it.
If **Go to tasks window for status** is checked, the **Tasks** window opens.
 6. Click **OK** to close a message.

Deleting iSCSI targets

The Storage Administrator (Provisioning) role is required to perform this task.



Caution: This task cannot be performed if corresponding with following:

- Host I/O processing is being performed.
- Hosts are not reserved (mounted) in the iSCSI target.

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. Select the **Host Groups / iSCSI Targets** tab.
 For Storage Navigator:
 - To display all iSCSI targets in the storage system, in the **Storage Systems** tree, expand the **Ports / Host Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab
 - To display iSCSI targets related to each port, in the **Storage Systems** tree, expand the **Ports / Host Groups / iSCSI Targets** and select the port. Select the **iSCSI Targets** tab
2. Select the iSCSI target that you want to delete.
3. Display the **Delete iSCSI Targets** window by performing one of the following:

- Click **More Actions**, then select **Delete iSCSI Targets**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Delete iSCSI Targets**.
- 4. In the **Delete iSCSI Targets** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.
- 5. Click **OK** to close a message.

Adding a host to the selected iSCSI target

The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform one of the following to display the tab.
For Hitachi Command Suite:
 - On the **Resource** tab, expand the **Storage Systems** tree. On the target storage system, click **Port / Host Group**. On the **Ports / Host Groups / iSCSI Targets** window, select the **Host Groups / iSCSI Targets** tab.
 For Storage Navigator:
 - To display all iSCSI targets in the storage system, in the **Storage Systems** tree, expand the **Ports / Host Groups / iSCSI Targets**. Select the **Host Groups / iSCSI Targets** tab
 - To display iSCSI targets related to each port, in the **Storage Systems** tree, expand the **Ports / Host Groups / iSCSI Targets** and select the port. Select the **iSCSI Targets** tab
 - To display each iSCSI target, in the **Storage Systems** tree, expand the **Ports / Host Groups / iSCSI Targets**. Select the port and the iSCSI target. Select the **Host** tab.
2. Select the iSCSI target to which the host is added. If the **Host** tab is selected, go to the next step.
3. Display the **Add Hosts** window by performing one of the following:
 - Click **Add Hosts**.
 - From the **Actions** menu, select **Ports/Host Groups, iSCSI**, then **Add Hosts**.
4. Select the desired host from the **Available Hosts** table, then click **Add**.
Selected iSCSI targets are listed in the **Selected Hosts** table.
If the desired host has never been connected with a cable to any port in the storage system, perform the following steps:
 - a. Click **Add New Host** under the **Available Hosts** list.
The **Add New Host** dialog box opens.
 - b. Select the format from **iqn** or **eui**. Enter the desired name in the **HBA iSCSI Name** box.

- c. If necessary, enter a nickname for the host bus adapter in the **Host Name** box.
- d. Click **OK** to close the **Add New Host** dialog box.
- e. Select the desired host bus adapter from the **Available Hosts** list.
5. Click **Finish**.
The **Confirm** window appears.
6. In the **Confirm** window, confirm the settings, in **Task Name** type a unique name for this task or accept the default, then click **Apply**.
If **Go to tasks window for status** is checked, the **Tasks** window opens.
7. Click **OK** to close a message.

Confirming communication status

Confirm the status of The Storage Administrator (Provisioning) role is required to perform this task.

1. Perform following to display the **Test Communication Statuses** window.
For Storage Navigator:
 - o Click **Actions** > **Ports/Host Groups** > **iSCSI** then > **Authentication** to open the **Test Communication Statuses** window.
2. Select the port ID from **Local Port ID (From)**.
3. In **IP Address (To)**, select **IPv4** or **IPv6** then specify the IP address.
4. Click **Test**.
5. In the **Communication Statuses** table, confirm the result.
6. Click **Close**.

Configuring VASA integrated storage systems

Storage systems can be integrated with an ESXi host or vCenter Server by Hitachi Storage Provider for VMware vCenter which is called the VASA provider. Snapshot or replication functions are used in these storage systems that are configured with the following procedures.

- ☐ [Creating LDEVs of ALU attribution](#)
- ☐ [Viewing LDEVs of ALUs or SLU attribution](#)
- ☐ [Unbinding LDEVs of SLUs attribution](#)

Creating LDEVs of ALU attribution



Caution: Do not use Storage Navigator or CCI to operate LDEVs with a SLU or ALU attribute. If you must operate LDEVs with SLU or ALU attributes, contact Hitachi Data Systems customer support. In accordance with instructions from HDS, if you use Storage Navigator or CCI to perform a configuration change operation for LDEVs with SLU or ALU attribute, shut down associated virtual machines in advance. If the virtual machine is shut down, LDEVs with SLU or ALU attributes related to the virtual machine are automatically unbound. If virtual machines cannot be shut down, use Storage Navigator to unbind LDEVs with an SLU attribute from LDEVs with an ALU attribute associated with the virtual machines before performing the configuration change operation. For more information about the unbinding of LDEVs of the SLU attribution, see [Unbinding LDEVs of SLUs attribution on page 8-4](#). Contact the storage administrator if you performed the configuration change operation without shutting down the virtual machines or unbinding of LDEVs with SLU attributes.

Use this procedure to create LDEVs of ALU attribution.

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.

Procedure

1. Open the **Logical Devices** window.
In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.
 - b. Expand the target storage system, right-click **Parity Groups**, select **System GUI**, and then click **Create LDEVs**.In Device Manager - Storage Navigator: Click **Actions** > **Logical Device** > **Create LDEVs**.
2. In the **Create LDEVs** window, from the **Provisioning Type** list, select an **ALU**.
3. In **Number of LDEVs**, type the number of LDEVs to be created.
4. In **LDEV Name**, specify a name for this LDEV.
 - a. In **Prefix**, type the characters that will become the fixed characters for the beginning of the LDEV name. The characters are case-sensitive.
 - b. In **Initial Number**, type the initial number that will follow the prefix name.
5. Click **Options** to show more options.
6. In **Initial LDEV ID**, make sure that an LDEV ID is set. To confirm the used number and unavailable number, click **View LDEV IDs** to open the **View LDEV IDs** window.

- a. In **Initial LDEV ID** in the **Create LDEVs** window, click **View LDEV IDs**.

In the **View LDEV IDs** window, the matrix vertical scale represents the second-to-last digit of the LDEV number, and the horizontal scale represents the last digit of the LDEV number. The **LDEV IDs** table shows the available, used, and disabled LDEV IDs.

In the table, used LDEV numbers appear in blue, unavailable numbers appear in gray, and unused numbers appear in white. LDEV numbers that are unavailable may be already in use, or already assigned to another emulation group (group by 32 LDEV numbers).



Note: When a mainframe volume or multi-platform volume is created, corresponding LDEV numbers cannot be specified if these values are not identical: - model/serial numbers of the virtual storage machine and the storage system - LDEV ID and the virtual LDEV ID.

- b. Click **Close**.

7. In the **Virtual Partition Manager** list, select **CLPR**.

8. From the **MP Unit** list, select an MP unit to be used by the LDEVs.

- If you assign a specific MP unit, select the ID of the MP unit.
- If you can assign any MP unit, click **Auto**.

9. Click **Add**.

The created LDEVs are added to the **Selected LDEVs** table.

The **Provisioning Type** and **Number of LDEVs** must be set. If these required items are not registered, you cannot click **Add**.

10. If necessary, change the following LDEV setting:

- Click **Change LDEV Settings** to open the **Change LDEV Settings** window. For details about how to change the LDEV settings, see [Changing LDEV settings on page 4-22](#).

11. If necessary, delete an LDEV from the **Selected LDEVs** table.

Select an LDEV to delete, and then click **Remove**. For details about how to remove an LDEV, see [Removing an LDEV to be registered on page 4-23](#).

12. Click **Finish**.

The **Confirm** window opens.

To continue the operation for setting the LU path and defining a logical unit, click **Next**. For details about how to set the LU path, see [Defining LU paths on page 7-21](#).

13. In the **Task Name** text box, type a unique name for the task or accept the default.

You can enter up to 32 ASCII characters and symbols, with the exception of: \ / : , ; * ? " < > |. The value "date-window name" is entered by default.

14. Click **Apply**.

If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Viewing LDEVs of ALUs or SLU attribution

Use this procedure to view the ALUs or SLUs of the storage system. The procedure can be performed on an ESXi host or vCenter Server as well.

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.

1. Open the Logical Devices window.
In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.
 - b. Expand the target storage system, right-click **Volumes**, and then select **System GUI**.In Device Manager - Storage Navigator:
 - a. Click **Storage Systems** and expand the **Storage Systems** tree.
 - b. Select **Logical Devices**.
2. In the **LDEVs** pane, click **More Actions** > **View ALUs/SLUs**.

Unbinding LDEVs of SLUs attribution

Use this procedure to unbind SLUs from ALUs. The procedure can be performed on an ESXi host or vCenter Server as well.

Prerequisites

The Storage Administrator (Provisioning) role is required to perform this task.

Procedure

1. Open the **Logical Devices** window.
In Hitachi Command Suite:
 - a. On the **Resources** tab, click **Storage Systems**, and then expand **All Storage Systems**.
 - b. Expand the target storage system, right-click **Volumes**, and then select **System GUI**.In Device Manager - Storage Navigator:
 - a. Click **Storage Systems** and expand the **Storage Systems** tree.
 - b. Select **Logical Devices**.
2. In the **LDEVs** pane, select **LDEV IDs** of the **ALU** provisioning type.
3. Click **More Actions** > **Unbind SLUs**.
4. If the **Go to tasks window for status** check box is selected, the **Tasks** window appears.

Troubleshooting

The information in this chapter can help you troubleshoot problems when provisioning a storage system.

If a failure occurs and a message appears, see the *Hitachi Device Manager - Storage Navigator Messages* for further instructions.

- ☐ [Troubleshooting Virtual LUN](#)
- ☐ [Troubleshooting Dynamic Provisioning](#)
- ☐ [Troubleshooting Data Retention Utility](#)
- ☐ [Troubleshooting provisioning while using Command Control Interface](#)
- ☐ [Calling the Hitachi Data Systems customer support](#)

Troubleshooting Virtual LUN

If a failure occurs while you are operating, see the *Hitachi Device Manager - Storage Navigator Messages*.

Troubleshooting Dynamic Provisioning

The following table provides troubleshooting instructions for Dynamic Provisioning.

Problems	Causes and Solutions
Pool usage level exceeds the threshold.	Causes: • Too many DP-VOLs are associated with a pool, or too much data is stored in a pool. • Capacity of the pool is insufficient. • The threshold of the pool is too low. Solutions: • Add some pool-VOLs to increase the capacity of the pool. See Increasing pool capacity on page 5-114. • Perform the operation to reclaim zero pages in order to release pages in which zero data are stored. See Releasing pages in a DP-VOL on page 5-125. • Set a larger value to the threshold of the pool. See Changing pool thresholds on page 5-110. Caution: You need free volumes to add as pool-VOLs. If there are no free volumes, create new volumes or ask the Hitachi Data Systems customer support to add drives. Therefore, it can take time to solve the problem.
Cannot create a DP-VOL.	Causes: • Usage of the pool has reached to 100%. • Something in the storage system is blocked. • The available capacity of DP-VOL is restricted due to the value of Subscription-Limit set for the pool. Solutions: • Add some pool-VOLs to the pool. See Increasing pool capacity on page 5-114. • Perform the operation to reclaim zero pages in order to release pages in which zero data are stored. See Releasing pages in a DP-VOL on page 5-125. • Adjust the value of Subscription Limit for the pool. See Changing the pool subscription limit on page 5-110. • Ask the Hitachi Data Systems customer support to solve the problem.

Problems	Causes and Solutions
Cannot add a pool-VOL.	Causes: 1,024 pool-VOLs are already defined in the pool. - The pool-VOL does not fill the requirements for a pool-VOL. - Something in the storage system is blocked. Solution: - Change the setting of the LDEV to satisfy the requirement of the Pool-VOL. See Pool-VOL requirements on page 5-5.
A pool-VOL is blocked. SIM code 627xxx is reported.	Causes: - A failure occurred in data drives greater than the parity group redundancy. The redundancy of the parity group depends on the number of the blocked PDEVs (data drives). For example: - When the parity group configuration is 3D +1P and failures occur in two or more drives, the failures are considered to have occurred in data drives beyond the parity group redundancy. - When the parity group configuration is 6D +2P and failures occur in three or more drives, the failures are considered to have occurred in data drives beyond the parity group redundancy. Solutions: - Ask the Hitachi Data Systems customer support to solve the problem.
A pool is blocked.	Solutions: Ask the Hitachi Data Systems customer support to solve the problem.
A pool cannot be restored.	Causes: - Processing takes time, because something in the storage system is blocked. - Usage of the pool has reached to 100%. Solutions: - Add some pool-VOLs to the pool to increase the capacity of the pool. See Increasing pool capacity on page 5-114. - Perform the operation to reclaim zero pages in order to release pages in which zero data are stored. See Releasing pages in a DP-VOL on page 5-125. - Ask the Hitachi Data Systems customer support to solve the problem.
A pool cannot be deleted.	Causes: The pool usage is not 0.

Problems	Causes and Solutions
	- External volumes are removed from the pool before you delete the pool. - DP-VOLs have not been deleted. Solutions: - Confirm that the pool usage is 0 after the DP-VOLs are deleted, then you can delete the pool. - Ask the Hitachi Data Systems customer support to solve the problem.
A failure occurs to the application for monitoring the volumes installed in a host.	Causes: - Free space of the pool is insufficient. - Some areas in the storage system are blocked. Solutions: - Check the free space of the pool and increase the capacity of the pool. See Increasing pool capacity on page 5-114). - Perform the operation to reclaim zero pages in order to release pages in which zero data are stored. See Releasing pages in a DP-VOL on page 5-125. - Ask the Hitachi Data Systems customer support to solve the problem.
When the host computer tries to access the port, error occurs and the host cannot access the port.	Causes: - Free space of the pool is insufficient. - Some areas in the storage system are blocked. Solutions: - Check the free space of the pool and increase the capacity of the pool. See Increasing pool capacity on page 5-114. - Perform the operation to reclaim zero pages in order to release pages in which zero data are stored. See Releasing pages in a DP-VOL on page 5-125. - Ask the Hitachi Data Systems customer support to solve the problem.
When you are operating Hitachi Device Manager - Storage Navigator, a timeout occurs frequently.	Causes: - The load on the management client is too heavy, so that it cannot respond to SVP. - The period of time until when time-out occurs is set too short. Solutions: - Wait for a while, then try the operation again.
DP-VOL capacity cannot be increased.	See Troubleshooting provisioning while using Command Control Interface on page 9-8 and identify the cause. Solutions: After refreshing the display, confirm whether the processing for increasing DP-VOL capacity meets

Problems	Causes and Solutions
	conditions described in Requirements for increasing DP-VOL capacity on page 5-8. • Retry the operation after 10 minutes or so. • Ask the Hitachi Data Systems customer support to solve the problem.
Cannot reclaim zero pages in a DP-VOL.	Causes: • Zero pages in the DP-VOL cannot be reclaimed because the DP-VOL does not meet conditions for releasing pages in a DP-VOL. Solutions: • Make sure that the DP-VOL meets the conditions described in Reclaiming zero pages in a DP-VOL on page 5-126.
The DP-VOL cannot be released if the process to reclaim zero pages in the DP-VOL is interrupted.	Causes: • Pages of the DP-VOL are not released because the process of reclaiming zero pages was interrupted. Solutions: • Make sure that the DP-VOL meets the conditions described in Reclaiming zero pages in a DP-VOL on page 5-126.
Cannot release the Protect attribute of the DP-VOLs. SIM code 628000 was issued.	Causes: • The pool is full. • The pool-VOL is blocked. • The pool-VOL that is an external volume is blocked. Solutions: • Add pool-VOLs to the pool to increase the free space in the pool. See Increasing pool capacity on page 5-114. • Perform the reclaiming zero pages operation to release pages in which zero data are stored. See Reclaiming zero pages in a DP-VOL on page 5-126. • Contact the Hitachi Data Systems customer support to restore the pool-VOL. • If the blocked pool-VOL is an external volume, verify the status of the path blockade and the external storage system. • After performing above solutions, release the Protect attribute (Data Retention Utility) of the DP-VOLs. For information about Data Retention Utility, see relevant chapters in this user guide.
SIM code such as 620xxx, 625000 or 626xxx was issued.	Causes: • Pool usage level exceeds the threshold. Solutions:

Problems	Causes and Solutions
	- Add pool-VOLs to the pool to increase the free space in the pool. See Increasing pool capacity on page 5-114. - Perform the operation to reclaim zero pages in order to release pages in which zero data are stored. See Releasing pages in a DP-VOL on page 5-125.
SIM code 622xxx was issued.	Causes: - Usage of the pool has reached 100%. Solutions: - Add pool-VOLs to the pool to increase the free space in the pool. See Increasing pool capacity on page 5-114. - Perform the operation to reclaim zero pages in order to release pages in which zero data are stored. See Releasing pages in a DP-VOL on page 5-125. The Protect attribute of Data Retention Utility can have been set to DP-VOLs. After performing above solutions, release the Protect attribute of the DP-VOLs.
SIM code 624000 was issued.	Causes: - The pools and DP-VOLs configuration, of which the size is more than the supported capacity, is created. Solutions: - Remove pools that are not used. - Remove DP-VOLs that are not used. - Remove Thin Image pairs that are not used. - Shrink pools capacities.
Formatted pool capacity displayed in the View Pool Management Status window does not increase.	Causes: - Another pool is being formatted. - The pool usage level reaches up to the threshold. - The pool is blocked. - I/O loads to the storage system are high. - The cache memory is blocked. - Pool-VOLs are blocked. - Pool-VOLs which are external volumes are blocked. Solutions: - Confirm the display again after waiting for a while. - Add pool-VOLs to the pool to increase the free space in the pool. For more information, see Increasing pool capacity on page 5-114. - Perform the operation to reclaim zero pages in order to release pages in which zero data are

Problems	Causes and Solutions
	stored. See Releasing pages in a DP-VOL on page 5-125. • Confirm the display again after decreasing I/O loads of the storage system. • Contact the Hitachi Data Systems customer support to restore the cache memory. • Contact the Hitachi Data Systems customer support to restore the pool-VOL. • If the blocked pool-VOL is an external volume, confirm following: ◦ Path blockage ◦ Status of the storage system

If you are unable to solve a problem using the above suggestions, or if you encounter a problem not listed, please contact the Hitachi Data Systems customer support.

If an error occurs during the operations, the error code and error message appear in the error message dialog box. For more information about error messages, see *Hitachi Device Manager - Storage Navigator Messages*.

Troubleshooting Data Retention Utility

If an error occurs with Data Retention Utility, the [Error Detail Dialog Box on page E-4](#) dialog box appears. The Error Detail dialog box displays error locations and error messages.

The Error Detail dialog box does not display Hitachi Device Manager - Storage Navigator error messages. To find information about Hitachi Device Manager - Storage Navigator errors and solutions, see the *Hitachi Device Manager - Storage Navigator Messages*.

Data Retention Utility troubleshooting instructions

The following table provides troubleshooting instructions for Data Retention Utility.

Problems	Probable Causes and Solutions
The Disable/ Enable or the Enable/Disable button on the Data Retention window is unavailable. Nothing happens when you click the button.	You have been making changes in the Data Retention window, but the changes have not been applied to the storage system. Apply the changes first, then perform the extension lock operation. You can find the changes by: • scrolling the current list up and down. • selecting another CU from the tree then scrolling the list up and down.

Problems	Probable Causes and Solutions
Open-systems hosts cannot read from or write to a volume.	- The volume is protected by the read-only attribute. Write failure is reported as an error message. - The volume is protected by the Protect attribute. Read (or write) failure is reported as an error message.
The number of days in the Retention Term does not decrease	The number of days in the Retention Term is calculated based on the operating time of the storage system. Therefore, the number of days in the Retention Term can not decrease.

Troubleshooting provisioning while using Command Control Interface

If an error occurs while operating Data Retention Utility or Dynamic Provisioning while using CCI, you might identify the cause of the error by referring to the log appearing on the CCI window or the CCI operation log file.

The CCI operation log file is stored in the following directory.

/HORCM/log*/curlog/horcmlog_HOST/horcm.log

where

- * is the instance number.
- HOST is the host name.

The following is an example of a log entry in the CCI window.

It was rejected due to SKEY=0x05, ASC=0x20,SSB=0xB9E1,0xB901 on Serial#(64015) ↓ SSB1 ↓ SSB2

Errors when operating CCI (Dynamic Provisioning, SSB1: 0x2e31/0xb96d)

Error Code (SSB2)	Error Contents	Solutions
0x2c3a	The operation was rejected because the specified volume was being enabled for the attribute of the data direct mapping.	Specify the volume in which the data direct mapping attribute is disabled.
0x9100	The command cannot be executed because user authentication is not performed.	Perform user authentication.
0xb900/ 0xb901/ 0xaf28	Error occurred when increasing DP-VOL capacity operation.	Ask the Hitachi Data Systems customer support to solve the problem.

Error Code (SSB2)	Error Contents	Solutions
0xb902	The operation was rejected because the configuration was being changed by SVP or Hitachi Device Manager - Storage Navigator, or because the DP-VOL capacity was going to be increased by another instance of the CCI.	Increase the DP-VOL capacity after finishing operations on your storage system, such as the Virtual LUN operation or a maintenance operation. See Caution in Requirements for increasing DP-VOL capacity on page 5-8 .
0xaf22	The operation was rejected because the specified volume is placed online with the OS which does not support EAV (Extended Address Volume).	Increase the DP-VOL capacity after the specified volume is placed online with the OS which supports EAV.
0xaf24	The operation was rejected because the total DP-VOL capacity exceeded the pool reservation rate after the capacity was increased.	Specify a capacity so that the pool reservation rate will not be exceeded.
0xaf25	The operation to increase capacity cannot be performed on the specified DP-VOL.	Check the emulation type of the specified DP-VOL.
0xaf26	The operation was rejected because of a lack of cache management devices due to increased capacity.	Specify a capacity so that the maximum number of cache management devices will not be exceeded.
0xaf29	The operation was rejected because the specified volume was not a DP-VOL.	Makes sure that the volume is a DP-VOL.
0xaf2a	The operation was rejected because the specified capacities are invalid or exceeded the value immediately below LDEV Capacity in the Expand Virtual Volumes window.	To increase capacity, specify the correct capacity that does not exceed the value immediately below LDEV Capacity in the Expand Virtual Volumes window. See the conditions for increasing DP-VOL capacity in Requirements for increasing DP-VOL capacity on page 5-8 .
0xaf2b	The operation was rejected because the specified volume operation was not finished.	Re-execute the operation after a brief interval.
0xaf2c	The operation was rejected because the control memory capacity is not enough to increase the specified capacity.	Confirm the value immediately below LDEV Capacity in the Expand Virtual Volumes window.
0xaf2e	The operation was rejected because the specified DP-VOL was used by other software or was being formatted.	Wait until formatting of the specified volume is finished, or see Using Dynamic Provisioning, Dynamic Tiering, or active flash with other VSP G200, G400, G600, G800 or VSP F400, F600, F800 products on page 5-11 and confirm whether the DP-VOL is used with

Error Code (SSB2)	Error Contents	Solutions
		software in which that the DP-VOL capacity cannot be increased.
0xaf2f	The specified DP-VOL capacity cannot be expanded because the configuration of journal volumes is being changed.	Re-execute the operation after the journal volume configuration is changed.
0x0b2b	The operation was rejected because the <code>raidcom extend ldev</code> command was executed with specifying the <code>-cylinder</code> option to the DP-VOL for the open-system.	Re-execute the <code>raidcom extend ldev</code> command without specifying the <code>-cylinder</code> option.

Errors when operating CCI (Data Retention Utility, SSB1:2E31/B9BF/B9BD)

Error Code (SSB2)	Description
9100	The command cannot be executed because user authentication is not performed.
B9BD	The setting failed because the specified volume does not exist.
B9C2	The specified volume is a command device.
B9C4	The command was rejected due to one of the following reasons: - The specified volume is a virtual volume. - The specified volume is a pool volume. - The specified volume is an secondary volume of Universal Replicator. - The specified volume is a journal volume. - The specified volume is a primary volume or secondary volume of ShadowImage. - The consumed capacity exceeded the licensed capacity. - The access attribute cannot be changed because the data retention term is set. - The specified volume is a command device. - The specified volume is in the PAIR or COPY status. - The specified volume does not exist. - The S-VOL Disable attribute is set to the specified volume. - The reserve function cannot be canceled using CCI. - The specified volume is a quorum disk for global-active device, so that the requested setting of Data Retention Utility cannot be performed.
B9C7	Data Retention Utility is not installed.
B9C9	The consumed capacity exceeded the licensed capacity.

Error Code (SSB2)	Description
B9CA	The command was rejected due to one of the following reasons: - Fewer days are set as the data retention term. - More than 60 years are set as the data retention term. - An interface other than Java updated the settings while Data Retention Utility was in the process of changing them. A conflict occurred between Java and the other interface.
B9CB	The retention term cannot be set because the access attribute is read/write.

Calling the Hitachi Data Systems customer support

If you need to call the Hitachi Data Systems customer support, make sure you can provide as much information about the problem as possible, including the following:

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

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

CCI command reference

This appendix provides information on Hitachi Device Manager - Storage Navigator tasks and corresponding Command Control Interface commands used in provisioning.

- [Hitachi Device Manager - Storage Navigator tasks and CCI command list](#)

Hitachi Device Manager - Storage Navigator tasks and CCI command list

The following lists actions (tasks) that can be performed in the Hitachi Device Manager - Storage Navigator GUI, and the corresponding commands that can be issued in CCI.

Item	Action name	CCI command
Logical Device	Create LDEVs	raidcom add ldev
	Delete LDEVs	raidcom delete ldev
	Edit LDEVs	raidcom modify ldev
	Format LDEVs	raidcom initialize ldev
	Block LDEVs	raidcom modify ldev
	Restore LDEVs	raidcom modify ldev
	Assign MP Unit	raidcom modify ldev
	Add LUN Paths	raidcom add lun
	Delete LUN Paths	raidcom delete lun
	Expand V-VOLs	raidcom extend ldev
	Reclaim Zero Pages	raidcom modify ldev
	Shredding	raidcom initialize ldev
Port/Host Group/ iSCSI Target (Fibre Channel)	Create Host Groups	raidcom add host_grp
	Delete Host Groups	raidcom delete host_grp
	Edit Host Groups	raidcom modify host_grp
	Add Hosts	raidcom add hba_wwn
	Add to Host Groups	raidcom add hba_wwn
	Remove Hosts	raidcom delete hba_wwn
	Edit Host	raidcom add hba_wwn
	Create Alternate LUN Paths	raidcom add lun
	Edit Ports	raidcom modify port
Port/Host Group/ iSCSI (iSCSI)	Create iSCSI Targets	raidcom add host_grp
	Delete iSCSI Targets	raidcom delete host_grp
	Edit iSCSI Targets	raidcom modify host_grp
	Add Hosts	raidcom add hba_iscsi
	Remove Hosts	raidcom delete hba_iscsi
	Edit Host	raidcom set hba_iscsi
	Add CHAP Users	raidcom add chap_user
	Remove CHAP Users	raidcom delete chap_user

Item	Action name	CCI command
	Edit CHAP User	raidcom set chap_user
	Create Alternate LUN Paths	raidcom add lun
	Edit Ports	raidcom modify port
Pool	Create Pools	raidcom add dp_pool
	Expand Pool	raidcom add dp_pool
	Shrink pools	raidcom delete pool
	Delete Pools	raidcom delete pool
	Edit Pools	raidcom modify pool
	Monitor Pools	raidcom monitor pool
	Stop Monitoring Pools	raidcom monitor pool
	Start Tier Relocation	raidcom reallocate pool
	Stop Tier Relocation	raidcom reallocate pool
	Restore Pools	raidcom modify pool
	View Tier Properties	raidcom get dp_pool
External Storage	Disconnect External Volumes	raidcom disconnect external_grp
	Reconnect External Volumes	raidcom check_ext_storage

Resource Partition Manager GUI reference

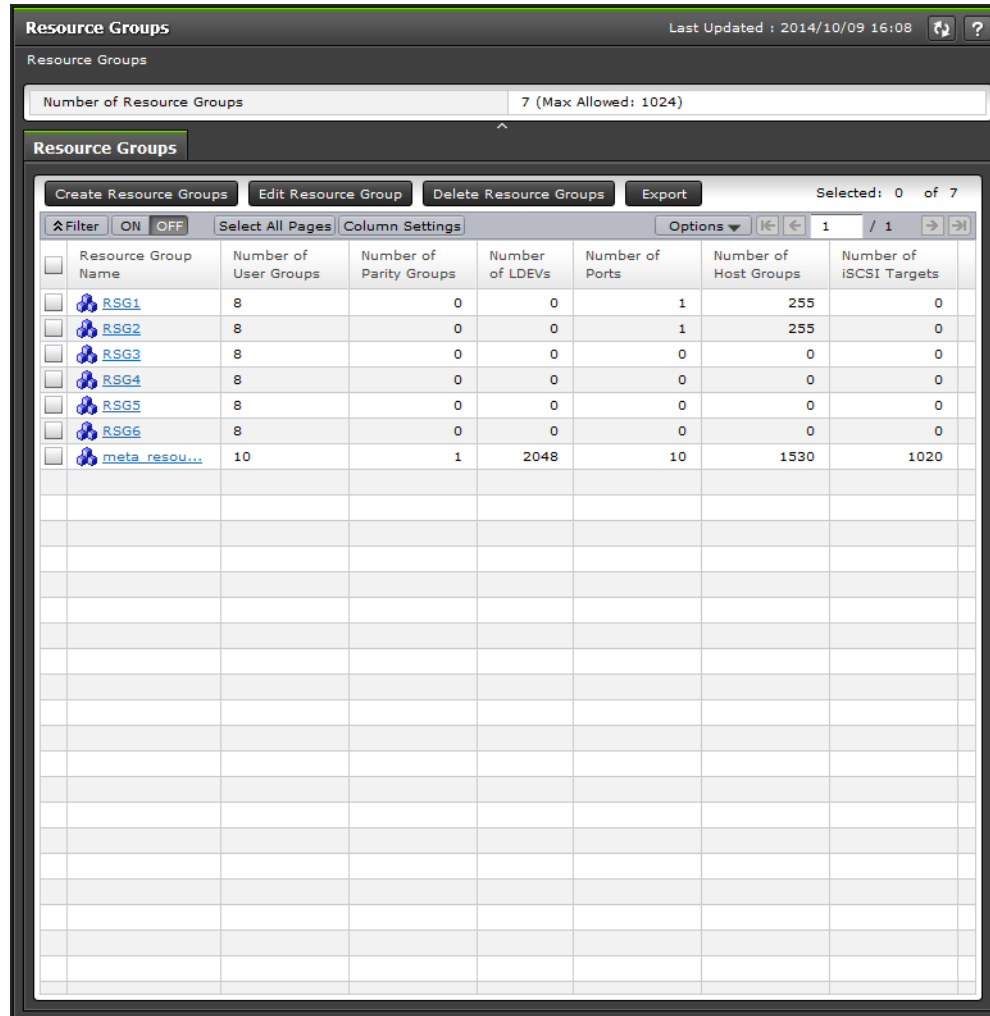
This appendix describes windows, wizards, and dialog boxes of Resource Partition Manager used when configuring resource groups.

- ☐ [Resource Group window](#)
- ☐ [Selected resource group window](#)
- ☐ [Create Resource Groups wizard](#)
- ☐ [Edit Resource Group wizard](#)
- ☐ [Add Resources wizard](#)
- ☐ [Remove Resources window](#)
- ☐ [Delete Resource Groups window](#)
- ☐ [Resource Group Properties window](#)
- ☐ [Edit Virtualization Management Settings wizard](#)

Resource Group window

Use this window to create or delete resource groups, and to view, edit, or export information about resource groups. You must have correct user permissions to perform tasks on resource groups.

- [Summary and buttons on page B-2](#)
- [Resource Groups tab on page B-3](#)



Summary and buttons

Item	Description
Number of Resource Groups	The number of resource groups configured in your storage system. The maximum allowed is 1024.
Create Resource Groups	Opens the Create Resource Group window where you can create one or more new resource groups. The results will appear in this window.
Edit Resource Group	Opens the Edit Resource Group window where you can edit the name of a selected resource group.

Item	Description
Delete Resource Groups	Opens the Delete Resource Groups window where you can delete one or more resource groups selected in this window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as for backup or reporting.

Resource Groups tab

Item	Description
Resource Group Name	Name of a resource group.
Resource Group ID*	Identifier of a resource group.
Number of User Groups	Number of user groups where the resource group is assigned.
Number of Parity Groups	Number of parity groups that are assigned to the resource group.
Number of LDEVs	Number of LDEVs that are assigned to the resource group.
Number of Ports	Number of ports that are assigned to the resource group.
Number of Host Groups	Number of host groups that are assigned to the resource group.
Number of iSCSI Targets	Number of iSCSI targets that are assigned to the resource group.
Virtual Storage Machine*	Model name and serial number of the virtual storage machine assigned to the resource group.
* This item does not appear in the window by default. To display this item, change the Column Settings window.	

Selected resource group window

This window opens when you select a resource group in the Resource Groups window. It provides information about parity groups, LDEVs, ports, and host groups in the selected resource group.

- [Summary on page B-4](#)
- [Parity Groups tab on page B-4](#)
- [LDEVs tab on page B-5](#)
- [Ports tab on page B-7](#)
- [Host Groups / iSCSI Targets tab on page B-8](#)

Summary

Item	Description
Number of Parity Groups	Number of parity groups that are assigned to the resource group.
Number of LDEVs	Number of LDEVs that are assigned to the resource group.
Number of Ports	Number of ports that are assigned to the resource group.
Number of Host Groups	Number of host groups that are assigned to the resource group.
Number of iSCSI Targets	Number of iSCSI targets that are assigned to the resource group.
Virtual Storage Machine	Model name and serial number of the virtual storage machine assigned to the resource group.

Parity Groups tab

[illegible]

Item	Description
Parity Group ID	Identifiers of parity groups that are already defined.
Capacity	Capacity of each parity group.

Item	Description
	Basic: Internal volume DP: DP-VOL External: External volume External MF: Migration volume Snapshot: Thin Image volume ALU: LDEV of the ALU attribution
Attribute	Attribute of the volume indicating how the LDEV is being used. Command Device: Command device. Remote Command Device. JNL VOL: Journal volume. Pool VOL: Pool volume. The number in parentheses is the pool identifier. Quorum Disk: Quorum disk for global-active device. ALU: LDEV of the ALU attribution SLU: LDEV of the SLU attribution Data Direct Mapping: LDEV of the data direct mapping attribute Hyphen (-): Volume in which the attribute is not defined.
Journal ID	Journal identifier when the attribute is JNL VOL. A hyphen indicates the attribute is other than JNL VOL.
Virtual Storage Machine*	Information about the virtual storage machine. LDEV ID*: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. If the setting of the LDEV virtualization management is canceled, Transient is displayed. At the same time, Failed is displayed on the Status column in the Task window. To resolve the transient status, perform one of the following operations to LDEVs:. - Resolve the cause of the failure by addressing the solution of the error message in the Task window. Then retry the same operation by using the Edit Virtualization Management Settings window. - In the Edit Virtualization Management Settings window, set Virtualization Management Settings to Disable and apply the setting to the storage system. Device Name*: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. SSID*: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank.
Add Resources	Opens the Add Resources window where you can add one or more resources to the resource group.
Remove Resources	Opens the Remove Resources window where you can remove one or more resources from the resource group.

Setting fields

Item	Description
Resource Group Name*	Type a unique name for this resource group. the following rules apply: - meta_resource cannot be set as a resource group name. - Names must be unique, and multiple occurrences of the same resource group name are not allowed in one storage system. - Resource names are case-sensitive. - Usable characters are alphanumeric, spaces, and symbols (! # \$ % & ' () + - . = @ [] ^ _ ` { } ~)
Select Parity Groups	Opens the Select Parity Groups window where you select one or more parity groups to be assigned to the resource group.
Select LDEVs	Opens the Select LDEVs window where you select one or more LDEVs to be assigned to the resource group.
Select Ports	Opens the Select Ports window where you select one or more ports to be assigned to the resource group.
Select Host Groups	Opens the Select Host Groups window where you select one or more host groups to be assigned to the resource group.
Select iSCSI Targets	Opens the Select iSCSI Targets window where you select one or more iSCSI Targets to be assigned to the resource group.
Add	Adds your settings to the Selected Resource Groups table.
* Item requires configuration	

Selected Resource Groups table

Item	Description
Resource Group Name (ID)	Name and identifier of each resource group. A hyphen indicates the ID number is not assigned before setting a resource group.
Number of Parity Groups	Number of parity groups to be assigned to the resource group.
Number of LDEVs	Number of LDEVs to be assigned to the resource group.
Number of Ports	Number of ports to be assigned to the resource group.
Number of Host Groups	Number of host groups to be assigned to the resource group.
Number of iSCSI Targets	Number of iSCSI targets to be assigned to the resource group.
Detail	Opens the Resource Group Property window where you can view details of the selected resource group.
Remove	Removes a selected resource group.

Select Parity Groups window

Select Parity Groups

Select parity group(s) from the Available Parity Groups list. Click Add to add the parity group(s), and click OK.

Parity Group ID	Capacity	Number of LDEVs
1-1	2147.21 GB	23

Add Remove

Parity Group ID	Capacity	Number of LDEVs
No Data		

Selected: 0 of 1 Selected: 0 of 0

OK Cancel ?

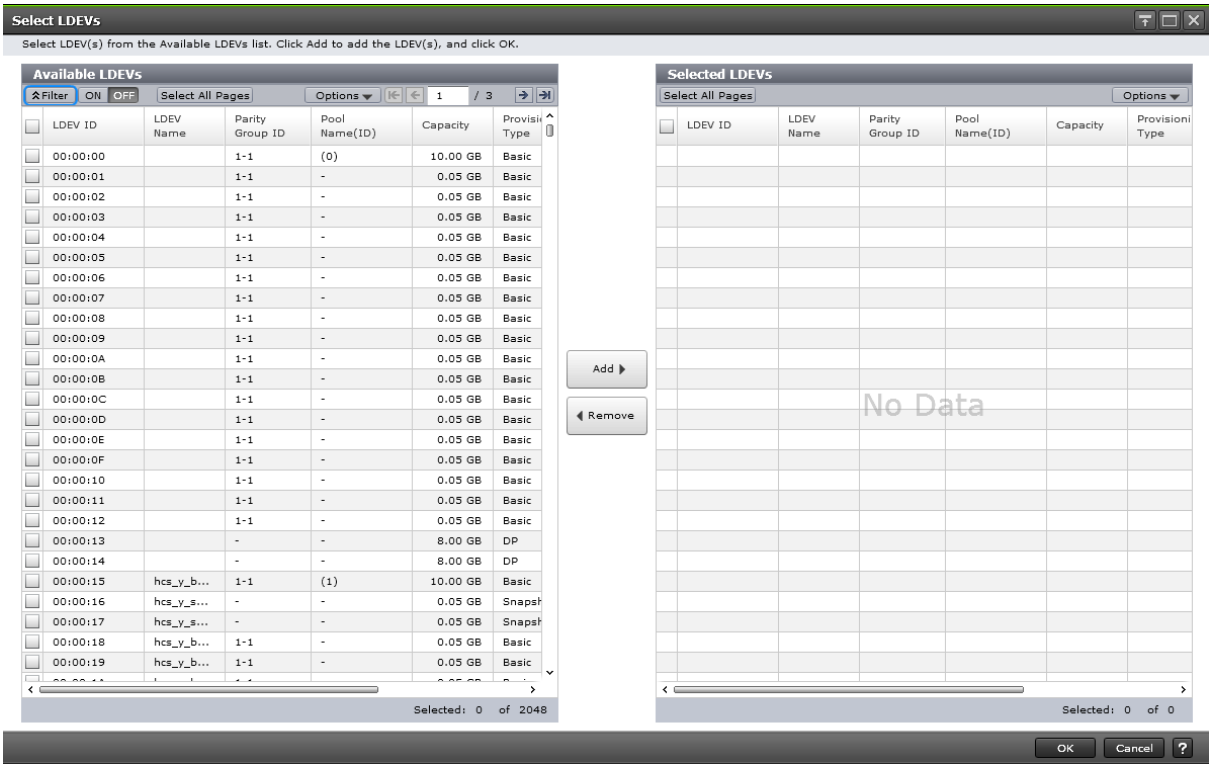
Available Parity Groups table

Item	Description
Parity Group ID	Parity group identifiers.
Capacity	Capacity of each parity group.
Number of LDEVs	Number of LDEVs in each parity group.
Add	Adds one or more parity groups selected in the Available Parity Groups table to the Selected Parity Groups table.
Remove	Removes one or more selected parity groups from the Selected Parity Groups table and relocates the parity groups to the Available Parity Groups table.

Selected Parity Groups table

Item	Description
Parity Group ID	Parity group identifiers.
Capacity	Capacity of each parity group.
Number of LDEVs	Number of LDEVs in each parity group.

Select LDEVs window



Available LDEVs table

Item	Description
LDEV ID	LDEV identifiers. LDEV IDs can be appear for undefined LDEVs. A hyphen appearing in columns to the right of the LDEV ID and LDEV name (for example, Parity Group ID, Pool Name ID, Capacity, and so on) indicates the LDEV is undefined.
LDEV Name	LDEV names.
Parity Group ID	Parity group identifier where the LDEV belongs.
Pool Name (ID)	Pool name and identifier where the LDEV belongs.
Capacity	Capacity of each LDEV.
Provisioning Type	Provisioning type of each volume. Basic: Internal volume DP: DP-VOL External: External volume External MF: Migration volume Snapshot: Thin Image volume ALU: LDEV of the ALU attribution
Attribute	Attribute of the volume indicating how the LDEV is used. Command Device: Command device Remote Command Device: Remote command device

Item	Description
	JNL VOL: Journal volume Pool VOL: Pool volume. The number in parentheses shows the pool ID. Quorum Disk: Quorum disk for global-active device. ALU: LDEV of the ALU attribution SLU: LDEV of the SLU attribution Data Direct Mapping: LDEV of the data direct mapping attribute Hyphen (-): Volume in which the attribute is not defined
Journal ID	Journal identifier when the attribute is JNL VOL. A hyphen indicates the attribute is other than JNL VOL.
Add	Adds one or more LDEVs selected in the Available LDEVs table to the Selected LDEVs table.
Remove	Removes one or more selected LDEVs from the Selected LDEVs table and relocates the LDEVs to the Available LDEVs table.

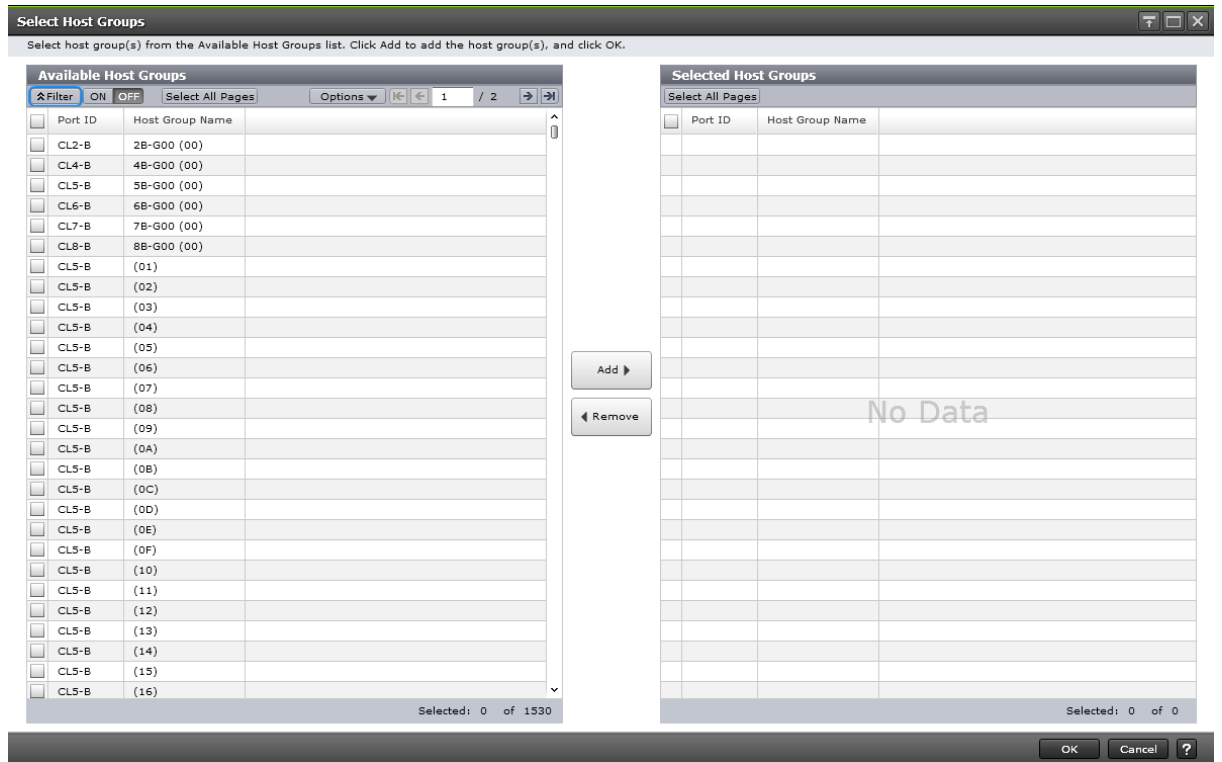
Selected LDEVs table

Item	Description
LDEV ID	LDEV identifiers. Some undefined LDEV IDs can appear. A hyphen in the LDEV name indicates the LDEV is undefined.
LDEV Name	LDEV names.
Parity Group ID	Parity group identifier where the LDEV belongs.
Pool Name (ID)	Pool name and identifier where the LDEV belongs.
Capacity	Capacity of the LDEV.
Provisioning Type	Displays the type of each volume. Basic: Internal volume DP: DP-VOL External: External volume External MF: Migration volume Snapshot: Thin Image volume ALU: LDEV of the ALU attribution
Attribute	Attribute of the volume indicating how the LDEV is being used. Command Device: Command device. Remote Command Device. JNL VOL: Journal volume. Pool VOL: Pool volume. The number in parentheses is the pool identifier. Quorum Disk: Quorum disk for global-active device. ALU: LDEV of the ALU attribution SLU: LDEV of the SLU attribution

Selected Ports table

Item	Description
Port ID	Port identifier.
Type	Types of ports. Fibre: Fibre Channel ports. iSCSI: iSCSI ports.

Select Host Groups window



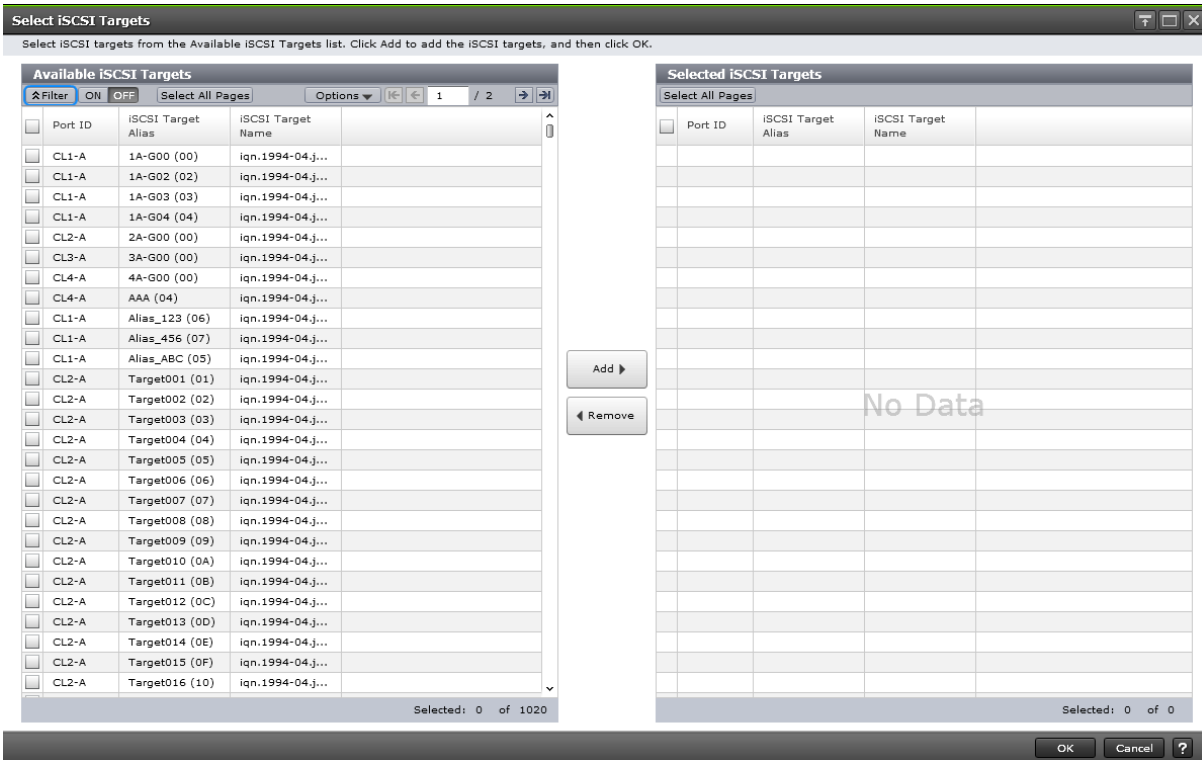
Available Host Groups table

Item	Description
Port ID	Port identifiers.
Host Group Name	Name and identifier of each host group that uses a port. Some undefined host groups can appear. If a host group is not defined, the blank appears.
Add	Adds one or more host groups selected in the Available Host Groups table to the Selected Host Groups table.
Remove	Removes one or more selected host groups from the Selected Host Groups table and relocates the host groups to the Available Host Groups table.

Selected Host Groups table

Item	Description
Port ID	Port identifiers.
Host Group Name	Name and identifier of each host group that uses a port. Some undefined host groups can appear. If a host group is not defined, the blank appears.

Select iSCSI Targets window



Available iSCSI Targets table

This table lists iSCSI targets that are assigned to each user.

Item	Description
Port ID	Port identifiers.
iSCSI Target Alias	Name and identifier of each iSCSI target alias that uses a port. Some undefined iSCSI targets can appear. If an iSCSI target is not defined, the blank appears.
iSCSI Target Name	iSCSI target name. If an iSCSI target is not defined, the blank appears.
Add	Adds one or more iSCSI targets selected in the Available iSCSI Targets table to the Selected iSCSI Targets table.

Item	Description
Number of Parity Groups	Number of parity groups to be assigned to the resource group.
Number of LDEVs	Number of LDEVs to be assigned to the resource group.
Number of Ports	Number of ports to be assigned to the resource group.
Number of Host Groups	Number of host groups to be assigned to the resource group.
Number of iSCSI Targets	Number of iSCSI targets to be assigned to the resource group.
Detail	Opens the Resource Group Property window where you can view the details of the selected resource group.

Edit Resource Group wizard

Edit Resource Group window

Edit Resource Group

1.Edit Resource Group > 2.Confirm

This wizard lets you edit the name of the selected resource group. Enter a name, and click Finish to confirm.

Resource Group Name:

(Max. 32 Characters)

Back Next Finish Cancel ?

Item	Description
Resource Group Name	Type the name of the resource group after editing. - meta_resource cannot be set as a name. - Duplicate occurrences of the same resource group name are not allowed in one storage system. - Names are case-sensitive. - Usable characters are alphanumeric, spaces, and symbols (! # \$ % & ' () + - . = @ [] ^ _ ` { } ~)

Edit Resource Group confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

1. Edit Resource Group > 2. Confirm

Enter a name for the task. Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Resource Group Name (ID)	Number of Parity Groups	Number of LDEVs	Number of Ports	Number of Host Groups
☒ RSG_008 (2)	0	0	0	0
☐				
☐				
☐				
☐				
☐				
☐				
☐				
☐				
☐				

Detail Total: 1

☒ Go to tasks window for status

Selected Resource Group tab

Item	Description
Resource Group Name (ID)	Name and identifier of the edited resource group.
Number of Parity Groups	Number of parity groups that are assigned to the resource group.
Number of LDEVs	Number of LDEVs that are assigned to the resource group.
Number of Ports	Number of ports that are assigned to the resource group.
Number of Host Groups	Number of host groups that are assigned to the resource group.
Detail	Opens the Resource Group Property window where you can view the details of the selected resource group.

Add Resources wizard

Add Resources window

Add Resources

1.Add Resources

> 2.Confirm

This wizard lets you add resources to the selected resource group. Click each button to select parity groups, LDEVs, ports,host groups and iSCSI targets to be added. Click Finish to confirm.

Parity Group Selection:

Total Selected Parity Groups:

0

Select Parity Groups

LDEV Selection:

Total Selected LDEVs:

0

Select LDEVs

Port Selection:

Total Selected Ports:

0

Select Ports

Host Group Selection:

Total Selected Host Groups:

0

Select Host Groups

iSCSI Target Selection:

Total Selected iSCSI Targets:

0

Select iSCSI Targets

Back

Next

Finish

Cancel

?

Item	Description
Select Parity Groups	Opens the Select Parity Group window where you can select one or more parity groups to be added to the resource group.
Select LDEVs	Opens the Select LDEVs window where you can select one or more LDEVs to be added to the resource group.
Select Ports	Opens the Select Ports window where you can select one or more ports to be added to the resource group.
Select Host Groups	Opens the Select Host Groups window where you can select one or more host groups to be added to the resource group.
Select iSCSI Targets	Opens the Select iSCSI Targets window where you can select one or more host groups to be added to the resource group.

Add Resources confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Item	Description
LDEV Name	LDEV names.
Parity Group ID	Parity group identifier where the LDEV belongs.
Pool Name (ID)	Pool name and identifier where the LDEV belongs.
Capacity	Capacity of the LDEV.
Provisioning Type	Provisioning type of the volume. Basic: Internal volume DP: DP-VOL External: External volume External MF: Migration volume Snapshot: Thin Image volume ALU: LDEV of the ALU attribution
Attribute	Attribute of the volume indicating how the LDEV is being used. Command Device: Command device. Remote Command Device. JNL VOL: Journal volume. Pool VOL: Pool volume. The number in parentheses is the pool identifier. Quorum Disk: Quorum disk for global-active device. ALU: LDEV of the ALU attribution SLU: LDEV of the SLU attribution Data Direct Mapping: LDEV of the data direct mapping attribute Hyphen (-): Volume in which the attribute is not defined.
Journal ID	Journal identifier appears when the attribute is JNL VOL. A hyphen indicates the attribute is other than JNL VOL.

Selected Ports table

Item	Description
Port ID	Port identifiers to be added to a resource group.
Type	Type of ports. - Fibre: Fibre Channel port. - iSCSI: iSCSI port.

Selected Host Groups table

Item	Description
Port ID	Port identifiers that are used by the host group.
Host Group Name	Name and identifier of each host group to be added to a resource group.

Item	Description
	Some undefined host groups can appear. If a host group is not defined, the blank appears.

Selected iSCSI Targets table

Item	Description
Port ID	Port identifiers that are used by the host group.
iSCSI Target Alias	iSCSI Target Alias. Name and identifier of each iSCSI target alias to be added to a resource group. Some undefined iSCSI targets can appear. If an iSCSI target is not defined, the blank appears.
iSCSI Target Name	iSCSI target name. If an iSCSI target is not defined, the blank appears.

Remove Resources window

Remove Resources

1.Confirm

The selected resource(s) will be deleted from the selected resource group. Are you sure to continue?

Task Name:

(Max. 32 Characters)

Selected Resource Group

Resource Group Name (ID)	
RSG1 (1)	

Selected Host Groups

Port ID	Host Group Name	
CL1-B	1B-G00 (00)	

Total: 1

☐ Go to tasks window for status
Back
Next
Apply
Cancel
?

Selected Resource Group table

Item	Description
Resource Group Name (ID)	Name and identifier of each resource group whose resources are deleted.

Selected Parity Groups table (when deleting parity groups)

Item	Description
Parity Group ID	Identifier of each parity group to be deleted from the resource group.
Capacity	Capacity of each parity group.
Number of LDEVs	Number of LDEVs in the parity group.

Selected LDEVs table (when deleting LDEVs)

Item	Description
LDEV ID	LDEV identifiers to be deleted from a resource group. Some undefined LDEV IDs can appear. A hyphen in the LDEV name indicates the LDEV is undefined.
LDEV Name	LDEV names to be deleted from the resource group.
Parity Group ID	Parity group ID where the LDEV belongs.
Pool Name (ID)	Pool name where the LDEV belongs.
Capacity	Capacity of each LDEV.
Provisioning Type	Provisioning type of each volume. Basic: Internal volume DP: DP-VOL External: External volume External MF: Migration volume Snapshot: Thin Image volume ALU: LDEV of the ALU attribution
Attribute	Attribute of the volume indicating how the LDEV is being used. Command Device: Command device. Remote Command Device. JNL VOL: Journal volume. Pool VOL: Pool volume. The number in parentheses is the pool identifier. Quorum Disk: Quorum disk for global-active device. ALU: LDEV of the ALU attribution SLU: LDEV of the SLU attribution Data Direct Mapping: LDEV of the data direct mapping attribute Hyphen (-): Volume in which the attribute is not defined.
Journal ID	Journal ID when the attribute is JNL VOL. A hyphen indicates the attribute is other than JNL VOL.

Selected Ports table (when deleting ports)

Item	Description
Port ID	Port IDs that to be deleted from the resource group.
Type	Type of ports. - Fibre: Fibre Channel port. - iSCSI: iSCSI port.

Selected Host Groups table (when deleting Host Groups)

Item	Description
Port ID	Port IDs that are used by the host group.
Host Group Name	Name and ID of each host group name to be deleted from the resource group. Some undefined host group names can appear. If a host group is not defined, the blank appears.

Selected iSCSI Targets table (when deleting iSCSI Targets)

Item	Description
Port ID	Port identifiers that are used by the host group.
iSCSI Target Alias	Name and ID of each iSCSI target alias to be deleted from the resource group. Some undefined iSCSI target can appear. If an iSCSI target is not defined, the blank appears.
iSCSI Target Name	iSCSI target name. If an iSCSI target is not defined, the blank appears.

Delete Resource Groups window

Delete Resource Groups

1.Confirm

The selected resource group(s) will be deleted. Are you sure to continue?

Task Name:

140909-DeleteResourceGroups

(Max. 32 Characters)

Selected Resource Groups

Resource Group Name (ID)	
RSG3 (3)	

Total: 1

☐ Go to tasks window for status

Back

Next

Apply

Cancel

?

Selected Resource Groups table

Item	Description
Resource Group Name (ID)	Name and ID of each resource group name to be deleted.

Resource Group Properties window

Resource Group Properties

Resource Group Name (ID): New_RSG (-)

Number of Parity Groups: 1

Number of LDEVs: 17

Number of Ports: 4

Number of Host Groups: 4

Number of iSCSI Targets: 4

Virtual Storage Machine: VSP G400/G600 / 400001

Parity Groups

Filter: ON OFF Options 1 / 1

Parity Group ID	Capacity	Number of LDEVs	Attribute
1-1	1610.42 GB	3	-

Total: 1

LDEVs

Filter: ON OFF Options 1 / 1

LDEV ID	LDEV Name	Parity Group ID	Pool Name(ID)	Capacity	Provisioning Type	Attribute	Journal ID	Virtual LDEV
00:00:00		-	-	0.05 GB	DP	-	-	00:00
00:00:01		-	-	0.05 GB	DP	-	-	00:00
00:00:02		-	-	0.05 GB	DP	-	-	00:00
00:00:03		-	-	0.05 GB	DP	-	-	00:00
00:00:04		-	-	0.05 GB	DP	-	-	00:00

Total: 17

Ports

Filter: ON OFF Options 1 / 1

Port ID	Type
CL1-A	Fibre
CL3-A	Fibre

Close ?

Resource Group Properties table

Item	Description
Resource Group Name (ID)	Name and ID of a resource group name.
Number of Parity Groups	Number of parity groups that are assigned to the resource group.
Number of LDEVs	Number of LDEVs that are assigned to the resource group.
Number of Ports	Number of ports that are assigned to the resource group.
Number of Host Groups	Number of host groups that are assigned to the resource group.
Number of iSCSI Targets	Number of iSCSI targets that are assigned to the resource group.

Item	Description
Virtual Storage Machine	Model name and serial number of the virtual storage machine assigned to the resource group.

Parity Groups table

Item	Description
Parity Group ID	Parity group IDs.
Capacity	Capacity of each parity group.
Number of LDEVs	Number of LDEVs in each parity group.
Attribute	Displays the attribute of the parity group. Hyphen (-): Parity group in which the attribute is not defined.

LDEVs table

Item	Description
LDEV ID	LDEV IDs. Some undefined LDEV IDs can appear. A hyphen in the LDEV name indicates the LDEV is undefined.
LDEV Name	LDEV names.
Parity Group ID	Parity group ID where the LDEV belongs.
Pool Name (ID)	Pool name and ID where the LDEV belongs.
Capacity	Capacity of each LDEV.
Provisioning Type	Provisioning type of a volume. Basic: Internal volume DP: DP-VOL External: External volume External MF: Migration volume Snapshot: Thin Image volume ALU: LDEV of the ALU attribution
Attribute	Attribute of the volume indicating how the LDEV is being used. Command Device: Command device. Remote Command Device. JNL VOL: Journal volume. Pool VOL: Pool volume. The number in parentheses is the pool identifier. Quorum Disk: Quorum disk for global-active device. ALU: LDEV of the ALU attribution SLU: LDEV of the SLU attribution Data Direct Mapping: LDEV of the data direct mapping attribute

Item	Description
	Hyphen (-): Volume in which the attribute is not defined.
Journal ID	Journal ID when the attribute is JNL VOL. A hyphen indicates the attribute is other than JNL VOL.
Virtual Storage Machine	Information about the virtual storage machine. - LDEV ID: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. - SSID: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank. - Attribute: Virtual LDEV attribute. If the attribute is not set for LDEV, this column is blank.

Ports table

Item	Description
Port Name	Port IDs.
Type	Type of the port. Fibre: Fibre Channel port. iSCSI: iSCSI port.

Host Groups table

Item	Description
Port ID	Port ID that is used by the host group.
Host Group Name	Name and identifier of each host group. Some undefined host group names can appear. If a host group is not defined, the blank appears.

iSCSI Targets table

Item	Description
Port ID	Port ID that is used by the iSCSI target.
iSCSI Target Alias	iSCSI target alias. iSCSI target alias and identifier of each iSCSI target.

Item	Description
	Some undefined iSCSI target aliases can appear. If an iSCSI target is not defined, the blank appears.
iSCSI Target Name	iSCSI target name. If an iSCSI target is not defined, the blank appears.

Edit Virtualization Management Settings wizard

Edit Virtualization Management Settings window

Setting Fields

Item	Description
Virtual Management Settings	Select one from the following options. Enable: Virtualization management can be used. You can set a initial virtual LDEV ID or the virtual configuration, or the both. Enable (Not Set): Virtualization management can be used. However, you cannot set the initial virtual LDEV ID and the virtual configuration. Disable: Virtual management cannot be used.
Initial Virtual LDEV ID	Specify the virtual LDEV identifier of the volume. - LDKC: LDKC number is displayed. - CU: Select the CU number between 00 and FE. - DEV: Select the device number between 00 and FF. - Interval: Specify the interval between 0 and 255. If the virtual storage machine is the same as the storage system, assign the virtual LDEV ID which is different from the LDEV ID of the selected LDEV. If the virtual storage machine is

Item	Description
	the same as the storage system, and if the virtual LDEV ID which is the same as LDEV ID of the selected LDEV must be assigned, select Disable in Virtualization Management Settings. <i>Caution:</i> To specify multiple virtual LDEV IDs, specify the interval for setting virtual LDEV IDs in Interval. If virtual storage machines that span multiple storage systems are configured, do not allocate any virtual LDEV ID that is already used in other storage system. This item is selectable only when Enable is selected for Virtual Management.
Virtual Configuration	Select either one from the following alternatives. - Specify: Virtual configuration can be specified and set. - Not Set: Virtual configuration cannot be set (the configuration is same as LDEV). For virtual configuration, the specified value is set to all the selected LDEVs. This item is selectable only when Enable is selected for Virtual Management.
Emulation Type	Select the virtual emulation type. For the virtual emulation type, like the emulation type, set one of the emulation types that exist in the same group of 32 volumes with LDEV IDs. This item is selectable only when the Specify is selected in the Virtual Configuration.
CVS Settings	Select either one from the following alternatives. - Enable: CVS settings can be used. - Disable: CVS Settings cannot be used. This item is selectable only when the Specify is selected in the Virtual Configuration.
Number of Concatenated LDEVs	Specify the decimal number of concatenated LDEVs between 1 and 36. If you do not concatenate virtual LDEVs, specify 1. This item is selectable only when the Specify is selected in the Virtual Configuration.
SSID	Specify the hexadecimal SSID between 0004 and FFFE. Specify a virtual SSID for each virtual LDEV address (64, 128, 256) in the virtual storage machine. This item is selectable only when the Specify is selected in the Virtual Configuration.

Edit Virtualization Management confirmation window

Edit Virtualization Management Settings

1.Edit Virtualization Management Settings > 2.Confirm

Enter a name for the task.
Confirm the settings in the list and click Apply to add the task in the Tasks queue for execution.

Task Name: 150519-EditVirtualizationManagem
(Max. 32 Characters)

Selected LDEVs

LDEV ID	Virtual Storage Machine				
	Model / Serial Number	LDEV ID	Device Name	SSID	
00:00:01	VSP G400/G600 / 400025	00:00:02	OPEN-3	0004	

Total: 1

☐ Go to tasks window for status Back Next Apply Cancel ?

Selected LDEVs table

Item	Description
LDEV ID	Displays LDEV identifier of the volume.
Virtual Storage Machine	Displays the following information about the virtual storage machine to which the LDEV belongs: - Model / Serial Number: Displays the model and serial number of the virtual storage machine to which the volume belongs. - LDEV ID: Displays the virtual LDEV identifier. - Device Name: Displays the virtual device name of the volume. - SSID: Displays the virtual SSID.



LDEV GUI reference

This appendix describes windows, wizards, and dialog boxes used when creating LDEVs.

- ☐ [Parity Groups window](#)
- ☐ [Parity Groups tab: Internal or external volume](#)
- ☐ [LDEVs tab: Internal or external volumes](#)
- ☐ [Logical Devices window](#)
- ☐ [Create LDEVs wizard](#)
- ☐ [Edit LDEVs wizard](#)
- ☐ [Change LDEV Settings window](#)
- ☐ [Select Free Spaces window](#)
- ☐ [Select Pool window](#)
- ☐ [View LDEV IDs window](#)
- ☐ [View Physical Location window](#)
- ☐ [Format LDEVs wizard](#)
- ☐ [Restore LDEVs window](#)
- ☐ [Block LDEVs window](#)

- ☐ [Delete LDEVs window](#)
- ☐ [LDEV Properties window](#)
- ☐ [ALUs / SLUs window](#)
- ☐ [Unbind SLUs window](#)
- ☐ [Components window](#)
- ☐ [DKC: Controller Boards & MP Units tab](#)
- ☐ [Edit MP Units wizard](#)
- ☐ [Assign MP Unit wizard](#)
- ☐ [View Management Resource Usage window](#)
- ☐ [Create Parity Groups wizard](#)
- ☐ [Change Settings \(Parity Group\) window](#)
- ☐ [Assign Spare Drives wizard](#)
- ☐ [Edit Copy-Back Mode wizard](#)
- ☐ [Format Parity Groups window](#)
- ☐ [Delete Parity Groups window](#)
- ☐ [Parity Group Properties window](#)

Parity Groups window

[illegible]

Use this window to view information about parity groups. Only the parity groups assigned to the logged-on user are available.

- [Summary on page C-3](#)
- [Parity Groups tab on page C-4](#)
- [Drives tab on page C-7](#)

Summary

Item	Description
Parity Group Capacity	Internal: Capacity of all of the parity groups in the internal volume.

Item	Description
	◦ Free¹: Free space capacity of the internal volume. ◦ Total²: Total capacity of the internal volume. • External: Capacity of all of the parity groups in the external volume. ◦ Free¹: Free space capacity of the external volume. ◦ Total²: Total capacity of the external volume.
Number of Drives	• SSD: Displays the number of SSDs. • SAS: Displays the number of SAS drives. • Total: Displays the total number of drives.
Format/Shredding Task Status	Formatting <i>n</i> %: Displays the progress of the format task. Preparing Quick Format <i>n</i> %: Displays the progress of the quick format preparing. Shredding <i>n</i> %: Displays the progress of the shredding. Verifying <i>n</i> % (<i>x</i> / <i>y</i> parity groups): Displays the progress of the verifying. <i>n</i> represents the progress of the verifying. <i>x</i> represents the number of parity groups that are completed of verifying. <i>y</i> represents the number of all parity groups that are to be verified. Blank: States that the format, shredding, or verifying is not being performed. If the configuration of the storage system is being changed, this field is also blank because the information cannot be collected.
Notes: 1. The control information used by the storage system, such as control cylinders, is not included in the Free capacity. 2. The total capacity of the LDEVs and the Free capacity is displayed in the Total.	

Parity Groups tab

Item	Description
Parity Group ID	Parity group identifier of the parity group in the storage system.
LDEV Status	Status of each LDEV in the parity group.  Normal: Normal status.  Blocked: Host cannot access a blocked volume.  Warning: Problem occurs in the volume.  Formatting: Volume is being formatted.  Preparing Quick Format: Volume is being prepared for quick formatting.  Quick Formatting: Volume is being quick-formatted.

Item	Description
	 Correction Access: Access attribute is being corrected.  Copying: Data in the volume is being copied.  Read Only: Data cannot be written on a read-only volume.  Shredding: Volume is being shredded.  Hyphen (-): Any status other than the above.
RAID Level	RAID level. An asterisk "*" indicates that the parity group to which the LDEV belongs is interleaved (concatenated). Either RAID level of the parity group appears.
Base Emulation Type ¹	Emulation type of each parity group.
Capacity	- Free: Capacity of the free space of each parity group. The control information used by the storage system, such as control cylinders, is not included in the Free capacity. - Total: The total capacity of the LDEVs and Free capacity is displayed in the Total.
Number of LDEVs	- Unallocated: Number of unallocated LDEVs in each parity group. - Total: Total number of LDEVs in each parity group.
Drive Type/RPM	Drive type and RPM in use on this LDEV.
Encryption	Encryption information. Enable: encrypted parity group Disable: non-encrypted parity group Hyphen (-): the parity group cannot be defined of the encryption function. This item is not available with Virtual Storage Platform G200.
Attribute	Displays the attribute of the parity group. Hyphen (-): The parity group in which the attribute is not defined.
Copy-Back Mode	Displays the setting of the copy-back mode. Enable: Copy-back mode is set to parity groups. Disable: Copy-back mode is not set to parity groups.
Resource Group Name (ID)	Resource group name and identifier of which this parity group is a member.
Virtual Storage Machine ¹	Model name and serial number of the virtual storage machine that has the parity group.
Create Parity Groups	Opens the Parity Groups window.
Create LDEVs	Opens the .

Item	Description
Format Parity Groups	Opens the Format Parity Groups window.
Format LDEVs ²	Opens the Format LDEVs window.
Edit Encryption ²	Opens the Edit Encryption window. This item is not available with Virtual Storage Platform G200.
Shred LDEVs ²	Opens the Shred LDEVs window.
Edit Copy-Back Mode ²	Opens the Edit Copy-Back Mode window.
Delete Parity Groups ²	Opens the Delete Parity Groups window.
Block LDEVs ²	Opens the Block LDEVs window.
Restore LDEVs ²	Opens the Restore LDEVs window.
Interrupt Shredding Task ²	Opens the Interrupt Shredding Task window.
Export ²	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
¹ Does not appear by default. To display this item, change the Column Settings window.	
² Available when you click More Actions .	

Drives tab

[illegible]

Only drives assigned to the logged-on user are displayed.

Item	Description
Parity Group ID	Displays the identifier of the parity group.
Drive Box	Displays the identifier of the drive box.
Location	Displays the location of the drive box.
Status	Displays the status of the drive box.
Drive Type/RPM/Capacity	Displays the drive type, RPM, and capacity. As for SSD, a hyphen (-) appears on the RPM field.
Drive Type-Code	Displays the drive type-code.
Usage	Displays the usage status of the drive. Data: Data drive. Spare: Spare drive. Free: Drive which is not used.
Create Parity Groups	Displays the Create Parity Groups window.
Assign Spare Drives	Displays the Assign Spare Drives window.
Export	Displays the window for outputting table information.

Parity Groups tab: Internal or external volume

[illegible]

Use this window to view information about the parity groups in the internal (or external) volume. Only the parity groups assigned to the logged-on user are available.

- [Summary on page C-9](#)
- [Parity Groups tab on page C-9](#)
- [Drives tab on page C-11](#)

Summary

Item	Description
Parity Group Capacity	- Free: The free space capacity of the internal or external volume. The control information used by the storage system, such as control cylinders, is not included in the Free capacity. - Total: The total capacity of the LDEVs and Free capacity is displayed in the Total.
Number of Drives	- SSD: Displays the number of SSDs. - SAS: Displays the number of SAS drives. - Total: Displays the total number of drives.

Parity Groups tab

Item	Description
Parity Group ID	The parity group identifiers of the parity groups in the storage system.
LDEV Status	The icons indicate the LDEV status.  Normal: Normal status.  Blocked: Host cannot access a blocked volume.  Warning: Problem occurs in the volume.  Formatting: Volume is being formatted.  Preparing Quick Format: Volume is being prepared for quick formatting.  Quick Formatting: Volume is being quick-formatted.  Correction Access: Access attribute is being corrected.  Copying: Data in the volume is being copied.  Read Only: Data cannot be written on a read-only volume.  Shredding: Volume is being shredded.  Hyphen (-): Any status other than the above.
RAID Level	RAID level. An asterisk "*" indicates that the parity group to which the LDEV belongs is interleaved (concatenated). Either RAID level of the parity group appears.
Capacity	Free: Capacity of the free space. The control information used by the storage system such as control cylinders is not included in the displayed capacity.

Item	Description
	Total: The total capacity of the LDEVs and the "Capacity - Free" capacity is displayed.
Number of LDEVs	- Unallocated: Number of unallocated LDEVs. - Total: Total number of LDEVs.
Drive Type/RPM	Drive type and RPM in use on this LDEV.
Encryption	Encryption information. Enable: encrypted parity group Disable: non-encrypted parity group Hyphen (-): the parity group cannot be defined of the encryption function. This item is not available with Virtual Storage Platform G200.
Attribute	Displays the attribute of the parity group. Hyphen (-): The parity group in which the attribute is not defined.
Copy-Back Mode	Displays the setting of the copy-back mode. Enable: Copy-back mode is set to parity groups. Disable: Copy-back mode is not set to parity groups.
Resource Group Name (ID)	Resource group name and identifier of which this parity group is a member.
Virtual Storage Machine ¹	Model name and serial number of the virtual storage machine having the parity group.
Create Parity Groups (Internal)	Opens the Parity Groups window.
Create LDEVs	Opens the .
Format Parity Groups	Opens the Format Parity Groups window.
Format LDEVs ²	Opens the Format LDEVs window.
Edit Encryption ²	Opens the Edit Encryption window. This item is not available with Virtual Storage Platform G200.
Shred LDEVs ²	Opens the Shred LDEVs window.
Edit Copy-Back Mode ²	Opens the Edit Copy-Back Mode window.
Delete Parity Groups ²	Opens the Delete Parity Groups window.
Block LDEVs ²	Opens the Block LDEVs window.
Restore LDEVs ²	Opens the Restore LDEVs window.
Export ²	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
¹ Does not appear by default. To display this item, change the Column Settings window.	

Item	Description
	Spare: Spare drive. Free: Drive which is not used.
Create Parity Groups(Internal)	Displays the Create Parity Groups window.
Assign Spare Drives	Displays the Assign Spare Drives window.
Export	Displays the window for outputting table information.

LDEVs tab: Internal or external volumes

1-1 Last Updated : 2014/11/20 19:29

VSP_G800(S/N:400023) > Parity Groups > Internal > 1-1

LDEV Status		● Normal	Interleaved Parity Groups		1-1
RAID Level		5(3D+1P)	Copy-Back Mode		Enable
Drive Type/RPM		SAS/10k			
Capacity	Free	290.40 GB	Number of LDEVs	Unallocated	19
	Total	1.57 TB		Total	33

LDEVs | Drives

Create LDEVs | Edit LDEVs | Format LDEVs | More Actions

Selected: 0 of 33

Filter	ON	OFF	Select All Pages	Column Settings	Options	1	/ 1
LDEV ID	LDEV Name	Status	Capacity	Attribute	Resource Group Name (ID)		
00:00:00		● Normal	40.00 GB	Pool V...	meta_resource(0)		
00:00:01		● Normal	40.00 GB	Pool V...	meta_resource(0)		
00:00:02		● Normal	40.00 GB	Pool V...	meta_resource(0)		
00:00:03		● Normal	40.00 GB	Pool V...	meta_resource(0)		
00:00:04		● Normal	40.00 GB	Pool V...	RSG1(1)		
00:00:05		● Normal	40.00 GB	Pool V...	RSG1(1)		
00:00:06		● Normal	40.00 GB	Pool V...	RSG1(1)		
00:00:07		● Normal	40.00 GB	Pool V...	RSG1(1)		
00:00:08		● Normal	40.00 GB	Pool V...	RSG2(2)		
00:00:09		● Normal	40.00 GB	Pool V...	RSG2(2)		
00:00:0A		● Normal	40.00 GB	Pool V...	RSG2(2)		
00:00:0B		● Normal	40.00 GB	Pool V...	RSG2(2)		
00:3F:00		● Normal	40.00 GB	Pool V...	meta_resource(0)		
00:3F:01		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:02		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:03		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:04		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:05		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:06		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:07		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:08		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:09		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:0A		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:0B		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:0C		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:0D		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:0E		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:0F		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:10		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:11		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:12		● Normal	40.00 GB	-	meta_resource(0)		
00:3F:13		● Normal	40.00 GB	-	meta_resource(0)		

Use this window to view information about the LDEVs assigned to parity groups in an internal or external volume. Only the parity groups assigned to the logged-on user are available.

- [Summary on page C-13](#)
- [LDEVs tab on page C-14](#)
- [Drives tab on page C-16](#)

Summary

Item	Description
LDEV Status	Current status of the LDEV.  Normal: Normal status.  Blocked: Host cannot access a blocked volume.  Warning: Problem occurs in the volume.  Formatting: Volume is being formatted.  Preparing Quick Format: Volume is being prepared for quick formatting.  Quick Formatting: Volume is being quick-formatted.  Correction Access: Access attribute is being corrected.  Copying: Data in the volume is being copied.  Read Only: Data cannot be written on a read-only volume.  Shredding: Volume is being shredded.  Hyphen (-): Any status other than the above.
RAID Level	RAID level. An asterisk "*" indicates that the parity group to which the LDEV belongs is interleaved (concatenated).
Drive Type/RPM	Drive type and RPM in use on this LDEV.
Capacity	- Free: Capacity of the free space. The control information used by the storage system, such as control cylinders, is not included in the Free capacity. - Total: The total capacity of the LDEVs and the "Capacity - Free" capacity is displayed in the Total.
Interleaved Parity Groups	Interleaved (concatenated) parity groups.
Copy-Back Mode	Displays the setting of the copy-back mode. Enable: Copy-back mode is enabled in the parity groups. Disable: Copy-back mode is disabled in the parity group.
Number of LDEVs	Unallocated: Number of unallocated LDEVs.

Item	Description
	Total: Total number of LDEVs.

LDEVs tab

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	LDEV name.
Status	LDEV status.  Normal: Normal status.  Blocked: Host cannot access a blocked volume.  Warning: Problem occurs in the volume.  Formatting: Volume is being formatted.  Preparing Quick Format: Volume is being prepared for quick formatting.  Quick Formatting: Volume is being quick-formatted.  Correction Access: Access attribute is being corrected.  Copying: Data in the volume is being copied.  Read Only: Data cannot be written on a read-only volume.  Shredding: Volume is being shredded.  Hyphen (-): Any status other than the above.
Capacity	Capacity of the selected LDEV.
Attribute	Attribute of the volume indicating how the LDEV is being used. Command Device: The volume is a command device. Remote Command Device: The volume is a remote command device. JNL VOL: The volume is a journal volume. Pool VOL: The volume is a pool volume. The number in the parenthesis indicates the pool identifier. Quorum Disk: Quorum disk for global-active device. Data Direct Mapping: LDEV of the data direct mapping attribute Hyphen (-): Volume in which the attribute is not defined
Resource Group Name (ID)	Resource group name and identifier of the LDEV.
Virtual Storage Machine ¹	Information about the virtual storage machine.

Item	Description
	- Model / Serial Number¹: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID¹: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name¹: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. - SSID¹: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank.
Create LDEVs	Opens the .
Edit LDEVs	Opens the Edit LDEVs window.
Format LDEVs	Opens the Format LDEVs window.
Delete LDEVs ²	Opens the Delete LDEVs window.
Shred LDEVs ²	Opens the Shred LDEVs window.
Block LDEVs ²	Opens the Block LDEVs window.
Restore LDEVs ²	Opens the Restore LDEVs window.
Export ²	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
¹ Does not appear by default. To display this item, change the Column Settings window.	
² Available when you click More Actions .	

Drives tab

Drive Box	Location	Status	Drive Type-Code	Drive Type/RPM/Capacity
DB-00	HDD00-00	Normal	DKR5D-J60...	SAS/10krpm/600GB
DB-00	HDD00-01	Normal	DKR5D-J60...	SAS/10krpm/600GB
DB-00	HDD00-02	Normal	DKR5D-J60...	SAS/10krpm/600GB
DB-00	HDD00-03	Normal	DKR5D-J60...	SAS/10krpm/600GB

Only drives assigned to the logged-on user are displayed.

Item	Description
Drive Box	Displays the drive box number.
Location	Displays the location of the drive box.
Status	Displays the status of the drive box.
Drive Type-Code	Displays the drive type-code.
Drive Type/RPM/Capacity	Displays the drive type, RPM, and capacity. As for SSD, a hyphen (-) appears on the RPM field.
Assign Spare Drives	Displays the Assign Spare Drives window.
Export	Displays the window for outputting table information.

Logical Devices window

Logical Devices

Last Updated : 2014/09/12 18:49

Storage(S/N:493011) > Logical Devices

Volume Migration

Number of LDEVs	Allocated	3	Reserved	28
	Unallocated	38	V-VOLs	35
			Total	104

Format/Shredding Task Status

LDEVs

Create LDEVs

Add LUN Paths

Edit LDEVs

More Actions

Selected: 0 of 104

Filter ON OFF

Select All Pages

Column Settings

Options

1 / 1

	LDEV ID	LDEV Name	Status	Capacity	Number of Paths	Provisioning Type	Attribute	Pool Name(ID)	Parity Group ID
☐	00:00:00		Blocked	10.00 GB	0	Basic	Pool V...	VFS_01(0)	1-1
☐	00:00:01		Blocked	10.00 GB	0	Basic	Pool V...	New_Pool_2...	1-1
☐	00:00:02		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:03		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:04		Blocked	10.00 GB	0	Basic	Pool V...	New_Pool_2...	1-1
☐	00:00:05		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:06		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:07		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:08		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:09		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:0A		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:0B		Blocked	10.00 GB	0	Basic	-	-	1-1
☐	00:00:0C		Blocked	10.00 GB	1	Basic	-	-	1-1
☐	00:00:0D		Blocked	10.00 GB	1	Basic	-	-	1-1
☐	00:00:0E		Blocked	10.00 GB	1	Basic	-	-	1-1
☐	00:00:0F		Blocked	10.00 GB	0	Basic	Pool V...	VFS_01(0)	1-1
☐	00:00:10		Normal	8.00 GB	1	DP	-	VFS_01(0)	-
☐	00:00:11		Normal	8.00 GB	1	DP	-	VFS_01(0)	-
☐	00:00:12		Normal	8.00 GB	1	DP	-	VFS_01(0)	-

Use this window to view information about logical devices. Only the LDEVs assigned to the logged-on user are available.

- [Summary on page C-17](#)
- [LDEVs tab on page C-18](#)

Summary

Item	Description
Number of LDEVs	- Allocated: Number of allocated LDEVs. - Unallocated: Number of unallocated LDEVs. - Reserved: Number of reserved LDEVs. - V-VOLs: Number of allocated V-VOLs.
Total Number of LDEVs	Total number of LDEVs.
Format/Shredding Task Status	Formatting <i>n</i> %: Displays the progress of the format task. Preparing Quick Format <i>n</i> %: Displays the progress of the quick format preparing. Shredding <i>n</i> %: Displays the progress of the shredding.

Item	Description
	Verifying n % (x / y parity groups): Displays the progress of the verifying. n represents the progress of the verifying. x represents the number of parity groups that are completed of verifying. y represents the number of all parity groups that are to be verified. Blank: States that the format, shredding, or verifying is not being performed. If the configuration of the storage system is being changed, this field is also blank because the information cannot be collected.
View Migration Plans*	Open the View Migration Plans window. For details, see the <i>Hitachi Volume Migration User Guide</i> .
View Histories*	Open the View Histories window. For details, see the <i>Hitachi Volume Migration User Guide</i> .
*Available when you select Volume Migration .	

LDEVs tab

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	LDEV name.
Status	LDEV status.  Normal: Normal status.  Blocked: Host cannot access a blocked volume.  Warning: Problem occurs in the volume.  Formatting: Volume is being formatted.  Preparing Quick Format: Volume is being prepared for quick formatting.  Quick Formatting: Volume is being quick-formatted.  Correction Access: Access attribute is being corrected.  Copying: Data in the volume is being copied.  Read Only: Data cannot be written on a read-only volume.  Shredding: Volume is being shredded.  Hyphen (-): Any status other than the above.
PIN Status	Displays the PIN status.

Item	Description
V-VOL Management Task ¹	Displays the V-VOL management task being performed on a Dynamic Provisioning, Dynamic Tiering, V-VOL. - Reclaiming Zero Pages: The process is in progress. - Waiting for Zero Page Reclaiming: The process has been waited. - Blank: The V-VOL management task can be performed on the volume, but the task is not currently in process. - Hyphen(-): The V-VOL management task cannot be performed on the volume.
Capacity	LDEV capacity.
Number of paths	Number of paths set for the LDEV.
Provisioning Type	Provisioning type to be assigned to the LDEV. Basic: Internal volume. DP: DP-VOL External: External volume. External MF: Migration volume. Snapshot: Thin Image volume. ALU: LDEV of the ALU attribution.
Attribute	Attribute of the volume indicating how the LDEV is being used. Command Device: Volume is a command device. Remote Command Device: Volume is a remote command device. JNL VOL: Volume is a journal volume. Pool VOL: Volume is a pool volume. The number in parentheses shows the pool identifier. Quorum Disk: Quorum disk for global-active device. ALU: LDEV of the ALU attribution. SLU: LDEV of the SLU attribution. Data Direct Mapping: LDEV of the data direct mapping attribute Hyphen (-): Volume other than the above.
Access Attribute ¹	Displays the access attribute of the LDEV.
Pool Name (ID)	Pool name (pool identifier).
Parity Group ID	Parity group identifier.
RAID Level	RAID level. An asterisk (*) indicates that the parity group that the LDEV belong to is interleaved (concatenated).
MP Unit ID ²	MP unit identifier.
Encryption ¹	Displays information about the encryption information. - Enable: Encryption setting of a parity group (or a pool) in which the LDEV is placed is disabled. Or the virtual volume associated with the pool whose pool-VOLs are disabled of the encryption setting. - Disable: Encryption setting of a parity group (or a pool) in which the LDEV is placed is disabled. Or the virtual volume associated

Item	Description
	with the pool whose pool-VOLs are disabled of the encryption setting. - Mixed: Pool-VOLs whose encryption settings are enabled and pool-VOLs whose encryption settings are disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. - Hyphen(-): External volume. For DP-VOL of Dynamic Provisioning, either the pool-VOL in the pool that owns DP-VOL is an external volume or that pool is being blocked. This item is not displayed when using Virtual Storage Platform G200.
T10 PI ¹	T10 PI attribute setting (Enabled or Disabled) on LDEV.
External Storage System ¹	Information about the external storage system. If LDEV is the DP-VOL of the data direct mapping attribute, the information about the external storage system to which LDEV is being mapped appears. - Vendor/Model/Serial Number: The information about these items of the external storage system is displayed. A hyphen (-) appears if an external storage system is not mapped to LDEV. - Path Group ID: The information about this item of the external storage system is displayed. If the link of the path group id is clicked, the Mapped Volumes tab appears. A hyphen (-) appears if an external storage system is not mapped to LDEV.
Data Direct Mapping ¹	Information about the data direct mapping. - LDEV ID: LDEV ID of the pool-VOL in the pool of the data direct mapping attribute, or LDEV ID of the DP-VOL of the data direct mapping attribute. If the link of the LDEV ID is clicked, the LDEV Properties window appears. If the data direct mapping attribute is disabled, a hyphen (-) is displayed. If DP-VOL of the data direct mapping attribute is not created in the pool of the data direct mapping attribute, this field is blank. - Parity Group ID: Parity Group ID of the pool-VOL in the pool of the data direct mapping attribute. If the data direct mapping attribute is disabled, a hyphen (-) is displayed.
Resource Group Name (ID) ¹	Resource group name and identifier of which this LDEV is a member.
Virtual Storage Machine ¹	Information about the virtual storage machine. - Model / Serial Number¹: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID¹: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name¹: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual

Item	Description
	CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. SSID¹: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank.
Create LDEVs	Opens the .
Add LUN Paths	Opens the LUN Paths window.
Edit LDEVs	Opens the Edit LDEVs window.
Format LDEVs ³	Opens the Format LDEVs window.
Delete LDEVs ³	Opens the Delete LDEVs window.
Shred LDEVs ³	Opens the Shred LDEVs window.
Delete LUN Paths ³	Opens the Delete LUN Paths window.
Edit Command Device ³	Opens the Edit Command Devices window
Block LDEVs ³	Opens the Block LDEVs window.
Restore LDEVs ³	Opens the Restore LDEVs window.
Assign MP Unit ³	Opens the Assign MP Unit window.
Delete UUIDs ³	Opens the Delete UUIDs window.
Reclaim Zero Pages ³	Opens the Reclaim Zero Pages window.
Stop Reclaiming Zero Pages ³	Opens the Stop Reclaiming Zero Pages window.
Expand V-VOLs ³	Opens the Expand V-VOLs window.
Migrate Volumes ³	Opens the Migrate Volumes window. For details, see <i>Hitachi Volume Migration User Guide</i> .
Interrupt Shredding Task ³	Opens the Interrupt Shredding Task window.
Force Delete Pairs (TC Pairs) ³	Opens the Force Delete Pairs (TC Pairs) window. For details, see Hitachi TrueCopy® User Guide.
Force Delete Pairs (UR Pairs) ³	Opens the Force Delete Pairs (UR Pairs) window. For details, see Hitachi Universal Replicator User Guide.
Force Delete Pairs (GAD Pairs) ³	Opens the Force Delete Pairs (GAD Pairs) window. For details, see Global-Active Device User Guide.
ALUs / SLUs ³	Opens the ALUs / SLUs window.
Unbind SLUs ³	Opens the Unbind SLUs window.
Export ³	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
¹ Does not appear by default. To display this item, change the Column Settings window.	

Item	Description
	² If an MP unit is blocked due to a failure, the processing to be performed by the MP unit where the failure occurred is taken over by another normal MP unit. See " MP unit priorities after takeover on page C-22 " for priorities assumed by MP units after takeover.
	³ Available when you click More Actions .

MP unit priorities after takeover

The following table shows the MP unit priorities after takeover.

MP unit blocked by failure	Priority assumed by MP units after takeover		
	1st	2nd	3rd
MPU10	MPU11	MPU21	MPU20
MPU11	MPU10	MPU20	MPU21
MPU20	MPU21	MPU11	MPU10
MPU21	MPU20	MPU10	MPU11

Create LDEVs wizard

Use this window to create and provision LDEVs. You can create multiple LDEVs at once when setting up your storage system.

Create LDEVs window

[illegible]

- [Setting fields on page C-23](#)
- [Selected LDEVs table on page C-28](#)

Setting fields

Item	Description
Provisioning Type	Select the type of LDEV. Basic: Internal volume. Dynamic Provisioning: DP-VOL. External: External volume. Snapshot: Thin Image volume. ALU: LDEV of the ALU attribution.
Data Direct Mapping	Select Enable or Disable for the data direct mapping attribute. This item can be selected if the Provisioning Type is DP or External. If the Provisioning Type is External and external volume of the data direct mapping does not exist, you cannot select Enable . Enable: The data direct mapping attribute is enabled. Disabled: The data direct mapping attribute is disabled.
Multi-Tier Pool	Select Enable or Disable of using Dynamic Tiering. Enable: The pool for Dynamic Tiering is displayed in the Select Pool window. Disable: The pool for Dynamic Provisioning is displayed in the Select Pool window.

Item	Description
Active Flash	The sets to be enabled for active flash. To check on this item both of the following are required: - The item for Multi-Tier Pool is enabled. - Pool volumes whose drive type is SSDs are installed.
Parity Group Selection, Pool Selection, or External Volume Selection	Select the parity group to which the LDEV is assigned. Parity Group Selection: Displayed when you create internal volumes. Pool Selection: Displayed when you create DP-VOLs. If the Data Direct Mapping is set to enable, this item is not displayed. External Volume Selection: Displayed when you create external volumes.
Drive Type/RPM	Select the data drive type and RPM. Any: All types of disk drives and RPMs that can be contained in the system. SSD: Includes SLC/MLC for SSD, FMC, and FMD. SAS/RPM: SAS drive and RPM. For VSP Fx00 models, SAS drives cannot be specified. External Storage: External storage system. Mixed: Mixes the data drive type.
RAID Level	Select the RAID level. External Storage is selected from the Drive Type/RPM field, a hyphen (-) appears.
Select Free Spaces	Displays the Select Free Spaces window.
Select Pool	Displays the Select Pool window.
Total Selected Free Spaces	Displays the number of the selected free spaces.
Total Selected Free Space Capacity	Displays the total capacity of the free spaces.
Selected Pool Name (ID)	Displays the selected pool name and ID.
Selected Pool Capacity	Displays the selected pool capacity.
LDEV Capacity	- Offset Boundary: To offset the specified LDEV capacity by boundary, set the Offset Boundary to ON. - Input area: Specify the LDEV capacity to create in a free space, a pool, or an external volume. Detailed calculation of the LDEV capacity differs depending on the specification of the unit. For details, see Virtual LUN size calculations on page 4-13. If the Data Direct Mapping is set to enable, this item is not displayed.
Number of LDEVs per Free Space, Number of LDEVs, or Number of LDEVs per External Volume	Specify the number of LDEVs to create in a free space, pool, or the external volume.

Item	Description
	If the Provisioning Type is set to DP and the Data Direct Mapping is set to enable, this item is not displayed. If the Provisioning Type is set to External and the Data Direct Mapping is set to enable, 1 is displayed in the Number of LDEVs per External Volume.
Available Volumes	Select available volumes. This item is displayed when the Provisioning Type is DP and the data direct mapping is Enable. The following items are displayed: • LDEV ID • LDEV Name • Parity Group ID • Capacity (of the LDEV) • Vendor/Model/Serial Number • Pool Name (ID) • Subscription Current (%): The percentage of the current subscription of the pool. • Subscription Limit (%): The percentage of the limit subscription of the pool. • Capacity (of the pool)
LDEV Name	LDEV name. Specify the prefix characters and the initial number. • Prefix: A fixed character string. • Initial Number: The initial number of the LDEV name. Specify the initial number according to the examples below. You can specify up to 32 characters total. Example: ◦ 1: Up to 9 numbers are added (1, 2, 3... 9). ◦ 08: Up to 92 numbers are added (08, 09, 10... 99). ◦ 23: Up to 77 numbers are added (23, 24, 25... 99). ◦ 098: Up to 902 numbers are added (098, 099, 100... 999).
Format Type	Specify the format type. This appears when an internal or external volume is used. Quick Format: Quick formatting is the default format type. You cannot select this when the provisioning type is something other than the internal volume. Normal Format: Normal formatting. Parity Group Format: Parity group is formatted. This type can be selected if no LDEV exists in the parity group. No Format: Volumes are not formatted.
Initial LDEV ID	Specify the LDEV ID. LDKC is fixed to 00. Default of CU and DEV is 00:00.

Item	Description
	For creating multiple LDEVs, select the interval of the assigned LDEV ID from the Interval list.
View LDEV IDs	Displays the View LDEV IDs windows.
CLPR	Cache logical partition number, displayed as <i>ID:CLPR</i> .
MP Unit ID	Specify the MP unit you want to assign to the LDEV. You can select an identifier from MPB0 to MPB7. If automatic assignment is enabled for one or more MPs, you can also select Auto. If Auto is enabled, the default is Auto. If Auto is disabled, the default is the lowest number of the MP unit.
Full Allocation	Select Enable to reserve pages in a pool that is associated with LDEVs. The default is Disable. Full allocation will be performed if either Enable or Disable are selected. You can select Enable if all of following are satisfied: - The sum of the mapped capacity and the reserved capacity is same or less than the depletion threshold. - The specified pool is not in the shrink processing of the pool capacity. - The data direct mapping attribute is disabled.
Tiering Policy	Tiering Policy: All(0) is selected by default. You can change a level from Level1(1) to Level5(5) or from Level6(6) to Level31(31). See Notes on tiering policy settings on page 5-56 . You can specify this function when the Multi-Tier Pool is enabled.
New Page Assignment Tier	Specify the new page assignment tier you want to assign to the LDEV. Middle is selected by default. You can select from the levels of High, Middle, and Low. See New page assignment tier on page 5-59 . You can specify this function when the Multi-Tier Pool is enabled.
Relocation Priority	Specify this option if the LDEV is to be relocated preferentially. You can select Default or Prioritize. You can specify this function when the Multi-Tier Pool is enabled.
T10 PI	Specify the T10 PI attribute setting (Enabled or Disabled) on LDEV. This item can be specified if Provisioning Type is defined with one of three types: Basic, DP, or Snapshot.
Add	Adds the LDEVs that have settings specified in the setting field is added to the Selected LDEVs table.

The items that can be set in this window depend on the type of volume you are creating. The following table lists the items that can be set according to volume type.

Item	Internal volume	V-VOL	External volume	Snapshot volume	LDEV of the ALU attribution
Provisioning Type	Required	Required	Required	Required	N/A
Data Direct Mapping	N/A	Optional	Optional	N/A	N/A
Multi-Tier Pool	N/A	Required	N/A	N/A	N/A
Active Flash	N/A	Optional	N/A	N/A	N/A
Drive Type/RPM	Required	Required	Disabled	N/A	N/A
RAID Level	Required	Required	Disabled	N/A	N/A
Select Free Spaces	Required	N/A	Required	N/A	N/A
Select Pool	N/A	Required	N/A	N/A	N/A
Offset Boundary	Optional	Optional	Optional	Optional	N/A
LDEV Capacity	Required	Required	Required	Required	N/A
Number of LDEVs per Free Space	Required	N/A	N/A	N/A	N/A
Number of LDEVs	N/A	Required	N/A	Required	Required
Number of LDEVs per External Volume	N/A	N/A	Required	N/A	N/A
Available Volumes	N/A	Optional	Optional	N/A	N/A
LDEV Name	Optional	Optional	Optional	Optional	Optional
Format Type	Required	N/A	Required	N/A	N/A
Initial LDEV ID	Optional	Optional	Optional	Optional	Optional
View LDEV IDs	Optional	Optional	Optional	Optional	Optional
CLPR	N/A	Optional	N/A	Optional	Optional
MP Unit ID	Optional	Optional	Optional	Optional	Optional
Full Allocation	N/A	Optional	N/A	N/A	N/A
Tiering Policy	N/A	Optional	N/A	N/A	N/A
New Page Assignment Tier	N/A	Optional	N/A	N/A	N/A
Relocation Priority	N/A	Optional	N/A	N/A	N/A
T10 PI	Optional	Optional	N/A	Optional	N/A

Selected LDEVs table

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	LDEV name, including the combination of prefix characters and the initial number.
Parity Group ID	Parity group identifier.
Pool Name (ID)	Pool name and pool identifier.
Data Direct Mapping	Information about the data direct mapping. - LDEV ID: LDEV ID of the pool-VOL in the pool of the data direct mapping attribute, or LDEV ID of the DP-VOL of the data direct mapping attribute. If the data direct mapping attribute is disabled, a hyphen (-) is displayed. - Parity Group ID: Parity Group ID of the pool-VOL in the pool of the data direct mapping attribute. If the data direct mapping attribute is disabled, a hyphen (-) is displayed.
Drive Type/RPM	Drive type and RPM in use on this LDEV.
RAID Level	RAID level. An asterisk "*" indicates that the parity group to which the LDEV belongs is interleaved (concatenated).
Capacity	LDEV capacity.
Format Type	Format type.
CLPR	Cache logical partition number, displayed as <i>ID:CLPR</i> . For detailed information about CLPRs, see the <i>Performance Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models</i> .
MP Unit ID	MP unit identifier. If Auto is selected, the identifier is automatically assigned.
Multi-Tier Pool	Indicates whether Dynamic Tiering is enabled or disabled. Enabled: The LDEV is for Dynamic Tiering. Disable: The LDEV is for Dynamic Tiering.
Full Allocation	Displays the status of the setting for the full allocation in a pool associated with the V-VOL. - Enable: Full allocation of all DP-VOL pages is performed. - Disable: Full allocation of all DP-VOL pages is not performed.
Active Flash	Indicates whether active flash is enabled or disabled. Enabled: The LDEV is for active flash. Disable: The LDEV is for Dynamic Tiering. Hyphen (-): The LDEV is for Dynamic Provisioning.

Item	Description
Tiering Policy	The tiering policy name and identifier for the LDEV.
New Page Assignment Tier	Displays the new page assignment tier for the LDEV.
Relocation Priority	Displays the relocation priority assigned to the LDEV.
Attribute	Displays the attribute of the LDEV. ALU: LDEV of the ALU attribution. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Encryption	Displays information about the encryption information. • Enable: Encryption setting of a parity group in which the LDEV is placed is enabled. Or the virtual volume associated with the pool whose pool-VOLs are enabled of the encryption setting. • Disable: Encryption setting of a parity group in which the LDEV is placed is disabled. Or the virtual volume associated with the pool whose pool-VOLs are disabled of the encryption setting. • Mixed: Pool-VOLs whose encryption settings are enabled and pool-VOLs whose encryption settings are disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): External volume. For DP-VOL of Dynamic Provisioning, either the pool-VOL in the pool that owns DP-VOL is an external volume or that pool is being blocked This item is not displayed when using Virtual Storage Platform G200.
T10 PI	Displays the T10 PI attribute information (Enabled or Disabled) on LDEV.
Resource Group Name (ID)	Resource group name and identifier of which this LDEV is a member.
Virtual Storage Machine	Displays the information about the virtual storage machine. • Model / Serial Number: The model name and serial number of the virtual storage machine having the LDEV. • Attribute: Virtual LDEV attribute. If the attribute is not set for LDEV, this column is blank.
Change LDEV Settings	Opens the Change LDEV Settings window.
Remove	Removes the added LDEV.

Create LDEVs confirmation window



Note: If multiple tasks that are connected in one wizard are executed, this window shows all configured items of tasks. To show information of configured items other than this topic, click **Back** to display related setting windows, then click **Help**.

[illegible]

Selected LDEVs table

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	LDEV name, including the combination of prefix characters and the initial number.
Data Direct Mapping	Information about the data direct mapping. - LDEV ID: LDEV ID of the pool-VOL in the pool of the data direct mapping attribute, or LDEV ID of the DP-VOL of the data direct mapping attribute. If the data direct mapping attribute is disabled, a hyphen (-) is displayed. - Parity Group ID: Parity Group ID of the pool-VOL in the pool of the data direct mapping attribute. If the data direct mapping attribute is disabled, a hyphen (-) is displayed.
Parity Group ID	Parity group identifier.
Drive Type/RPM	Drive type and RPM in use on this LDEV.

Item	Description
Pool Name (ID)	Pool name (pool identifier).
RAID Level	RAID level. An asterisk "*" indicates that the parity group to which the LDEV belongs is interleaved (concatenated).
Capacity	LDEV capacity.
Provisioning Type	Type of LDEV. Basic: Internal volume. DP: DP-VOL. External: External volume. Snapshot: Thin Image volume. ALU: LDEV of the ALU attribution.
Format Type	Format type.
CLPR	Cache logical partition number, in <i>ID:CLPR</i> format. For detailed information about CLPRs, see the <i>Performance Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models</i> .
MP Unit ID	MP unit identifier. If Auto is selected, the identifier is automatically assigned.
Multi-Tier Pool	Displays whether Dynamic Tiering is enabled or disabled. Enable: The LDEV for Dynamic Tiering is displayed. Disable: The LDEV for Dynamic Provisioning is displayed.
Active Flash	Indicates whether active flash is enabled or disabled. Enabled: The LDEV is for active flash. Disable: The LDEV is for Dynamic Tiering. Hyphen (-): The LDEV is for Dynamic Provisioning.
Full Allocation	Displays the status of the setting for the full allocation in a pool associated with the V-VOL. • Enable: Full allocation of all DP-VOL pages is performed. • Disable: Full allocation of all DP-VOL pages is not performed.
Tiering Policy	Displaying the tiering policy name and identifier for the LDEV.
New Page Assignment Tier	Displays the new page assignment tier for the LDEV.
Relocation Priority	Relocation priority assigned to the LDEV.
Attribute	Displays the attribute of the LDEV. ALU: LDEV of the ALU attribution. Data Direct Mapping: LDEV of the data direct mapping attribute.

Item	Description
	Hyphen (-): Volume in which the attribute is not defined.
Encryption	Displays information about the encryption information. • Enable: Encryption setting of a parity group in which the LDEV is placed is enabled. Or the virtual volume associated with the pool whose pool-VOLs are enabled of the encryption setting. • Disable: Encryption setting of a parity group (or a pool) in which the LDEV is placed is disabled. Or the virtual volume associated with the pool whose pool-VOLs are disabled of the encryption setting. • Mixed: Pool-VOLs whose encryption settings are enabled and pool-VOLs whose encryption settings are disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): External volume. For DP-VOL of Dynamic Provisioning, either the pool-VOL in the pool that owns DP-VOL is an external volume or that pool is being blocked This item is not displayed when using Virtual Storage Platform G200.
T10 PI	Displays the T10 PI attribute information (Enabled or Disabled) on LDEV.
Resource Group Name (ID)	Resource group name and identifier of which this LDEV is a member.
Virtual Storage Machine	Displays the information about the virtual storage machine. • Model / Serial Number: The model name and serial number of the virtual storage machine having the LDEV. • Attribute: Virtual LDEV attribute. If the attribute is not set for LDEV, this column is blank.

Edit LDEVs wizard

Use this window to change the LDEV name.

Edit LDEVs window

Use this window to edit LDEV properties.

Edit LDEVs

1.Edit LDEVs > 2.Confirm

This wizard lets you edit one or more properties.
Check the box in front of the property you want to edit, and then enter the new value.

☐ **LDEV Name:** Prefix: Initial Number:
(Max. 32 characters total including max. 9-digit number, or blank)

☒ **Full Allocation:** ☒ Enable ☐ Disable

☐ **Tiering Policy:**

☐ **New Page Assignment Tier:**

☐ **Tier Relocation:** ☐ Enable ☐ Disable

☐ **Relocation Priority:** ☐ Default ☐ Prioritize

Back Next Finish Cancel ?

Item	Description
LDEV Name	Specify the LDEV name, using up to 32 characters. - Prefix: Fixed character string. - Initial Number: Initial number. Specify the initial number according to these examples. Example: 1: Up to 9 numbers are added (1, 2, 3 ... 9) 08: Up to 92 numbers are added (08, 09, 10 ... 99) 23: Up to 77 numbers are added (23, 24, 25 ... 99) 098: Up to 902 numbers are added (098, 099, 100 ... 999)
Full Allocation	Select Enable to allocate all pages of LDEVs on the current pool. The default is Disable. If the following conditions of the LDEVs are met, you can select Enable. - All LDEVs are V-VOLs of Dynamic Provisioning. - The sum of the mapped capacity and the reserved capacity is same or less than the depletion threshold. - The specified pool is not in the shrink processing of the pool capacity. - The status of LDEV is Normal. - The data direct mapping attribute is disabled.

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	LDEV name, including the combination of prefix characters and the initial number.
Parity Group ID	Parity group identifier.
Pool Name (ID)	Pool name and pool identifier.
Capacity	LDEV capacity.
Provisioning Type	Type of LDEV. Basic: Internal volume. DP: DP-VOL. External: External volume. Snapshot: Thin Image volume. ALU: LDEV of the ALU attribution.
Full Allocation	Displays the status of the setting for the full allocation in a pool associated with the V-VOL. • Enable: Full allocation is performed. • Disable: Full allocation is not performed. • Hyphen (-): LDEVs other than V-VOLs for Dynamic Provisioning.
Tiering Policy	Tiering policy. A hyphen is displayed for volumes other than Dynamic Tiering volumes.
New Page Assignment Tier	Displays the new page assignment tier for the LDEV. A hyphen (-) is displayed for volumes other than Dynamic Tiering volumes.
Tier Relocation	Displays whether tier relocation is enabled or disabled. A hyphen (-) is displayed for volumes other than Dynamic Tiering volumes.
Relocation Priority	Displays the relocation priority assigned to the LDEV. A hyphen is displayed if the LDEV is the one of the following: • LDEV other than Dynamic Tiering. • The tier relocation of LDEV is set to disabled.

Change LDEV Settings window

Use this window to edit one or more LDEV properties.

Change LDEV Settings

This wizard lets you edit one or more properties.
Check the box in front of the property you want to edit, and then enter the new value.

☐ **LDEV Name:** Prefix Initial Number
 (Max. 32 characters total including max. 9-digit number, or blank)

☐ **Initial LDEV ID:** LDKC CU DEV
 00 : 00 : 2A
 Interval
 0 View LDEV IDs

☐ **MP Unit ID:** Auto

☐ **T10 PI:** ☐ Enable ☒ Disable

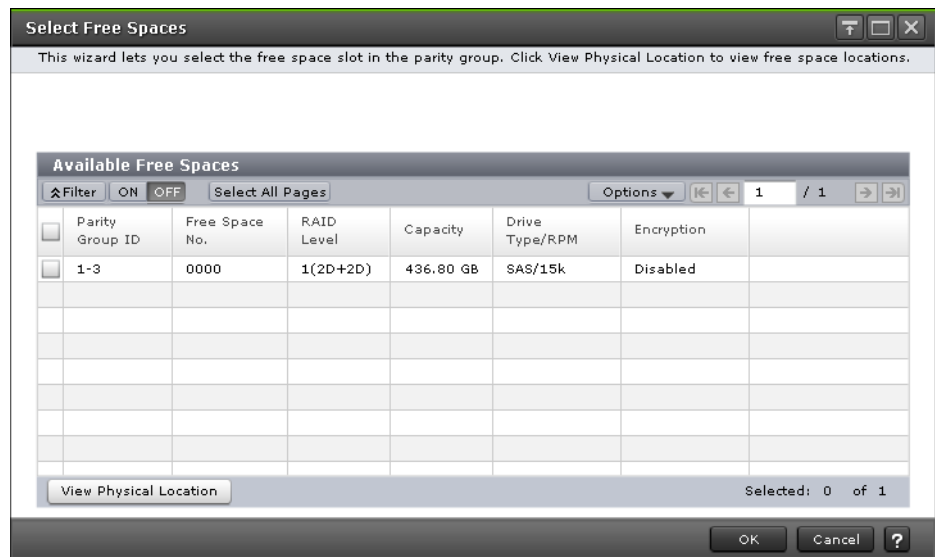
OK Cancel ?

Item	Description
LDEV Name	Specify the LDEV name, using up to 32 characters. - Prefix: Fixed character string. - Initial Number: Initial number. Specify the initial number according to these examples. Examples: 1: Up to 9 numbers are added (1, 2, 3 ... 9) 08: Up to 92 numbers are added (08, 09, 10 ... 99) 23: Up to 77 numbers are added (23, 24, 25 ... 99) 098: Up to 902 numbers are added (098, 099, 100 ... 999)
Initial LDEV ID	Specify the LDEV identifier, which is the combination of LDKC, CU, and LDEV. Assigns the identifier at a certain interval starting with the identifier you specify. - LDKC: Specify the LDKC number. It is fixed to 00. - CU: Specify the CU number. - DEV: Specify the LDEV number. - Interval: Specify the interval of the assigned LDEV ID. - View LDEV IDs: Opens the View LDEV IDs window.
MP Unit ID	Select the MP unit id you want to assign to the LDEV. Select any identifier or Auto.

Item	Description
	Select an identifier from MPB0 to MPB7. If automatic assignment is enabled for one or more MPs, you can also select Auto.
T10 PI	Specify the T10 PI attribute setting (Enabled or Disabled) on LDEV.

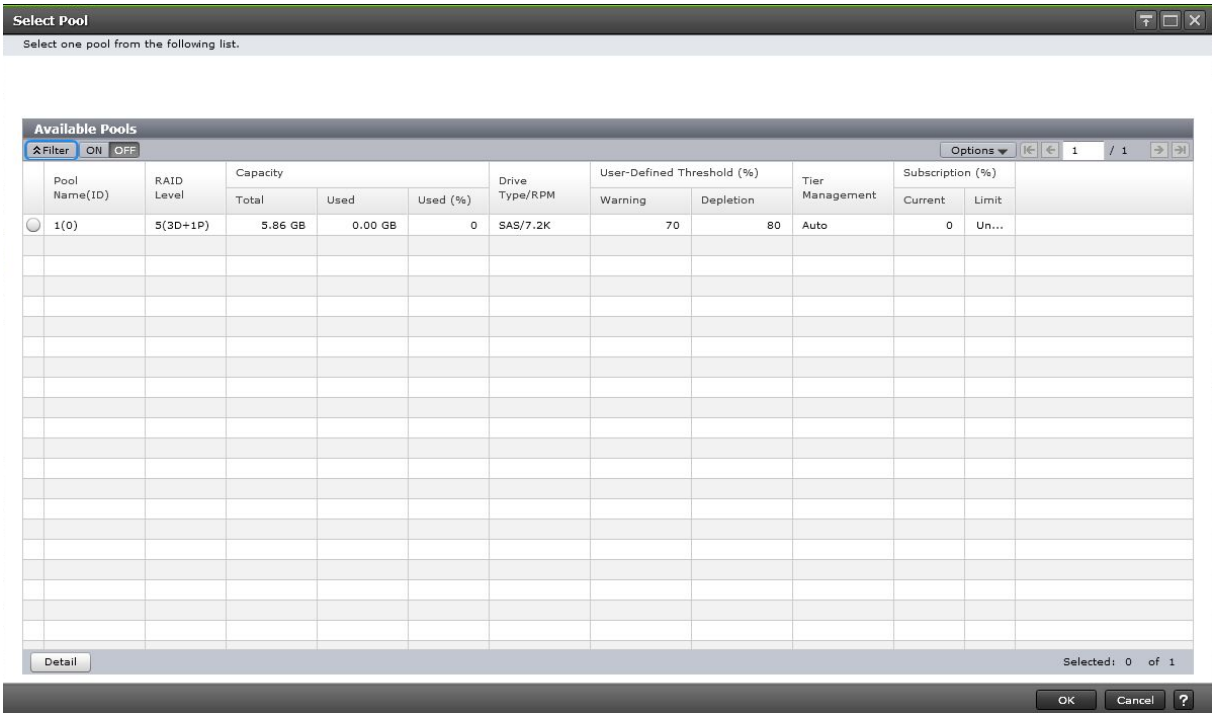
Select Free Spaces window

Use this window to view information about available free space slots in the parity group. Only the free spaces in the parity groups assigned to the logged-on user are available.



Item	Description
Parity Group ID	Parity group identifier.
Free Space No.	Sequence number for identifying free space in the parity group.
RAID Level	RAID level. An asterisk "*" indicates that the parity group to which the LDEV belongs is interleaved (concatenated).
Capacity	Capacity of free space.
Drive Type/ RPM	Drive type and RPM in use on this LDEV.
Encryption	Encryption information. Enable: encrypted parity group Disable: non-encrypted parity group Hyphen (-): the parity group cannot be defined of the encryption function. This item is not available with Virtual Storage Platform G200.
View Physical Location	Opens the View Physical Location window.

Select Pool window



Available Pools table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
RAID Level	Displays the RAID level.
Capacity	Displays information about the pool capacity. Total: Total capacity of pool. Used: Sum of the mapped capacity and the reserved capacity. The displayed value of Used might be larger than the displayed value of Total due to the following reasons: Used displays the sum of the mapped capacity and the reserved capacity that is rounded up on each page. - The mapped capacity of DP-VOL includes the capacity of the control information (Uses a maximum of 168 MB per 3,145,548 MB). - DP-VOL of the data direct mapping attribute includes the control information (168 MB is used per 3,145,548 MB) and the capacity for one page. Used (%): Percentage of the sum of the mapped capacity and the reserved capacity of a pool. Used (%) displays the value which is truncated after the decimal point of the actual value.

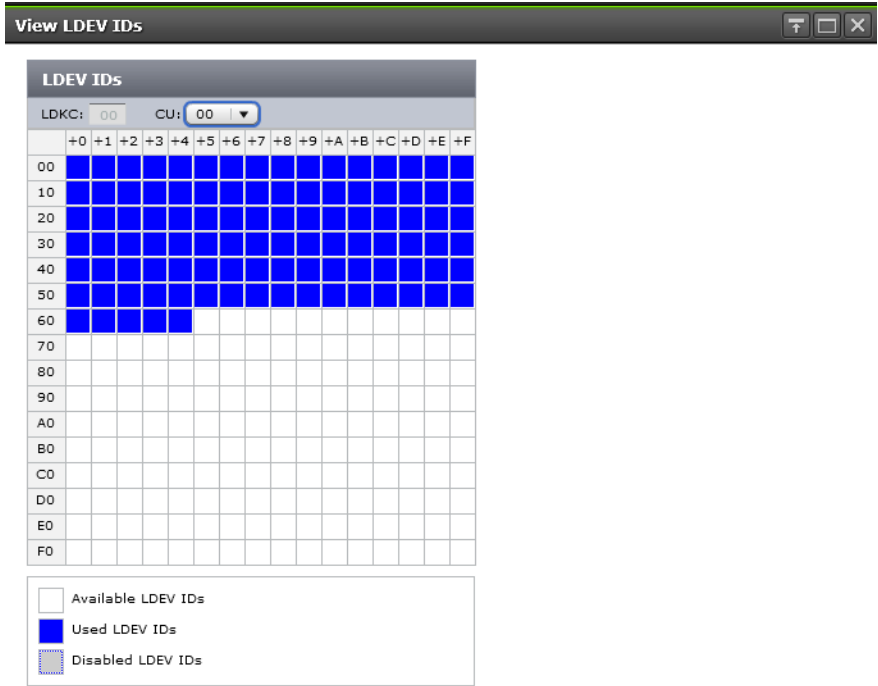
Item	Description
Drive Type/RPM	Displays the data drive type and RPM. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.
Encryption	Displays information about the encryption information. • Enabled: Pool which is created by pool-VOLs whose encryption settings are enabled. • Disable: Pool which is created by pool-VOLs whose encryption settings are disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed. This status appears when two or more of the following are specified as pool-VOLs: ◦ Volume encryption setting is enabled ◦ Volume encryption setting is disabled ◦ External volume Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): The pool is created by external volumes or is being blocked. This item is not displayed when using Virtual Storage Platform G200.
User-Defined Threshold (%)	Displays the pool threshold. • Warning: Warning threshold is displayed. • Depletion: Depletion threshold is displayed.
Tier Management	Displays Auto or Manual according to the Tier Management setting when Dynamic Tiering is enabled. Displays Manual for pools other than Dynamic Tiering which are available for monitoring. For other pools, a hyphen (-) is displayed.
Subscription (%)	Displays information about subscription of the pool. • Current: Percentage of the total V-VOL capacity assigned to the pool and the V-VOL capacity to be created. • Limit: Percentage of the subscription limit of the pool.
Detail	Displays the Pool Properties window when selecting a row and clicking this button

View LDEV IDs window

Use this window to view available, used, and disabled LDEV IDs in matrix format. The vertical scale in the matrix represents the second-to-last digit of the LDEV number, and the horizontal scale represents the last digit of the LDEV number.

In the matrix, cells of used LDEV numbers display in blue, unselectable in gray, and unused in white. The LDEV numbers corresponding to any one of the following conditions cannot be specified:

- LDEV is already in use.
- LDEV is already assigned to another emulation group (grouped every 32 LDEVs).
- LDEV is not assigned to the user.



Item	Description
LDEV IDs	LDEV identifier, which is the combination of LDKC, CU, and LDEV. LDKC: Indicates the LDKC number. CU: Indicates the CU number. For the CU number of each storage system type, see following: • VSP G800 or VSP F800: From 00 to 3F • VSP G400, G600 or VSP F400, F600: From 00 to 0F • VSP G200: From 00 to 07

View Physical Location window

Use this window to view information about the physical location of where free spaces and LDEVs are assigned in a parity group.

View Physical Location

Parity Group Property

Parity Group ID	1-1
RAID Level	5(3D+1P)
Capacity(Free/Total)	445.19 GB/805.19 GB
Drive Type/RPM	SAS/15k
Vendor/Model/Serial Number	- / - / -
Resource Group Name (ID)	meta_resource(0)

Physical Location

Filter ON OFF

Options

Physical Location No.	Free Space No.	LDEV ID	LDEV Name	Capacity	Number of Paths
0000	-	00:00:00		10.00 GB	0
0001	-	00:00:01		10.00 GB	0
0002	-	00:00:02		10.00 GB	0
0003	-	00:00:03		10.00 GB	0
0004	-	00:00:04		10.00 GB	0
0005	-	00:00:05		10.00 GB	0
0006	-	00:00:06		10.00 GB	0
0007	-	00:00:07		10.00 GB	0
0008	-	00:00:08		10.00 GB	0
0009	-	00:00:09		10.00 GB	0
0010	-	00:00:0A		10.00 GB	0
0011	-	00:00:0B		10.00 GB	0
0012	-	00:00:0C		10.00 GB	0

Total: 37

Close ?

Parity Group Property table

Item	Description
Parity Group ID	Parity group identifier. For an interleaved parity group, all parity groups that are contained in the interleaved parity group are shown.
RAID Level	RAID level. An asterisk "*" indicates that the parity group to which the LDEV belongs is interleaved (concatenated).
Capacity (Free/Total)	Free capacity and total capacity of the parity group. The control information used by the storage system, such as control cylinders, is not included in the Free capacity. The total capacity of the LDEVs and Free capacity is displayed in the Total.
Drive Type/ RPM	Drive type and RPM in use on this LDEV.
Vendor/Model/Serial Number	For external volumes, vendor name, model name, and serial number appear. For internal volumes, -/-/- appears.
Resource Group Name (ID)	Resource group name and identifier of which this parity group is a member.

Physical Location table

Item	Description
Physical Location No.	Location where the free spaces and LDEVs are assigned.

LDEV GUI reference

C-41

Provisioning Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models

Item	Description
Free Space No.	Free space number. The hyphenation appears for volumes other than free spaces.
LDEV ID	LDEV identifier. A hyphen (-) appears for other than LDEV IDs.
LDEV Name	LDEV name. A hyphen (-) appears for volumes other than LDEVs.
Capacity	Capacity of the LDEV.
Number of Paths	Number of paths set for the LDEV. A hyphen (-) appears for volumes other than LDEVs.

Format LDEVs wizard

Use this window to format LDEVs. LDEVs must be formatted before you can use the storage space.

Format LDEVs window

Format LDEVs

1.Format LDEVs > 2.Confirm

This wizard lets you format the LDEVs before your application can use the storage space.

Format Type : Quick Format

Number of Selected Parity Groups : 1

- A maximum of 72 parity groups can concurrently undergo Quick Format.
- Quick Format may impact the host I/O performance.

Back Next Finish Cancel ?

Item	Description
Format Type	Select the type of formatting to be used on this LDEV.

Item	Description
	Basic: Internal volume. DP: DP-VOL. External: External volume. Snapshot: Thin Image volume. ALU: LDEV of the ALU attribution.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. ALU: LDEV of the ALU attribution. SLU: LDEV of the SLU attribution. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Format Type	How the LDEV is formatted. - Quick Format: Quick-formatting is performed. - Normal Format: Normal formatting is performed.

Restore LDEVs window

Use this window to recover blocked LDEVs.

Restore LDEVs

1. Confirm

This wizard lets you recover blocked LDEVs. Enter a name for the task.
Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name:

(Max. 32 Characters)

Selected LDEVs						
LDEV ID	LDEV Name	Parity Group ID	Pool Name(ID)	Capacity	Provisioning Type	Attribute
00:00:01		1-1	-	0.04 GB	Basic	-
00:00:02		1-1	-	0.04 GB	Basic	-
00:00:03		1-1	-	0.04 GB	Basic	-
Total:						3

☐ Go to tasks window for status

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	LDEV name.
Parity Group ID	Parity group identifier.

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	LDEV name.
Parity Group ID	Parity group identifier.
Pool Name (ID)	Pool name and pool identifier.
Capacity	LDEV capacity.
Provisioning Type	Provisioning type assigned to the LDEV. Basic: Internal volume. DP: DP-VOL. External: External volume. Snapshot: Thin Image volume. ALU: LDEV of the ALU attribution.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. ALU: LDEV of the ALU attribution. SLU: LDEV of the SLU attribution. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.

Delete LDEVs window

Use the window to delete an LDEV from a parity group.

Delete LDEVs

1. Confirm

⚠ Selected Logical devices (LDEVs) will be deleted. Are you sure to continue?

Task Name: (Max. 32 Characters)

LDEV ID	LDEV Name	Parity Group ID	Pool Name(ID)	Capacity	Provisioning Type	Attribute
00:00:01		1-1	-	0.04 GB	Basic	-
00:00:02		1-1	-	0.04 GB	Basic	-
00:00:03		1-1	-	0.04 GB	Basic	-

Total: 3

Go to tasks window for status Back Next Apply Cancel ?

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	LDEV name.
Parity Group ID	Parity group identifier.
Pool Name (ID)	Pool name and pool identifier.
Capacity	LDEV capacity.
Provisioning Type	Provisioning type assigned to the LDEV. Basic: Internal volume. DP: DP-VOL. External: External volume. Snapshot: Thin Image volume. ALU: LDEV of the ALU attribution.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. ALU: LDEV of the ALU attribution. SLU: LDEV of the SLU attribution. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.

LDEV Properties window

Use this window to view properties assigned to a selected LDEV.

- [LDEV Properties table on page C-48](#)
- [Basic tab on page C-49](#)
- [Replication Tab on page C-53](#)

Basic		Replication	
Basic Properties			
Parity Group	ID	1-1	
	Interleaved Parity Groups	-	
	RAID Level	1(2D+2D)	
	Drive Type/RPM	SAS/7.2k	
Pool	Encryption	-	
	Name (ID)	-	
	RAID Level	-	
Type		-	
Provisioning Type		Basic	
Status		Normal	
PIN Status		Normal	
Attribute		-	
Command	Security	-	
Device	User Authentication	-	
Attribute	Device Group Definition	-	
Number of Paths		32	
UUID			
CLPR		0:CLPR0	
Access Attribute		Read/Write	
SSID		0004	
Cache Mode		-	
V-VOL Management Task		-	
Consistent View		NEW	

Item	Description
	attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. SSID: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank.

Basic tab

LDEV basic information is displayed in the Basic Properties, LUNs, and Hosts.

Basic Properties table

Item	Description
Parity Group	Displays information about the parity group. ID: Displays the parity group ID. Interleaved Parity Groups: Displays the interleaved parity groups. RAID Level: Displays the RAID level of parity group. The asterisk (*) indicates the parity group is the interleaved parity group. Drive Type/RPM: Displays the data drive type and RPM. Encryption: Displays the encryption setting (enable or disable). If the parity group in which the encryption setting is not defined, a hyphen (-) is displayed. This item is not available with Virtual Storage Platform G200.
Pool	Displays information about the pool. Name (ID): Displays the pool name and ID. RAID Level: Displays the RAID level of pool. Type: Displays the data drive type of pool. Encryption: Displays the encryption information about the pool. - Enable: Encryption setting of a pool-VOL containing LDEV is enabled. - Disable: Encryption setting of a pool-VOL containing LDEV is disabled. - Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed. This status appears when two or more of the following are specified as pool-VOLs: - Volume encryption setting is enabled - Volume encryption setting is disabled

Item	Description
	- External volume Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. - Hyphen(-): The pool is created by external volumes or is being blocked. This item is not displayed when using Virtual Storage Platform G200.
Provisioning Type	Display the type of LDEV. Basic: Internal volume. DP: DP-VOL. External: External volume. Snapshot: Thin Image volume. ALU: LDEV of the ALU attribution.
Status	Displays the LDEV status. Normal: Normal status. Blocked: Host cannot access blocked volumes. Warning: Problem occurs in the volumes. Formatting: Volumes are being formatted. Preparing Quick Format: Volumes are being prepared for quick formatting. Quick Formatting: Volumes are being quick-formatted. Correction Access: Access attribute is being corrected. Copying: Data in the volumes are being copied. Read Only: Data cannot be written on the Read Only volumes. Shredding: Volumes are being shredded.
PIN status	Displays the PIN status.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. JNL VOL: Journal volume. Pool VOL: Pool volume. The number in parentheses shows the pool ID. Quorum Disk: Quorum disk for global-active device. ALU: LDEV of the ALU attribution. SLU: LDEV of the SLU attribution. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Command Device Attribute	Security: Displays the setting (Enable or Disable) of Command Device Security.

Item	Description
	- User Authentication: Displays the setting (Enable or Disable) of user authentication. - Device Group Definition: Displays the setting (Enable or Disable) of Device Group Definition.
Number of Paths	Displays the number of paths of the selected LDEV.
UUID	Displays the UUID.
CLPR	Displays the identifier and name of the CLPR in <i>ID:CLPR</i> format.
Access Attribute	Displays the access attribute of the LDEV.
SSID	Displays the SSID.
Cache Mode	Displays the cache mode.
V-VOL Management Task	Displays the V-VOL management task being performed on a Dynamic Provisioning, Dynamic Tiering V-VOL.
Current MP Unit ID	Displays the current MP unit ID.
Assigned MP Unit ID	Displays the assigned MP unit ID.
T10 PI	T10 PI attribute setting (Enabled or Disabled) on LDEV.
External Storage System	Information about the external storage system. If LDEV is the DP-VOL of the data direct mapping attribute, the information about the external storage system to which LDEV is being mapped appears. - Vendor/Model/Serial Number: The information about the items of the external storage system is displayed. A hyphen(-) appears if an external storage system is not mapped to LDEV. - Path Group ID: The information about this item of the external storage system is displayed. If the link of the path group id is clicked, the Mapped Volumes tab appears. A hyphen(-) appears if an external storage system is not mapped to LDEV.
Data Direct Mapping	Information about the data direct mapping. LDEV ID: LDEV ID of the pool-VOL in the pool of the data direct mapping attribute, or LDEV ID of the DP-VOL of the data direct mapping attribute. If the link of LDEV ID is clicked, the LDEV Properties window appears. If the data direct mapping attribute is disabled, a hyphen (-) is displayed. If the DP-VOL of the data direct mapping attribute is not created in the pool of the data direct mapping attribute, this field is blank. Parity Group ID: Parity Group ID of the pool-VOL in the pool the data direct mapping attribute. If the data direct mapping attribute is disabled, a hyphen (-) is displayed.
Resource Group Name (ID)	Displays the resource group name and identifier of the LDEV. The identifier is provided in parentheses.

Item	Description
Full Allocation	Displays the status of the setting for the full allocation with V-VOLs for Dynamic Provisioning. • Enable: Full allocation is performed. • Disable: Full allocation is not performed. • Hyphen (-): LDEVs other than V-VOLs for Dynamic Provisioning.
Tiering Policy	Displays the tiering policy name and ID.
New page Assignment Tier	Displays the new page assignment tier.
Tier Relocation	Displays the tier relocation setting.
Relocation Priority	Displays the relocation priority setting.

LUNs table

This table is not displayed if the path is not set.

Item	Description
Port ID	Port name.
Type	Types of ports Fibre: Fibre Channel ports. iSCSI: iSCSI ports.
Host Group Name / iSCSI Target Alias	Host group name or iSCSI target alias.
iSCSI Target Name	iSCSI target name.
LUN ID	Identifier of the logical unit.

Hosts table

This table provides information about the host that can view LDEVs. This table is not available if the WWN is not registered in the host to which the path is set.

Item	Description
Type	Types of ports. Fibre: Fibre Channel ports. iSCSI: iSCSI ports.
HBA WWN / iSCSI Name	HBA WWN or iSCSI name.
Host Name	Host name.

Replication Tab

Information about the volume of the local replication pair is displayed in the Replication Properties, SI Pairs, TI Pairs, TC Pairs, UR Pairs, and GAD Pairs tables.

For details about each item, see following:

- *Hitachi ShadowImage® User Guide*
- *Hitachi Thin Image User Guide*
- *Hitachi TrueCopy® User Guide*
- *Hitachi Universal Replicator User Guide*
- *Global-Active Device User Guide*

Replication Properties table

Item	Description
Local Replication	• ShadowImage L1: Displays the status of the ShadowImage L1 pair. • ShadowImage L2: Displays the status of the ShadowImage L2 pair. • Thin Image: Displays the status of the Thin Image pair.
Remote Replication	• TrueCopy: Displays the status of the TrueCopy pair. • Universal Replicator: Displays the status of the Universal Replicator pair.

SI Pairs table

Item	Description
Primary Volume	• LDEV ID: Displays LDEV ID of the primary volume. • LDEV Name: Displays LDEV name of the primary volume. • Capacity: Displays capacity of the primary volume. • CLPR: Displays CLPR ID of the primary volume.
Copy Type	Displays copy type of the pair.
Status	Displays the pair status.
Secondary Volume	• LDEV ID: Displays LDEV ID of the secondary volume. • LDEV Name: Displays LDEV name of the secondary volume. • Capacity: Displays capacity of the secondary volume. • CLPR: Displays CLPR ID of the secondary volume.
Copy Pace	Displays the pace of copying of the pair.

Item	Description
CTG ID	Displays the consistency group ID of the pair.
Mirror Unit	Displays the mirror unit number of the pair.
Detail	Displays the View Pair Properties window.

TI Pairs table

Item	Description
Primary Volume	- LDEV ID: Displays LDEV ID of the primary volume. - LDEV Name: Displays LDEV name of the primary volume. - Capacity: Displays capacity of the primary volume. - CLPR: Displays CLPR ID of the primary volume.
Snapshot Group	Displays the snapshot group name. Information is shown for this item only if you have configured a snapshot group for the HTI pair.
Status	Displays the pair status.
Snapshot Date	Displays the date and time when you created the pair to store snapshot.
Secondary Volume	- LDEV ID: Displays LDEV ID of the secondary volume. - LDEV Name: Displays LDEV name of the secondary volume. - Capacity: Displays capacity of the secondary volume. - CLPR: Displays CLPR ID of the secondary volume.
Pool Name (ID)	Displays pool name and ID.
CTG ID	Displays the consistency group ID.
Mirror Unit	Displays the mirror unit number of the pair.
Detail	Displays the View Pair Properties window.

TC Pairs table

Item	Description
Pair Position	Displays whether the volume is a primary or secondary volume.
Status	Displays the pair status.
Remote Storage System	- Model / Serial Number: Displays the model and serial number of the remote storage system. - LDEV ID: Displays LDEV ID of the remote storage system.

Item	Description
	- Port ID: Displays Port ID of the remote storage system. - Host Group ID / iSCSI Target ID: Displays Host Group ID or iSCSI Target ID of the remote storage system. - LUN ID: Displays LUN ID of the remote storage system.
Path Group ID	Displays the path group ID.
Update Type	Displays the update type.
CTG ID	Displays the consistency group ID.
CTG Utilization	Displays whether the consistency group is shared by multiple local and remote storage systems.
Fence Level	Displays the fence level.
Detail	Displays the View Pair Properties window.

UR Pairs table

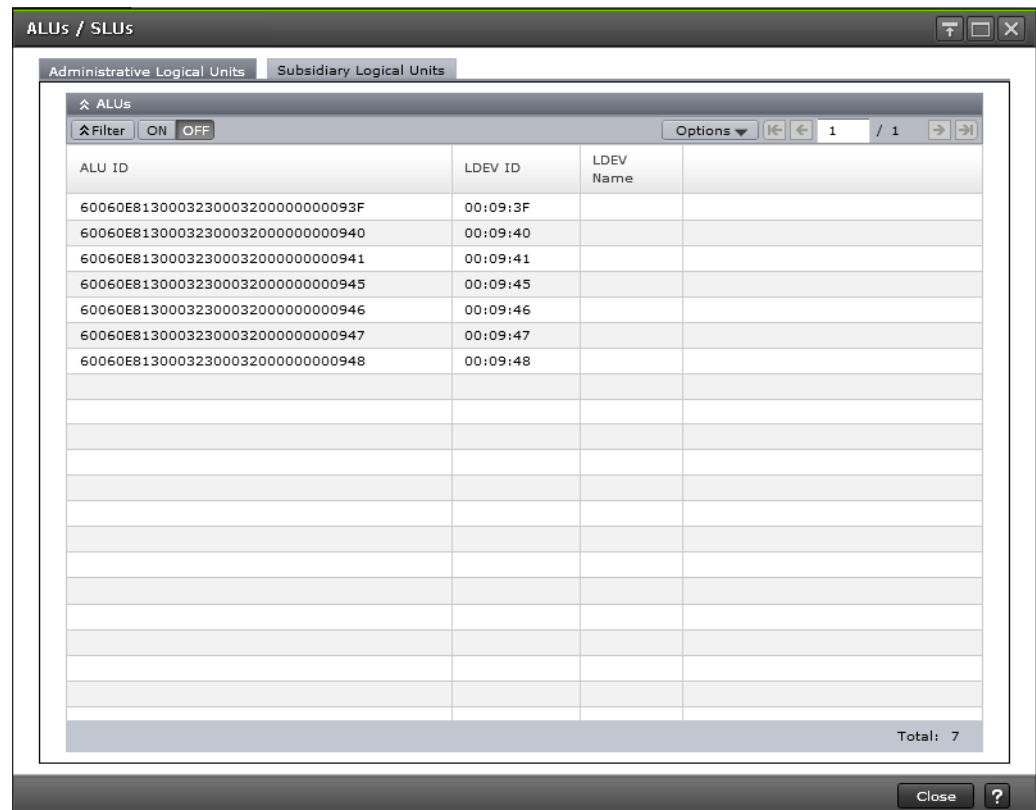
Item	Description
Journal ID	Displays the journal ID.
Pair 1	Displays the pair one information. - Pair Position: Displays whether the volume is a primary or secondary volume. - Mirror ID: Displays the mirror ID. - Status: Displays the pair status. - Remote Storage System: Displays the information about the remote storage system. - Model / Serial Number: Displays the model and serial number of the remote storage system. - LDEV ID: Displays LDEV ID of the remote storage system. - Port ID: Displays Port ID of the remote storage system. - Host Group ID / iSCSI Target ID: Displays Host Group ID or iSCSI Target ID of the remote storage system. - LUN ID: Displays LUN ID of the remote storage system. - Journal ID: Displays journal ID of the remote storage system. - Path Group ID: Displays the path group ID. - CTG ID: Displays the consistency group ID. - Error Level: Displays the error level.
Pair 2	Displays the pair two information.

Item	Description
	• Pair Position: Displays whether the volume is a primary or secondary volume. • Mirror ID: Displays the mirror ID. • Status: Displays the pair status. • Remote Storage System: Displays the information about the remote storage system. ◦ Model / Serial Number: Displays the model and serial number of the remote storage system. ◦ LDEV ID: Displays LDEV ID of the remote storage system. ◦ Port ID: Displays Port ID of the remote storage system. ◦ Host Group ID / iSCSI Target ID: Displays Host Group ID or iSCSI Target ID of the remote storage system. ◦ LUN ID: Displays LUN ID of the remote storage system. ◦ Journal ID: Displays journal ID of the remote storage system. • Path Group ID: Displays the path group ID. • CTG ID: Displays the consistency group ID. • Error Level: Displays the error level.
Detail	Displays the View Pair Properties window.

GAD Pairs table

Item	Description
Pair Position	Displays whether the volume is a primary or secondary volume.
Status	Displays the pair status.
Remote Storage System	• Model / Serial Number: Displays the model and serial number of the remote storage system. • LDEV ID: Displays LDEV ID of the remote storage system. • Port ID, Host Group ID, LUN ID: Displays Port ID, Host Group ID, and LUN ID of the remote storage system.
Path Group ID	Displays the path group ID.
Quorum Disk ID	Displays the quorum disk ID.
Mirror ID	Displays the mirror ID.
Detail	Displays the View Pair Properties window.

ALUs / SLUs window



Administrative Logical Unit tab

Item	Description
ALU ID	ALU attribution identifier of an LDEV. If ALU ID is not assigned, a ? appears.
LDEV ID	LDEV identifier, a combination of LDKC, CU, and LDEV.
LDEV Name.	Name of the LDEV.

Subsidiary Logical Unit tab

Item	Description
SLU ID	SLU attribution identifier of an LDEV. If ALU ID is not assigned, a ? appears.
LDEV ID	LDEV identifier, a combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.
Provisioning Type	Provisioning type to be assigned to the LDEV. DP: DP-VOL Snapshot: Thin Image volume.

Unbind SLUs window

Unbind SLUs

1. Confirm

All SLUs will be unbound from the selected ALUs. Are you sure you want to continue?

Task Name:

150131-UnbindSLUs

(Max. 32 Characters)

Selected ALUs

LDEV ID	ALU ID	LDEV Name	
00:00:04	60060E81300032300032000000000004		

Total: 1

☐ Go to tasks window for status

Back

Next

Apply

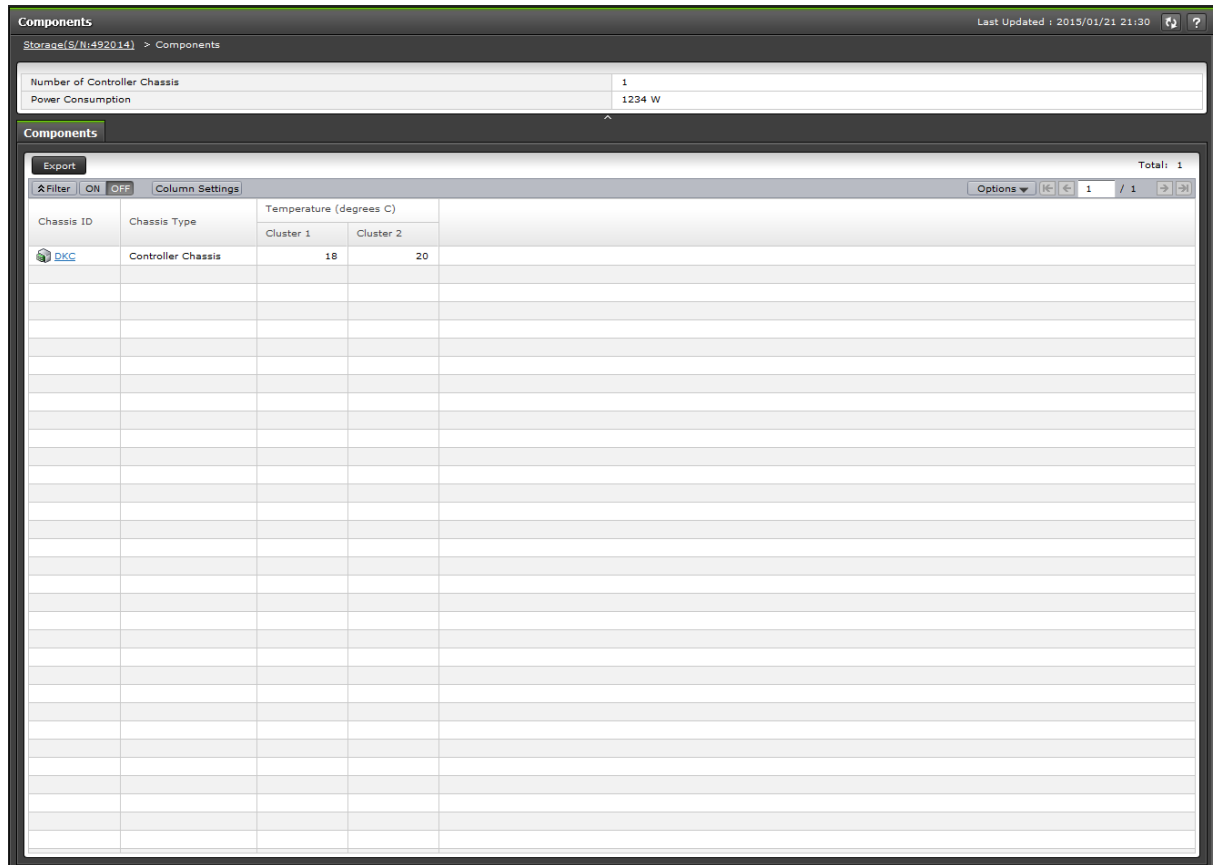
Cancel

Selected ALUs

Item	Description
LDEV ID	LDEV identifier, a combination of LDKC, CU, and LDEV.
ALU ID	ALU attribution identifier of an LDEV.
LDEV Name	Name of the LDEV.

Components window

Use this window to view information about the controller chassis components in the storage system.



- [Summary on page C-59](#)
- [Components tab on page C-60](#)

Summary

Item	Description
Number of Controller Chassis	Number of controller chassis.
Power Consumption	Power consumption of controller chassis. In the following cases, the power consumption value might temporarily display lower: • When starting the storage system • After replacing a part of the storage system • When updating the firmware or after updating the firmware
Edit High Temperature Mode	Opens the Edit Temperature Mode window

Components tab

Item	Description
Chassis ID	Chassis identifier of the storage system.
Chassis Type	Chassis type.
Power Temperature (degrees C)	Temperature of each cluster. - Cluster 1: Temperature of cluster 1. - Cluster 2: Temperature of cluster 2.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

DKC: Controller Boards & MP Units tab

Use this window to view information about MP units in the storage system.

The screenshot displays the 'DKC: Controller Boards & MP Units' window. At the top, it shows the breadcrumb 'Storage(S/N:492022) > Components > DKC'. Below this is a field for 'Number of Controller Boards (MP Units)' with the value '2 (4)'. The main title is 'Controller Boards & MP Units'. There are two buttons: 'Edit MP Units' and 'Export'. Below the buttons is a table with the following columns: Controller Board ID, MP Unit ID, Status, Cluster, and Auto Assignment. The table contains 4 rows of data, all with a status of 'Normal' and 'Enabled' auto assignment. The table is titled 'Controller Boards & MP Units' and has a 'Number of Controller Boards (MP Units)' field showing '2 (4)'.

Controller Board ID	MP Unit ID	Status	Cluster	Auto Assignment
CTL-0	MPU-10	Normal	1	Enabled
CTL-0	MPU-11	Normal	1	Enabled
CTL-1	MPU-20	Normal	2	Enabled
CTL-1	MPU-21	Normal	2	Enabled

- [Summary on page C-61](#)
- [Controller Boards & MP Units tab on page C-61](#)

Summary

Item	Description
Controller Boards (MP Units)	Number of Controller Boards and MP Units. The number of the MP unit is displayed in a parenthesis.

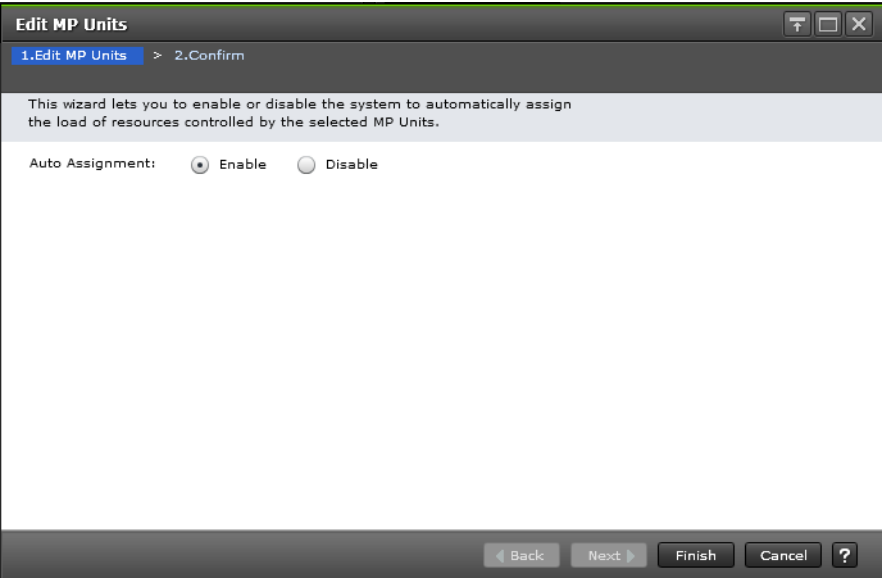
Controller Boards & MP Units tab

Item	Description
Controller Board ID	Identifier of the controller board.
MP Unit ID	Identifier of the MP unit.
Status	Status of the MP unit.  Normal: Available.  Warning: The MP unit is partially blocked.  Blocked: The MP unit is blocked.  Failed: The MP unit is in abnormal status.
Cluster	Cluster number of the MP unit.
Auto Assignment	Indicates whether the MP unit is automatically assigned to resources. Enabled: The MP unit is automatically assigned to resources (logical devices, external volumes, and journal volumes). Disabled: The MP unit is not automatically assigned to resources.
Edit MP Units	Opens the Edit MP Units window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

Edit MP Units wizard

Use this wizard to enable or disable the storage system to automatically assign the load of resources controlled by the selected MP units.

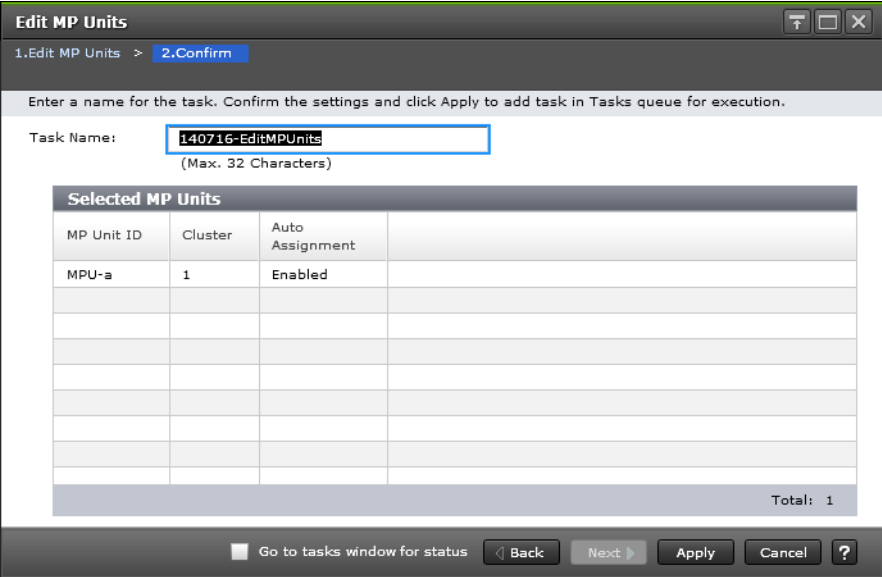
Edit MP Units window



Item	Description
Auto Assignment	Specify whether to automatically assign an MP unit to resources (logical devices, external volumes, and journal volumes). • Enable: Resources is automatically assigned to the specified MP unit. • Disable: Resources will not be automatically assigned to the specified MP unit.

Edit MP Units confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.



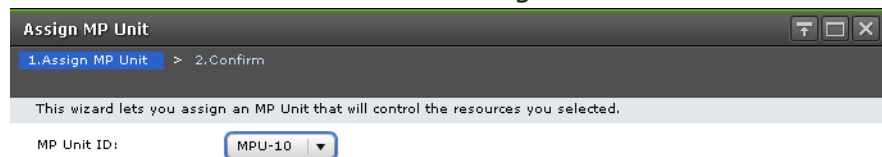
Item	Description
MP Unit ID	MP unit identifier.
Cluster	Cluster number of the MP unit.
Auto Assignment	Indicates whether automatic assignment of MP units is in use. Enabled: An MP unit is automatically assigned to resources (logical devices, external volumes, and journal volumes). Disabled: An MP unit is not automatically assigned to resources.

Assign MP Unit wizard

Use this wizard to assign an MP unit that will control selected resources.

Assign MP Unit window

Use this window to select an MP unit to assign to an LDEV.



Item	Description
MP Unit ID	Change the MP unit identifier assigned to the LDEV. <i>MP unit ID:</i> The selected MP unit identifier is assigned to the LDEV.

Assign MP Unit confirmation window

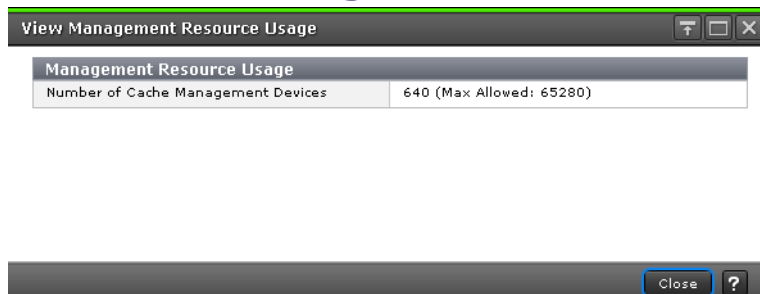
Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Selected LDEVs table

C-64

Item	Description
MP Unit ID	MP unit identifier to be set.

View Management Resource Usage window



Management Resource Usage table

Item	Description
Number of Cache Management Devices	The current number and maximum allowed number of cache management devices in the storage system are displayed.

Create Parity Groups wizard

Create Parity Groups window

When selecting drives manually

1.Create Parity Groups > 2.Confirm

This wizard lets you create parity groups. Enter the information for parity groups you want to create, and then click Add. Click Options to expand the parity group settings. Click Finish to confirm the creation, or click Next if you want to assign the spare drives.

Drive Type/RPM/Capacity: Select a Drive Type/RPM/Capacity

RAID Level: Select a RAID Level

Drive Selection: ☐ Auto ☒ Manual

Available Drives

Filter ON OFF

Select All Pages

Options

1 / 1

Location	Drive Box	Drive Box Type	Drive Type-Code
No Data			

Selected: 0 of 0

The number you have to select: 0

Options

Initial Parity Group ID: 1 (1-15) - 1 (1-32)

Cache Partition: 0:CLPR0

Encryption: ☐ Enable ☒ Disable

Copy-Back Mode: ☒ Enable ☐ Disable

Selected Parity Groups

Select All Pages

Options

1 / 1

Parity Group ID	Drive Type/RPM/Capacity	RAID Level	CLPR	Encryption	Copy-Back Mode
No Data					

Selected: 0 of 0

Concatenate Change Settings Detail Remove

Next Task Option: Continue to Assign Spare Drives

Back Next Finish Cancel ?

When selecting drives automatically

1.Create Parity Groups > 2.Confirm

This wizard lets you create parity groups. Enter the information for parity groups you want to create, and then click Add. Click Options to expand the parity group settings. Click Finish to confirm the creation, or click Next if you want to assign the spare drives.

Drive Type/RPM/Capacity: Select a Drive Type/RPM/Capacity

RAID Level: Select a RAID Level

Drive Selection: ☒ Auto ☐ Manual

Number of Parity Groups: (0-0)

Options

Initial Parity Group ID: 1 (1-15) - 1 (1-32)

Drive Box Type: Any

Initial Drive Box: DB-00

Drive Select Type: ☐ Disperse ☒ Linear

Cache Partition: 0:CLPR0

Encryption: ☐ Enable ☒ Disable

Copy-Back Mode: ☒ Enable ☐ Disable

Selected Parity Groups

Select All Pages

Options

1 / 1

Parity Group ID	Drive Type/RPM/Capacity	RAID Level	CLPR	Encryption	Copy-Back Mode
No Data					

Selected: 0 of 0

Concatenate Change Settings Detail Remove

Next Task Option: Continue to Assign Spare Drives

Back Next Finish Cancel ?

Setting fields

Item	Description
Drive Type/RPM/Capacity	Select the type of the drive box.
RAID level	Select the RAID level.
Drive Selection	Select the mode of the drive selection from Auto or Manual.
Number of Parity Groups	Enter the number of parity groups. This item appears when selected Auto as your drive selection.
Available Drives	This item appears when selected Manual as your drive selection. For drives to be incorporated to a parity group, set the check box of a row to ON. - Location: Displays the location of the drive box. - Drive Box: Displays the name of the drive box. - Drive Box Type: Displays the type of the drive box. - Drive Type-Code: Displays the type code of the drive box.
The number you have to select	Displays the number of drives that you must select. This item appears when selected Manual as your drive selection.
Initial Parity Group ID	Enter the parity group ID. Text box on the left side: Enter the alphanumeric characters, which are fixed characters of the head of the parity group names. Characters are case-sensitive. Text box on the right side: Enter the initial number following the prefix name.
Drive Box Type	Select the type of drive box. This item appears when selected Auto as your drive selection.
Initial Drive Box	This item appears when selected Auto as your drive selection. The smallest available number is entered in the text box as a default. No number appears in the text box if no available parity group ID exists. If you specify the parity group ID which is already used, the minimum parity group ID after that the specified parity group ID is automatically set.
Drive Select Type	This item appears when selected Auto as your drive selection. Select the method for the selecting of drives in a parity group. - Disperse: Selected drives where are located dispersedly. - Linear: Selected drives where are located linearly. This item is not available with Virtual Storage Platform G200. If this storage system is used, only Linear is available.
Cache Partition	Select a CLPR number which is displayed as <i>ID:CLPR</i> .
Encryption	Specify if encrypted parity groups are created. Enable: Encrypted parity groups are created.

Item	Description
	Disable: Non-encrypted parity groups are created. This item is not available with Virtual Storage Platform G200.
Copy-Back Mode	Specify if the copy-back mode is set to a parity group. - Enable: Copy-back mode is enabled in a parity group. - Disable: Copy-back mode is disabled in a parity group.
Add	When you click Add , the configured information is added to the right side of the Selected Parity Groups table.

Selected Parity Groups table

Item	Description
Parity Group ID	Displays a parity group ID.
Drive Type/RPM/Capacity	Displays the drive type, RPM, and capacity. As for SSD, a hyphen (-) appears on the RPM field.
RAID Level	Displays a RAID level.
CLPR	Displays the CLPR ID and name that is displayed as <i>ID:CLPR</i> .
Encryption	Displays the encryption information. Enable: Encrypted parity group. Disable: Non-encrypted parity group. This item is not available with Virtual Storage Platform G200.
Copy-Back Mode	Displays the copy-back mode setting information. Enable: Copy-back mode is set to enable in a parity group. Disable: Copy-back mode is set to disable in a parity group.
Drive Type-Code	Displays the drive type-code.
Concatenate	Creates a concatenated parity group by selecting multiple rows. When clicked this button with selecting multiple rows, a message asking whether a concatenated parity group is created is displayed.
Change Settings	Changes the setting of the parity group. When clicked this button with selecting a row, the Change Settings window is displayed.
Detail	Displays the Parity Group Properties window when a row is selected, and shows the error window when a row is not selected or multiple rows are selected.
Remove	Deletes the parity group selected in the Selected Parity Groups window. Displays the error window when a row is not selected.

Click **Next** to go to the task setting window, which is indicated in **Task Next Option**.

[illegible]

Item	Description
Parity Group ID	Displays a parity group ID.
Drive Type/RPM/Capacity	Displays the drive type, RPM, and capacity. As for SSD, a hyphen (-) appears on the RPM field.
RAID Level	Displays a RAID level.
CLPR	Displays the CLPR ID and name that is displayed as <i>ID:CLPR</i> .
Encryption	Displays the encryption information. Enable: Encrypted parity group. Disable: Non-encrypted parity group. This item is not available with Virtual Storage Platform G200.
Copy-Back Mode	Displays the copy-back mode setting information. Enable: Copy-back mode is set to enable in a parity group. Disable: Copy-back mode is set to disable in a parity group.
Drive Type-Code	Displays the drive type-code.

Item	Description
Detail	Displays the Parity Group Properties window when a row is selected, and shows the error window when a row is not selected or multiple rows are selected.



Note: If multiple tasks that are connected in one wizard are executed, this window shows all configured items of tasks. To show information of configured items other than this topic, click **Back** to display related setting windows, then click **Help**.

Change Settings (Parity Group) window

Item	Description
Initial Parity Group ID	Set the check box to ON and enter the parity group ID. Text box on the left side: Enter the alphanumeric characters, which are fixed characters of the head of the parity group names. Characters are case-sensitive. Text box on the right side: Enter the initial number following the prefix name.
Cache Partition	Set the check box to ON and select a CLPR number which is displayed as <i>ID:CLPR</i> .
Encryption	Set the check box to ON and specify if encrypted parity groups are created. • Enable: Encrypted parity groups are created. • Disable: Non-encrypted parity groups are created. This item is not available with Virtual Storage Platform G200.

Item	Description
Copy-Back Mode	Set the check box to ON and specify if the copy-back mode is set to a parity group. - Enable: Copy-back mode is set to enable in a parity group. - Disable: Copy-back mode is set to disable in a parity group.

Assign Spare Drives wizard

Assign Spare Drives window

Available Drives table

This table lists drives for spare drives. Only drives assigned to the logged-on user are available.

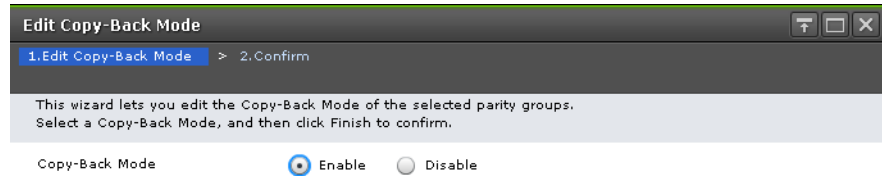
Item	Description
Drive Box	Displays the drive box number.
Location	Displays the location of the drive box.
Drive Type-Code	Displays the drive type code.
Add	Adds one or more drives selected in the Available Drives table to the Selected Spare Drives table.



Note: If multiple tasks that are connected in one wizard are executed, this window shows all configured items of tasks. To show information of configured items other than this topic, click **Back** to display related setting windows, then click **Help**.

Edit Copy-Back Mode wizard

Edit Copy-Back Mode window



Item	Description
Copy-Back Mode	Specify the copy-back mode in a parity group. Enable: Copy-back mode is enabled. This function performs when failure data-drives are replaced. Disable: Copy-back function is disabled.

Edit Copy-Back Mode confirmation window

[illegible]

Selected Parity Groups table

Item	Description
Parity Group ID	Displays the parity group ID.
RAID Level	Displays the RAID level.
Drive Type-Code	Displays the drive type code.
Drive Type/RPM	Displays the drive type and RPM.
Copy-Back Mode	Displays the copy-back mode that is set for the parity group. Enabled: Copy-back mode is enabled. Disabled: Copy-back mode is disabled.



Note: If multiple tasks that are connected in one wizard are executed, this window shows all configured items of tasks. To show information of configured items other than this topic, click **Back** to display related setting windows, then click **Help**.

Format Parity Groups window

Format Parity Groups

1.Confirm

Formatting the selected parity groups will initialize (delete) all data including LDEVs in the parity groups. Do you want to continue?

Task Name:

140911-FormatParityGroups

(Max. 32 Characters)

Selected Parity Groups

Parity Group ID	RAID Level	Capacity	Drive Type/RPM	
1-2	5(2D+1P)	2146.98...	SAS/10k	

Total: 1

☒ Go to tasks window for status

Back

Next

Apply

Cancel

?

Selected Parity Groups table

Item	Description
Parity Group ID	Displays the parity group ID.
RAID Level	Displays the RAID level.
Capacity	Displays the capacity of the parity group.
Drive Type/RPM	Displays the drive type and RPM.

Delete Parity Groups window

Delete Parity Groups

1.Confirm

The selected parity groups and all LDEVs in the selected parity groups will be deleted. Do you want to continue?

Task Name:

140908-DeleteParityGroups

(Max. 32 Characters)

Selected Parity Groups

Parity Group ID	RAID Level	Capacity	Drive Type-Code	Drive Type/RPM	Number of LDEVs	
1-1	1(2D+2D)	5470.78...	DKR2D-H3R...	SAS/7.2k	2	

Total: 1

☒ Go to tasks window for status

Back

Next

Apply

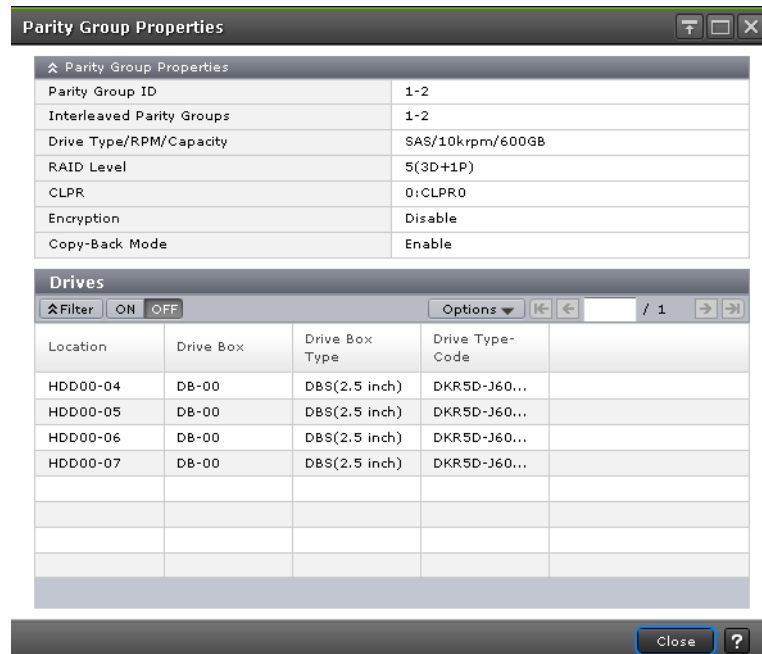
Cancel

?

Selected Parity Groups table

Item	Description
Parity Group ID	Displays the parity group ID.
RAID Level	Displays the RAID level.
Capacity	Displays the capacity of the parity group.
Drive Type-Code	Displays the drive type code.
Drive Type/RPM	Displays the drive type and RPM.
Number of LDEVs	Displays the number of LDEVs in the parity group.

Parity Group Properties window



Parity Group Properties table

Item	Description
Parity Group ID	Displays the parity group ID.
Interleaved Parity Groups	Displays interleaved (concatenated) parity groups.
Drive Type/RPM/Capacity	Displays the drive type, RPM, and capacity. As for SSD, a hyphen (-) appears on the RPM field.
RAID Level	Displays the RAID level. The asterisk (*) indicates the parity group is the interleaved parity group.
CLPR	Displays the identifier and name of the CLPR in <i>ID:CLPR</i> format.

Item	Description
Encryption	Displays the encryption function which is set for the parity group. If the parity group is encrypted, Enabled is displayed. If the parity group is not encrypted, Disabled is displayed. This item is not available with Virtual Storage Platform G200.
Copy-Back Mode	Displays the copy-back mode that is set for the parity group. If the copy-back mode is enabled, Enabled is displayed. If the period mode is not enabled, Disabled is displayed.

Drives table

Only drives assigned to the logged-on user are displayed.

Item	Description
Location	Displays the location of the drive box.
Drive Box	Displays the drive box number.
Drive Box Type	Displays the drive box type.
Drive Type-Code	Displays the drive type code.



Dynamic Provisioning, Dynamic Tiering, and active flash GUI reference

The Dynamic Provisioning, Dynamic Tiering, and active flash windows, wizards, and dialog boxes are described in the following topics.

- ☐ [Pools window](#)
- ☐ [Pools: Volume tabs](#)
- ☐ [Create Pools wizard](#)
- ☐ [Expand Pool wizard](#)
- ☐ [Edit Pools wizard](#)
- ☐ [Delete Pools wizard](#)
- ☐ [Expand V-VOLs wizard](#)
- ☐ [Restore Pools window](#)
- ☐ [Shrink Pool window](#)
- ☐ [Stop Shrinking Pools window](#)
- ☐ [Select Pool VOLs window](#)
- ☐ [Reclaim Zero Pages window](#)
- ☐ [Stop Reclaiming Zero Pages window](#)

- ☐ [Pool Property window](#)
- ☐ [View Tier Properties window](#)
- ☐ [Monitor Pools window](#)
- ☐ [Stop Monitoring Pools window](#)
- ☐ [Start Tier Relocation window](#)
- ☐ [Stop Tier Relocation window](#)
- ☐ [View Pool Management Status window](#)
- ☐ [Edit External LDEV Tier Rank wizard](#)
- ☐ [Edit Tiering Policies wizard](#)
- ☐ [Change Tiering Policy Window](#)
- ☐ [Change Pool Configuration Pattern Window](#)

Pools window

Pools Last Updated : 2015/01/09 11:30

Storage(S/N:1) > Pools

Edit Tiering Policies

		Dynamic Provisioning (DP)	Thin Image (TI)
Pool Capacity	Used/Total	0.00 MB / 49.25 GB [0 %]	0.00 MB / 105.86 GB [0 %]
	Estimated Configurable	56.36 TB	1126.24 TB
V-VOL Capacity	Allocated/Total	0.00 MB / 1.05 GB [0 %]	-
	Estimated Configurable	56.41 TB	-
Licensed Capacity (Used/Licensed)		0.00 MB / Unlimited	0.00 MB / Unlimited
Number of Pools		6 (Max Allowed: 128)	

Pools

Create Pools Create LDEVs Expand Pool More Actions

Selected: 0 of 6

Filter ON OFF Select All Pages Column Settings Options 1 / 1

	Pool Name	Status	Number of Pool VOLS	Number of V-VOLs	Number of Primary VOLS	RAID Level	Capacity			
							Total	Reserved	Used	Used (%)
☐	HDP	Normal	1	0	-	5(3D+1P)	5.86 GB	0.00 GB	0.00 GB	0
☐	HDT	Normal	1	2	-	5(3D+1P)	5.86 GB	0.00 GB	0.00 GB	0
☐	HISOL	Normal	1	0	-	5(3D+1P)	5.86 GB	0.00 GB	0.00 GB	0
☐	TI	Normal	2	-	0	5(3D+1P)	105.86 GB	0.00 GB	0.00 GB	0
☐	siqokak...	Normal	2	0	-	5(3D+1P)	15.83 GB	0.00 GB	0.00 GB	0
☐	siqokak...	Normal	2	0	-	5(3D+1P)	15.83 GB	0.00 GB	0.00 GB	0

- [Summary on page D-3](#)
- [Pools tab on page D-5](#)

Summary

Item	Description
Pool Capacity ¹	Displays information about the pool capacity. • Used/Total Dynamic Provisioning (DP): Displays the pool capacity (the used capacity and the total pool capacity) of Dynamic Provisioning, Dynamic Tiering, and active flash. Thin Image (TI): Displays the pool capacity (used/total) of Thin Image. For each value, if the Estimated Configurable capacity is zero, is displayed in the cell. • Estimated Configurable² Dynamic Provisioning (DP): Displays the estimated pool capacity of Dynamic Provisioning, Dynamic Tiering, and active flash.

Item	Description
	Thin Image (TI): Displays the remaining physical pool capacity that is configurable for Thin Image.
V-VOL Capacity ¹	Displays information about the DP-VOL capacity. Allocated/Total Dynamic Provisioning (DP): In the Allocated field, total capacity of the Dynamic Provisioning, Dynamic Tiering, and active flash DP-VOLs to which LU paths are allocated is displayed. In the Total field, total capacity of the Dynamic Provisioning, Dynamic Tiering, and active flash DP-VOLs is displayed. For each value, if the Estimated Configurable capacity is zero,  is displayed in the cell. Estimated Configurable² Dynamic Provisioning (DP): Displays the DP-VOL estimated configurable capacity of Dynamic Provisioning, Dynamic Tiering, and active flash.
Licensed Capacity (Used / Licensed)	Dynamic Provisioning (DP): Displays the licensed capacity of Dynamic Provisioning. Used displays the total capacity of pools for Dynamic Provisioning, Dynamic Tiering, and active flash. Thin Image (TI): Displays the licensed capacity of the Thin Image. Caution: In the Licensed Capacity(Used/Licensed) field, the total capacity of the system is displayed. The total capacity of the system includes capacities of LDEVs assigned to each user and resources other than LDEVs. Therefore, the value displayed as the "Used" Licensed Capacity (Used/ Licensed) might differ from the value of the "Total" Pool Capacity.
Number of Pools	Displays the total number of pools for Dynamic Provisioning, Dynamic Tiering, active flash, and Thin Image.
Edit Tiering Policies	Displays the Edit Tiering Policies window.
Notes: - The total value of the Total cells under Capacity of each pool type in the Pools tab and the total Used capacity of the Pool Capacity in the Summary table are almost same, but small differences might occur. If the pool-VOL or DP-VOL for Dynamic Provisioning is created, the estimated configurable pool capacity and estimated configurable V-VOL capacity for Dynamic Provisioning (DP) change. The estimated capacity is calculated based on the configuration of current pools and DP-VOL, and remaining capacity of the control memory. - The estimated configurable capacity of Dynamic Provisioning is the estimate of the DP-VOL capacity or the pool capacity that can be created by using the remaining capacity of the control memory after deduction of the capacity of the shared memory used by the current pool and DP-VOL. The value of Estimated Configurable can be used only as a guide, but are not guaranteed to create pools and DP-VOLs having the estimated configurable capacity. If the pool-VOL or DP-VOL for Dynamic Provisioning is created or deleted, the estimated configurable pool capacity and estimated configurable V-VOL capacity for both Dynamic Provisioning change.	

Pools tab

Item	Description
Pool Name	Displays the pool name. Clicking the pool name takes you to the pool information window in the lower hierarchy.
Pool ID ¹	Displays pool ID.
Status	Displays information about the pool status.  Normal: Pool is in a normal status.  Warning: Pool-VOL in the pool is blocked, or the pool is being shrunk.  Exceeded Threshold: Used capacity of the pool exceeds the pool threshold.  Shrinking: Pool-VOL is being reduced.  Blocked: Pool is full, or an error occurred in the pool, indicating that the pool is blocked. If the pool is in both Warning and Blocked status, only Blocked is displayed.
Number of Pool VOLs	Displays the number of pool-VOLs associated with the pool.
Number of V-VOLs	Displays the number of V-VOLs associated with the pool. For a Thin Image pool, a hyphen (-) is displayed.
Number of Primary VOLs	Displays the number of primary volumes of the Thin Image pairs. If a pool is other than the Thin Image pool, a hyphen (-) is displayed.
RAID level	Displays RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Capacity	Displays information about the pool capacity. Total: Total capacity of pool. Using Option, you can select unit of capacity. One block means 512 bytes and one page means 42 megabytes in a pool capacity of Dynamic Provisioning, Dynamic Tiering, active flash, or Thin Image, Reserved: Displays the reserved capacity of the pool. The displayed value of Reserved might be larger than the displayed value of Total due to following reason: Reserved displays reserved capacity that is rounded up on each page. - The mapped capacity of DP-VOL includes the capacity of the control information (Requires a maximum of 168 MB per 3,145,548 MB). Used: Sum of the mapped capacity and the reserved capacity. The displayed value of Used might be larger than the displayed value of Total due to the following reasons:

Item	Description
	◦ Used displays the sum of the mapped capacity and the reserved capacity that is rounded up on each page. ◦ The mapped capacity of DP-VOL includes the capacity of the control information (Uses a maximum of 168 MB per 3,145,548 MB). ◦ DP-VOL of the data direct mapping attribute includes the control information (168 MB is used per 3,145,548 MB) and the capacity for one page. • Used (%): On a pool capacity basis, percentages of the sum of the mapped capacity and the reserved capacity. Used (%) displays the value which is truncated after the decimal point of the actual value. For the pool of Dynamic Provisioning, Dynamic Tiering, and Thin Image, a hyphen (-) is displayed if the unit of capacity is changed into Cylinder.
User-Defined Threshold (%)	Displays information about the threshold of a pool. • Warning: Warning threshold. • Depletion: Depletion threshold. For a Thin Image pool, a hyphen (-) is displayed for Depletion.
Subscription (%)	Displays information about subscription of the pool. • Current: Percentage of the total V-VOL capacity assigned to the pool. • Limit: Percentage of the subscription limit of the pool. For a Thin Image pool, a hyphen (-) is displayed for Current and Limit.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP (data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Drive Type/RPM	Displays the data drive type and RPM of the pool. If multiple drive types or RPMs exist in a pool, this field indicates that drive types or RPMs are mixed. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.
Tier Management	Displays whether Dynamic Tiering is enabled or disabled. If it is enabled Auto or Manual is displayed. If it is disabled, a hyphen (-) is displayed. For a Thin Image pool, a hyphen (-) is displayed.
Encryption	Displays the encryption information about the pool. • Enable: Encryption setting of a pool-VOL containing LDEV is enabled.

Item	Description
	• Disable: Encryption setting of a pool-VOL containing LDEV is disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed. This status appears when two or more of the following are specified as pool-VOLs: ◦ Volume encryption setting is enabled ◦ Volume encryption setting is disabled ◦ External volume Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): The pool is created by external volumes or is being blocked. This item is not displayed when using Virtual Storage Platform G200.
Shrinkable	Displays whether the pool-VOL can be removed. While the pool is being shrunk, a hyphen (-) is displayed.
Monitoring Mode	Displays the monitoring mode that is set for the pool. If the continuous mode is enabled, Continuous Mode is displayed. If the period mode is enabled, Period Mode is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Status	Displays the status of pool monitoring. • In Progress: The monitoring is being performed. • During Computation: The calculating is being processed. Other than these cases, a hyphen (-) is displayed.
Recent Monitor Data	Displays the latest monitoring data. • If the monitoring data exists, the monitoring period of time is displayed. Example: 2010/11/15 00:00 - 2010/11/15 23:59 • If the monitoring data is being obtained, only the starting time is displayed. Example: 2010/11/15 00:00 - • If the latest monitoring data does not exist, a hyphen (-) is displayed.
Pool Management Task	Displays the pool management task being performed to the pool. • Waiting for Rebalance: The rebalance process is waiting. • Rebalancing: The rebalance process is being performed. • Waiting for Relocation: The tier relocation process is waiting. • Relocating: The tier relocation process is being performed.

Item	Description
	- Waiting for Shrink: The pool shrinking process is waiting. - Shrinking: The pool shrinking process is being performed. - Blank: The pool management task is not being performed to the pool. For details about the tier relocation, see the tier relocation log file. For details about the table items of the tier relocation log file, see Tier relocation log file contents on page 5-42.
Relocation Result	Displays the status of the tier relocation processing. In Progress: The status of Pool Management Task is Waiting for Relocation or Relocating. Completed: The tier relocation operation is not in progress, or the tier relocation is complete. Uncompleted (n% relocated): The tier relocation is suspended at the indicated percentage progression. Hyphen (-): The pool is not a Dynamic Tiering or active flash pool.
Relocation Speed	Displays the tier relocation speed: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest).
Protect V-VOLs when I/O fails to Blocked Pool VOL	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: - Data Retention Utility is not installed. - Pool type is other than DP or DT.
Protect V-VOLs when I/O fails to Full Pool	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: - Data Retention Utility is not installed. - Pool type is other than DP or DT.
Create Pools	Displays the Create Pools window.
Create LDEVs	Displays the .
Expand Pool	Displays the Expand Pool window.
Delete Pools ²	Displays the Delete Pools window.
Restore Pools ²	Displays the Restore Pools window.

Item	Description
Edit Pools ²	Displays the Edit Pools window.
Monitor Pools ²	Displays the Monitor Pools window.
Stop Monitoring Pools ²	Displays the Stop Monitoring Pools window.
Start Tier Relocation ²	Displays the Start Tier Relocation window.
Stop Tier Relocation ²	Displays the Stop Tier Relocation window.
View Tier Properties ²	Displays the View Tier Properties window. This window can be viewed only for the pools for which Dynamic Tiering is enabled.
View Pool Management Status ²	Displays the View Pool Management Status window.
Export Tier Relocation Log ²	Displays the window to download the result of the tier relocation. For more information about the table item of the tier relocation file, see Tier relocation log file contents on page 5-42 .
Export ²	Displays the window for outputting table information.
Notes: ¹ Does not appear by default. To display this item, change the Column Settings window. ² Appears when you click More Actions .	

Pools: Volume tabs

[illegible]

- [Summary on page D-10](#)
- [Pool Volumes tab on page D-14](#)
- [Virtual Volumes tab on page D-16](#)
- [Primary Volumes tab on page D-20](#)

Summary

Item	Description
Status	Displays information about the pool status.  Normal: Pool is in a normal status.  Warning: Pool-VOL in the pool is blocked, or the pool is being shrunk.

Item	Description
	 Exceeded Threshold: Percentages of the sum of the mapped capacity of the pool and the reserved capacity of the pool exceed the pool threshold.  Shrinking: Pool-VOL is being reduced.  Blocked: The pool is full, or an error occurred in the pool, indicating that the pool is blocked. If the pool is in both Warning and Blocked status, only Blocked is displayed.
Pool Name (ID)	Displays the pool name and pool ID.
Pool VOL with System Area (Name)	Displays the LDEV ID and LDEV name of the pool-VOL which includes the pool management area.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
RAID Level	Displays RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Drive Type/RPM	Displays the data drive type and RPM of the pool. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank. If various types (such as drive types, RPMs, external LDEV tier ranks) of drives exist in a pool, Mixed is displayed.
Encryption	Displays the encryption information about the pool. • Enabled: Encryption setting of a pool-VOL containing LDEV is enabled. • Disable: Encryption setting of a pool-VOL containing LDEV is disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed. This status appears when two or more of the following are specified as pool-VOLs: ◦ Volume encryption setting is enabled ◦ Volume encryption setting is disabled ◦ External Volume Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): External volume. For DP-VOL of Dynamic Provisioning, either the pool-VOL in the pool that owns

Item	Description
	DP-VOL is an external volume or that pool is being blocked. This item is not displayed when using Virtual Storage Platform G200.
Cache Mode	For a configuration of external volumes, displays whether the cache mode is enabled or disabled. For a configuration other than external volume configuration, a hyphen (-) is displayed.
Protect V-VOLs when I/O fails to Blocked Pool VOL	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: • Data Retention Utility is not installed. • Pool type is other than DP or DT.
Protect V-VOLs when I/O fails to Full Pool	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: • Data Retention Utility is not installed. • Pool type is other than DP or DT.
Number of Pool VOLs	Displays the number of pool-VOLs set for the pool, and the maximum number of pool-VOLs that can be set for the pool.
Number of V-VOLs	Displays the number of V-VOLs associated with the pool, and the maximum number of V-VOLs that can be associated with the pool. For the pool of a data direct mapping attribute, a hyphen (-) appears for the maximum number of V-VOLs which can associate with the pool. For a Thin Image, a hyphen (-) is displayed.
Number of Primary VOLs	Displays the number of primary volumes of the Thin Image pairs. When the applicable volume does not exist, a hyphen (-) is displayed.
Pool Capacity (Used/Total)	Displays the sum of the mapped capacity and reserved capacity for the pool, and the total capacity of the pool. If the pool consists of multiple pool-VOLs, the sum of its capacities is displayed in the Total field.
V-VOL Capacity (Used/Total)	Displays the sum of the mapped capacity and the reserved capacity for virtual volumes, and the total capacity of virtual volumes. For a Thin Image pool, a hyphen (-) is displayed along with the used and total V-VOL capacity.

Item	Description
Subscription (Current/Limit)	Displays the subscription (Rate of total V-VOL capacity associated with a pool to the pool capacity/Subscription that is set). For a Thin Image, a hyphen (-) is displayed for Current or Limit.
User-Defined Threshold (Warning/Depletion)	Displays the user-defined threshold (Warning/Depletion). For a Thin Image, a hyphen (-) is displayed for Depletion.
Tier Management	If Dynamic Tiering is enabled, Auto or Manual is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed. For a Thin Image, a hyphen (-) is displayed.
Cycle Time	Displays the cycle of performance monitoring and tier relocation. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Period	Displays the time of starting and ending of performance monitoring. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Mode	Displays the monitoring mode that is set for the pool. If the continuous mode is enabled, Continuous Mode is displayed. If the period mode is enabled, Period Mode is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Status	Displays the status of pool monitoring. If the monitoring is being performed, In Progress is displayed. A hyphen (-) is displayed other than this case.
Recent Monitor Data	Displays the latest monitoring data. - If the monitoring data exists, the monitoring period of time is displayed. Example: 2010/11/15 00:00 - 2010/11/15 23:59 - If the monitoring data is being obtained, only the starting time is displayed. Example: 2010/11/15 00:00 - - If the latest monitoring data does not exist, a hyphen (-) is displayed.
Pool Management Task	Displays the pool management task being performed to the pool. - Waiting for Rebalance: The rebalance process is waiting. - Rebalancing: The rebalance process is being performed. - Waiting for Relocation: The tier relocation process is waiting. - Relocating: The tier relocation process is being performed. - Waiting for Shrink: The pool shrinking process is waiting.

Item	Description
	- Shrinking: The pool shrinking process is being performed. - Blank: The pool management task is not being performed to the pool. For details about the tier relocation, see the tier relocation log file. For details about the table items of the tier relocation log file, see Tier relocation log file contents on page 5-42.
Relocation Result	Displays the status of the tier relocation processing. In Progress: The status of Pool Management Task is Waiting for Relocation or Relocating. Completed: The tier relocation operation is not in progress, or the tier relocation is complete. Uncompleted (n% relocated): The tier relocation is suspended at the indicated percentage progression. Hyphen (-): The pool is not a Dynamic Tiering or active flash pool.
Relocation Speed	Displays the tier relocation speed: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest).

Pool Volumes tab

Only the LDEVs assigned to the logged-on user are available.

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Status	Displays the following information about the pool-VOL status.  Normal: Pool-VOL is in the normal status.  Shrinking: Pool-VOL is being reduced.  Blocked: Pool-VOL is blocked.
Parity Group ID	Displays the parity group ID.
Capacity	Displays the pool capacity. - Usable: The usable capacity in the pool-VOL that is offset on the basis of the page appears. For the pool-VOL with system area, the displayed capacity does not include the capacity of the management area. - Mapped: The mapped capacity in the pool-VOL that is offset on the basis of the page appears. For the pool of Dynamic Provisioning, Dynamic Tiering, active flash, and Thin Image, a hyphen (-) is displayed if the unit of capacity is changed to Cylinder.

Item	Description
	For the pool of Dynamic Provisioning, Dynamic Tiering, and Thin Image, a hyphen (-) is displayed if the unit of capacity is changed to Cylinder.
RAID Level	Displays the RAID level.
Drive Type/RPM	Displays the data drive type and RPM. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.
Tier ID	Displays the tier identifier. For a Dynamic Provisioning, or a Thin Image pool, a hyphen (-) is displayed.
Provisioning Type	Displays the type of the LDEV. Basic: Internal volume. External: External volume.
Attribute	Description: Attribute of the volume, indicating how the LDEV is being used. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Cache Mode	For the external volume, this item displays whether the cache mode is enabled. If the LDEV is not an external volume, a hyphen (-) is displayed.
Shrinkable	Displays whether the pool-VOL can be removed while the pool is being shrunk, a hyphen (-) is displayed.
Encryption ¹	Displays the information about parity group encryption. - Enabled: Encryption setting of a parity group or pool-VOL containing LDEV is enabled. - Disable: Encryption setting of a parity group or pool-VOL containing LDEV is disabled. - Mixed: Pool-VOLs whose encryption settings are enabled and pool-VOLs whose encryption settings are disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. - Hyphen(-): External volume. This item is not displayed when using Virtual Storage Platform G200.
Data Direct Mapped LDEV	Displays the LDEV ID of the pool-VOL in the pool of the data direct mapping attribute. If the link of the LDEV ID is clicked, the LDEV Properties window appears. A hyphen (-) appears if the data direct mapping attribute is disabled. If DP-VOL with a data direct mapping attribute is not created in the pool of the data direct mapping attribute, this item is blank.

Item	Description
Resource Group Name (ID)	Displays the resource group names and IDs of the LDEV. The identifier is provided in parentheses.
Expand Pool	Displays the Expand Pool window.
Shrink Pool	Displays the Shrink Pool window.
Stop Shrinking Pools	Displays the Stop Shrinking Pools window.
Edit External LDEV Tier Rank ²	Displays the Edit External LDEV Tier Rank window. You cannot operate the pool other than the pool of Dynamic Provisioning, Dynamic Tiering, or active flash.
Edit External Volumes ²	Displays the Edit External Volumes window. If the volume type of the specified pool-VOL is other than the external volume, you cannot operate this button. For details, see the Hitachi Universal Volume Manager User Guide
Export ²	Displays the window for outputting table information.
¹ This item does not appear in the window by default. To display this item, change the Column Settings window.	
² Appears when you click More Actions .	

Virtual Volumes tab

This tab is displayed unless you select a Thin Image pool.

	LDEV ID	LDEV Name	Status	Capacity				Used Capacity		
				Total	Reserved	Used	Used (%)	Tier1	Tier2	Tier3
☐	00:21:F1	Aiz-JNLV...	Normal	500.00 GB	0.00 GB	1.51 GB	1	1.51 GB	-	-
☐	00:21:F2	Aiz-JNLV...	Normal	500.00 GB	0.00 GB	0.00 GB	0	0.00 GB	-	-

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Status	Normal: Normal status. Blocked: Host cannot access a blocked volume. Warning: Problem occurs in the volume.

Item	Description
	 Formatting: Volume is being formatted.  Preparing Quick Format: Volume is being prepared for quick formatting.  Quick Formatting: Volume is being quick-formatted.  Correction Access: Access attribute is being corrected.  Copying: Data in the volume is being copied.  Read Only: Data cannot be written to a read-only volume.  Shredding: Volume is being shredded.  Hyphen (-): Any status other than the above.
Capacity	Displays information about the V-VOL capacity. • Total: Displays the V-VOL capacity. • Reserved: Displays the reserved capacity of the V-VOL. The displayed value of Reserved might be larger than the displayed value of Total due to following reasons: ◦ Reserved displays the reserved capacity that is rounded up on each page. ◦ The mapped capacity of V-VOL for Dynamic Provisioning includes the capacity of control information (168 MB is required per 3,145,548 MB). • Used: Displays the sum of the mapped capacity and the reserved capacity. The displayed value of Used might be larger than the displayed value of Total due to following reasons: ◦ Used displays the sum of the mapped capacity and the reserved capacity that is rounded up on each page. ◦ The mapped capacity of DP-VOL includes the capacity of the control information (Uses a maximum of 168 MB per 3,145,548 MB). ◦ DP-VOL of the data direct mapping attribute includes the control information (168 MB is used per 3,145,548 MB) and the capacity for one page. If used capacity is referenced during I/O or copy processing by software such as ShadowImage or Universal Replicator, the used capacity displayed might be different from the actual capacity even if the full allocation is enabled on the V-VOL. This is caused by a gap between the times that information is gathered about the mapped capacity and the reserved capacity.

Item	Description
	Used(%): For the entire capacity of V-VOL, this item displays percentages of the sum of the mapped capacity and the reserved capacity.
Used Capacity	Displays information about the mapped capacity of V-VOL - Tier1: Displays the used capacity of tier 1. A hyphen (-) is displayed if the logical volume is a not a V-VOL of Dynamic Tiering or active flash. - Tier2: Displays the used capacity of tier 2. A hyphen (-) is displayed if tier 2 does not exist or if the logical volume is a not a V-VOL of Dynamic Tiering or active flash. - Tier3: Displays the used capacity of tier 3. A hyphen (-) is displayed if tier 3 does not exist or if the logical volume is not a V-VOL of Dynamic Tiering or active flash. The reserved capacity is not included in the used capacity for each tier of the V-VOL. Therefore, the Used value in the Capacity column might not correspond with the Used Capacity value.
Number of Paths	Displays the number of alternate paths.
CLPR	Displays the CLPR ID.
Full Allocation	Displays the status of the setting for the full allocation in a pool associated with the V-VOL. - Enable: Pages are reserved. - Disable: Pages are not reserved.
Tiering Policy	Displays the tiering policy name and identifier. All(0): The policy of which all tiers in the pool are used. Level1(1) - Level5(5): One of the policy from Level1 to Level5 is set to V-VOL. Level6(6) - Level31(31): The tiering policy of the user definition is set to V-VOL Hyphen (-): V-VOL is not the Dynamic Tiering or active flash V-VOL.
New Page Assignment Tier	Displays the new page assignment tier. High: High is set to V-VOL. Middle: Middle is set to V-VOL. Low: Low is set to V-VOL. Hyphen (-): V-VOL is not the Dynamic Tiering or active flash V-VOL.
Tier Relocation	Displays whether tier relocation is set to enabled or disabled. If the Dynamic Tiering or active flash V-VOL is not used, a hyphen (-) is displayed.
Relocation Priority	Displays the relocation priority. Prioritized: The priority is set to V-VOL. Blank: The priority is not set to V-VOL.

Item	Description
	Hyphen (-): V-VOL is not the Dynamic Tiering or active flash V-VOL or the tier relocation function is disabled.
Pool Management Task	Displays the pool management task being performed to the pool. Waiting for Rebalance: The rebalance process is waiting. Rebalancing: The rebalance process is being performed. Waiting for Relocation: The tier relocation process is waiting. Relocating: The tier relocation process is being performed. Waiting for Shrink: The pool shrinking process is waiting. Shrinking: The pool shrinking process is being performed. Blank: The pool management task is not being performed to the pool.
V-VOL Management Task	Displays the V-VOL management task being performed to V-VOL. Reclaiming Zero Pages: The zero page reclaiming processing is being performed. Waiting for Zero Page Reclaiming: The zero page reclaiming processing is waiting. Blank: The V-VOL management task is not being performed to V-VOL.
Attribute	Displays the attribute of the LDEV. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
T10 PI ¹	T10 PI attribute setting (Enabled or Disabled) on LDEV.
Access Attribute ¹	Displays the access attribute of the LDEV.
Data Direct Mapped LDEV ¹	Displays the LDEV ID of the pool-VOL in the pool of the data direct mapping attribute. If the link of the LDEV ID is clicked, the LDEV Properties window appears. A hyphen (-) appears if the data direct mapping attribute is disabled.
Resource Group Name (ID)	Displays the resource group names and identifiers of the LDEV. The identifier is provided in parentheses.
Virtual Storage Machine ¹	Information about the virtual storage machine. - Model / Serial Number¹: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID¹: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name¹: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS

Item	Description
	attribute is set, CVS is attached as the suffix to the device name. - SSID¹: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank. - Attribute¹: Virtual LDEV attribute. If the attribute is not set for LDEV, this column is blank.
Create LDEVs	Displays the Create LDEV window.
Add LUN Paths	Displays the Add LUN Paths window.
Expand V-VOLs	Displays the Expand V-VOLs window.
Format LDEVs ²	Displays the Format LDEVs window.
Delete LDEVs ²	Displays the Delete LDEVs window.
Shred LDEVs ²	Displays the Shred LDEVs window.
Delete LUN Paths ²	Displays the Delete LUN Paths window.
Block LDEVs ²	Displays the Block LDEVs window.
Restore LDEVs ²	Displays the Restore LDEVs window.
Edit LDEVs ²	Displays the Edit LDEVs window.
Reclaim Zero Pages ²	Displays the Reclaim Zero Pages window.
Stop Reclaiming Zero Pages ²	Displays the Stop Reclaiming Zero Pages window.
View Tier Properties ²	Displays the View Tier Properties window. This window can open only for a pool for which Dynamic Tiering is enabled.
View ALUs / SLUs ²	Displays the ALUs / SLUs window.
Export ²	Displays the window for outputting table information.
¹ Does not appear by default. To display this item, change the Column Settings window.	
² Appears when you click More Actions .	

Primary Volumes tab

If you select a Thin Image pool, this tab is displayed.

Pool Volumes Primary Volumes							
Export Filter ☐ ON ☐ OFF Column Settings Options 1 / 1							
LDEV ID	LDEV Name	Status	Used Pool Capacity	Pool Usage (%)	Number of Paths	CLPR	Pool Management Task
No Data							

Item	Description
LDEV ID	Displays the combination of the LDKC, CU, and LDEV. Clicking LDEV ID opens the LDEV Properties window.
LDEV Name	Displays the LDEV name.
Status	 Normal: Normal status.  Blocked: Host cannot access a blocked volume.  Warning: Problem occurs in the volume.  Formatting: Volume is being formatted.  Preparing Quick Format: Volume is being prepared for quick formatting.  Quick Formatting: Volume is being quick-formatted.  Correction Access: Access attribute is being corrected.  Copying: Data in the volume is being copied.  Read Only: Data cannot be written to a read-only volume.  Shredding: Volume is being shredded.  Hyphen (-): Any status other than the above.
Used Pool Capacity	Displays the used pool capacity.
Pool Usage(%)	Displays the pool usage level.
Number of Paths	Displays the number of alternate paths.
CLPR	Displays the CLPR. Displays in ID:CLPR form.
Pool Management Task	Displays the pool management task being performed to the pool. Waiting for Rebalance: The rebalance process is waiting. Rebalancing: The rebalance process is being performed. Waiting for Relocation: The tier relocation process is waiting. Relocating: The tier relocation process is being performed. Waiting for Shrink: The pool shrinking process is waiting. Shrinking: The pool shrinking process is being performed. Blank: The pool management task is not being performed to the pool.
Encryption ¹	Displays the information about parity group encryption. Enable: Encryption setting of a parity group or pool-VOL containing LDEV is enabled.

Item	Description
	- Disable: Encryption setting of a parity group or pool-VOL containing LDEV is disabled. - Mixed: Pool-VOLs whose encryption settings are enabled and pool-VOLs whose encryption settings are disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. - Hyphen(-): External volume. This item is not displayed when using Virtual Storage Platform G200.
Virtual Storage Machine ¹	Information about the virtual storage machine. - Model / Serial Number¹: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID¹: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name¹: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. - SSID¹: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank.
Export	Displays the window for outputting table information.
¹ Does not appear by default. To display this item, change the Column Settings window.	

Create Pools wizard

Create Pools window

Use this window to create new pools.

When selecting pool-VOL manually

[illegible]

When selecting pool-VOL automatically

[illegible]

Setting fields

Item	Description
*Pool Type	Select the pool type. For Thin Image, select Thin Image. For following software, select Dynamic Provisioning. - Dynamic Provisioning - Dynamic Tiering - active flash
*Multi-Tier Pool	If Dynamic Tiering is enabled, Auto or Manual for performance monitoring and tier relocation is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Active Flash	When the following conditions are satisfied, this check box can be selected: - Multi-Tier Pool is enabled. - Pool volumes whose drive type is SSD are installed. If this check box is selected, the active flash function is usable.
Data Direct Mapping	Select Enable or Disable for the data direct mapping attribute. This item can be selected if the following are specified: Pool Type: Dynamic Provisioning Multi-Tier Pool: Disable
*Pool Volume Selection	Select the mode of the pool-VOL setting from Auto or Manual. If Enable is selected in Data Direct Mapping, Manual is selected automatically.
*Drive Type/RPM	Select the data drive type and RPM of the pool-VOL. When the volume is created by Dynamic Provisioning, Dynamic Tiering, and active flash, Mixable appears. When the volume is the external volume, Drive Type displays External Storage. This item is displayed when you select Manual as your Pool Volume Selection.
*RAID Level	Select the RAID level of the pool-VOL. This item is displayed when you select Manual as your Pool Volume Selection. Mixable appears in the case of Dynamic Tiering or active flash. A hyphen (-) appears when External Storage is selected in the Drive Type/RPM list.
*Select Pool VOLs	Opens the Select Pool VOLs window. Selecting a pool-VOL is mandatory. This item is displayed when you select Manual as your Pool Volume Selection.
Total Selected Pool Volumes	Displays the total number of the selected pool-VOLs. This item is displayed when you select Manual as your Pool Volume Selection.
Total Selected Capacity	Displays the total capacity of the selected pool-VOLs. This item is displayed when you select Manual as your Pool Volume Selection.

Item	Description
Resource Group	This item is displayed when you select Auto as your Pool Volume Selection. Select the resource group name of the pool.
Performance	This item is displayed when you select Auto as your Pool Volume Selection. Select the performance of the pool.
Total Capacity	This item is displayed when you select Auto as your Pool Volume Selection. Specify the total capacity of the pool.
Change Pool Configuration	This item is displayed when you select Auto as your Pool Volume Selection. Opens the Change Pool Configuration Pattern window. You can change the pool configuration that is automatically selected. For details, see Change Pool Configuration Pattern Window on page D-82 .
Total Pool Volumes	This item is displayed when you select Auto as your Pool Volume Selection. Displays the total number of pool-VOLs.
Total Capacity	This item is displayed when you select Auto as your Pool Volume Selection. Displays the capacity of the pool created by the selected pool configuration.
*Pool Name	Set the pool name. You can enter up to 32 case-sensitive and alphanumeric characters.
Initial Pool ID	The smallest available number is entered in the text box as a default. No number appears in the text box if no available pool ID exists. If you specify the pool ID which is used already, the minimum pool ID after that the specified pool ID is automatically set.
Subscription Limit	Set the subscription limit of the pool from 0 to 65534 (%). If this is blank, the subscription is set to unlimited. When creating a Thin Image pool, this setting is not necessary.
Warning Threshold	Set the threshold between 1 and 100%. The default value is 70%. For Thin Image: Set the threshold between 20% and 95%. The default value is 80%. If Enable is selected in Data Direct Mapping, 100 % is specified automatically.
Depletion Threshold	Set the threshold between 1% and 100%. The default value is 80%. When creating a Thin Image pool, this setting is not necessary.

Item	Description
	If Enable is selected in Data Direct Mapping, 100 % is specified automatically.
Protect V-VOLs when I/O fails to Blocked Pool VOL	This item can be set if following are satisfied: - Dynamic Provisioning is selected in Pool Type. - Data Retention Utility must be installed. Select Yes or No in the protect function for DP-VOL. If this function is enabled, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute.
Protect V-VOLs when I/O fails to Full Pool	This item can be set if following are satisfied: - Dynamic Provisioning is selected in Pool Type. - Data Retention Utility must be installed. Select Yes or No in the protect function for DP-VOL. If this function is enabled, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute.
Tier Management	Select Auto or Manual of performance monitoring and tier relocation. - Cycle Time Select the cycle of performance monitoring and tier relocation. - Monitoring Period When 24 Hours is selected in the Cycle Time list, specify the time zone from 00:00 to 23:59 (default value), in which performance monitoring is to be performed. Take one or more hours between the starting time and the ending time. If you specify the starting time later than the ending time, the performance monitoring continues until the time when you specify as the ending time on the next day. This function can be set when the Multi-Tier Pool is enabled.
Monitoring Mode	Specifies the monitoring mode, If you perform the tier relocation weighted to the past period monitoring result, select Continuous Mode. If you perform the tier relocation on the specified cycle, select Period Mode. You can specify this function when the Multi-Tier Pool is enabled.
Relocation speed	Specifies the page relocation speed. You can set the speed to: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest). The default is 3(Standard). If the speed specified is slower than 3(Standard), the data drive load is low when tier relocation is performed.
Buffer Space for New page assignment	You can set this function when the Multi-Tier Pool is enabled. Tier 1: Enter an integer value from 0 to 50 as the percentage (%) to set for tier 1. A default value depends on the data drive type of pool-VOL in tier 1. The default value of SSD is 0%. The default value other than SSD is 8%.

Item	Description
	Tier 2: Enter an integer value from 0 to 50 as the percentage (%) to set for tier 2. A default value depends on the data drive type of pool-VOL in tier 2. Tier 3: Enter an integer value from 0 to 50 as the percentage (%) to set for tier 3. A default value depends on the data drive type of pool-VOL in tier 3.
Buffer Space for Tier relocation	You can set this function when the Multi-Tier Pool is enabled. Tier 1: Enter an integer value from 2 to 40 as the percentage (%) to set for tier 1. A default value is 2%. Tier 2: Enter an integer value from 2 to 40 as the percentage (%) to set for tier 2. A default value is 2%. Tier 3: Enter an integer value from 2 to 40 as the percentage (%) to set for tier 3. A default value is 2%.
*Items with asterisks require configuration.	

Add

When you click **Add**, the configured information is added to the right side of the Selected Pools table.

Selected Pools table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
RAID Level	Displays RAID level of the pool. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Capacity	Displays the total capacity of the created pool in the specified unit. The displayed capacity is approximately 4.1 GB (capacity of the management area) less than the total capacity of the selected pool-VOLs.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Drive Type/RPM	Displays the data drive type and RPM. If multiple drive types or RPMs exist in a pool, this field indicates Mixed. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.

Item	Description
Encryption	Displays the encryption information about the pool. • Enable: Encryption setting of pool-VOLs containing LDEV is enabled. • Disable: Encryption setting of pool-VOLs containing LDEV is disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed. This status appears when two or more of the following are specified as pool-VOLs: ◦ Volume encryption setting is enabled ◦ Volume encryption setting is disabled ◦ External volume Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): The pool that is created by external volumes. This item is not displayed when using Virtual Storage Platform G200.
User-Defined Threshold (%)	Displays the pool threshold. • Warning: Warning threshold is displayed. • Depletion: Depletion threshold is displayed. For a Thin Image pool, a hyphen (-) is displayed for Depletion.
Subscription Limit (%)	Displays subscription limit of the pool. For Thin Image pool, a hyphen (-) is displayed.
Protect V-VOLs when I/O fails to Blocked Pool VOL	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: • Data Retention Utility is not installed. • Pool type is the type other than DP or DT.
Protect V-VOLs when I/O fails to Full Pool	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: • Data Retention Utility is not installed. • Pool type is other than DP or DT.

Item	Description
Number of Pool VOLs	Displays the number of pool-VOLs.
Tier Management	If Dynamic Tiering is enabled, Auto or Manual for performance monitoring and tier relocation is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Cycle Time	Displays the cycle of performance monitoring and tier relocation. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Period	Displays the time zone of performance monitoring when 24 Hours is selected as the Cycle Time. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Mode	If the continuous mode is enabled, Continuous Mode is displayed. If the period mode is enabled, Period Mode is displayed.
Relocation speed	Displays the page relocation speed: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest). If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Buffer Space for New page assignment (%)	Displays the information of the buffer space for new page assignment to each tier. Tier 1: If you make the Dynamic Tiering function available, the buffer space for new page assignment to tier 1 is displayed. If you make the Dynamic Tiering function unavailable, a hyphen (-) is displayed. Tier 2: If you make the Dynamic Tiering function available, and tier 2 exists, the buffer space for new page assignment to tier 2 is displayed. If you make the Dynamic Tiering function unavailable, or tier 2 does not exist, a hyphen (-) is displayed. Tier 3: If you make the Dynamic Tiering function available, and tier 3 exists, the buffer space for new page assignment to tier 3 is displayed. If you make the Dynamic Tiering function unavailable, or tier 3 does not exist, a hyphen (-) is displayed.
Buffer Space for Tier relocation (%)	Displays the information of the buffer space for tier relocation to each tier. Tier 1: If you make the Dynamic Tiering function available, the buffer space for tier relocation to tier 1 is displayed. If you make the Dynamic Tiering function unavailable, a hyphen (-) is displayed. Tier 2: If you make the Dynamic Tiering function available, and tier 2 exists, the buffer space for tier relocation to tier 2 is displayed. If you make the Dynamic Tiering function unavailable, or tier 2 does not exist, a hyphen (-) is displayed. Tier 3: If you make the Dynamic Tiering function available, and tier 3 exists, the buffer space for tier relocation to tier 3 is displayed. If you make the Dynamic Tiering function unavailable, or tier 3 does not exist, a hyphen (-) is displayed.

Item	Description
RAID Level	Displays the RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Capacity	Displays the pool capacity.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Drive Type/RPM	Displays the data drive type and RPM. If multiple drive types or RPMs exist in a pool, this field indicates that drive types or RPMs are mixed. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.
Encryption	Displays the encryption information about the pool. • Enable: Encryption setting of pool-VOLs containing LDEV is enabled. • Disable: Encryption setting of pool-VOLs containing LDEV is disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed. This status appears when two or more of the following are specified as pool-VOLs: ◦ Volume encryption setting is enabled ◦ Volume encryption setting is disabled ◦ External volume Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): The pool that is created by external volumes. This item is not displayed when using Virtual Storage Platform G200
User-Defined Threshold (%)	Displays the pool threshold. • Warning: Warning threshold is displayed. • Depletion: Depletion threshold is displayed. For a Thin Image pool, a hyphen (-) is displayed for Depletion.
Subscription Limit (%)	Displays the subscription limit. For Thin Image pool, a hyphen (-) is displayed.

Item	Description
Protect V-VOLs when I/O fails to Blocked Pool VOL	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: • Data Retention Utility is not installed. • Pool type is other than DP or DT.
Protect V-VOLs when I/O fails to Full Pool	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: • Data Retention Utility is not installed. • Pool type is other than DP or DT.
Number of Pool VOLs	Displays the number of pool-VOLs.
Tier Management	If Dynamic Tiering is enabled, Auto or Manual for performance monitoring and tier relocation is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Cycle Time	Displays the cycle of performance monitoring and tier relocation. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Period	Displays the time zone of performance monitoring when 24 Hours is selected as the Cycle Time. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Mode	If the continuous mode is enabled, Continuous Mode is displayed. If the period mode is enabled, Period Mode is displayed.
Relocation speed	Displays the page relocation speed: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest). If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Buffer Space for New page assignment (%)	Displays the information of the buffer space for new page assignment to each tier. Tier 1: If you make the Dynamic Tiering function available, the buffer space for new page assignment to tier 1 is displayed. If you make the Dynamic Tiering function unavailable, a hyphen (-) is displayed. Tier 2: If you make the Dynamic Tiering function available, and tier 2 exists, the buffer space for new page assignment to tier 2 is displayed. If you make the Dynamic Tiering function unavailable, or tier 2 does not exist, a hyphen (-) is displayed.

Item	Description
	Tier 3: If you make the Dynamic Tiering function available, and tier 3 exists, the buffer space for new page assignment to tier 3 is displayed. If you make the Dynamic Tiering function unavailable, or tier 3 does not exist, a hyphen (-) is displayed.
Buffer Space for Tier relocation (%)	Displays the information of the buffer space for tier relocation to each tier. Tier 1: If you make the Dynamic Tiering function available, the buffer space for tier relocation to tier 1 is displayed. If you make the Dynamic Tiering function unavailable, a hyphen (-) is displayed. Tier 2: If you make the Dynamic Tiering function available, and tier 2 exists, the buffer space for tier relocation to tier 2 is displayed. If you make the Dynamic Tiering function unavailable, or tier 2 does not exist, a hyphen (-) is displayed. Tier 3: If you make the Dynamic Tiering function available, and tier 3 exists, the buffer space for tier relocation to tier 3 is displayed. If you make the Dynamic Tiering function unavailable, or tier 3 does not exist, a hyphen (-) is displayed.
Detail	Displays the Pool Properties window when a row is selected, and shows the error window when a row is not selected or multiple rows are selected.

Expand Pool wizard

Expand Pool window

Use this window to add LDEVs to a pool to expand the pool to increase pool capacity.

Item	Description
Drive Type/RPM	The Drive Type/RPM of the selected pool or Mixable is displayed. When the volume is the external volume, Drive Type displays External Storage .
RAID Level	Set the RAID level of the selected pool. If the level is not set, Mixable appears. If External Storage is selected in the Drive Type/RPM field, a hyphen (-) is displayed.
Select Pool VOLs	Opens the Select Pool VOLs window.
Total Selected Pool Volumes	Total number of the pool-VOLs selected for this pool.
Total Selected Capacity	Total capacity of the pool-VOLs selected for this pool.

Expand Pool confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Selected Pool table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.

Selected Pool Volumes table

Item	Description
LDEV ID	Displays LDEV identifier, which is the combination of LDKC, CU, and LDEV.

Item	Description
LDEV Name	Displays the LDEV name.
Capacity	Displays the pool-VOL capacity.
Parity Group ID	Displays the parity group ID.
RAID Level	Displays RAID level. If a pool-VOL is an external volume, a hyphen (-) is displayed.
Drive Type/RPM	Displays the data drive type and RPM. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.
Cache Mode	For the external volume, this item displays whether the cache mode is enabled. If the LDEV is not an external volume, a hyphen (-) is displayed.
Attribute	Attribute of the volume indicating how the LDEV is being used. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.

Edit Pools wizard

Edit Pools window



Caution: In one pool, if the setting operations are performed with two times or more to edit many setting items, wait until the primary task applies then perform the secondary operation. If the secondary operation is performed while being applying of the primary task, the primary task is canceled and the secondary task is applied to the storage system.

Edit Pools

1.Edit Pools > 2.Confirm

This wizard lets you edit one or more properties.
Check the box in front of the property you want to edit, and then enter the new value.

☒ Multi-Tier Pool: ☒ Enable ☐ Disable

☐ Active Flash

[Options for Multi-Tier Pool](#)

☐ Tier Management: ☒ Auto ☐ Manual

Cycle Time: Hour(s)

Monitoring Period: -

☐ Monitoring Mode:

☐ Relocation Speed:

	Tier1	Tier2	Tier3
☐ Buffer Space for New page assignment:	0 % (0-50)	8 % (0-50)	% (-)
☐ Buffer Space for Tier relocation:	2 % (2-40)	2 % (2-40)	% (-)

☐ Subscription Limit: %
(58-65534, or blank for "Unlimited")

☐ Pool Name: Prefix Initial Number
(Max. 32 characters total including max. 9-digit number)

☐ Warning Threshold: %
(44-100)

☐ Depletion Threshold: %
(44-100 and greater than or equal to Warning Threshold)

☐ Protect V-VOLs when I/O fails to Blocked Pool VOL: ☐ Yes ☐ No

☐ Protect V-VOLs when I/O fails to Full Pool: ☐ Yes ☐ No

Back Next Finish Cancel ?

Item	Description
Multi-Tier Pool	Select the check box, then Enable or Disable when using or not using Dynamic Tiering. In Thin Image, you cannot change the setting of this function.
Active Flash	Select the check box if you are using the active flash function. If pool volumes whose drive type is SSD are installed, this check box can be selected. In Thin Image, you cannot change the setting of this function.
Options for Multi-Tier Pool	Specifies the performance monitoring, tier relocation, edit buffer space for new page assignment, and buffer space for tier relocation if Multi-Tier Pool is set to Enable . In Thin Image, you cannot change the setting of this function. Select the Tier Management check box, then set the tier management, the cycle time, and the monitoring period. Tier Management: Select Auto or Manual.

Item	Description
	• Cycle Time: When selecting Auto in the Tier Management option, select the cycle of performance monitoring and tier relocation from the Cycle Time list. • Monitoring Period: When selecting 24 Hours in the Cycle Time list, specify the time of starting and ending of performance monitoring in 00:00 to 23:59 (default value). Take one or more hours between the starting time and the ending time. If you specify the starting time later than the ending time, the performance monitoring continues until the time when you specify as the ending time on the next day. Select the Monitoring Mode check box, then set the monitoring mode. Monitoring Mode: Specify the monitoring mode. If you perform the tier relocation weighted to the past period monitoring result, select Continuous Mode. If you perform the tier relocation on the specified cycle, select Period Mode. Select the Relocation Speed check box. Then set the tier relocation speed. Relocation Speed: Specify the page relocation speed when tier relocation is performed. You can set the speed to: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest). Select the Buffer Space for New page assignment check box, then set the buffer space for new page assignment. Buffer Space for New page assignment: Enter an integer value from 0 to 50 as the percentage (%) to set for tier 1, tier 2, and tier 3. If there is no tier, you cannot set this item. Select the Buffer Space for Tier relocation check box, then set the buffer space for tier relocation. Buffer Space for Tier relocation: Enter an integer value from 2 to 40 as the percentage (%) to set for tier 1, tier 2, and tier 3. If the check box is not selected, you cannot set this item. You must set all items if you change the pool setting from Dynamic Provisioning to Dynamic Tiering or active flash. If the check box is selected, you cannot collapse the Options for Multi-Tier Pool field.
Data Direct Mapping	Select the check box, then select Enable or Disable for the data direct mapping attribute. This item can be enabled if the pool type is Dynamic Provisioning and the multi-tier function is disabled. However, depending on the selected pool, Enable or Disable cannot be selected. See the following: Both Enable and Disable will be inactive if one of the following conditions is satisfied: • Multi-Tier Pool is set to Enable. • Thin Image pool is selected. • Dynamic Provisioning for Mainframe pool is selected.

Item	Description
	- Dynamic Tiering for Mainframe pool is selected. Enable will be inactive if: - In the selected pool, the DP-VOL not related to the LDEV of the data direct mapping, is created. Disable will be inactive if: - In the selected pool, the LDEV of the data direct mapping exists.
Subscription Limit	Select the Subscription Limit check box, then enter the subscription limit (%). In Thin Image, you cannot change the setting of this function. - If this field is blank, the subscription is set to be unlimited. - Use blank or a value in the following range: (Total V-VOL capacity including the control information / pool capacity) * 100(%) +1 to 65534(%) - When the current subscription setting is unlimited and the value calculated by the following formula exceeds 65534, you cannot configure the subscription limit. (Total V-VOL capacity including the control information / pool capacity) * 100) - If the check box is not selected, the subscription limit is disabled.
Pool Name	Select the Pool Name check box, then enter the pool name. - Prefix: Enter the alphanumeric characters, which are fixed characters of the head of the pool name. The characters are case-sensitive. - Initial Number: Enter the initial number following the prefix name, which can be entered up to 9 digits.* - You can enter up to the 32 characters including the initial number. The initial number must be 9 or less digits. *When a pool is selected, the pool name appears in the Prefix text box by default. When multiple pools are selected, the initial number from the set number to the maximum number of the digit number is automatically set. Example: - When 1 is set in the Initial Number field, number 1 to 9 is automatically given to the pool name. - When 08 is set in the Initial Number field, number 08 to 99 is automatically given to the pool name. - When 098 is set in the Initial Number field, number 098 to 999 is automatically given to the pool name.
Warning Threshold	Select the Warning Threshold check box, then enter a threshold. The minimum threshold is the sum of the mapped capacity rates, reserved capacity rates, and one percent (1%). The maximum threshold is 100%. For Thin Image, you cannot change the setting of this function:

Item	Description
	Check Warning Threshold and enter a threshold. You cannot set this item if the result of the following calculation exceeds 95: $(used-pool-capacity/pool-capacity) * 100 (\%)$
Depletion Threshold	Select the Depletion Threshold check box, then enter a threshold. The minimum threshold is the sum of the mapped capacity rates, reserved capacity rates, and one percent (1%). The maximum threshold is 100%. If you change the Thin Image pool, you cannot set this item.
Protect V-VOLs when I/O fails to Blocked Pool VOL	Select the check box, then select Yes or No in the protect function for DP-VOL. If this function is enabled, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. However, if Data Retention Utility is not installed, this check box goes inactive.
Protect V-VOLs when I/O fails to Full Pool	Select the check box, then select Yes or No in the protect function for DP-VOL. If this function is enabled, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. However, if Data Retention Utility is not installed, this check box goes inactive.



Caution: To change multiple parameters for a pool two or more times, wait until the current task finishes, then change the next settings. If you attempt to change settings before the current task finishes, only the settings in the next task is applied, so the result might be different from what you expected.

Edit Pools confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

[illegible]

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
RAID Level	Displays the RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Capacity	Displays the pool capacity.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Drive Type/RPM	Displays the data drive type and RPMs. If multiple drive types or RPMs exist in a pool, this field indicates Mixed. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
User-Defined Threshold (%)	Displays the pool threshold. - Warning: Warning threshold is displayed. - Depletion: Depletion threshold is displayed. For a Thin Image pool, a hyphen (-) is displayed for Depletion.
Subscription Limit (%)	Displays the subscription limit.

Item	Description
	For Thin Image pool, a hyphen (-) is displayed.
Protect V-VOLs when I/O fails to Blocked Pool VOL	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool-VOL is blocked, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: • Data Retention Utility is not installed. • Pool type is other than DP or DT.
Protect V-VOLs when I/O fails to Full Pool	Displays whether the protect function for DP-VOL is being enabled or disabled. If the setting is enabled, when the pool usage reaches the full size, DP-VOL is protected from reading and writing requests. And at the same instant, the access attribute of the DP-VOL is changed to the Protect attribute. A hyphen appears if the pool corresponds with one of following: • Data Retention Utility is not installed. • Pool type is other than DP or DT.
Number of Pool VOLs	Displays the number of pool-VOLs.
Tier Management	If Dynamic Tiering is enabled, Auto or Manual for performance monitoring and tier relocation is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Cycle Time	Displays the cycle of performance monitoring and tier relocation. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Period	Displays the time zone of performance monitoring when 24 Hours is selected as the Cycle Time. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Mode	If the continuous mode is enabled, Continuous Mode is displayed. If the period mode is enabled, Period Mode is displayed.
Relocation Speed	Displays the page relocation speed: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest). If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Buffer Space for New page assignment (%)	Displays the information of the buffer space for new page assignment to each tier. Tier 1: If you make the Dynamic Tiering function available, the buffer space for new page assignment to tier 1 is displayed. If you make the Dynamic Tiering function unavailable, a hyphen (-) is displayed. Tier 2: If you make the Dynamic Tiering function available, and tier 2 exists, the buffer space for new page assignment to tier 2 is displayed. If you make the Dynamic Tiering function unavailable, or tier 2 does not exist, a hyphen (-) is displayed.

Item	Description
	Tier 3: If you make the Dynamic Tiering function available, and tier 3 exists, the buffer space for new page assignment to tier 3 is displayed. If you make the Dynamic Tiering function unavailable, or tier 3 does not exist, a hyphen (-) is displayed.
Buffer Space for Tier relocation (%)	Displays the information of the buffer space for tier relocation to each tier. Tier 1: If you make the Dynamic Tiering function available, the buffer space for tier relocation to tier 1 is displayed. If you make the Dynamic Tiering function unavailable, a hyphen (-) is displayed. Tier 2: If you make the Dynamic Tiering function available, and tier 2 exists, the buffer space for tier relocation to tier 2 is displayed. If you make the Dynamic Tiering function unavailable, or tier 2 does not exist, a hyphen (-) is displayed. Tier 3: If you make the Dynamic Tiering function available, and tier 3 exists, the buffer space for tier relocation to tier 3 is displayed. If you make the Dynamic Tiering function unavailable, or tier 3 does not exist, a hyphen (-) is displayed.

Delete Pools wizard

Delete Pools window

Delete Pools

1. Delete Pools > 2. Confirm

This wizard lets you delete the pools and make the pool volumes available for other use. Click Finish to confirm the deletion, or click Next to shred LDEVs for the selected pools.

Selected Pools

Filter ON OFF Options 1 / 1

Pool Name (ID)	RAID Level	Capacity	Pool Type	Drive Type/RPM	User-Defined Threshold (%)	Number of Pool VOLS
					Warning	Depletion
☐ DP (3)	6(6D+2P)	995.85 GB	DP	SAS/10k	70	80

Detail Selected: 0 of 1

Next Task Option : Continue to Shred LDEVs Back Next Finish Cancel ?

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.

Item	Description
RAID Level	Displays the RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Capacity	Displays the pool capacity.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Drive Type/RPM	Displays the data drive type and RPM of the pool. If multiple drive types or RPMs exist in a pool, this field indicates that drive types or RPMs are mixed. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.
User-Defined Threshold (%)	Displays the pool threshold. - Warning: Warning threshold is displayed. - Depletion: Depletion threshold is displayed. For a Thin Image pool, a hyphen (-) is displayed for Depletion.
Number of Pool VOLs	Displays the number of pool-VOLs.
Detail	Displays the Pool Properties window when a row is selected, and shows the error window when a row is not selected or multiple rows are selected.

Next Task Option

Click **Next** to go to the task setting window, which is indicated in **Task Next Option**.

Delete Pools confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.



Note: If multiple tasks that are connected in one wizard are executed, this window shows all configured items of tasks. To show information of configured items other than this topic, click **Back** to display related setting windows, then click **Help**.

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
RAID Level	Displays the RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Capacity	Displays the pool capacity.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Drive Type/RPM	Displays the data drive type and RPM. If multiple drive types or RPMs exist in a pool, this field indicates that drive types or RPMs are mixed. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.
User-Defined Threshold (%)	Displays the pool threshold. - Warning: Warning threshold is displayed. - Depletion: Depletion threshold is displayed. For a Thin Image pool, a hyphen (-) is displayed for Depletion.

Item	Description
Number of Pool VOLs	Displays the number of pool-VOLs.
Detail	Displays the Pool Properties window when a row is selected, and shows the error window when a row is not selected or multiple rows are selected.

Expand V-VOLs wizard

Expand V-VOLs window

Use this wizard to expand the V-VOLs to the defined final capacity of the virtual volumes.

Item	Description
Specify Total Capacity	Select this check box when you specify the total capacity of V-VOL.
Specify Additional Capacity	Select this check box when you specify the additional capacity of V-VOL.
Offset Boundary	Select this check box To offset the specified LDEV capacity by boundary.

Item	Description
	Final: Displays the capacity after expanding the volume.
Provisioning Type	Displays the LDEV type. In this case, DP is displayed.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Hyphen (-): Volume in which the attribute is not defined.
Full Allocation	Displays the status of the setting for the full allocation in a pool associated with the V-VOL. - Enable: Pages are reserved. - Disable: Pages are not reserved.

Restore Pools window

Restore Pools

1. Confirm

To recover Blocked Pools, Enter a name for the task.
Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Pool Name (ID)	RAID Level	Capacity	Pool Type	Drive Type/RPM	User-Defined Threshold (%)	
					Warning	Depletion
DP(1)	1(2D+2D)	20.00 GB	DP	SAS/15k	70	80

Total: 1

☐ Go to tasks window for status Back Next Apply Cancel ?

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
RAID Level	Displays the RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Capacity	Displays the pool capacity. If the pool is blocked and pool-VOLs that belong to the pool cannot be identified, 0 is displayed.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed.

Prediction Result of Shrinking table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
User-Defined Threshold (%)	Displays the pool threshold. - Warning: Warning threshold is displayed. - Depletion: Depletion threshold is displayed. For a Thin Image pool, a hyphen (-) is displayed for Depletion.
Capacity(Used/Total)	Displays the capacity before and after shrinking. - Before Shrinking: Displays the sum of the mapped capacity and the reserved capacity, the total capacity before shrinking, and the pool usage rates. - After Shrinking: Displays the sum of the mapped capacity and the reserved capacity, the total capacity after the shrinking pool, and the pool usage rates.
Attribute	Attribute of the volume indicating how the LDEV is being used. Pool VOL: LDEV of the pool-VOL. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.

Selected Pool Volumes table

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Parity Group ID	Displays the parity group ID.
Capacity	Displays the pool-VOL capacity.

Stop Shrinking Pools window

Stop Shrinking Pools

1. Confirm

Enter a name for the task. Confirm the settings and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Pool Name (ID)	RAID Level	Capacity	Pool Type	Drive Type/RPM	User-Defined Threshold (%)	
					Warning	Depletion
DT_Max(7)	Mixed	1655 Pa...	DT	Mixed	70	80

Detail

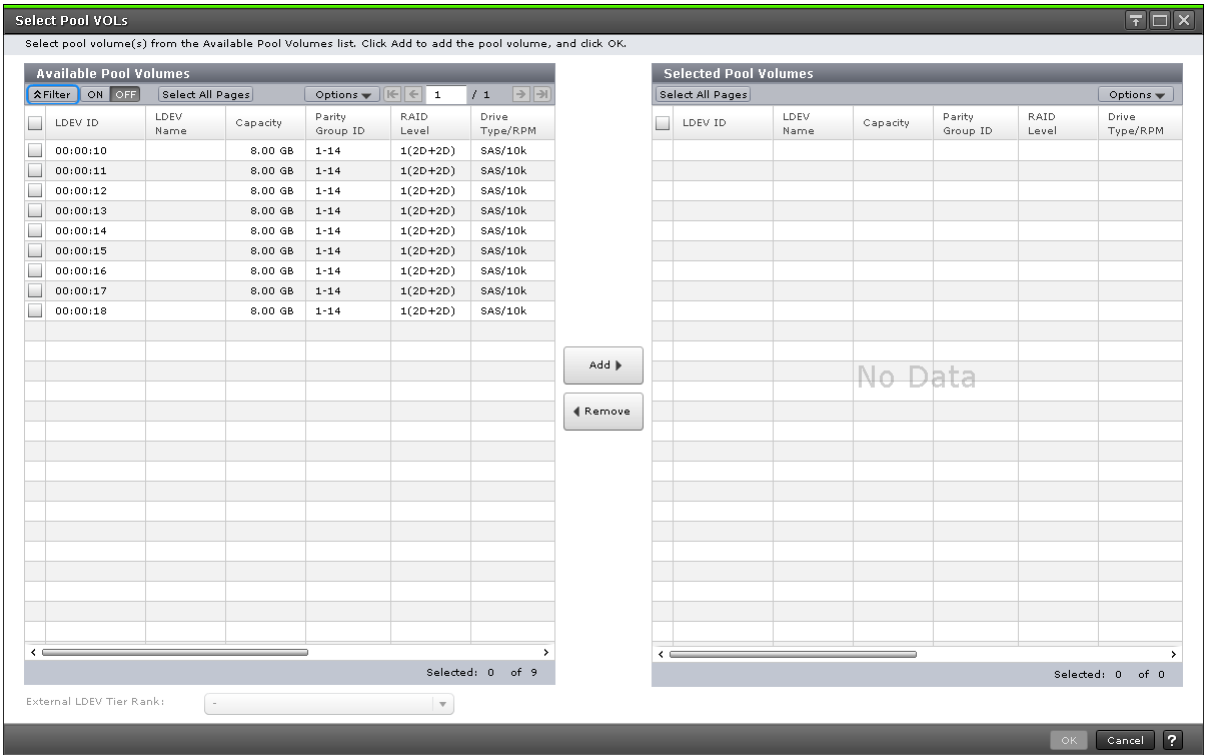
Total: 1

Go to tasks window for status Back Next Apply Cancel ?

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
RAID Level	Displays the RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Capacity	Displays the pool capacity.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Drive Type/RPM	Displays the data drive type and RPM. If multiple drive types or RPMs exist in a pool, this field indicates that drive types or RPMs are mixed. When the volume is the external volume, Drive Type displays External Storage and the value of the external LDEV tier rank.
User-Defined Threshold (%)	Displays the pool threshold. - Warning: Warning threshold is displayed. - Depletion: Depletion threshold is displayed. For a Thin Image pool, a hyphen (-) is displayed for Depletion.
Number of Pool VOLs	Displays the number of pool-VOLs.
Detail	Displays the Pool Properties window when a row is selected, and shows the error window when a row is not selected or multiple rows are selected.

Select Pool VOLs window

Use this window to add pool-VOLs to a pool. Only LDEVs assigned to the logged-on user are available.



Available Pool Volumes table

Only the LDEVs assigned to the user are displayed.

Item	Description
LDEV ID	Displays the LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Capacity	Displays the pool-VOL capacity.
Parity Group ID	Displays the parity group ID.
RAID Level	Displays the RAID level. If an LDEV is an external volume, a hyphen (-) is displayed.
Drive Type/RPM	Displays the data drive type and RPM. When the volume is the external volume, Drive Type displays External Storage .
Provisioning Type	Displays the type of the LDEV. Basic: Internal volume. External: External volume.
Attribute	Attribute of the volume indicating how the LDEV is being used.

Item	Description
	Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Cache Mode	For the external volume, this item displays whether the cache mode is enabled. If the LDEV is not an external volume, a hyphen (-) is displayed.
Encryption	Displays the encryption information about the pool. • Enable: Encryption setting of a parity group or pool-VOL containing LDEV is enabled. • Disable: Encryption setting of a parity group or pool-VOL containing LDEV is disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): External volume. This item is not displayed when using Virtual Storage Platform G200. Virtual Storage Platform G200.
Resource Group Name (ID)	Displays the resource group names and IDs of the LDEV. The ID is provided in parentheses.

External LDEV Tier Rank

Specify the tier rank of the external volume. If there is no external volume in the **Available Pool Volumes** table or **Selected Pool Volumes** table, you cannot select this option.

Add

When you select a row in the Available Pool Volumes table and click **Add**, the selected pool-VOL is added to the Selected Pool Volumes table.

Up to 1,024 volumes can be added including the volumes already in the pool.

When adding a volume to the pool for which Multi-Tier Pool is enabled, note the following:

For a pool, you can add volumes whose **Drive Type/RPM** settings are the same and whose **RAID Levels** are different. For example, you can add the following volumes to the same pool:

- Volume whose **Drive Type/RPM** is SAS/15K and whose **RAID Level** is 5 (3D+1P)

- Volume whose **Drive Type/RPM** is SAS/15K and whose **RAID Level** is 5 (7D+1P)

Remove

When you select a row in Selected Pool Volumes table and click **Remove**, the selected pool-VOL is removed from the Selected Pool Volumes table.

Selected Pool Volumes table

Item	Description
LDEV ID	Displays the LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Capacity	Displays the pool-VOL capacity.
Parity Group ID	Displays the parity group ID.
RAID Level	Displays the RAID level. If an LDEV is an external volume, a hyphen (-) is displayed.
Drive Type/RPM	Displays the data drive type and RPM. When the volume is the external volume, Drive Type displays External Storage .
External LDEV Tier Rank	Displays the tier rank of the external volume. If the volume is not an external volume, a hyphen(-) is displayed.
Provisioning Type	Displays the type of the LDEV. Basic: Internal volume. External: External volume.
Attribute	Attribute of the volume indicating how the LDEV is being used. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Cache Mode	For the external volume, this item displays whether the cache mode is enabled. If the LDEV is not an external volume, a hyphen (-) is displayed.
Encryption	Displays the encryption information about the pool. - Enable: Encryption setting of a parity group or pool-VOL containing LDEV is enabled. - Disable: Encryption setting of a parity group or pool-VOL containing LDEV is disabled. - Mixed: Pool-VOLs whose encryption settings are enabled or pool-VOLs whose encryption settings are disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled.

Item	Description
	Hyphen (-): External volume. This item is not displayed when using Virtual Storage Platform G200.
Resource Group Name (ID)	Displays the resource group names and identifiers of the LDEV. The identifier is provided in parentheses.

Reclaim Zero Pages window

Reclaim Zero Pages [Icons]

1. Confirm

This wizard lets you return the space with zero data to the available space for use.

Task Name: (Max. 32 Characters)

Selected Virtual Volumes						
LDEV ID	LDEV Name	Pool Name(ID)	Capacity	Provisioning Type	Attribute	
00:00:47	V-VOL	Prov_Pool(3)	10.00 GB	DP	-	
						Total: 1

☐ Go to tasks window for status Back Next Apply Cancel ?

Item	Description
LDEV ID	Displays the LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Pool Name (ID)	Displays the pool name and pool ID.
Capacity	Displays the capacity.
Provisioning Type	Displays the LDEV type. In this case, DP is displayed.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Hyphen (-): Volume in which the attribute is not defined.

Stop Reclaiming Zero Pages window

Stop Reclaiming Zero Pages

1.Confirm

Are you sure you want to Stop Zero Page Reclamation?

Task Name:

140929-StopReclaimingZeroPages

(Max. 32 Characters)

Selected Virtual Volumes

LDEV ID	LDEV Name	Pool Name(ID)	Capacity	Provisioning Type	Attribute	
00:00:01		1(0)	0.05 GB	DP	-	
						Total: 1

☐ Go to tasks window for status

Back

Next

Apply

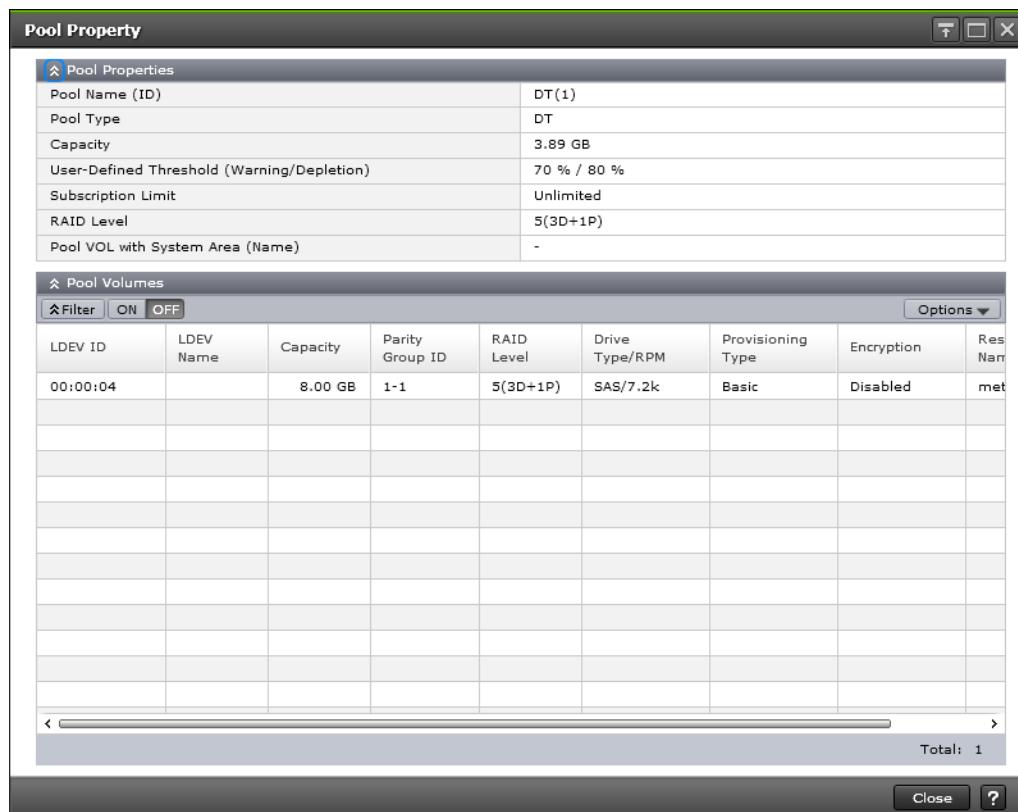
Cancel

?

Item	Description
LDEV ID	Displays the LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Pool Name (ID)	Displays the pool name and pool ID.
Capacity	Displays the capacity.
Provisioning Type	Displays the LDEV type. In this case, DP is displayed.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Hyphen (-): Volume in which the attribute is not defined.

Pool Property window

Use this window to view and change pool properties. Only the LDEVS assigned to the logged-on user are available.



Pool Properties table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Capacity	Displays the pool capacity in the specified unit.
User-Defined Threshold (Warning/Depletion)	Displays the user-defined threshold (Warning/Depletion).
Subscription Limit	Displays the subscription limit. For a Thin Image pool, a hyphen (-) is displayed for Current or Limit.
RAID Level	Displays the RAID level. If multiple RAID levels exist in a pool, this field indicates that RAID levels are mixed. If all pool-VOLs are external volumes, a hyphen (-) is displayed.
Encryption	Displays the encryption information about the pool.

Item	Description
	• Enable: Encryption setting of a pool-VOL containing LDEV is enabled. • Disable: Encryption setting of a pool-VOL containing LDEV is disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed. This status appears when two or more of the following are specified as pool-VOLs: ◦ Volume encryption setting is enabled ◦ Volume encryption setting is disabled ◦ External volume Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): The pool is created by external volumes or is being blocked. This item is not displayed when using Virtual Storage Platform G200.
Pool VOL with System Area (Name)	Displays LDEV ID and LDEV name of the pool-VOL which includes the system area. If you open this window from the Selected Pools table in the Create Pool window, a hyphen(-) is displayed.

Pool Volumes table

Only the LDEVs assigned to the user are displayed.

Item	Description
LDEV ID	Displays the LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Capacity	Displays the pool volumes capacity in the specified unit. If you open this window from the Selected Pools table in the Create Pool window, the LDEV capacity selected in the Select Pool VOLs window is displayed.
Parity Group ID	Displays the parity group ID.
RAID Level	Displays the RAID level. If a pool-VOL is an external volume, a hyphen (-) is displayed.
Drive Type/RPM	Displays the tier ID. A hyphen (-) is displayed when selecting the pool for Dynamic Provisioning, or Thin Image.
Tier ID	Displays the tier identifier. A hyphen (-) is displayed when you select a Dynamic Provisioning, or Thin Image pool.
Provisioning Type	Displays the type of the LDEV. Basic: Internal volume.

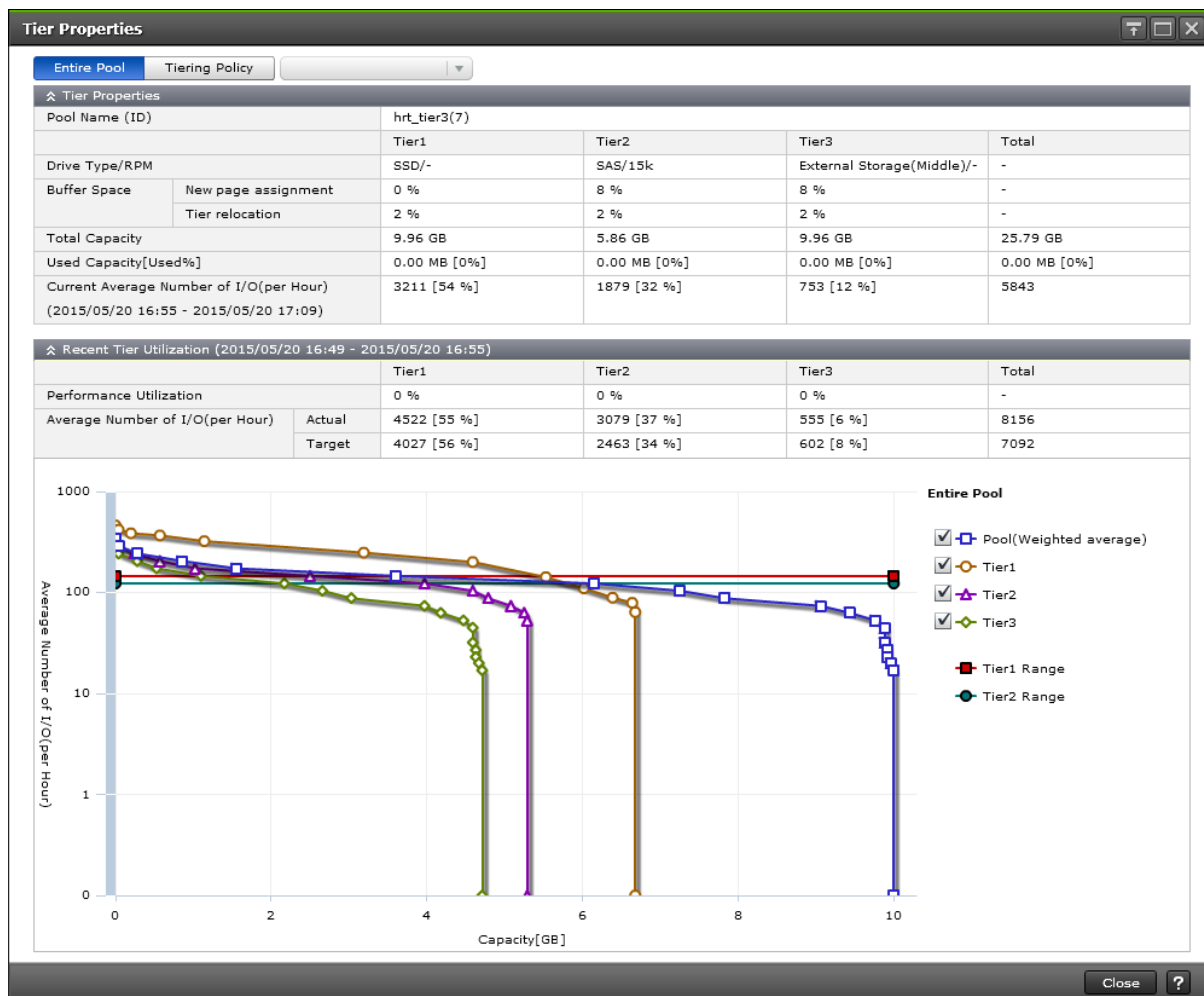
Item	Description
	External: External volume.
Attribute	Attribute of the volume indicating how the LDEV is being used. Pool VOL: LDEV of the pool-VOL Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Cache Mode	For the external volume, this item displays whether the cache mode is enabled. If the LDEV is not an external volume, a hyphen (-) is displayed.
Encryption	Displays the encryption information about the pool. • Enable: Encryption setting of a parity group or pool-VOL containing LDEV is enabled. • Disable: Encryption setting of a parity group or pool-VOL containing LDEV is disabled. • Mixed: Pool-VOLs whose encryption settings are enabled or disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): External volume. This item is not displayed when using Virtual Storage Platform G200.
Resource Group Name (ID)	Displays the resource group names and identifiers of the LDEV. The identifier is provided in parentheses.

View Tier Properties window

This window shows tier properties and a performance graph:

- [For pools on page D-59](#)
- [For V-VOLs on page D-63](#)

When the pool name (pool ID) appears in the graph banner, you are looking at a pool information. When the LDEV name (LDEV ID) appears in the graph banner, you are looking at V-VOL information.



For pools

The following tables list the View Tier Properties information.

When selecting Entire Pool or Tiering Policy

Item	Description
Entire Pool or Tiering Policy	Select the following resource to display the performance graph. - Entire Pool: Displays the performance graph of the entire pool. - Tiering Policy: Displays the performance graph of the tiering policy.
All(0), and from Level1(1) to Level31(31)	Select the Tiering Policy. The performance graph that corresponds to the selected tiering policy appears.

Tier Properties table

Item	Description
Pool Name(ID)	Displays the pool name and identifier.
Tier name	Displays the tier names: Tier1, Tier2, Tier3, and Total. Each column displays information about the tier.
Drive Type/RPM	Displays the data drive type and RPM of tier. If multiple types exist in a tier, Mixed is displayed. For an external volume, Drive Type displays External Storage with the value of the external LDEV tier rank.
Buffer Space	Displays the following buffer spaces. • New page assignment: Buffer spaces for new page assignment. • Tier relocation: Buffer spaces for tier relocation.
Total Capacity	Displays the total capacity of each tier and total capacity of the pool.
Used Capacity (Used %)	Displays the percentage of the used capacity for the pool and each tier. The field is updated asynchronously with the Recent Tier Utilization table and when the View Tier Properties window is opened. The Used Capacity of each tier can differ from the sum of the used capacities of all tiers.
Tiering Policy: tiering policy name	Displays the used capacity size and percentage related to the tiering-policy of the pool and each tier. This item displays when you make a Tiering Policy selection.
Current Average Number of I/O(per Hour)	Displays the actual monitored average I/Os and the percentages for each tier, and an entire pool, for the period from the creation of the pool to the current state. This item appears when selecting Entire Pool. The number of I/Os is initialized in the following cases, and then I/Os are counted again: • When monitoring information collection is complete. • When the number of tiers in a pool changes. • When a tier location of the pool VOL is changed by adding a pool VOL. • When multi tier pools are enabled after being invalid. • When the fixed monitoring information is calculated again. For details about cases that the fixed monitoring information is calculated again, see Performance monitoring or tier relocation conditions on page 5-29 .

Recent Tier Utilization (monitoring period) table

Item	Description
Header area	If a error occurs, a message appears.
Tier name	Displays the tier names: Tier1, Tier2, Tier3, and Total. Each column displays information about the tier.

Item	Description
Performance Utilization	Displays the percentage of progress in performance utilization processing.
Average Number of I/O (per Hour)	Actual: Displays the actual monitored average I/Os and percentages for each tier, and a pool, on an hourly basis.* Target: Displays the target average I/Os and percentages for each tier, and a pool, after the tier determination calculation.* This item appears when selecting the Entire Pool option.
Tiering Policy: tiering policy name	Displays the average number of I/Os for the pool and each tier that are related to the tiering-policy. This item displays when you make a Tiering Policy selection.*
* This field is updated when performance monitoring information is collected, asynchronously with Used Capacity (Used %). If ? is displayed, take the actions displayed in the header area of the Recent Tier Utilization table. If an error message and countermeasure are not shown in the header area of the Recent Tier Utilization table, refresh the window. If ? continues to display, call the Hitachi Data Systems customer support.	

Performance Graph

Item	Description
Performance graph	Displays the performance graph of the entire pool or tiering policy.
Pool	If Entire Pool and the period mode of the monitoring mode are specified, this item appears. When this check box is selected, the performance graph appears. The vertical scale of the performance graph indicates the average number of I/Os on an hourly basis. The horizontal scale of the performance graph indicates the capacity. If there is no monitor data, this item does not appear.
Pool(Weighted average)	If Entire Pool and the continuous mode of the monitoring mode are specified, this item appears. When this check box is selected, the performance graph appears. The vertical scale indicates the average number of I/Os on an hourly basis. The number of I/Os is a weighted, averaged with the monitoring data from the past cycle weighted against the monitoring data from the current cycle. The horizontal scale indicates the capacity. If there is no monitor data, this item does not appear.
Policy	If Tiering Policy and the period mode of the monitoring mode are specified, this item appears. When the check box is selected, the performance graph appears. The vertical scale of the performance graph indicates the average number of I/Os on an hourly basis. The horizontal scale of the performance graph indicates the capacity. If there is no monitor data, this item does not appear.
Policy(Weighted average)	If Tiering Policy and the continuous mode of the monitoring mode are specified, this item appears. When the check box

Item	Description
	is selected, the performance graph appears. The vertical scale of the performance graph indicates the average number of I/Os on an hourly basis. The horizontal scale of the performance graph indicates the capacity. If there is no monitor data, this item does not appear.
Tier1	Displays the performance graph of tier1. The vertical scale indicates the average number of I/Os on an hourly basis. The horizontal scale indicates the capacity. If there is no monitor data in tier1, this item does not appear.
Tier2	Displays the performance graph of tier2. The vertical scale indicates the average number of I/Os on an hourly basis. The horizontal scale indicates the capacity. If there is no monitor data in tier2, this item does not appear.
Tier3	Displays the performance graph of tier3. The vertical scale indicates the average number of I/Os on an hourly basis. The horizontal scale indicates the capacity. If there is no monitor data in tier3, this item does not appear.
Tier1 range	Displays the range in tier1. If there is no monitor data in tier1, this item does not appear.
Tier2 range	Displays the range in tier2. If there is no monitor data in tier2, this item does not appear.

The following describes how to read the performance graph when it contains pool information.

The vertical scale of the graph indicates an average number of I/Os by each hour and the horizontal scale indicates capacity (GB) of the area where I/Os are performed.

The two lines in the graph indicate tier 1 range and tier 2 range. They are calculated when the collection of performance monitoring has been completed (monitoring period completes). They show the boundary of each tier.

A maximum of 127 dots is shown in the graph. The following information appears over a dot in the graph depending on where the cursor is placed.

- Capacities, average I/Os, and total I/Os appear if the cursor is placed on the dot of the Tier1, Tier2, Tier3, Pool, or the Pool(Weighted average).
- The lower value of the average I/Os appears if the cursor is placed on the dot of the Tier1 Range or the Tier2 Range.

The following table describes these items.

Item	Description
Capacities	The capacity (GB) of the area from the dot of the maximum value on the vertical scale to a specified dot. The capacity of the dot on the vertical scale is 0.00 GB.
Average I/Os	All I/Os are sorted into 127 sections. The average I/O is the representative I/O number assigned to each section, based on the definition of the storage system. By the total number of I/Os, the number of dots can be 127 or less.
Total I/Os	The total number of I/Os in the section from the dot of the maximum value on the vertical scale to a specified dot. The total I/Os is calculated using the average I/Os and capacities in the specified section. If the specified dot is on the vertical scale, the total I/Os is zero.

When no I/Os are in the lower tier with multiple tiers, the tier range line is placed at 0 on the vertical scale.

For example, if the dot is placed far from the lower limit of the tier range, the lower limit levels of the Tier 1 Range and Tier 2 Range are adjusted to improve the visibility of the performance graph. In this case, the value that is obtained by Command Control Interface can not correspond with the value of the dot displayed in a performance graph.

For V-VOLs

The following table provides the View Tier Properties table information when LDEV information is present.

Tier Properties table when selecting a DP-VOL

Item	Description
LDEV ID	Displays the combination of the LDKC, CU, and LDEV.
LDEV name	Displays the LDEV name.
Tiering Policy	Displays the tiering policy name and identifier.
New Page Assignment Tier	Displays the new page assigned tier.
Tier Relocation	Displays whether tier relocation is set to Enabled or Disabled.
Relocation Priority	Displays the relocation priority.
Tier name	Displays the tier names: Tier1, Tier2, Tier3, and Total. Each column displays information about the tier.
Drive Type/RPM	Displays the data drive type and RPM of tier. If multiple types exist in a tier, Mixed is displayed. For an external volume, Drive Type displays External Storage with the value of the external LDEV tier rank.
Pool Capacity	Displays the total capacity of each tier and total capacity of the pool.

Item	Description
Used Capacity (Used %)	Displays the percentage of the used capacity for the pool and each tier. The field is updated asynchronously with the Recent Tier Utilization table and when the View Tier Properties window is opened. The Used Capacity of each tier can differ from the sum of the used capacities of all tiers.
Current Average Number of I/O(per Hour)	Displays the actual monitored average I/Os and the percentages for each tier, and an entire pool, for the period from the creation of the pool to the current state. This item appears when selecting Entire Pool. The number of I/Os is initialized in the following cases, and then I/Os are counted again: • When monitoring information collection is complete. • When the number of tiers in a pool changes. • When a tier location of the pool VOL is changed by adding a pool VOL. • When multi tier pools are enabled after being invalid. • When the fixed monitoring information is calculated again. For details about cases that the fixed monitoring information is calculated again, see Performance monitoring or tier relocation conditions on page 5-29.

Recent Tier Utilization (monitoring period) table

Item	Description
Header area	If a error occurs, a message appears.
Tier name	Displays the tier names: Tier1, Tier2, Tier3, and Total. Each column displays information about the tier.
Average Number of I/O (per Hour)	Actual: Displays the actual monitored average I/Os and percentages of each tier and a DP-VOL on an hourly basis.* Target: Displays the target average I/Os and percentages of each tier, and a DP-VOL, after the tier determination calculation.
* This field is updated when performance monitoring information is collected, asynchronously with Used Capacity (Used %). If ? is displayed, take the actions displayed in the header area of the Recent Tier Utilization table. If an error message and countermeasure are not shown in the header area of the Recent Tier Utilization table, refresh the window. If ? continues to display, call the Hitachi Data Systems customer support.	

Performance Graph

Item	Description
Performance graph	Displays the performance graph of the entire pool or tiering policy.

Item	Description
Volume	If the period mode of the monitoring mode is specified, this item appears. When this check box is selected, the performance graph appears. The vertical scale of the performance graph indicates the average number of I/Os on an hourly basis. The horizontal scale of the performance graph indicates the capacity. If there is no monitor data, this item does not appear.
Volume(Weighted average)	If the continuous mode of the monitoring mode is specified, this item appears. When this check box is selected, the performance graph appears. The vertical scale indicates the average number of I/Os on an hourly basis. The number of I/Os is a weighted, averaged with the monitoring data from the past cycle weighted against the monitoring data from the current cycle. The horizontal scale indicates the capacity. If there is no monitor data, this item does not appear.
Tier1	Displays the performance graph of tier1. The vertical scale indicates the average number of I/Os on an hourly basis. The horizontal scale indicates the capacity. If there is no monitor data in tier1, this item does not appear.
Tier2	Displays the performance graph of tier2. The vertical scale indicates the average number of I/Os on an hourly basis. The horizontal scale indicates the capacity. If there is no monitor data in tier2, this item does not appear.
Tier3	Displays the performance graph of tier3. The vertical scale indicates the average number of I/Os on an hourly basis. The horizontal scale indicates the capacity. If there is no monitor data in tier3, this item does not appear.
Tier1 range	Displays the range in tier1. If there is no monitor data in tier1, this item does not appear.
Tier2 range	Displays the range in tier2. If there is no monitor data in tier2, this item does not appear.

The following describes how to read the performance graph when LDEV information is presented.

The vertical scale of the graph indicates an average number of I/Os by each hour and the horizontal scale indicates a capacity, in GB, of the area where I/Os are performed.

The two lines in the graph indicate tier 1 range and tier 2 range. These ranges are calculated when the collection of performance monitoring data is complete (monitoring period completes). They show the boundary of each tier.

A maximum of 127 dots is shown in the graph. The following information appears over a dot in the graph depending on where the cursor is placed.

- Capacities, average I/Os, and total I/Os appear if the cursor is placed on the dot of the Tier1, Tier2, Tier3, Volume or the Volume(Weighted average).
- The lower value of the average I/Os appears if the cursor is placed on the dot of the Tier1 Range or the Tier2 Range.

The following table describes these items.

Item	Description
Capacities	The capacity (GB) of the area from the dot of the maximum value on the vertical scale to a specified dot. The capacity of the dot on the vertical scale is 0.00 GB.
Average I/Os	All I/Os are sorted into 127 sections. The average I/O is the representative I/O number assigned to each section, based on the definition of the storage system. By the total number of I/Os, the number of dots can be 127 or less.
Total I/Os	The total number of I/Os in the section from the dot of the maximum value on the vertical scale to a specified dot. The total I/Os is calculated using the average I/Os and capacities in the specified section. If the specified dot is on the vertical scale, the total I/Os is zero.

When no I/Os are in the lower tier with multiple tiers, the tier range line is placed at 0 on the vertical scale.

Monitor Pools window

Monitor Pools

1. Confirm

Enter a name for the task. Confirm the settings and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Selected Pools

Pool Name (ID)	Number of Pool VOLS	Capacity			Recent Monitor Data
		Total	Mapped	Mapped (%)	
DTPool(0)	1	3.89 GB	0.00 GB	0	-

Total: 1

☒ Go to tasks window for status
 Back Next Apply Cancel ?

Selected Pools table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
Number of Pool VOLs	Displays the number of pool-VOLs in the selected pool.
Capacity	Displays the information about the pool capacity. Total: Total capacity of pool. Using Option, you can select unit of capacity. - One block equals 512 bytes and one page equals 42 megabytes in a pool capacity of Dynamic Provisioning, Dynamic Tiering, active flash, or Thin Image. - Mapped: Page capacity of the pool in which user data and control information is stored. - Mapped (%): Percentages of the page capacity of the pool that contains user data and control information. Mapped (%) displays the value which is truncated after the decimal point of the actual value.
Recent Monitor Data	Displays the period of monitoring time as follows: <i>Starting-time-Ending-time</i> If the monitoring data is being obtained, only the starting time is displayed. If the latest monitoring data does not exist, a hyphen (-) is displayed.

Stop Monitoring Pools window

Stop Monitoring Pools

1. Confirm

Enter a name for the task. Confirm the settings and click Apply to add task in Tasks queue for execution.

Task Name: 150303-StopMonitoringPools (Max. 32 Characters)

Pool Name (ID)	Number of Pool VOLs	Capacity			Recent Monitor Data
		Total	Mapped	Mapped (%)	
DTPool(0)	1	3.89 GB	0.00 GB	0	2015/03/03 07:25 -

Total: 1

☐ Go to tasks window for status
Back
Next
Apply
Cancel
?

Selected Pools table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
Number of Pool VOLs	Displays the number of pool-VOLs in the selected pool.
Capacity	Displays the information about the pool capacity. Total: Total capacity of pool. Using Option, you can select unit of capacity. - One block equals 512 bytes and one page equals 42 megabytes in a pool capacity of Dynamic Provisioning, Dynamic Tiering, active flash, or Thin Image. - Mapped: Page capacity of the pool in which user data and control information is stored. - Mapped (%): Percentages of the page capacity of the pool that contains user data and control information. Mapped (%) displays the value which is truncated after the decimal point of the actual value.
Recent Monitor Data	Displays the period of monitoring time as follows: <i>Starting-time-Ending-time</i> If the monitoring data is being obtained, only the starting time is displayed. If the latest monitoring data does not exist, a hyphen (-) is displayed.

Start Tier Relocation window

Start Tier Relocation

1. Confirm

Enter a name for the task. Confirm the settings and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Selected Pools					Recent Monitor Data
Pool Name (ID)	Number of Pool VOLs	Capacity			
		Total	Mapped	Mapped (%)	
DTPool(0)	1	3.89 GB	0.00 GB	0	2015/03/03 07:25 -

Total: 1

☐ Go to tasks window for status
Back
Next
Apply
Cancel
?

Selected Pools table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
Number of Pool VOLS	Displays the number of pool-VOLs in the selected pool.
Capacity	Displays the information about the pool capacity. Total: Total capacity of pool. Using Option, you can select unit of capacity. - One block equals 512 bytes and one page equals 42 megabytes in a pool capacity of Dynamic Provisioning, Dynamic Tiering, active flash, or Thin Image. - Mapped: Page capacity of the pool in which user data and control information is stored. - Mapped (%): Percentages of the page capacity of the pool that contains user data and control information. Mapped (%) displays the value which is truncated after the decimal point of the actual value.
Recent Monitor Data	Displays the period of monitoring time as follows: <i>Starting-time-Ending-time</i> If the monitoring data is being obtained, only the starting time is displayed. If the latest monitoring data does not exist, a hyphen (-) is displayed.
Relocation Speed	Displays the tier relocation speed: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest)

Stop Tier Relocation window

Stop Tier Relocation

1. Confirm

Enter a name for the task. Confirm the settings and click Apply to add task in Tasks queue for execution.

Task Name: 150303-StopTierRelocation
(Max. 32 Characters)

Selected Pools

Pool Name (ID)	Number of Pool VOLS	Capacity			Recent Monitor Data
		Total	Mapped	Mapped (%)	
DTPool(0)	1	3.89 GB	0.00 GB	0	2015/03/03 07:25 -

Total: 1

☐ Go to tasks window for status
Back
Next
Apply
Cancel
?

Selected Pools table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
Number of Pool VOLs	Displays the number of pool-VOLs in the selected pool.
Capacity	Displays the information about the pool capacity. • Total: Total capacity of pool. Using Option, you can select unit of capacity. ◦ One block equals 512 bytes and one page equals 42 megabytes in a pool capacity of Dynamic Provisioning, Dynamic Tiering, active flash, or Thin Image. • Mapped: Page capacity of the pool in which user data and control information is stored. • Mapped (%): Percentages of the page capacity of the pool that contains user data and control information. Mapped (%) displays the value which is truncated after the decimal point of the actual value.
Recent Monitor Data	Displays the period of monitoring time as follows: <i>Starting-time-Ending-time</i> If the monitoring data is being obtained, only the starting time is displayed. If the latest monitoring data does not exist, a hyphen (-) is displayed.
Relocation Progress(%)	Displays the progress percentage of the tier relocation. 0 to 99: The relocation is performed at the indicated percentage progression. 100: The relocation operation is not in performed, or the relocation is complete. For details about the tier relocation, see the tier relocation log file. For details about the table items of the tier relocation log file, see Tier relocation log file contents on page 5-42.
Relocation Speed	Displays the tier relocation speed: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest)

View Pool Management Status window

[illegible]

Pool Management Status table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.
Pool Type	Displays the pool type. For a Dynamic Provisioning pool, DP is displayed. For a Dynamic Tiering pool, DT is displayed. For an active flash pool, DT(Active Flash) is displayed. For a pool of the data direct mapping attribute, DP(data direct mapping) is displayed. For a Thin Image pool, TI is displayed.
Number of V-VOLs	Displays the number of V-VOLs associated with the pool, and the maximum number of V-VOLs that can be associated with the pool. If you select a Dynamic Provisioning, Dynamic Tiering, or active flash pool, this item appears. If the pool of a data direct mapping attribute is selected, a hyphen (-) appears for the maximum number of V-VOLs which can associate with the pool.
Number of Primary VOLs	Displays the number of primary volumes of Thin Image pairs that are associated with the pool. If you select a Thin Image pool, this item appears.

Item	Description
Number of Pool VOLs	Displays the number of pool-VOLs set for the pool, and the maximum number of pool-VOLs that can be set for the pool.
Pool Management Task (Status/Progress)	Displays the status and progress ratio of the pool management task being performed to the pool, and average progress ratio of the each V-VOL in the pool. Waiting for Rebalance: The rebalance process is waiting. Rebalancing: The rebalance process is being performed. Waiting for Relocation: The tier relocation process is waiting. Relocating: The tier relocation process is being performed. Waiting for Shrink: The pool shrinking process is waiting. Shrinking: The pool shrinking process is being performed. Blank: The pool management task is not being performed to the pool. The following values that are displayed in the Virtual Volume table or in the Primary Volume table can not correspond with the value displayed for this item. This is because the progress of the pool management task is calculated after the progress of each V-VOL displayed in the Virtual Volume table or the Primary Volume table is calculated. - Pool Management Task - Status - Pool Management Task - Progress(%) For details about the tier relocation, see the tier relocation log file. For details about the table items of the tier relocation log file, see Tier relocation log file contents on page 5-42.
Relocation Result	Displays the status of the tier relocation processing. In Progress: The status of Pool Management Task is Waiting for Relocation or Relocating. Completed: The tier relocation operation is not in progress, or the tier relocation is complete. Uncompleted (n% relocated): The tier relocation is suspended at the indicated percentage progression. Hyphen (-): The pool is not a Dynamic Tiering or an active flash pool.
Capacity	- Used/Total: Displays the used and total pool capacity. If the pool consists of multiple pool-VOLs, the sum of its capacities is displayed in the Total field. - Free: Displays the free and formatted pool capacity. If the pool consists of multiple pool-VOLs, the sum of its capacities is displayed in the Total field.
Tier Management	If Dynamic Tiering is enabled, Auto or Manual of performance monitoring and tier relocation is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Mode	Displays the monitoring mode that is set for the pool. If the continuous mode is enabled, Continuous Mode is displayed.

Item	Description
	If the period mode is enabled, Period Mode is displayed. If Dynamic Tiering is disabled, a hyphen (-) is displayed.
Monitoring Status	Displays the status of pool monitoring. If the monitoring is being performed, In Progress is displayed. A hyphen (-) is displayed other than this case.
Relocation Speed/Actual	Displays the tier relocation speed: 1(Slowest), 2(Slower), 3(Standard), 4(Faster), or 5(Fastest). Actual displays the measured value of the tier relocation capacity per second.

Virtual Volume table

If you select a Dynamic Provisioning (including the pool of the data direct mapping attribute), Dynamic Tiering, or active flash pool, this table appears.

Item	Description
LDEV ID	Displays the LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Pool Management Task	- Status: Displays the pool management task being performed to the pool. Waiting for Rebalance: The rebalance process is waiting. Rebalancing: The rebalance process is being performed. Waiting for Relocation: The tier relocation process is waiting. Relocating: The tier relocation process is being performed. Waiting for Shrink: The pool shrinking process is waiting. Shrinking: The pool shrinking process is being performed. Blank:The pool management task is not being performed to the pool. - Progress(%): Displays V-VOL progress percentage (%) of the pool management task being performed. A hyphen (-) is displayed when the pool management task is not performed.
V-VOL Management Task	- Status: Displays the V-VOL management task being performed to V-VOL. Reclaiming Zero Pages: The zero page reclaim processing that is being performed. Waiting for Zero Page Reclaiming: The zero page reclaim processing Blank:The V-VOL management task is not being performed to V-VOL. - Progress(%): Displays the progress percentages (%) of the V-VOL management task being performed. A

Item	Description
	hyphen (-) is displayed when the V-VOL management task is not performed.
Capacity	• Total: Displays the V-VOL capacity. • Reserved: Displays the reserved capacity of the V-VOL. The displayed value of Reserved might be larger than the displayed value of Total due to following reasons: ◦ Reserved displays the reserved capacity that is rounded up on each page. ◦ The mapped capacity of V-VOL for Dynamic Provisioning includes the capacity of control information (168 MB is required per 3,145,548 MB). • Used: Displays the sum of the mapped capacity and the reserved capacity. The displayed value of Used might be larger than the displayed value of Total due to following reasons: ◦ Used displays the sum of the mapped capacity and the reserved capacity that is rounded up on each page. ◦ The mapped capacity of DP-VOL includes the capacity of the control information (Uses a maximum of 168 MB per 3,145,548 MB). ◦ DP-VOL of the data direct mapping attribute includes the control information (168 MB is used per 3,145,548 MB) and the capacity for one page. ◦ If used capacity is referenced during I/O or copy processing by software such as ShadowImage or Universal Replicator, the used capacity displayed might be different from the actual capacity even if the full allocation is enabled on the V-VOL. This is caused by a gap between the times that information is gathered about the mapped capacity and the reserved capacity. • Used(%): For the entire capacity of V-VOL, this item displays percentages of the sum of the mapped capacity and the reserved capacity. If the logical volume is not the volume other than V-VOL, a hyphen (-) is displayed.
Full Allocation	Displays the status of the setting for the full allocation in a pool associated with the V-VOL. • Enable: Pages are reserved. • Disable: Pages are not reserved.
Tiering Policy	Displays the tiering policy name and identifier. All(0): Policy in which all tiers of the pool are used. Level1(1) - Level5(5): Policy selected from levels 1 to 5 is set to the V-VOL. Level6(6) - Level31(31): Policy defined by the user and set to the V-VOL.

Item	Description
	Hyphen (-): V-VOL is not the V-VOL of Dynamic Tiering or active flash V-VOL.
New Page Assignment Tier	Displays the new page assigned tier. High: High is set to V-VOL. Middle: Middle is set to V-VOL. Low: Low is set to V-VOL. Hyphen (-): V-VOL is not the Dynamic Tiering or active flash V-VOL.
Tier Relocation	Displays whether tier relocation is set to enable or disable. If the Dynamic Tiering or active flash V-VOL is not used, a hyphen (-) is displayed.
Relocation Priority	Displays the relocation priority. Prioritized: The priority is set to V-VOL. Blank: The priority is not set to V-VOL. Hyphen (-): V-VOL is not the Dynamic Tiering or active flash V-VOL or the tier relocation function is disabled.
Attribute	Displays the attribute of the LDEV. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Virtual Storage Machine	Information about the virtual storage machine. - Model / Serial Number: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. - SSID: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank.

Primary Volumes table

Item	Description
LDEV ID	Displays the LDEV identifier which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.

Item	Description
Pool Management Task	- Status: Displays the pool management task being performed to the pool. Waiting for Rebalance: The rebalance process is waiting. Rebalancing: The rebalance process is being performed. Waiting for Shrink: The pool shrinking process is waiting. Shrinking: The pool shrinking process is being performed. Blank: The pool management task is not being performed to the pool. - Progress (%): Displays a progress percentage (%) of a pool management task being performed on each primary volume. A hyphen (-) is displayed when the pool management task is not performed.
Used Pool Capacity	Displays the used pool capacity.
Pool Usage(%)	Displays the pool usage ratio.
Virtual Storage Machine	Information about the virtual storage machine. - Model / Serial Number: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. - SSID: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank.

Edit External LDEV Tier Rank wizard

Edit External LDEV Tier Rank window

Edit External LDEV Tier Rank

1.Edit External LDEV Tier Rank > 2.Confirm

This wizard lets you edit the External LDEV Tier Rank. Select LDEVs from the Selected Pool Volumes list, click the Change button, and select the Tier Rank. Click Finish to confirm.

LDEV ID	LDEV Name	Parity Group ID	Usable Capacity	External LDEV Tier Rank
☐ 00:02:00		1-2	95.89 GB	High
☐				
☐				
☐				
☐				
☐				
☐				
☐				

Change

Selected: 0 of 1

Back Next Finish Cancel ?

Selected Pool Volumes table

Item	Description
LDEV ID	Displays the combination of the LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Parity Group ID	Displays the parity group ID.
Usable Capacity	Displays available capacity of page boundaries in a pool-VOL by the specified unit. For the pool-VOL with system area, the displayed capacity does not include the capacity of the management area.
External LDEV Tier Rank	Displays the tier rank of the external volume.
Change	Changes the tier rank of the selected pool-VOL to High, Middle, or Low.

Edit External LDEV Tier Rank confirmation window

Edit External LDEV Tier Rank

1.Edit External LDEV Tier Rank > **2.Confirm**

Enter a name for the task. Confirm the settings and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Selected Pool	
Pool Name (ID)	
DP_Pool(0)	

Selected Pool Volumes				
LDEV ID	LDEV Name	Parity Group ID	Usable Capacity	External LDEV Tier Rank
00:02:00		1-2	95.89 GB	High

Total: 1

☐ Go to tasks window for status Back Next Apply Cancel ?

Selected Pool table

Item	Description
Pool Name (ID)	Displays the pool name and pool ID.

Selected Pool Volumes table

Item	Description
LDEV ID	Displays the combination of the LDKC, CU, and LDEV.
LDEV Name	Displays the LDEV name.
Parity Group ID	Displays the parity group ID.
Usable Capacity	Displays available capacity of page boundaries in a pool-VOL by the specified unit. For the pool-VOL with system area, the displayed capacity does not include the capacity of the management area.
External LDEV Tier Rank	Displays the tier rank of the external volume.

Edit Tiering Policies wizard

Edit Tiering Policies window

Edit Tiering Policies

1. Edit Tiering Policies > 2. Confirm

This wizard lets you edit the tiering policies. Select policies from the Tiering Policies list, click Change to change the Tiering Policy. Click Finish to confirm.

Tiering Policies

Filter ON OFF

ID	Tiering Policy	Tier1 Max (%)	Tier1 Min (%)	Tier3 Max (%)	Tier3 Min (%)	Number of V-VOLs
0	All	-	-	-	-	0
1	Level1	-	-	-	-	0
2	Level2	-	-	-	-	0
3	Level3	-	-	-	-	0
4	Level4	-	-	-	-	0
5	Level5	-	-	-	-	0
6	Level6	0	0	0	0	0
7	Level7	100	0	100	0	0
8	Level8	100	0	100	0	0
9	Level9	100	0	100	0	0
10	Level10	100	0	100	0	0
11	Level11	100	0	100	0	0
12	Level12	100	0	100	0	0
13	Level13	100	0	100	0	0
14	Level14	100	0	100	0	0
15	Level15	100	0	100	0	0
16	Level16	100	0	100	0	0
17	Level17	100	0	100	0	0
18	Level18	100	0	100	0	0

Change Selected: 0 of 32

Back Next Finish Cancel ?

Tiering Policies table

Item	Description
ID	Displays the identifier of the tiering policy.
Tiering Policy	Displays the name of the tiering policy.
Tier1 Max(%)	Displays the maximum percentage that is allocated to tier 1 in the total capacity to which tier relocation is performed. For a policy with an identifier from 0 to 5, a hyphen (-) is displayed.
Tier1 Min(%)	Displays the minimum percentage that is allocated to tier 1 in the total capacity to which tier relocation is performed. For a policy whose identifier is from 0 to 5, a hyphen (-) is displayed.
Tier3 Max(%)	Displays the maximum percentage that is allocated to tier 3 in the total capacity to which tier relocation is performed. For a policy with an identifier from 0 to 5, a hyphen (-) is displayed.
Tier3 Min(%)	Displays the minimum percentage that is allocated to tier 3 in the total capacity to which tier relocation is performed.

Item	Description
	For a policy whose identifier is from 0 to 5, a hyphen (-) is displayed.
Tier3 Max(%)	Displays the maximum percentage that is allocated to tier 3 in the total capacity to which tier relocation is performed. For a policy with an identifier from 0 to 5, a hyphen (-) is displayed.
Tier3 Min(%)	Displays the minimum percentage that is allocated to tier 3 in the total capacity to which tier relocation is performed. For a policy whose identifier is from 0 to 5, a hyphen (-) is displayed.
Number of V-VOLs	Displays the number of V-VOLs to which the tiering policy is set.

Change Tiering Policy Window

Change Tiering Policy

Change the tiering policy and click OK.

Tiering Policy: Level6(6)

Tier1 Max: 0 %

Tier1 Min: 0 %

Tier3 Max: 0 %

Tier3 Min: 0 %

OK Cancel ?

Change Tiering Policy table

Item	Description
Tiering Policy	Displays the tiering policy name and policy identifier.
Tier1 Max(%)	Select the maximum percentage that is allocated to tier 1 in the total capacity for the tier relocation from 0 (%) to 100 (%). The setting value is needed to satisfy either one of the following conditions: Equal to Tier1 Min Bigger than Tier1 Min
Tier1 Min(%)	Select the minimum percentage that is allocated to tier 1 in the total capacity for the tier relocation from 0 (%) to 100

Pool Configuration Patterns table

Item	Description
Priority	Displays the priority of the pool configuration.
Selected	Displays whether the pool configuration is selected or not.
Total Capacity	Displays the total capacity of the pool.
Drive Type/RPM	Displays the data drive type and RPM of the pool.
RAID Level	Displays the RAID level of the pool.
Total Capacity	Displays the total capacity of the pool.
Select	If the pool configuration is changed, select a row in the Pool Configuration Patterns table. Then click this button. The selected pool configuration is reflected to the pool setting.

For Dynamic Tiering or active flash pools

[illegible]

When you create a Dynamic Tiering or active flash pool, the following table displays.

Pool Configuration Patterns table

Item	Description
Priority	Displays the priority of the pool configuration.
Selected	Displays whether the pool configuration is selected or not.
Total Capacity	Displays the total capacity of the pool

Item	Description
Tier 1	Displays the tier 1 information. Drive Type/RPM: Displays the data drive type and RPM of pool-VOLs. RAID Level: Displays the RAID level of pool-VOLs. Rate (%): Displays the percentage of the tier 1 against the total capacity of the pool.
Tier 2	Displays the tier 2 information. Drive Type/RPM: Displays the data drive type and RPM of pool-VOLs. RAID Level: Displays the RAID level of pool-VOLs. Rate (%): Displays the percentage of the tier 2 against the total capacity of the pool.
Tier 3	Displays the tier 3 information. Drive Type/RPM: Displays the data drive type and RPM of pool-VOLs. RAID Level: Displays the RAID level of pool-VOLs. Rate (%): Displays the percentage of the tier 3 against the total capacity of the pool.
Select	If the pool configuration is changed, select a row in the Pool Configuration Patterns table. Then click this button. The selected pool configuration is reflected to the pool setting.



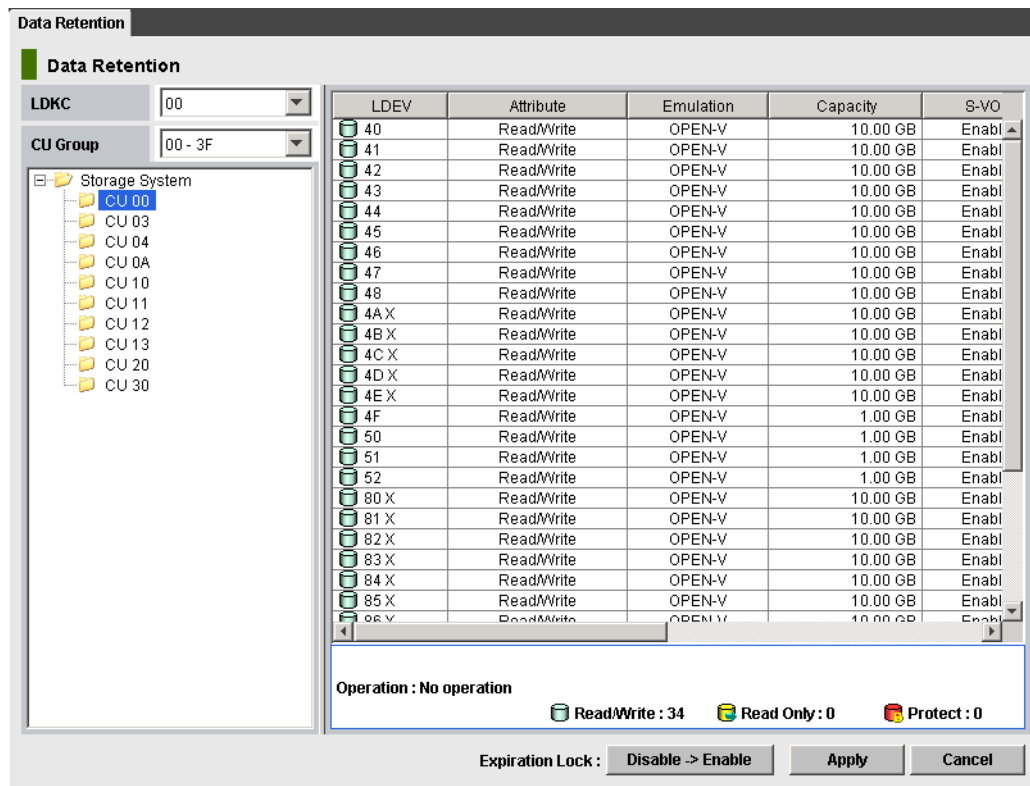
Data Retention Utility GUI reference

This appendix describes windows, wizards, and dialog boxes of the Data Retention Utility used to assign access attributes to open-system volumes.

- ☐ [Data Retention window](#)
- ☐ [Error Detail Dialog Box](#)

Data Retention window

Use the Data Retention window to assign an access attribute to open-system volumes.



Item	Description
LDKC	Select the LDKC which is displayed in the tree.
CU Group	00-3F: Installed CUs in this group (from 00 to 3F) are displayed in the tree.
Tree	A list of CUs. Selecting a CU provides the selected CU information in the volume list on the right of the tree. This tree appears only the CUs that include volumes to which access attributes can be actually set.
Volume list	Lists information about the CU selected in the tree. See the table below for details.
Expiration Lock	Enables or disables enhanced volume protection. - Disable > Enable: Indicates the expiration lock is disabled. You can change an access attribute to read/write when the retention term is over. - Enable > Disable: Indicates the expiration lock is enabled. You cannot change an access attribute to read/write even when the retention term is over.
Apply	Applies settings to the storage system.
Cancel	Discards setting changes.

Volume list

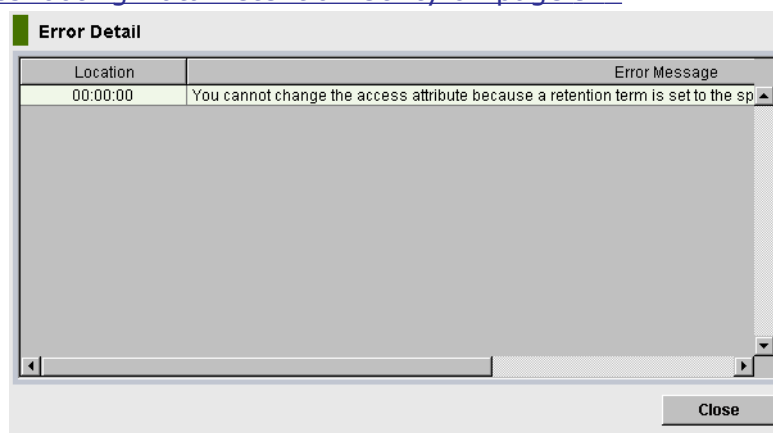
The volume list provides information about access attributes that are assigned to volumes.

Item	Description
LDEV	LDEV number.  : Read/write  : Read-only  : Protect The symbol beside the LDEV number indicates: #: an external volume - A: LDEV of the ALU attribute. - S: LDEV of the SLU attribute. - V: a virtual volume - X: a virtual volume used for Dynamic Provisioning
Attribute	Access attribute assigned to this volume. These attributes can be assigned using the Command Control Interface (CCI). - Read/Write: Both read and writer operations are permitted on the logical volume. - Read-only: Read operations are permitted on the logical volume. - Protect: Neither read nor write operations are permitted.
Emulation	Volume emulation types.
Capacity	Capacity of each volume in GB to two decimal places.
S-VOL	Indicates whether the volume can be specified as a secondary volume (S-VOL). You can also use the CCI to specify whether each volume can be used as an S-VOL.
Reserved	Indicates the method that can be used to make LU path and command device settings. - Hyphen (-): Both CCI and Hitachi Device Manager - Storage Navigator can be used to make LU path and command device settings. - CCI: Only CCI can be used to make LU path and command device settings. Hitachi Device Manager - Storage Navigator cannot be used to do so.
Retention Term	Period (in days) when you are prohibited from changing access attribute to read/write. The retention term can be extended but cannot be shortened. During the retention term, you can change read-only to protect, or vice versa. 500 days: Attempts to change access attribute to read/write are prohibited in the next 500 days. - Unlimited: The retention term is extended with no limits. 0 days: You can change access attribute to read/write. Caution: In Data Retention Utility, you can increase the value for Retention Term, but cannot decrease the value.

Item	Description
Path	Number of LU paths.
Mode	Indicates the mode that the CCI user assigns to the volume. You cannot use Hitachi Device Manager - Storage Navigator to change modes. You must use the CCI to change modes. • Zer: Zero Read Cap mode is assigned to the volume. If the Read Capacity command (which is a SCSI command) is issued to a volume in Zero Read Cap mode, it is reported that the capacity of the volume is zero. • Inv: Invisible mode is assigned to the volume. If the Inquiry command (which is a SCSI command) is issued to a volume in Invisible mode, it is reported that the volume does not exist. Therefore, the hosts is unable to recognize the volume. • Zer/Inv. Both Zero Read Cap mode and Invisible mode are assigned to the volume. • Hyphen (-): No mode is assigned by CCI to the volume.
Operation	Target of the operation or the name of the operation. When no operation is performed, No Operation appears. Also shown are the volume icons and the total number of volumes with each access attribute.

Error Detail Dialog Box

If an error occurs with Data Retention Utility, the Error Detail dialog box appears. The Error Detail dialog box displays error locations and error messages. For troubleshooting information related to Data Retention Utility, see [Troubleshooting Data Retention Utility on page 9-7](#).



The items and descriptions of the Error Detail dialog box follow.

Items	Description
Location	Location where the error occurred. If an error relating to a volume occurred, the LDKC number, CU number, and LDEV number (volume number) are shown.

Items	Description
Error Message	Provides the full text of the error message. For details about the solution, see <i>Hitachi Device Manager - Storage Navigator Messages</i> .
Close	Closes the Error Detail window.



LUN Manager GUI reference

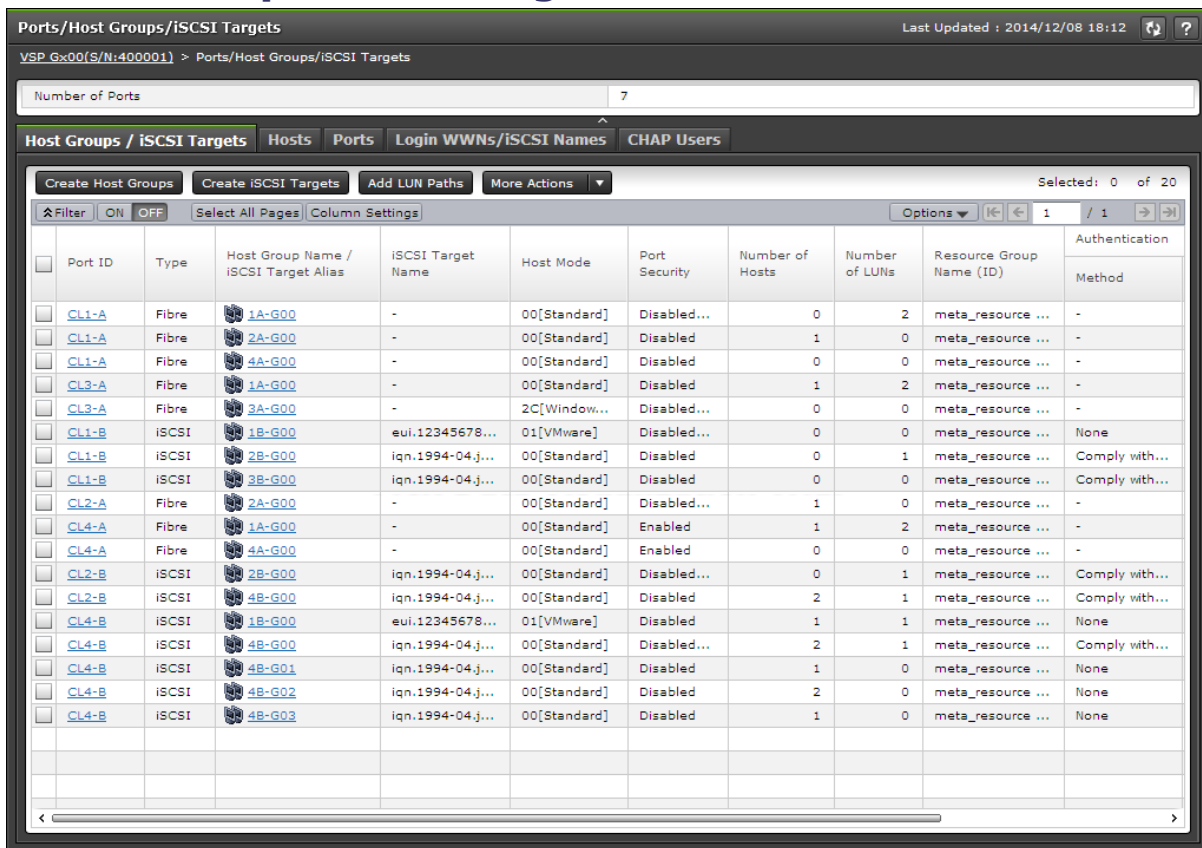
This appendix describes the LUN Manager windows, wizards, and dialog boxes used in managing logical units.

- ☐ [Ports/Host Groups/iSCSI Targets window](#)
- ☐ [Ports/Host Groups: Host Groups and Hosts tabs \(Fibre channel\)](#)
- ☐ [Ports/iSCSI Targets: iSCSI Targets, Hosts, and CHAP Users tabs \(iSCSI\)](#)
- ☐ [Port / Host Groups / iSCSI Targets: Hosts, LUNs, Host Mode Options, and CHAP Users tabs](#)
- ☐ [Add LUN Paths wizard](#)
- ☐ [Create Host Groups wizard](#)
- ☐ [Edit Host Groups wizard](#)
- ☐ [Add to Host Groups wizard \(when specific host is selected\)](#)
- ☐ [Add Hosts wizard \(when specific hosts group is selected\)](#)
- ☐ [Delete LUN Paths wizard](#)
- ☐ [Edit Host wizard](#)
- ☐ [Edit Ports wizard](#)
- ☐ [Create Alternative LUN Paths wizard](#)
- ☐ [Copy LUN Paths wizard](#)

- ☐ [Remove Hosts wizard](#)
- ☐ [Edit UUIDs wizard](#)
- ☐ [Add New Host window](#)
- ☐ [Change LUN IDs window](#)
- ☐ [Delete Host Groups window](#)
- ☐ [Delete Login WWNs window](#)
- ☐ [Delete UUIDs window](#)
- ☐ [Host Group Properties window](#)
- ☐ [LUN Properties window](#)
- ☐ [Authentication window](#)
- ☐ [Edit Command Devices wizard](#)
- ☐ [Host-Reserved LUNs window](#)
- ☐ [Release Host-Reserved LUNs wizard](#)
- ☐ [View Login WWN Statuses window](#)
- ☐ [View Login iSCSI Name Statuses window](#)
- ☐ [Port Properties window](#)
- ☐ [CHAP User Properties window](#)
- ☐ [Host Properties window](#)
- ☐ [Create iSCSI Targets wizard](#)
- ☐ [Edit iSCSI Targets wizard](#)
- ☐ [Add CHAP Users wizard when selected iSCSI target](#)
- ☐ [Edit CHAP User wizard](#)

- ☐ [iSCSI Target Properties window](#)
- ☐ [Add New CHAP User window](#)
- ☐ [Delete iSCSI Targets window](#)
- ☐ [Delete Login iSCSI Names window](#)
- ☐ [Remove CHAP Users window](#)
- ☐ [Remove Target CHAP Users window](#)
- ☐ [Remove Port CHAP Users window](#)
- ☐ [Remove Hosts window](#)
- ☐ [Test Communication Statuses window](#)
- ☐ [Edit T10 PI Mode wizard](#)

Ports/Host Groups/iSCSI Targets window



- [Summary on page F-4](#)
- [Host Groups / iSCSI Targets tab on page F-4](#)
- [Hosts tab on page F-6](#)
- [Ports tab on page F-8](#)
- [Login WWNs/iSCSI Names tab on page F-10](#)
- [CHAP Users tab on page F-11](#)

Summary

Item	Description
Number of Ports	Total number of ports.

Host Groups / iSCSI Targets tab

This tab provides information about the host groups and iSCSI targets that are assigned to the logged-on user.

Item	Description
Port ID	Identifier of the port.

Item	Description
	Clicking a port ID opens Ports/Host Groups: Host Groups and Hosts tabs.
Type	Types of ports. Fibre: Fibre Channel ports. iSCSI: iSCSI ports.
Host Group Name / iSCSI Target Alias	Icons and names of the host group or iSCSI target alias. Clicking a host group name or an iSCSI target alias opens Ports/Host Groups/iSCSI Targets: Hosts, LUNs, and Host Mode Options tabs.
Host Group ID / iSCSI Target ID ¹	Host group ID or iSCSI target ID.
iSCSI Target Name	iSCSI target name.
Host Mode	Host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts set to the relevant port.
Number of LUNs	Number of logical units.
Authentication	Information about the authentication. If the port is a Fibre Channel port, a hyphen appears. - Method: Authentication method that is CHAP, None, or Comply with Host Setting - Mutual CHAP: Mutual CHAP setting that is Enabled or Disabled - User Name - Number of Users
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Resource Group Name (ID)	Resource group name and identifier of the host groups.
Virtual Storage Machine ¹	Model name and serial number of the virtual storage machine that has the port.
Create Host Groups	Opens the Create Host Groups window.
Create iSCSI Targets	Opens the Create iSCSI Targets window.
Add LUN Paths	Opens the Add LUN Paths window.
Add Hosts ²	Opens the Add Hosts window.
Delete Host Groups ²	Opens the Delete Host Groups window.
Delete iSCSI Targets ²	Opens the Delete iSCSI Targets window.
Edit Host Groups ²	Opens the Edit Host Groups window.
Edit iSCSI Targets ²	Opens the Edit iSCSI Targets window.
Create Alternative LUN Paths ²	Opens the Create Alternative LUN Paths window.

Item	Description
Add CHAP Users ²	Opens the Add CHAP Users window.
Remove Target CHAP Users ²	Opens the Remove Target CHAP Users window.
Export ²	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

Notes:

¹Does not appear by default. To display this item, change the **Column Settings** window.

²Appears when you click **More Actions**.

Hosts tab

[illegible]

This tab provides information about the HBA WWNs that are registered to the host groups assigned to the logged-on user. This tab provides information about the iSCSI Names that are registered to the iSCSI targets assigned to the logged-on user.

Item	Description
Port ID	Identifier of the port. Clicking a port ID opens Ports/Host Groups: Host Groups and Hosts tabs.
Type	Types of ports. Fibre: Fibre Channel ports. iSCSI: iSCSI ports.
HBA WWN / iSCSI Name	HBA WWNs / iSCSI Names and their icons.
Host Name	Name of hosts.
Host Group Name	Name of the host group.
Number of iSCSI Targets	Number of iSCSI targets.
Add to Host Groups	Opens the Add to Host Groups window.
Edit Host	Opens the Edit Host window.
View Host Properties (iSCSI)	Opens the Host Properties window.
Remove Hosts (Fibre)*	Opens the Remove Hosts window.
Remove Hosts (iSCSI)*	Opens the Remove Hosts window.
Export*	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
*Appears when you click More Actions .	

Ports tab

Port ID	Type	WWN / iSCSI Name	IPv4	IPv6			Speed	Security
			IP Address	Mode	Link Local Address	Global Address		
CL1-A	Fibre	50060E8012001C00	-	-	-	-	Auto(-)	Disabled
CL3-A	Fibre	50060E8012001C20	-	-	-	-	Auto(-)	Disabled
CL1-B	Fibre	50060E8012001C01	-	-	-	-	Auto(-)	Disabled
CL3-B	Fibre	50060E8012001C21	-	-	-	-	Auto(-)	Disabled
CL2-A	Fibre	50060E8012001C10	-	-	-	-	Auto(-)	Disabled
CL4-A	Fibre	50060E8012001C30	-	-	-	-	Auto(-)	Disabled
CL2-B	Fibre	50060E8012001C11	-	-	-	-	Auto(-)	Disabled
CL4-B	Fibre	50060E8012001C31	-	-	-	-	Auto(-)	Disabled

This tab provides information about the ports assigned to the logged-on user.

Item	Description
Port ID	Identifier of the port. Clicking a port ID opens Ports/Host Groups: Host Groups and Hosts tabs.
Type	Types of ports. Fibre: Fibre Channel ports. iSCSI: iSCSI ports.
Adapter Type	Port adapter type.
WWN / iSCSI Name	WWN or iSCSI initiator name of the port.
IPv4	Information about the setting for IPv4 as follows: - IP Address: IP address for the port. - Subnet Mask*: Subnet mask for the port. - Default Gateway*: Default gateway for the port.
IPv6	Information about the setting for IPv6 as follows: - Mode: IPv6 setting (Enabled or Disabled) for the port. - Link Local Address: Link local address for the port. - Global Address: Global address for the port. - Subnet Prefix*: Subnet prefix for the port address.

Item	Description
	Assigned Default Gateway*: Assigned default gateway address for the port.
Speed	Data transfer speed for the selected port. Valid speeds are 1, 2, 4, 8, 10, or 16 Gbps. If Auto is set for the port speed, Auto (1, 2, 4, 8, 10, or 16 Gbps) appears. The value enclosed in parentheses is defined by the storage system. A hyphen (-) appears in the parentheses when the connection is not in the linkup status.
Security	LUN security setting (Enabled or Disabled) on the port.
Address (Loop ID)	Address of the port.
Fabric	Indicates whether a fabric switch is used.
Connection Type	Topology of the port.
TCP Port Number*	TCP port number.
Ethernet MTU Size(Byte)	MTU size on Ethernet. - MTU: Specified MTU size. - Linked MTU: Present MTU size for the data transfer.
MAC Address*	MAC address.
Keep Alive Timer(sec.)*	Keep alive timer setting.
Selective ACK*	Selective ACK setting (Enabled or Disabled) for the port.
Delayed ACK*	Delayed ACK setting (Enabled or Disabled) for the port.
Maximum Window Size(KB)*	Maximum window size setting.
iSNS Server*	Information about the iSNS server. - Mode: iSNS server setting (Enabled or Disabled) for the port. - IP Address: IP address of the iSNS server. - TCP Port Number: TCP port number of the iSNS server.
VLAN*	Information about VLAN. - Tagging Mode: Tagging mode setting (Enabled or Disabled) for the port. - ID: VLAN identifier.
Authentication	Information about authentication. - CHAP User Name: CHAP user name of the port. - Used: shows whether the CHAP user is used by the CHAP authentication. If Yes appears, the CHAP user is used. If No appears, the CHAP user is not used.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Resource Group Name (ID)	Resource group names and identifiers of the ports
Virtual Storage Machine*	Model name and serial number of the virtual storage machine that has the port.

Item	Description
HBA WWN / iSCSI Name	HBA WWNs / iSCSI Names and their icons.
Host Name	Name of the host.
Host Group Name	Name of the host group.
Number of iSCSI Targets	Number of iSCSI targets.
Add to Host Groups	Opens the Add to Host Groups window.
Delete Login WWNs	Opens the Delete Login WWNs window.
Delete Login iSCSI Names	Opens the Delete Login iSCSI Names window.
View Login WWN Statuses*	Opens the View Login WWN Statuses window.
View Login iSCSI Name Statuses*	Opens the View Login iSCSI Name Statuses window.
Export*	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

CHAP Users tab

[illegible]

Item	Description
Port ID	Identifier of the port. Clicking a port ID opens Port/iSCSI Targets: iSCSI Targets, Hosts and CHAP Users tabs.
User Name	User name. Clicking a user name opens the CHAP User Properties window.
Number of iSCSI Targets	Number of iSCSI Targets.
Edit CHAP User	Opens the Edit CHAP User window.
Remove CHAP Users	Opens the Remove CHAP Users window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

Ports/Host Groups: Host Groups and Hosts tabs (Fibre channel)

The screenshot displays the LUN Manager GUI for a Hitachi Virtual Storage Platform (VSP) Gx00/S/N:400028. The top navigation bar shows the path: VSP Gx00(S/N:400028) > Ports/Host Groups/iSCSI Targets > CL3-A. The main content area is divided into two tabs: 'Host Groups' and 'Hosts'. The 'Hosts' tab is currently selected, showing a table with columns: Port ID, Host Group Name, Host Mode, Port Security, Number of Hosts, Number of LUNs, and Resource Group Name (ID). The table contains one entry for CL3-A, which is linked to a host group named '3A-000'. The 'Hosts' tab also includes a 'Create Host Groups' button and a 'More Actions' dropdown menu. The 'Host Groups' tab is visible in the background, showing a table with columns: Port ID, Host Group Name, Host Mode, Port Security, Number of Hosts, Number of LUNs, and Resource Group Name (ID). The 'Host Groups' tab also includes a 'Create Host Groups' button and a 'More Actions' dropdown menu.

- [Summary on page F-13](#)
- [Host Groups tab on page F-13](#)
- [Hosts tab on page F-14](#)

Summary

Item	Description
WWN	WWN of the port.
Speed	Data transfer speed for the selected fibre channel port. Valid speeds are 2, 4, 8, or 16 Gbps. If Auto is set for the port speed, Auto (2, 4, 8, or 16 Gbps) appears. The value enclosed in parentheses is defined by the storage system. A hyphen (-) appears in the parentheses when the connection is not in the linkup status.
Security	LUN security setting (Enabled or Disabled) on the port.
Address (Loop ID)	Address of the selected port.
Fabric	Indicates whether a fabric switch is used.
Connection Type	Topology of the selected port.
Number of LUNs	Total number of logical units set to the relevant port, and the maximum number of logical units that can be registered to the port.
Number of Hosts	Total number of hosts set to the relevant port, and the maximum number of hosts that can be registered to the port.
Number of Host Groups	Total number of host groups set to the relevant port, and the maximum number of host groups that can be registered to the port.

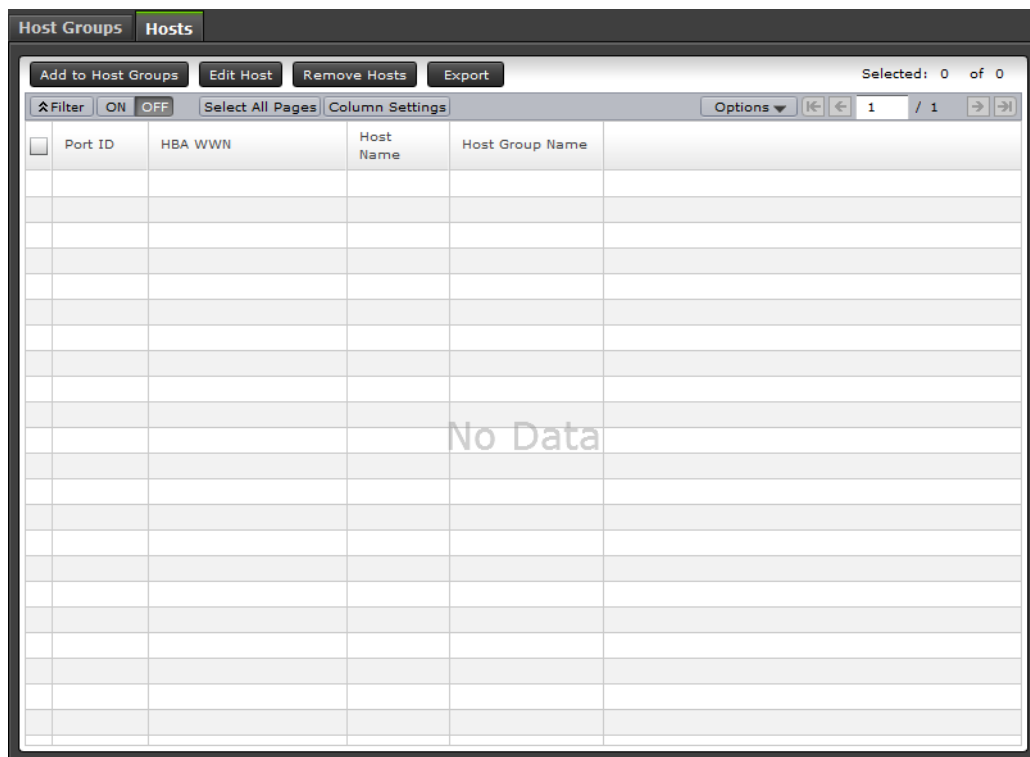
Host Groups tab

This tab provides information about the host groups assigned to the logged-on user.

Item	Description
Port ID	Identifier of the port.
Host Group Name	Icons and names of host groups. Clicking a host group name opens Ports/Host Groups: Hosts, LUNs, and Host Mode Options tabs.
Host Group ID ¹	Host group ID
Host Mode	Host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts in the host group.
Number of LUNs	Number of logical units in the host group.
Resource Group Name (ID)	Resource group name and identifier of the host group.
Virtual Storage Machine ¹	Model name and serial number of the virtual storage machine that has the port.
Create Host Groups	Opens the Create Host Groups window.

Item	Description
Add LUN Paths	Opens the Add LUN Paths window.
Add Hosts	Opens the Add Hosts window.
Delete Host Groups ²	Opens the Delete Host Groups window.
Edit Host Groups ²	Opens the Edit Host Groups window.
Create Alternative LUN Paths ²	Opens the Create Alternative LUN Paths window.
Export ²	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
Notes: ¹ Does not appear by default. To display this item, change the Column Settings window. ² Appears when you click More Actions .	

Hosts tab



This tab provides information about the HBA WWNs that are registered to the host groups assigned to the logged-on user.

Item	Description
Port ID	Identifier of the port.
HBA WWN	HBA WWNs and their icons.

Summary

Item	Description
IPv4	Information about the setting for IPv4 as follows: - IP Address: IP address for the port. - Subnet Mask: Subnet mask for the port. - Default Gateway: Default gateway for the port.
IPv6	Information about the setting for IPv6 as follows: - Mode: IPv6 setting (Enabled or Disabled) for the port. - Link Local Address: Link local address for the port. - Global Address: Global address for the port. - Assigned Default Gateway: Assigned default gateway address for the port.
iSCSI name	iSCSI name of the port.
Speed	Data transfer speed. Valid speeds are 1 or 10 Gbps. If Auto is set for the port speed, Auto (1 or 10 Gbps) appears. The value enclosed in parentheses is defined by the storage system.
Security	LUN security setting (Enabled or Disabled) for the port.
TCP Port Number	TCP port number.
Ethernet MTU Size	MTU size on Ethernet.
MAC Address	MAC address.
Keep Alive Timer	Keep alive timer setting.
Selective ACK	Selective ACK setting (Enabled or Disabled) on the port.
Delayed ACK	Delayed ACK setting (Enabled or Disabled) on the port.
Maximum Window Size	Maximum window size setting.
iSNS Server	Information about the iSNS server. - Mode: iSNS server setting (Enabled or Disabled) for the port. - IP Address: IP address of the iSNS server. - TCP Port Number: TCP port number of the iSNS server.
VLAN	Information about VLAN. - Tagging Mode: Tagging mode setting (Enabled or Disabled) for the port. - ID: VLAN identifier.
Number of LUNs	Total number of logical units set to the relevant port, and the maximum number of logical units that can be registered to the port.
Number of Hosts	Total number of hosts set to the relevant port, and the maximum number of hosts that can be registered to the port.

Item	Description
Number of iSCSI Targets	Total number of iSCSI targets set to the relevant port, and the maximum number of iSCSI targets that can be registered to the port.
Number of CHAP Users	Total number of CHAP users set to the relevant port, and the maximum number of CHAP users that can be registered to the port.
View Port Properties	Opens the View Port Properties window.

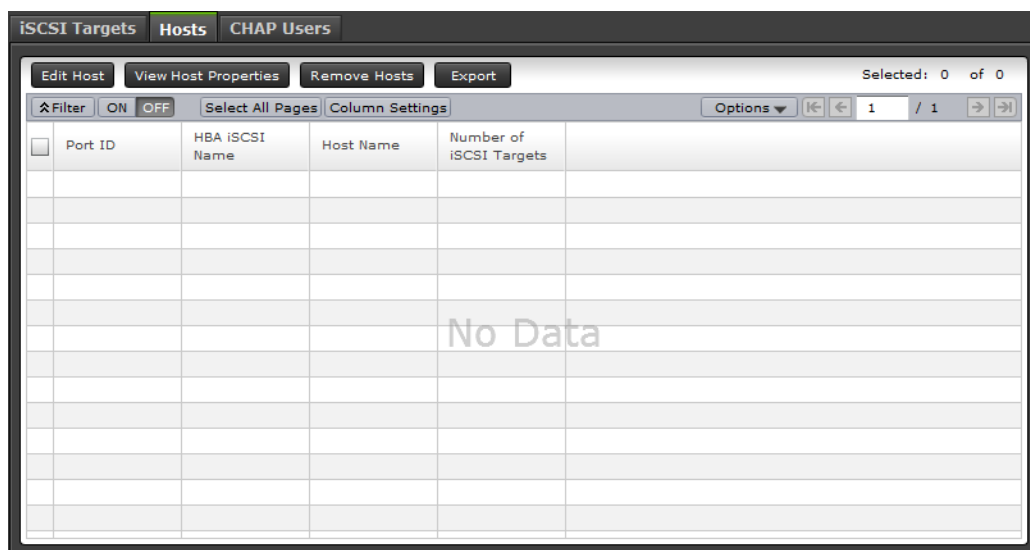
iSCSI Targets tab

This tab provides information about the iSCSI targets that are assigned to the logged-on user.

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target ID ¹	iSCSI target ID.
iSCSI Target Name	iSCSI target name.
Host Mode	Host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts set to the relevant port.
Number of LUNs	Number of logical units.
Authentication	Information about the authentication. - Method: Authentication method that is CHAP, None, or Comply with Host Setting - Mutual CHAP: Mutual CHAP setting that is Enabled or Disabled - User Name - Number of Users
Resource Group Name (ID)	Resource group name and identifier of the iSCSI target.
Virtual Storage Machine ¹	Model name and serial number of the virtual storage machine that has the iSCSI target.
Create iSCSI Targets	Opens the Create iSCSI Targets window.
Add LUN Paths	Opens the Add LUN Paths window.
Add Hosts	Opens the Add Hosts window.
Delete iSCSI Targets ²	Opens the Delete iSCSI Targets window.
Edit iSCSI Targets ²	Opens the Edit iSCSI Targets window.
Create Alternative LUN Paths ²	Opens the Create Alternative LUN Paths window.

Item	Description
Add CHAP Users ²	Opens the Add CHAP Users window.
Remove Target CHAP Users ²	Opens the Remove Target CHAP Users window.
Export ²	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
Notes: ¹ Does not appear by default. To display this item, change the Column Settings window. ² Appears when you click More Actions .	

Hosts tab



This tab provides information about the iSCSI Names that are registered to the iSCSI targets assigned to the logged-on user.

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	HBA iSCSI Names and their icons.
Host Name	Name of hosts.
Number of iSCSI Targets	Number of iSCSI targets.
Edit Host	Opens the Edit Host window.
View Host Properties	Opens the Host Properties window.
Remove Hosts	Opens the Remove Hosts window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

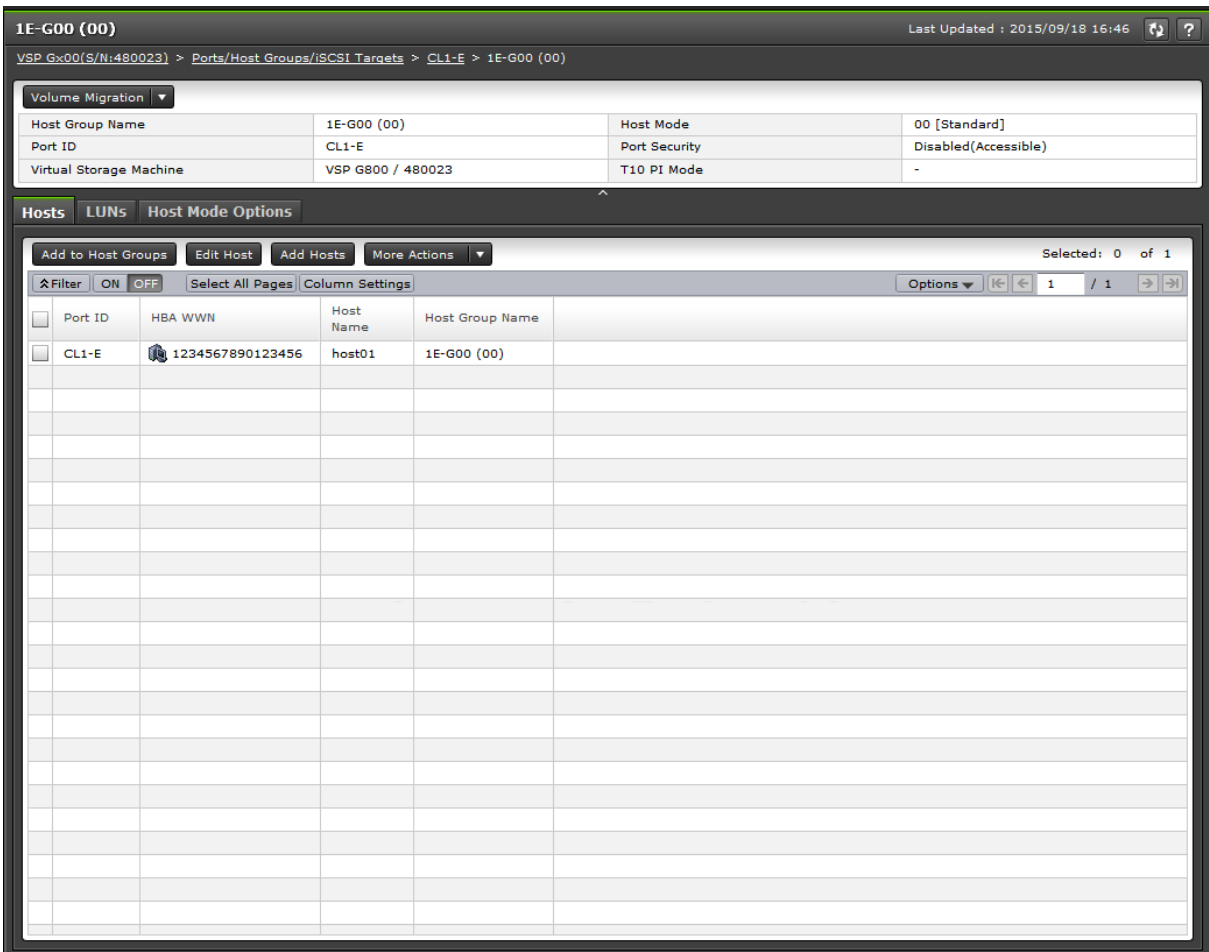
CHAP Users

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Item	Description
Port ID	Identifier of the port.
User Name	User name. Clicking a user name opens the CHAP User Properties window.
Number of iSCSI Targets	Number of iSCSI Targets.
Edit CHAP User	Opens the Edit CHAP User window.
Remove CHAP Users	Opens the Remove CHAP Users window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

Port / Host Groups / iSCSI Targets: Hosts, LUNs, Host Mode Options, and CHAP Users tabs

Fibre channel



- [Summary on page F-20](#)
- [Hosts tab on page F-21](#)
- [LUNs tab on page F-22](#)
- [Host Mode Options tab on page F-27](#)

Summary

Item	Description
Host Group Name	Name of the host group.
Port ID	Identifier of the port.
Virtual Storage Machine	Model name and serial number of the virtual storage machine that has a host group.
Host Mode	Host mode of the host group.

Item	Description
Port Security	LUN security setting (Enabled or Disabled) on the port.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
View Migration Plans*	Open the View Migration Plans window. For details, see the Hitachi Volume Migration User Guide.
View Histories*	Open the View Histories window. For details, see the Hitachi Volume Migration User Guide.
Notes: *Available when you select Volume Migration.	

Hosts tab

Item	Description
Port ID	Identifier of the port.
HBA WWN	HBA WWNs and their icons.
Host Name	Name of the host.
Host Group Name	Name of the host group.
Add to Host Groups	Opens the Add to Host Groups window.
Edit Host	Opens the Edit Host window.
Add Hosts	Opens the Add Hosts window
Remove Hosts*	Opens the Remove Hosts window.
Export*	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
* Available by clicking More Actions .	

LUNs tab

Port ID	LUN ID	LDEV ID	LDEV Name	Pool Name (ID)	Capacity			Used Capacity
					Total	Used	Used (%)	
No Data								

This tab provides information about the LU paths that correspond to the LDEV assigned to the logged-in user.

Item	Description
Port ID	Identifier of the port.
LUN ID	Icons and identifiers of the logical unit. Clicking a LUN ID opens the LUN Properties window.
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV. Clicking an LDEV ID takes you to the LDEV Properties window.
LDEV Name	Name of each LDEV.
Pool Name (ID)	Displays the pool name and pool ID. If the logical volume is not the volume other than V-VOL, a hyphen (-) is displayed.
Capacity	Total: Displays the logical volume capacity. Reserved: Displays the reserved capacity of the V-VOL. The displayed value of Reserved might be larger than the displayed value of Total due to following reasons: Reserved displays the reserved capacity that is rounded up on each page. - The mapped capacity of V-VOL for Dynamic Provisioning includes the capacity of control

Item	Description
	information (168 MB is required per 3,145,548 MB). If used capacity is referenced during I/O or copy processing by software such as ShadowImage or Universal Replicator, the used capacity displayed might be different from the actual capacity even if the full allocation is enabled on the V-VOL. This is caused by a gap between the times that information is gathered about the mapped capacity and the reserved capacity. • Used: Displays the sum of the mapped capacity and the reserved capacity. The displayed value of Used might be larger than the displayed value of Total due to following reasons: ◦ Used displays the sum of the mapped capacity and the reserved capacity that is rounded up on each page. ◦ The mapped capacity of DP-VOL includes the capacity of the control information (Requires a maximum of 168 MB per 3,145,548 MB). ◦ DP-VOL of the data direct mapping attribute includes the control information (168 MB is required per 3,145,548 MB) and the capacity for one page. • Used(%): For the entire capacity of V-VOL, this item displays percentages of the sum of the mapped capacity and the reserved capacity. If the logical volume is not the volume other than V-VOL, a hyphen (-) is displayed.
Used Capacity	• Tier1: Displays the used capacity of tier 1. If the logical volume is not the volume other than a V-VOL for Dynamic Tiering, or active flash, a hyphen (-) is displayed. • Tier2: Displays the used capacity of tier 2. If the logical volume is not the volume other than a V-VOL for Dynamic Tiering, or active flash, or if tier 2 does not exist, a hyphen (-) is displayed. • Tier3: Displays the used capacity of tier 3. If the logical volume is not the volume other than a V-VOL for Dynamic Tiering, or active flash, or if tier 3 does not exist, a hyphen (-) is displayed. The reserved capacity is not included in the used capacity for each tier of the V-VOL. Therefore, the Used value in the Capacity column may not correspond with the Used Capacity value.
Provisioning Type	Displays the type for each logical volume. Basic: Internal volume. External: External volume. DP: DP-VOL Snapshot: Thin Image volume.

Item	Description
CLPR	Cache logical partition number, displayed as <i>ID:CLPR</i> .
Full Allocation	Displays the status of the full allocation setting in a pool that is associated with the V-VOL. • Enable: Pages are reserved. • Disable: Pages are not reserved.
Tiering Policy	Displays the tiering policy name and ID. All(0): Policy specified when all tiers in the pool are used. Level1(1) to Level31(31) : Policy selected from Level1 to Level31, set to the V-VOL. Hyphen (-): The logical volume is not the Dynamic Tiering or active flash V-VOL.
New Page Assignment Tier	Displays the new page assignment tier of the tiering policy. See New page assignment tier on page 5-59 . Hyphen (-): The logical volume is not the Dynamic Tiering or active flash V-VOL.
Tier Relocation	Displays whether tier relocation is set to Enable or Disable . If the logical volume is not to the V-VOL of Dynamic Tiering or active flash, a hyphen (-) is displayed.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Encryption ¹	Displays the encryption information about the pool. • Enable: Encryption setting of a parity group or virtual volume associated with pool-VOLs containing LDEV is enabled. • Disable: Encryption setting of a parity group or virtual volume associated with pool-VOLs containing LDEV is disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): External volume. For DP-VOL of Dynamic Provisioning, either the pool-VOL in the pool that owns DP-VOL is an external volume or that pool is being blocked. This item is not displayed when using of Virtual Storage Platform G200.
Access Attribute ¹	Displays the access attribute of the LDEV.

Item	Description
Number of Paths	Displays the total number of relevant paths and alternative paths.
Data Direct Mapped LDEV	Displays the LDEV ID of pool-VOL in the pool of the data direct mapping attribute. If the link of the LDEV ID is clicked, the LDEV Properties window appears. A hyphen (-) appears if the data direct mapping attribute is disabled.
T10 PI Mode ¹	Displays the T10 PI attribute information (Enabled or Disabled) on LDEV.
Virtual Storage Machine ¹	Information about the virtual storage machine. - Model / Serial Number¹: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID¹: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name¹: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. - SSID¹: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank. - Attribute¹: Virtual LDEV attribute. If the attribute is not set for LDEV, this column is blank.
Add LUN Paths	Opens the Add LUN Paths window.
Copy LUN Paths	Opens the Copy LUN Paths window.
Edit Command Devices	Opens the Edit Command Devices window.
View Host-Reserved LUNs ²	Displays the Host-Reserved LUNs window.
Delete LUN Paths ²	Opens the Delete LUN Paths window.
Edit UUIDs ²	Opens the Edit UUIDs window.
Delete UUIDs	Opens the Delete UUIDs window.
Create LDEVs	Opens the Create LDEVs window.
Edit LDEVs	Opens the Edit LDEVs window.
Format LDEVs	Opens the Format LDEVs window.
Shred LDEVs	Opens the Shred LDEVs window. For details, see Hitachi Volume Shredder User Guide.
Block LDEVs	Opens the Block LDEVs window.
Restore LDEVs	Opens the Restore LDEVs window.
Assign MP Blade	Opens the Assign MP Blade window.

Item	Description
Reclaim Zero Pages	Opens the Reclaim Zero Pages window.
Stop Reclaiming Zero Pages	Opens the Stop Reclaiming Zero Pages window.
Expand V-VOLs	Opens the Expand V-VOL window.
View Tier Properties	Opens the View Tier Properties window.
Migrate Volumes	Opens the Migrate Volumes window. For details, see Hitachi Volume Migration User Guide.
Force Delete Pairs	• TC Pairs: Opens the Force Delete Pairs (TC Pairs) window. For details, see the Hitachi TrueCopy® User Guide. • UR Pairs: Opens the Force Delete Pairs (UR Pairs) window. For details, see the Hitachi Universal Replicator User Guide. • GAD Pairs: Opens the Force Delete Pairs (GAD Pairs) window. For details, see the Global-Active Device User Guide .
View ALUs / SLUs	Opens the View ALUs / SLUs window.
Unbind SLUs	Opens the Unbind SLUs window.
Export ²	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
¹ Does not appear by default. To display this item, change the Column Settings window. ² Appears when you click More Actions .	

Host Mode Options tab

Hosts LUNS Host Mode Options			
Edit Host Groups		Export	
Filter ON OFF		Column Settings	
		Options 1 / 1	
Mode No.	Option Description	Status	
2	VERITAS Database Edition/Advanced Cluster	Disabled	
6	TPRLO	Disabled	
7	Automatic recognition function of LUN	Disabled	
12	No display for ghost LUN	Disabled	
13	SIM report at link failure	Disabled	
14	HP TruCluster with TrueCopy function	Disabled	
15	HACMP	Disabled	
22	Veritas Cluster Server	Disabled	
23	REC command support	Disabled	
33	Set/Report Device Identifier enable	Disabled	
39	Change the nexus specified in the SCSI Target Reset	Disabled	
40	V-Vol expansion	Disabled	
41	Prioritized device recognition command	Disabled	
43	Queue Full Response	Disabled	
49	BB Credit Set Up Option1	Disabled	
50	BB Credit Set Up Option2	Disabled	
51	Round Trip Set Up Option	Disabled	
54	(VAAI) Support Option for the EXTENDED COPY command	Disabled	
60	LUN0 Change Guard	Disabled	
63	(VAAI) Support option for vStorage APIs based on T10 standards	Disabled	
67	Change of the ED_TOV value	Disabled	
68	Support Page Reclamation for Linux	Disabled	
71	Change the Unit Attention for Blocked Pool-VOLs	Disabled	
73	ATX CDFS Support	Disabled	

Item	Description
Mode No.	Number of the host mode option.
Option Description	Description of the host mode option.
Status	Setting (enable or disable) of the host mode option.
Edit Host Groups	Opens the Edit Host Group window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

iSCSI

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- [Summary on page F-28](#)
- [Hosts tab on page F-29](#)
- [LUNs tab on page F-30](#)
- [Host Mode Options tab on page F-35](#)
- [CHAP Users tab on page F-36](#)

Summary

Item	Description
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Port ID	Identifier of the port.
Virtual Storage Machine	Model name and serial number of the virtual storage machine that has the port.
Host Mode	Host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.

Item	Description
Authentication	Information about the authentication. - Method: Authentication method that is CHAP, None, or Comply with Host Setting - Mutual CHAP: Mutual CHAP setting that is Enabled or Disabled - User Name

Hosts tab

This tab provides information about the iSCSI Names that are registered to the iSCSI targets assigned to the logged-on user.

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	HBA iSCSI Names and their icons.
Host Name	Name of hosts.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Edit Host	Opens the Edit Host window.
Add Hosts	Opens the Add Hosts window.
Remove Hosts	Opens the Remove Hosts window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

LUNs tab

Port ID	LUN ID	LDEV ID	LDEV Name	Pool Name (ID)	Capacity			Used Capacity
					Total	Used	Used (%)	
No Data								

This tab provides information about the LU paths that correspond to the LDEV assigned to the logged-in user.

Item	Description
Port ID	Identifier of the port.
LUN ID	Icons and identifiers of the logical unit. Clicking a LUN ID opens the LUN Properties window.
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV. Clicking an LDEV ID takes you to the LDEV Properties window.
LDEV Name	Name of each LDEV.
Pool Name (ID)	Displays the pool name and pool ID. If the logical volume is not the volume other than V-VOL, a hyphen (-) is displayed.
Capacity	Total: Displays the logical volume capacity. Reserved: Displays the reserved capacity of the V-VOL. The displayed value of Reserved might be larger than the displayed value of Total due to following reasons: Reserved displays the reserved capacity that is rounded up on each page.

Item	Description
	◦ The mapped capacity of V-VOL for Dynamic Provisioning includes the capacity of control information (168 MB is required per 3,145,548 MB). If used capacity is referenced during I/O or copy processing by software such as ShadowImage or Universal Replicator, the used capacity displayed might be different from the actual capacity even if the full allocation is enabled on the V-VOL. This is caused by a gap between the times that information is gathered about the mapped capacity and the reserved capacity. • Used: Displays the sum of the mapped capacity and the reserved capacity. The displayed value of Used might be larger than the displayed value of Total due to following reasons: ◦ Used displays the sum of the mapped capacity and the reserved capacity that is rounded up on each page. ◦ The mapped capacity of DP-VOL includes the capacity of the control information (Requires a maximum of 168 MB per 3,145,548 MB). ◦ DP-VOL of the data direct mapping attribute includes the control information (168 MB is required per 3,145,548 MB) and the capacity for one page. • Used(%): For the entire capacity of V-VOL, this item displays percentages of the sum of the mapped capacity and the reserved capacity. If the logical volume is not the volume other than V-VOL, a hyphen (-) is displayed.
Used Capacity	• Tier1: Displays the used capacity of tier 1. If the logical volume is not the volume other than a V-VOL for Dynamic Tiering, or active flash, a hyphen (-) is displayed. • Tier2: Displays the used capacity of tier 2. If the logical volume is not the volume other than a V-VOL for Dynamic Tiering, or active flash, or if tier 2 does not exist, a hyphen (-) is displayed. • Tier3: Displays the used capacity of tier 3. If the logical volume is not the volume other than a V-VOL for Dynamic Tiering, or active flash, or if tier 3 does not exist, a hyphen (-) is displayed. The reserved capacity is not included in the used capacity for each tier of the V-VOL. Therefore, the Used value in the Capacity column may not correspond with the Used Capacity value.
Provisioning Type	Displays the type for each logical volume. Basic: Internal volume. External: External volume. DP: DP-VOL

Item	Description
	Snapshot: Thin Image volume.
CLPR	Cache logical partition number, displayed as <i>ID:CLPR</i> .
Full Allocation	Displays the status of the setting for the full allocation in a pool associated with the V-VOL. • Enable: Pages are reserved. • Disable: Pages are not reserved.
Tiering Policy	Displays the tiering policy name and ID. All(0): Policy specified when all tiers in the pool are used. Level1(1) to Level31(31) : Policy selected from Level1 to Level31, set to the V-VOL. Hyphen (-): The logical volume is not the Dynamic Tiering or active flash V-VOL.
New Page Assignment Tier	Displays the new page assignment tier of the tiering policy. See New page assignment tier on page 5-59 . Hyphen (-): The logical volume is not the Dynamic Tiering or active flash V-VOL.
Tier Relocation	Displays whether tier relocation is set to Enable or Disable . If the logical volume is not to the V-VOL of Dynamic Tiering or active flash, a hyphen (-) is displayed.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. Hyphen (-): Volume in which the attribute is not defined.
Access Attribute ¹	Displays the access attribute of the LDEV.
Encryption	Displays the encryption information about the pool. • Enable: Encryption setting of a parity group or virtual volume associated with pool-VOLs containing LDEV is enabled. • Disable: Encryption setting of a parity group or virtual volume associated with pool-VOLs containing LDEV is disabled. • Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed in the pool in which the LDEV is placed. Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. • Hyphen(-): External volume. For DP-VOL of Dynamic Provisioning, either the pool-VOL in the pool that owns DP-VOL is an external volume or that pool is being blocked. This item is not displayed when using Virtual Storage Platform G200.

Item	Description
Number of Paths	Displays the total number of relevant paths and alternative paths.
Data Direct Mapped LDEV	Displays the LDEV ID of pool-VOL in the pool of the data direct mapping attribute. If the link of the LDEV is clicked, the LDEV Properties window appears. A hyphen (-) appears if the data direct mapping attribute is disabled.
Virtual Storage Machine ¹	Information about the virtual storage machine. - Model / Serial Number¹: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID¹: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name¹: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. - SSID¹: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank. - Attribute¹: Virtual LDEV attribute. If the attribute is not set for LDEV, this column is blank.
Add LUN Paths	Opens the Add LUN Paths window.
Copy LUN Paths	Opens the Copy LUN Paths window.
Edit Command Devices	Opens the Edit Command Devices window.
View Host-Reserved LUNs ²	Displays the Host-Reserved LUNs window.
Delete LUN Paths ²	Opens the Delete LUN Paths window.
Edit UUIDs ²	Opens the Edit UUIDs window.
Delete UUIDs ²	Opens the Delete UUIDs window.
Create LDEVs ²	Opens the Create LDEVs window.
Edit LDEVs ²	Opens the Edit LDEVs window.
Format LDEVs ²	Opens the Format LDEVs window.
Shred LDEVs ²	Opens the Shred LDEVs window. For details, see Hitachi Volume Shredder User Guide.
Block LDEVs ²	Opens the Block LDEVs window.
Restore LDEVs ²	Opens the Restore LDEVs window.
Assign MP Blade ²	Opens the Assign MP Blade window.
Reclaim Zero Pages ²	Opens the Reclaim Zero Pages window.

Item	Description
Stop Reclaiming Zero Pages ²	Opens the Stop Reclaiming Zero Pages window.
Expand V-VOLs ²	Opens the Expand V-VOL window.
View Tier Properties ²	Opens the View Tier Properties window.
Migrate Volumes ²	Opens the Migrate Volumes window. For details, see Hitachi Volume Migration User Guide.
Interrupt LDEV Task ²	Select Shred and the Interrupt Shredding Task window is displayed.
Force Delete Pairs ²	• TC Pairs: Opens the Force Delete Pairs (TC Pairs) window. For details, see the Hitachi TrueCopy® User Guide. • UR Pairs: Opens the Force Delete Pairs (UR Pairs) window. For details, see the Hitachi Universal Replicator User Guide. • GAD Pairs: Opens the Force Delete Pairs (GAD Pairs) window. For details, see the Global-Active Device User Guide .
View ALUs / SLUs ²	Opens the View ALUs / SLUs window.
Unbind SLUs ²	Opens the Unbind SLUs window.
Export ²	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.
¹ Does not appear by default. To display this item, change the Column Settings window. ² Appears when you click More Actions .	

Host Mode Options tab

Hosts	LUNS	Host Mode Options	CHAP Users
Edit iSCSI Targets		Export	
Filter ON OFF		Column Settings	Options 1 / 1
Mode No.	Option Description	Status	
2	VERITAS Database Edition/Advanced Cluster	Disabled	
6	TPRLO	Disabled	
7	Automatic recognition function of LUN	Disabled	
12	No display for ghost LUN	Disabled	
13	SIM report at link failure	Disabled	
14	HP TruCluster with TrueCopy function	Disabled	
15	HACMP	Disabled	
22	Veritas Cluster Server	Disabled	
23	REC command support	Disabled	
33	Set/Report Device Identifier enable	Disabled	
39	Change the nexus specified in the SCSI Target Reset	Disabled	
40	V-Vol expansion	Disabled	
41	Prioritized device recognition command	Disabled	
43	Queue Full Response	Disabled	
49	BB Credit Set Up Option1	Disabled	
50	BB Credit Set Up Option2	Disabled	
51	Round Trip Set Up Option	Disabled	
54	(VAAI) Support Option for the EXTENDED COPY command	Disabled	
60	LUN0 Change Guard	Disabled	
63	(VAAI) Support option for vStorage APIs based on T10 standards	Disabled	
67	Change of the ED_TOV value	Disabled	
68	Support Page Reclamation for Linux	Disabled	
71	Change the Unit Attention for Blocked Pool-VOLs	Disabled	
72	AIX GPFS Support	Disabled	

Item	Description
Mode No.	Number of the host mode option.
Option Description	Description of the host mode option.
Status	Setting (enable or disable) of the host mode option.
Edit iSCSI Targets	Opens the Edit Host Group window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

CHAP Users tab

[illegible]

Item	Description
Port ID	Identifier of the port.
User Name	User name.
Number of iSCSI Targets	Number of iSCSI Targets
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Edit CHAP User	Opens the Edit CHAP User window.
Remove CHAP Users	Opens the Remove CHAP Users window.
Export	Opens a window where you can export configuration information listed in the table to a file that can be used for multiple purposes, such as backup or reporting.

Add LUN Paths wizard

Select LDEVs window

Add LUN Paths

1. Select LDEVs > 2. Select Host Groups / iSCSI Targets > 3. View/Change LUN Paths > 4. Confirm

This wizard lets you assign LDEVs to host groups or iSCSI targets, and then map the host groups or iSCSI targets to LUN paths. Select LDEVs from the Available LDEVs list, and then click Add. Click Next to assign LDEVs to host groups or iSCSI targets.

LDEVs:

Available LDEVs

LDEV ID	LDEV Name	Parity Group ID	Pool Name (ID)	RAID Level	Capacity
00:01:00		1-10	-	1(2D+2D)	100.0C
00:01:01		1-10	-	1(2D+2D)	100.0C
00:01:02		1-10	-	1(2D+2D)	100.0C
00:01:03		1-10	-	1(2D+2D)	100.0C
00:01:04		1-10	-	1(2D+2D)	100.0C
00:01:05		1-11	-	1(2D+2D)	100.0C
00:01:06		1-11	-	1(2D+2D)	100.0C
00:01:07		1-11	-	1(2D+2D)	100.0C
00:01:08		1-11	-	1(2D+2D)	100.0C
00:01:09		1-11	-	1(2D+2D)	100.0C
00:01:0A		1-4	-	5(6D+1P)	1610.0C
00:01:0B		1-5	-	5(6D+1P)	1610.0C
00:01:0C		1-4	-	5(6D+1P)	3071.0C
00:01:0D		1-6	-	1(2D+2D)	536.0C
00:01:0E		1-7	-	1(2D+2D)	536.0C
00:01:0F		1-8	-	1(2D+2D)	536.0C
00:01:10		1-9	-	1(2D+2D)	536.0C
00:01:11		1-15	-	5(2D+1P)	2047.0C
00:01:12		1-15	-	5(2D+1P)	2047.0C
00:01:13		1-15	-	5(2D+1P)	2047.0C
00:01:14		1-15	-	5(2D+1P)	2047.0C
00:01:15		1-15	-	5(2D+1P)	2047.0C

Selected: 0 of 36

Selected LDEVs

LDEV ID	LDEV Name	Parity Group ID	Pool Name (ID)	Capacity	Provisioning Type

Selected: 0 of 0

Navigation: Back, Next, Finish, Cancel, ?

Available LDEVs table

This table lists logical volumes for which LU paths can be established. Only the LDEVs available to the logged-on user are available.

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.
Parity Group ID	Identifier of the parity group.
Pool Name (ID)	Pool name and pool identifier. If the LDEV is not used as a pool-VOL, a hyphen (-) appears.
RAID Level	Displays the RAID level. If multiple RAID levels exist in a pool, Mixed appears in this field.
Capacity	Size of each logical volume.
Provisioning Type	Provisioning type for each logical volume. Basic: Internal volume. External: External volume. DP: DP-VOL

Item	Description
	Snapshot: Thin Image volume.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
T10 PI	T10 PI attribute setting (Enabled or Disabled) on LDEV.
Number of Paths	Number of paths set for the LDEV.
Resource Group Name (ID)	Resource group name and identifier of the LDEV.
Virtual Storage Machine	Model name and serial number of the virtual storage machine that has the LDEV.
Add	Adds logical volumes selected from the Available LDEVs table to the Selected LDEVs table.
Remove	Removes logical volumes from the Selected LDEVs table.

Selected LDEVs table

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.
Parity Group ID	Identifier of the parity group.
Pool Name (ID)	Pool name and pool identifier. If the LDEV is not used as a pool-VOL, a hyphen (-) appears.
Capacity	Size of each logical volume.
Provisioning Type	Provisioning type for each logical volume. Basic: Internal volume. External: External volume. DP: DP-VOL Snapshot: Thin Image volume.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.

Item	Description
T10 PI	T10 PI attribute setting (Enabled or Disabled) on LDEV.
Number of Paths	Number of paths set for the LDEV.
Resource Group Name (ID)	Resource group name and identifier of the LDEV.
Virtual Storage Machine	Model name and serial number of the virtual storage machine that has the LDEV.

Select Host Groups / iSCSI Targets window

Add LUN Paths

1.Select LDEVs > **2.Select Host Groups / iSCSI Targets** > 3.View/Change LUN Paths > 4.Confirm

Select host groups from the Available Host Groups list, and then click Add. If you want to add iSCSI targets, select iSCSI from Selection Object, select iSCSI targets from the Available iSCSI Targets list, and then click Add. Click Next to map the host groups or iSCSI Targets to LUN paths.

Selection Object: ☒ Fibre ☐ iSCSI

Host Groups:

Available Host Groups

Filter: ON OFF Select All Pages Options 1 / 1

Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	Re Na
☐	CL1-A 0715a (05)	00 [Standard]	Enabled	1	mi
☐	CL1-A 1A-G00_TEST3 ...	00 [Standard]	Enabled	0	mi
☐	CL1-A HG0518a (01)	00 [Standard]	Enabled	0	mi
☐	CL1-A HG0519a (02)	00 [Standard]	Enabled	0	mi
☐	CL1-A HG0607a (03)	00 [Standard]	Enabled	0	mi
☐	CL1-A HG0611a (04)	00 [Standard]	Enabled	0	mi
☐	CL3-A 0511a (01)	00 [Standard]	Disabled	0	mi
☐	CL3-A 3A-G00 (00)	00 [Standard]	Disabled...	0	mi
☐	CL3-A HG0518b (02)	00 [Standard]	Disabled	0	mi
☐	CL3-A HG0528a (03)	00 [Standard]	Disabled	0	mi
☐	CL5-A 5A-G00 (00)	00 [Standard]	Disabled...	0	mi
☐	CL5-A HG0519b (01)	00 [Standard]	Disabled	0	mi
☐	CL7-A 7A-G00 (00)	00 [Standard]	Disabled...	0	mi
☐	CL1-B 1B-G00 (00)	00 [Standard]	Disabled...	0	mi
☐	CL3-B 3B-G00 (00)	00 [Standard]	Disabled...	0	mi
☐	CL2-A 2A-G00 (00)	0C [Windows]	Disabled...	0	mi
☐	CL2-A HG0519c (01)	00 [Standard]	Disabled	0	mi
☐	CL4-A 4A-G00 (00)	00 [Standard]	Disabled...	0	mi
☐	CL6-A 6A-G00 (00)	00 [Standard]	Disabled...	0	mi
☐	CL8-A 8A-G00 (00)	00 [Standard]	Disabled...	0	mi
☐	CL2-B 2B-G00 (00)	00 [Standard]	Disabled...	0	mi

Detail Selected: 0 of 22

Selected Host Groups

Select All Pages

Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	Reso Name
No Data					

Detail Selected: 0 of 0

Buttons: Add Remove Back Next Finish Cancel ?

Selection Object

Item	Description
Selection Object	- Fibre: Select to add LUN paths to host groups. - iSCSI: Select to add LUN paths to iSCSI targets.

Available Host Groups table

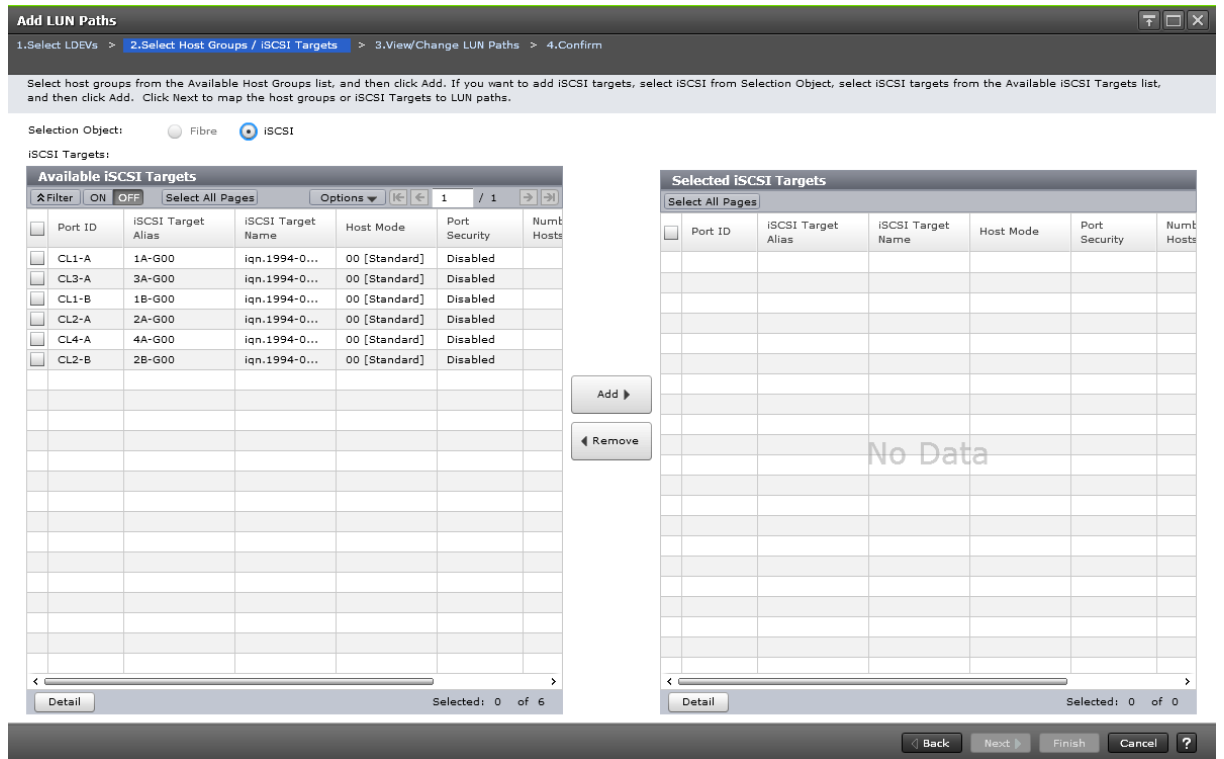
This table lists host groups for which LU paths can be established. Only the host groups assigned to the logged-on user are available.

Item	Description
Port ID	Identifier of the port.

Item	Description
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Resource Group Name (ID)	Resource group name and identifier of the host group.
Virtual Storage Machine	Model name and serial number of the virtual storage machine that has the port.
Detail	Details about the selected host group.
Add	Adds host groups selected from the Available Host Groups table to the Selected Host Groups table.
Remove	Removes the selected host groups from the Selected Host Groups table.

Selected Host Groups table

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI mode setting (Enabled or Disabled) on the port.
Resource Group Name (ID)	Resource group name and identifier of the host group.
Virtual Storage Machine	Model name and serial number of the virtual storage machine that has the port.
Detail	Details about the selected host group.



Available iSCSI Targets table

This table lists iSCSI targets for which LU paths can be established. Only the iSCSI targets assigned to the logged-on user are available.

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target ID	iSCSI target ID.
iSCSI Target Name	iSCSI target name.
Host Mode	Host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts set to the relevant port.
Resource Group Name (ID)	Resource group name and identifier of the iSCSI target.
Detail	Details about the selected iSCSI target.
Add	Adds iSCSI targets selected from the Available iSCSI Targets table to the Selected iSCSI Targets table.
Remove	Removes the selected host groups from the Selected iSCSI Targets table.

Selected iSCSI Targets table

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target ID	iSCSI target ID.
iSCSI Target Name	iSCSI target name.
Host Mode	Host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts set to the relevant port.
Resource Group Name (ID)	Resource group name and identifier of the iSCSI target.

Add LUN Paths window

This window provides information about LUs that are already set. You can view information about the LUN and change the LUN ID.

Add LUN Paths

1.Select LDEVs > 2.Select Host Groups / iSCSI Targets > 3.View/Change LUN Paths > 4.Confirm

The LUN IDs are automatically set, but you can change a LUN by clicking Change LUN IDs. You must first select the check box for the host group (in the table subheading) you want to change, and select LDEVs you want to change and then click Change LUN IDs. Click Finish to confirm the LUN paths.

LUNs:

Added LUNs

Filter: ON OFF Select All Pages Options 1 / 1

☐	LDEV ID	LDEV Name	Parity Group ID	Pool Name (ID)	Capacity	Provisioning Type	Attribute	T10 PI	LUN ID(1 Sets of Paths)
☐	00:01:00		1-10	-	100.00 GB	Basic	-	Disabled	0

Change LDEV Settings Change LUN IDs Selected: 0 of 1

Back Next Finish Cancel ?

Added LUNs table

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.

Item	Description
Parity Group ID	Identifier of the parity group.
Pool Name (ID)	Pool names and pool identifiers. If the LDEV is not used as a pool-VOL, a hyphen (-) appears.
Capacity	Size of each logical volume.
Provisioning Type	Provisioning types for each logical volume. Basic: Internal volume. External: External volume. DP: DP-VOL Snapshot: Thin Image volume.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
T10 PI	T10 PI attribute setting (Enabled or Disabled) on LDEV.
LUN ID ((<i>number of LUNs</i>) Sets of Paths)	Number of assigned LUNs.
<i>port ID/ host group name or iSCSI target name</i>	Name of the port and the host group (or iSCSI target name) of assigned LUNs. This item appears according to the number of assigned LUNs.
Change LDEV Settings	To change the LDEV name setting, select an LDEV then click this button.
Change LUN IDs	To change the LUN setting, select the check box in the table column of <i>port ID/host group name</i> , select the target LDEV, then click this button.

Add LUN Paths confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Item	Description
T10 PI	T10 PI attribute setting (Enabled or Disabled) on LDEV.
LUN ID ((<i>number of LUNs</i>) Sets of Paths)	Number of assigned LUNs for the relevant LDEV.
<i>port ID/ host group name or iSCSI target name</i>	Name of the port and the host group (or iSCSI target name) of the assigned LUNs. Assigned LUN IDs also appear.

Create Host Groups wizard

Create Host Groups window

Item	Description
Host Group Name	Enter the name of the host group. As a host group name, you can use single-byte ASCII characters (alphanumeric characters and symbols) up to 64 characters. You cannot use the following symbols: \ / : , ; * ? " < > You cannot use a space character at the beginning or end of the host group name.
Resource Group Name (ID)	Select the resource group in which the host group is created. If Any is selected, among all ports being allocated to the user, ports where the host group can be add are available in the Available Ports table. If other

Item	Description
	than Any is selected, among ports assigned to the selected resource group, ports where the host group can be add are available in the Available Ports table.
Host Mode	Select the host mode from the list.
Add	Adds the settings to the Selected Host Groups table.

Host Mode Options table

Item	Description
Mode No.	The ID number of the host mode option.
Option Description	The description of host mode option.
Status	The setting status (Enabled or Disabled) of the host mode option.
Enabled	Indicates that the host mode option is enabled.
Disabled	Indicates that the host mode option is disabled.

Available Hosts table

This table lists information about the registered hosts.

Item	Description
Port ID	Identifier of the port.
HBA WWN	WWN of the port.
Host Name	Name of the host.
Host Group Name	Name of the host group.
New Host	Indicates whether this is a new host. - Yes: The host is newly added and has never been connected through a cable to any port in the storage system. - No: The host has been connected through a cable to another port.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Add New Host	Adds a new host. Or, select host bus adapters then click to assign a nickname to the host bus adapter.

Available Ports table

This table lists the registered ports.

Item	Description
Port ID	Identifier of the port.
Security	LUN security setting (Enabled or Disabled) on the port.
T10 PI Mode	T10 PI mode setting (Enabled or Disabled) on the port.

Selected Host Groups table

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Resource Group Name (ID)	Resource group name and identifier of the host group.
Virtual Storage Machine	Model name and serial number of the virtual storage machine that has the host group.
Detail	Details about the selected host group.
Remove	Removes the selected host groups from the Selected Host Groups table.

Next Task Option

Click **Next** to go to the task setting window, which is indicated in **Next Task Option**.

Create Host Groups confirmation window



Note: If multiple tasks that are connected in one wizard are executed, this window shows all configured items of tasks. To show information of configured items other than this topic, click **Back** to display related setting windows, then click **Help**.

Edit Host Groups

1.Edit Host Groups
2.Confirm

This wizard lets you edit one or more properties. Check the box in front of the property you want to edit, and then enter the new value. When you change the Host Mode, all of the Host Mode Options will be set to default.

☐
Host Group Name:
1A-G00
(Max. 64 characters)

☐
Host Mode:
00[Standard]

Host Mode Options:

Mode No.	Option Description	Status
☐ 2	VERITAS Database Edition/Advanced Cluster	Enable
☐ 6	TPRLO	Disable
☐ 7	Automatic recognition function of LUN	Disable
☐ 12	No display for ghost LUN	Disable
☐ 13	SIM report at link failure	Disable
☐ 14	HP TruCluster with TrueCopy function	Disable
☐ 15	HACMP	Disable
☐ 22	Veritas Cluster Server	Disable
☐ 23	REC command support	Disable
☐ 33	Set/Report Device Identifier enable	Disable
☐ 39	Change the nexus specified in the SCSI Target Reset	Disable
☐ 40	V-Vol expansion	Disable
☐ 41	Prioritized device recognition command	Disable
☐ 43	Queue Full Response	Disable

Selected: 0 of 30

Back
Next
Finish
Cancel
?

Item	Description
Host Group name	Specify the name of the host group. Host group name takes up to 64 single-byte ASCII characters (alpha-numerals and symbols). You cannot use the following symbols: \ / : , ; * ? " < > You cannot use a space character at the beginning or end of the host group name.
Host Mode	Select the host mode from the list.

Host Mode Options table

To set the host mode option, select a host mode option, then click **Enable**. If you do not need a host mode option, select an unnecessary host mode option, then click **Disable**.

Item	Description
Mode No.	Number identifier of the host mode option.
Option Description	Description of the host mode option.
Status	Indicates the current status setting (Enabled or Disabled) of the host mode option on this host group.
Enable	Enables the host mode option.

Item	Description
Disable	Disables the host mode option.



Caution: The operation of the Edit iSCSI targets cannot be completed if specified multiple iSCSI targets in that different host modes are defined, and if one of iSCSI target is connected to the port.

Edit Host Groups confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	T10 PI Mode	
CL1-A	1A-G00 (00)	00 [Standard]	Disabled...	0	Disabled	

Selected Host Groups table

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Detail	Details about the selected host group.

Add to Host Groups wizard (when specific host is selected)

Add to Host Groups window

Available Host Groups table

This table lists host groups in which selected hosts can be registered. Only the host groups assigned to the logged-on user are available.

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Detail	Details about the selected host group.
Add	Adds host groups selected from the Available Host Groups table to the Selected Host Groups table.
Remove	Removes the selected host groups from the Selected Host Groups table.

Selected Host Groups table

This table lists the selected host groups.

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.

Item	Description
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Detail	Details about the selected host group.

Add to Host Groups confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

1.Add to Host Groups > 2.Confirm

Enter a name for the task. Confirm the settings in the lists and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

HBA WWN	Host Name
1234567890123456	host01
Total: 1	

Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	T10 PI Mode
CL3-E	3E-G00 (00)	00 [Standard]	Disabled...	1	-
Total: 1					

☐ Go to tasks window for status

Selected Hosts table

This table lists the hosts selected to be added to a host group.

Item	Description
HBA WWN	WWN of the port.
Host Name	Name of the host.

Selected Host Groups table

A list of host groups to which hosts are registered.

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.

Item	Description
Host Mode	The host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.

Add Hosts wizard (when specific hosts group is selected)

Add Hosts window

Available Hosts table (Fibre channel)

This table lists the hosts that can be registered in the selected host group.

Item	Description
Port ID	Identifier of the port.
HBA WWN	WWN of the port.
Host Name	Name of the host.
Host Group Name	Name of the host group.
New Host	Indicates whether this is a newly added host.

Item	Description
	- Yes: The host is newly added and has never been connected through a cable to any port in the storage system. - No: The host has been connected through a cable to another port.
Add New Host	Adds a new host. Note that Port ID and Host Group Name is blank after a new host is added.
Add	Adds hosts selected from the Available Hosts table to the Selected Hosts table.
Remove	Removes hosts from the Selected Hosts table.

Selected Hosts table (Fibre channel)

This table lists hosts selected from the **Available Hosts** table.

Item	Description
Port ID	Identifier of the port. This field is blank for the host created by clicking Add New host .
HBA WWN	WWN of the port.
Host Name	Name of the host.
Host Group Name	Name of the host group. Note that this field is blank for the host created by clicking Add New host .
Add New Host	Indicates whether this is a newly added host. - Yes: The host is newly added and has never been connected via a cable to any port in the storage system. - No: The host has been connected via a cable to another port.

Add Hosts

1.Add Hosts > 2.Confirm

This wizard allows you to add hosts to the selected iSCSI targets. Select hosts from the Available Hosts list, or click Add New Host to add a new host to the list, and then click Add. Click Finish to confirm.

Hosts:

Available Hosts

Filter ON OFF Select All Pages Options 1 / 1

☐	Port ID	HBA iSCSI Name	Host Name	Number of iSCSI Targets	Add New Host
☐	CL2-A	iqn.test1	hostCL2A	3	No
☐	CL2-A	iqn.test1	hostCL2A	3	No
☐	CL2-A	iqn.test1	hostCL2A	3	No
☐	CL4-A	iqn.test1	HOSTCL4A	4	No
☐	CL4-A	iqn.test3	CLA-Host	4	No
☐	CL4-A	iqn.test1	HOSTCL4A	4	No
☐	CL4-A	iqn.test3	CLA-Host	4	No
☐	CL4-A	iqn.test1	HOSTCL4A	4	No
☐	CL4-A	iqn.test3	CLA-Host	4	No
☐	CL4-A	iqn.test1	HOSTCL4A	4	No
☐	CL4-A	iqn.test3	CLA-Host	4	No
☐	CL4-A	iqn.test1	HOSTCL4A	4	No
☐	CL4-A	iqn.test3	CLA-Host	4	No

Add New Host

Selected: 0 of 11

Selected Hosts

Select All Pages

☐	Port ID	HBA iSCSI Name	Host Name	Number of iSCSI Targets	Add New Host
No Data					

Selected: 0 of 0

Add

Remove

Back Next Finish Cancel ?

Available Hosts table (iSCSI)

This table lists the hosts that can be registered in the selected iSCSI target.

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	HBA iSCSI Name of the port.
Host Name	Name of the host.
Number of iSCSI Targets	Number of iSCSI Targets.
Add New Host	Indicates whether this is a newly added host. - Yes: The host is newly added and has never been connected via a cable to any port in the storage system. - No: The host has been connected via a cable to another port.
Add New Host	Adds a new host. Note that Port ID is blank after a new host is added.
Add	Adds hosts selected from the Available Hosts table to the Selected Hosts table.
Remove	Removes hosts from the Selected Hosts table.

Selected Hosts table (iSCSI)

This table lists hosts selected from the **Available Hosts** table.

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	HBA iSCSI Name of the port.
Host Name	Name of the host.
Number of iSCSI Targets	Number of iSCSI Targets.
Add New Host	Indicates whether this is a newly added host. - Yes: The host is newly added and has never been connected via a cable to any port in the storage system. - No: The host has been connected via a cable to another port.

Add Hosts confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Add Hosts

1.Add Hosts > 2.Confirm

Enter a name for the task. Confirm the settings in the lists and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Selected Host Groups					
Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	T10 PI Mode
CL1-E	1E-G00 (00)	00 [Standard]	Disabled...	2	-
Total: 1					

Selected Hosts	
HBA WWN	Host Name
0123456789012345	host02
Total: 1	

☐ Go to tasks window for status

Selected Host Groups table (Fibre channel)

This table lists the selected host groups.

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.

Selected LUN Paths table

This table provides information about the selected LUN paths.

Item	Description
Port ID	Identifier of the port.
LUN ID	Identifier of the selected LUN paths.
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.
Host Group Name / iSCSI Target Alias	Name of the host group or iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Capacity	Size of each logical volume.
Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
T10 PI	T10 PI attribute setting (Enabled or Disabled) on LDEV.
Remove from Delete process	Removes LUN paths from the Selected LUN Paths table.
Delete all defined LUN paths to above LDEVs	Removes LUN paths from the Selected LUN Paths table. When this check box is selected, the host groups of all the alternate paths in the LDEV displayed in the Selected LUNs table must be assigned to the Storage Administrator group permitted to manage them.

Next Task Option

Click **Next** to go to the task setting window, which is indicated in **Task Next Option**.

Delete LUN Paths confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Edit Host wizard

Use this wizard to edit host parameters.



Caution: In one host, if the setting operations are performed with two times or more to edit many setting items, wait until the primary task applies then perform the secondary operation. If the secondary operation is performed while being applying of the primary task, the primary task is canceled and the secondary task is applied to the storage system.

Edit Host window

For fibre channel ports

Item	Description
HBA WWN	Specify the WWN of the port in 16 digits of hexadecimal numbers.
Host Name	Specify the host name. Host name takes up to 64 single-byte ASCII characters (alpha-numerals and symbols). You cannot use the following symbols: \ / : , ; * ? " < > You cannot use a space character at the beginning or end of the host name. A host name is case-sensitive.
Apply same settings to the HBA WWN in all ports	If this check box is selected, the changes made in this dialog box will also affect other ports.

For iSCSI ports

Item	Description
HBA iSCSI Name	Specify the WWN of the port in 16 digits of hexadecimal numbers. • iqn or eui: Select the format of the iSCSI name. • Text box: Specify the iSCSI name. For the iqn format, an iSCSI name takes up to 219 single-byte ASCII characters (alpha-numerals and symbols). You cannot use the following symbols: \ / : , ; * ? " < > For the eui format, an iSCSI name takes fixed to 16 alpha-numerals.
Host Name	Specify the host name. Host name takes up to 32 single-byte ASCII characters (alpha-numerals and symbols). You cannot use the following symbols: \ / : , ; * ? " < > You cannot use a space character at the beginning or end of the host name. A host name is case-sensitive.
Apply same settings to the HBA iSCSI name in all ports.	If this check box is selected, the changes made in this dialog box will also affect other ports.

Edit Host confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Edit Host

1.Edit Host > 2.Confirm

Enter a name for the task. Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Selected Hosts			
Port ID	HBA WWN	Host Name	
CL7-A	5001438009AB4D84	HostNa...	

Total: 1

☐ Go to tasks window for status Back Next Apply Cancel ?

Selected Hosts table (Fibre channel)

Item	Description
Port ID	Identifier of the port.
HBA WWN	WWN of the port.
Host Name	Name of the host.

Edit Host

1.Edit Host > 2.Confirm

Enter a name for the task. Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Selected Hosts				
	Port ID	HBA iSCSI Name	Host Name	Number of iSCSI Targets
☐	CL2-A	iqn.test1	hostCL2A	3
☐	CL4-A	iqn.test1	HOSTCL4A	4
☐	CL4-A	iqn.test1	HOSTCL4A	4
☐	CL4-A	iqn.test1	HOSTCL4A	4
☐	CL4-A	iqn.test1	HOSTCL4A	4

Detail Total: 5

☐ Go to tasks window for status Back Next Apply Cancel ?

Selected Hosts table (iSCSI ports)

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	HBA iSCSI Name of the port.
Host Name	Name of the host.
Number of iSCSI Targets	Number of iSCSI targets.

Item	Description
Detail	Details about the selected host.

Edit Ports wizard

Use this wizard to edit port parameters.



Caution: In one port, if the setting operations are performed with two times or more to edit many setting items, wait until the primary task applies then perform the secondary operation. If the secondary operation is performed while being applying of the primary task, the primary task is canceled and the secondary task is applied to the storage system.

Edit Ports window

Edit Ports

1.Edit Ports > 2.Confirm

This wizard lets you edit one or more properties. Check the box in front of the property you want to edit, and then enter the new value.

☒ Port Security : ☐ Enable ☒ Disable

☐ Port Speed : Auto

☐ Address (Loop ID) : DC (6)

☐ Fabric : ☐ ON ☒ OFF

☐ Connection Type : FC-AL

Back Next Finish Cancel ?

For fibre channel ports

Item	Description
Port Security	Select whether LUN security is Enabled or Disabled.
Port Speed	Select the data transfer speed for the selected fibre channel port. If Auto is selected, the storage system automatically sets the data transfer speed to 2, 4, 8, or 16 Gbps. Caution: If you are using 2-Gbps HBA and switch, set the transfer speed of the CHB(FC) (fibre channel board) port as 2 Gbps. If you are using 4-Gbps HBA and switch, set the transfer speed of the CHB(FC) port as 4 Gbps. If you are using 8-Gbps HBA and switch, set the transfer speed of the CHB(FC) port as 8 Gbps. If you are using 16-Gbps HBA and switch, set the transfer speed of the

Item	Description
	CHB(FC) port as 16-Gbps. If the Auto Negotiation setting is required, the linkup can become improper at server restart. Check a channel lamp, and if it is blinking, remove and re-insert the cable to perform the signal synchronization and linkup. When the transfer speed of the CHB(FC) port is set to Auto, the data might not be transferred at the maximum speed depending on the connected device. Confirm the transfer speed appearing in Speed in the Ports list when you start up the storage system, HBA, or switch. When the transfer speed is not the maximum speed, select the maximum speed from the list on the right or remove and reinsert the cable.
Address (Loop ID)	Select the address of the selected port.
Fabric	Select whether a fabric switch is set to ON or OFF .
Connection Type	Select the topology. - FC-AL: Fibre channel arbitrated loop - P-to-P (point-to-point). Caution: Some fabric switches require that you specify point-to-point topology. If you enable a fabric switch, check the documentation for the fabric switch to determine whether your switch requires point-to-point topology.

Edit Ports

1. Edit Ports > 2. Confirm

This wizard lets you edit one or more properties. Check the box in front of the property you want to edit, and then enter the new value.

IPv4 Settings

- ☐ IP Address: 192.168.0.100
- ☐ Subnet Mask: 255.255.255.0
- ☐ Default Gateway: 0.0.0.0

IPv6 Mode: ☒ Enable ☐ Disable

IPv6 Settings

- ☐ Link Local Address: ☐ Auto ☒ Manual
FE80:0000:0000:0000: 0:0:0:2
- ☐ Global Address: ☐ Auto ☒ Manual
fe:0:0:0:0:0:0:1
- ☐ Default Gateway: 0:0:0:0:0:0:0:0

Port Security: ☐ Enable ☒ Disable

Port Speed: 10Gbps

TCP Port Number: 3260 (1-65535)

Selective ACK: ☒ Enable ☐ Disable

Delayed ACK: ☒ Enable ☐ Disable

Maximum Window Size: 64KB

Ethernet MTU Size: 1500Byte

Keep Alive Timer: 60 Seconds (30-64800)

Back Next Finish Cancel ?

For iSCSI ports

Item	Description
IPv4 Settings	Specify the information about IPv4. - IP Address: Specify an IP address. If 2 or more ports are selected, this information cannot be specified. - Subnet Mask: Specify a subnet mask. - Default Gateway: Specify a default gateway.
IPv6 Mode	Specify this information if IPv6 is used or not used. - Enable: IPv6 mode is enabled. If Enable is selected, the IPv6 Setting of the following can be specified. - Disable: IPv6 mode is disabled.
IPv6 Settings	Specify the information about IPv6. - Link Local Address: Link local address of the port. - Auto: Sets the link local address automatically.

Item	Description
	- Manual: Sets the link local address manually. Specify the link local address in the text box. - Global Address: Global address of the port. - Auto: Sets the link local address automatically. - Manual: Sets the link local address manually. Specify the link local address in the text box. - Default Gateway: Default gateway address of the port.
Port Security	Specify this information if the LUN security is used or not used. - Enable: The LUN security is enabled. - Disable: The LUN security is disabled.
Port Speed	Select the data transfer speed for the selected port. 1 Gbps, 10 Gbps, or Auto can be selected.
TCP Port Number	Specify the TCP port number.
Selective ACK	Specify this information if the selective ACK is used or not used. - Enable: The selective ACK is enabled. - Disable: The selective ACK is disabled.
Delayed ACK	Specify this information if the delayed ACK is used or not used. - Enable: The delayed ACK is enabled. - Disable: The delayed ACK is disabled.
Maximum Window Size	Select the maximum window size from 64 KB, 128 KB, 256 KB, 512 KB, or 1024 KB.
Ethernet MTU Size	Select Ethernet MTU size from 1500 bytes, 4500 bytes, or 9000 bytes.
Keep Alive Timer	Specify the interval time to perform the keep alive timer option.
VLAN Tagging Mode	Specify this information if the VLAN tagging mode is used or not used. - Enable: The VLAN tagging mode is enabled. And specify the VLAN ID in the text box. - Disable: The VLAN tagging mode is disabled.
iSNS Server	Specify this information if the iSNS server is used or not used. - Enable: The iSNS server mode is enabled. And specify the IP Address and TCP Port Number of the following. - Disable: The iSNS server mode is disabled.
IP Address	Specify the IP address for IPv4 or IPv6.

Item	Description
TCP Port Number	Specify the TCP port number.
CHAP User Name	Specify the CHAP user name.
Secret	Specify the secret to be used for host authentication.
Re-enter Secret	Specify the secret again for confirmation.

Edit Ports confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Edit Ports

1.Edit Ports > 2.Confirm

Enter a name for the task. Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Port ID	Security	Speed	Address (Loop ID)	Fabric	Connection Type	
CL5-B	Enabled	Auto	DC (6)	OFF	FC-AL	

Total: 1

☐ Go to tasks window for status < Back Next > Apply Cancel ?

Selected Ports table for fibre channel ports

Item	Description
Port ID	Identifier of the port.
Security	LUN security setting (Enabled or Disabled) on the port.
Speed	Data transfer speed for the selected fibre channel port.
Address (Loop ID)	Address of the selected port.
Fabric	Status setting (ON or OFF) for a fabric switch.
Connection Type	Topology of the selected port. - FC-AL: Fibre channel arbitrated loop - P-to-P: Point-to-point

Item	Description
TCP Port Number	TCP port number.
Selective ACK	Appears with enabled or disabled for the selective ACK.
Delayed ACK	Appears with enabled or disabled for the delayed ACK.
MTU	Ethernet MTU size.
Maximum Window Size	Maximum window size.
Keep Alive Timer	Interval time to perform the keep alive timer option.
VLAN	- Tagging Mode: Appears with enabled or disabled for VLAN. - ID: Identifier of VLAN.
iSNS Server	- Mode: iSNS server setting (Enabled or Disabled). - IP Address: IP address of the iSNS server. - TCP Port Number: TCP port number of the iSNS server.
CHAP Authentication	Information for the host authentication. - User Name: User name appears. - Secret: If the secret is specified, the character string of six asterisks (*) appears.

Create Alternative LUN Paths wizard

Create Alternative LUN Paths window

Create Alternative LUN Paths

1.Create Alternative LUN Paths > 2.Confirm

This wizard lets you copy the selected host group and LUN settings to other ports. Select the ports you want to paste the host group and LUN settings, and then click Add. Click Finish to confirm.

Resource Group Name (ID): Any

Ports:

Available Ports

Filter ON OFF Select All Pages Options 1 / 1

Port ID	Security
CL3-B	Disabled
CL5-B	Disabled
CL7-B	Disabled
CL2-B	Disabled
CL4-B	Disabled
CL6-B	Disabled
CL8-B	Disabled

Selected Ports

Select All Pages

Port ID	Security

Add Remove

No Data

Selected: 0 of 7

Selected: 0 of 0

Back Next Finish Cancel ?

Item	Description
Resource Group Name (ID)	Select the resource group in which the host group is created. If Any is selected, among all ports being allocated to the user, ports where the host group can be add are available in the Available Ports table. If other than Any is selected, among ports assigned to the selected resource group, ports where the host group can be add are available in the Available Ports table.

Available Ports table

This table lists the ports for which alternate paths can be created.

Item	Description
Port ID	Identifier of the port.
Security	LUN security setting (Enabled or Disabled) on the port.
Add	Adds ports selected from the Available Ports table to the Selected Ports table.
Remove	Removes ports from the Selected Ports table.

Selected Ports table

Item	Description
Port ID	Identifier of the port.
Security	LUN security setting (Enabled or Disabled) on the port.

Create Alternative LUN Paths confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Create Alternative LUN Paths

1. Create Alternative LUN Paths > **2. Confirm**

Enter a name for the task. Confirm the settings in the lists and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Selected Host Groups						
Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	T10 PI Mode	Resource Group Name (ID)
CL1-C	1E-G00 (01)	00 [Standard]	-	1	-	meta_resource ...
Total: 1						

Added LUNs						
LUN ID	LDEV ID	LDEV Name	Capacity	Parity Group ID	Number of Paths	T10 PI
0	00:00:01		3.00 GB	-	2	Disabled
1	00:00:02		3.00 GB	-	2	Disabled
Total: 2						

☐ Go to tasks window for status

Selected Host Groups table for fibre channel ports

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Resource Group Name (ID)	Resource group name and identifier of the resource group containing the host groups.

Selected Host Groups table for iSCSI ports

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	Alias of the iSCSI target.
iSCSI Target Name	Name of the iSCSI target.
Host Mode	The host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
Resource Group Name (ID)	Resource group name and identifier of the resource group containing the host groups.

Added LUNs table

Item	Description
LUN ID	Identifier of the added logical unit.
LDEV ID	Identifier of the LDEV.
LDEV Name	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
Capacity	Size of each logical volume.
Parity Group ID	Identifier of the parity group.

Item	Description
Number of Paths	Number of paths set for the LDEV.

Copy LUN Paths wizard

Copy LUN Paths window

Selection Object

Item	Description
Selection Object	- Host Group: Select to copy LUN paths to host groups. - iSCSI target: Select to copy LUN paths to iSCSI targets.

Available Host Groups table

This table lists the host groups for which LU paths can be copied. Only the host group assigned to the logged-on user are available.

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Host Mode	Host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts set to the relevant port.
Detail	Details about the selected iSCSI target.
Add	Adds iSCSI targets selected from the Available iSCSI Targets table to the Selected iSCSI Targets table.
Remove	Removes the selected host groups from the Selected iSCSI Targets table.

Selected iSCSI Targets table

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Host Mode	Host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts set to the relevant port.
Details	Details about the selected iSCSI target.

Copy LUN Paths confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Copy LUN Paths

1.Select Host Groups / iSCSI Targets > **2.Confirm**

Enter a name for the task. Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name: (Max. 32 Characters)

Selected Host Groups						
Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	T10 PI Mode	
CL3-E	3E-G00 (00)	00 [Standard]	Disabled...	0	-	
						Total: 1

Added LUNs						
LUN ID	LDEV ID	LDEV Name	Capacity	Parity Group ID	Number of Paths	T10 PI
0	00:00:01		3.00 GB	-	2	Disabled
						Total: 1

☐ Go to tasks window for status < Back Next > Apply Cancel ?

Selected Host Groups table

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.

Selected iSCSI Targets table

Added LUNs table

F-78

Item	Description
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.

Remove Hosts wizard

Remove Hosts window

Remove Hosts

1.Remove Hosts > 2.Confirm

This wizard lets you remove one or more hosts from the host group.

Selected Hosts

Filter ON OFF Options 1 / 1

Port ID	HBA WWN	Host Name	Host Group Name
CL7-A	5001438009AB4D84	HPBL86...	HPBL860-4 (01)

Total: 1

☐ Remove selected hosts from all host groups containing the hosts in the storage system.

Back Next Finish Cancel ?

Selected Hosts table

Item	Description
Port ID	Identifier of the port.
HBA WWN	WWN of the port.
Host Name	Name of the host.
Host Group Name	Name of the host group.
Remove selected hosts from all host groups containing the hosts in the storage system	If this check box is selected, selected hosts are removed from all host groups containing the hosts in the storage system.

Remove Hosts confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Remove Hosts

1.Remove Hosts > 2.Confirm

⚠ Your applications on the selected hosts will not be able to access the data anymore. Are you sure to continue?

Task Name: (Max. 32 Characters)

Port ID	HBA WWN	Host Name	Host Group Name
CL7-A	5001438009AB4D84	HPBL86...	HPBL860-4 (01)

Total: 1

☐ Go to tasks window for status Back Next Apply Cancel ?

Selected Hosts table

Item	Description
Port ID	Identifier of the port.
HBA WWN	WWN of the port.
Host Name	Name of the host.
Host Group Name	Name of the host group.

Edit UUIDs wizard

Edit UUIDs window

Edit UUIDs

1.Edit UUIDs > 2.Confirm

Set the initial UUID and click Finish to confirm.

UUID :

Prefix Initial Number

(Max. 64 characters total, or blank)

OpenVMS allows only numeric value between 1-32767

Back Next Finish Cancel ?

Item	Description
Prefix	For an OPEN VMS server host: The total length of the Prefix and the Initial Number can not exceed 5 characters. If the Prefix is 5 characters, you can not specify an Initial Number and vice versa. For a server host other than OPEN VMS: The total length of the Prefix and the Initial Number can not exceed 64 characters. If the Prefix is 64 characters, you can not specify an Initial Number and vice versa. The following rules apply to UUID: • These characters cannot be used: \ / : , ; * ? " < > • A space character cannot be used for the first and the last characters. • UUIDs are case-sensitive. For example, Abc and abc are different UUIDs.
Initial Number	For an OPEN VMS server host: The total length of the Prefix and the Initial Number can not exceed 5 characters. If the Prefix is 5 characters, you can not specify an Initial Number and vice versa. For a server host other than OPEN VMS: The total length of the Prefix and the Initial Number can not exceed 64 characters. If the Prefix is 64 characters, you can not specify an Initial Number and vice versa. The following rules apply to the initial number. Example: • 1: Up to 9 numbers are added (1, 2, 3 ... 9) • 08: Up to 92 numbers are added (08, 09, 10 ... 99) (If the host mode is OpenVMS, the numbers are: 8, 9, 10 ... 99) • 23: Up to 77 numbers are added (23, 24, 25 ... 99)



Caution: If UUID is blank, the UUID setting is released.

Edit UUIDs confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Edit UUIDs

1.Edit UUIDs > **2.Confirm**

Enter a name for the task. Confirm the settings in the list and click Apply to add task in Tasks queue for execution.

Task Name: **150707-EditUUIDs**
(Max. 32 Characters)

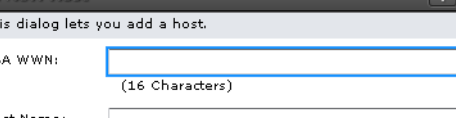
Selected LUNs						
Port ID	LUN ID	LDEV ID	LDEV Name	UUID	Capacity	
CL1-A	2	00:00:12		aa01	16.00 GB	
						Total: 1

☐ Go to tasks window for status Back Next Apply Cancel ?

Selected LUNs table

Item	Description
Port ID	Identifier of the port.
LUN ID	Logical units whose UUID has been changed.
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.
UUID	Identifies the set or changed UUID. A blank field indicates that the UUID is released.
Capacity	Size of each logical volume.

Add New Host window



Add New Host

This dialog lets you add a host.

HBA WWN:

(16 Characters)

Host Name:

(Max. 64 characters, or blank)

OK Cancel ?

For fibre channel ports

Item	Description
HBA WWN	Specify the WWN of the port in 16 digits of hexadecimal numbers.
Host Name	Specify the host name. As a host name, you can use single-byte ASCII characters (alpha-numerals and symbols) up to 64 characters. You cannot use the following symbols: \ / : , ; * ? " < > You cannot use a space character at the beginning or end of the host name. A host name is case-sensitive.

Add New Host

This dialog lets you add a host.

HBA iSCSI Name: ☒ iqn ☐ eui

iqn.
(Max. 219 characters)

Host Name:
(Max. 32 characters, or blank)

OK Cancel ?

For iSCSI ports

Item	Description
HBA iSCSI Name	Specify the WWN of the port in 16 digits of hexadecimal numbers. - iqn or eui: Select the format of the iSCSI name. - Text box: Specify the iSCSI name. For the iqn format, an iSCSI name takes up to 219 single-byte ASCII characters (alpha-numerals and symbols). You cannot use the following symbols: \ / : , ; * ? " < > For the eui format, an iSCSI name takes fixed to 16 alpha-numerals.
Host Name	Specify the host name. Host name takes up to 32 single-byte ASCII characters (alpha-numerals and symbols). You cannot use the following symbols: \ / : , ; * ? " < > You cannot use a space character at the beginning or end of the host name. A host name is case-sensitive.

Change LUN IDs window

Change LUN IDs

Set the initial LUN ID.

Initial LUN ID:

(0-2047, Decimal input)

OK

Cancel

?

Setting field

Item	Description
Initial LUN ID	Specify the initial LUN ID. If multiple LUs are selected, LUN IDs are set consecutively from the specified LUN ID.

Delete Host Groups window

Delete Host Groups

1.Confirm

Selected Host groups will be deleted. Are you sure to continue?

Task Name:

(Max. 32 Characters)

Selected Host Groups					
Port ID	Host Group Name	Host Mode	Port Security	Number of Hosts	
CL3-B	3B-G00 (00)	00[Standard]	Disabled...	0	

Detail

Total: 1

☐ Go to tasks window for status

Back

Next

Apply

Cancel

?

Selected Host Groups table

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.

Item	Description
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.
Detail	Details about the selected host group.

Delete Login WWNs window

Delete Login WWNs

1. Confirm

⚠ This wizard let you delete WWNs which have ever connected (Not connected now).
The connected HBA WWNs are not deleted by this action. Are you sure to continue?

Task Name: (Max. 32 Characters)

Port ID	HBA WWN	Host Name	Host Group Name
CL1-A	000010000000C948		

Total: 1

Go to tasks window for status Back Next Apply Cancel ?

Selected Login WWNs table

Item	Description
Port ID	Identifier of the port.
HBA WWN	WWN of the port.
Host Name	Name of the host.
Host Group Name	Name of the host group.

Delete UUIDs window

Delete UUIDs

1. Confirm

⚠ The UUID for selected LDEVs will be deleted. Are you sure to continue?

Task Name: (Max. 32 Characters)

LDEV ID	LDEV Name	UUID	Capacity
00:00:00	gadtest1		100.00 GB

Total: 1

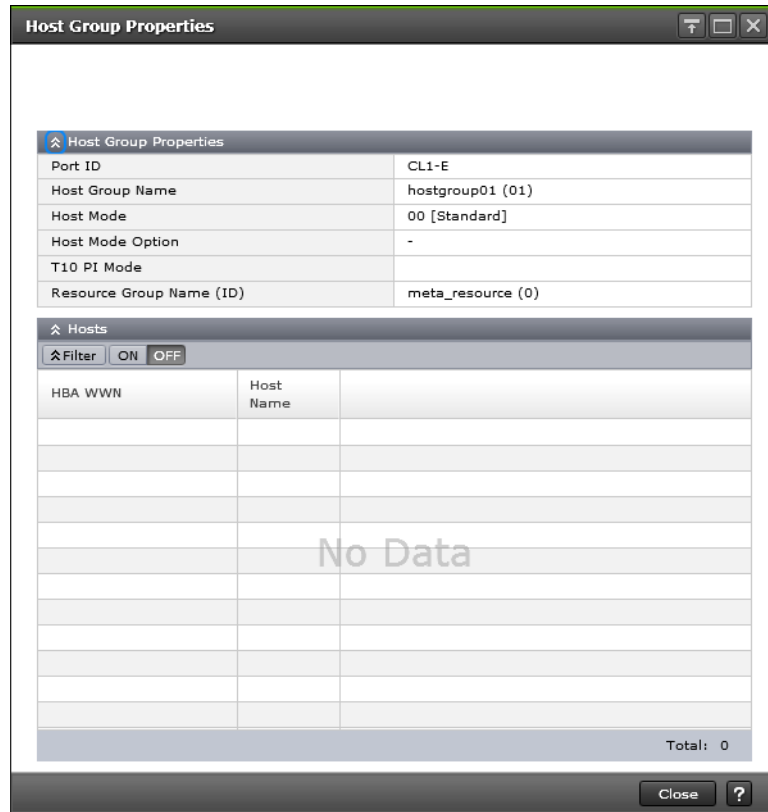
☐ Go to tasks window for status Back Next Apply Cancel ?

Selected LDEVs table

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.
UUID	This field is blank because the UUID is to be deleted.
Capacity	Size of each logical volume.

Host Group Properties window

Use this window to view properties about a selected host group.



Host Group Properties table

Item	Description
Port ID	Identifier of the port.
Host Group Name	Name of the host group.
Host Mode	The host mode of the host group.
Host Mode Option	The number of host mode options that are enabled.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.
Resource Group Name (ID)	Resource group names and IDs of host groups. The ID is provided in parentheses.

Hosts table

Item	Description
HBA WWN	WWN of the port.
Host Name	Name of the host.

LUN Properties window



The screenshot shows the 'LUN Properties' window with the following data:

LUN Properties		
LUN ID	2	
LDEV ID	00:03:1E	
LDEV Name	Basic	
Host Group Name / iSCSI Target Alias	1A-G00	
iSCSI Target Name	-	
Host Mode	00[Standard]	
Host Mode Option		
Port ID	CL1-A	
Type	Fibre	
Emulation Type	OPEN-V CVS	
Capacity	100.00 GB	
Provisioning Type	Basic	
LDEV Attribute	-	
Command	Security	-
Device	User Authentication	-
Attributes	Device Group Definition	-
Access Attribute	Read/Write	
Number of Paths	3	
UUID		
CLPR	0:CLPR0	
Encryption	Disabled	
Virtual	Model / Serial Number	VSP G400/G600 / 482001
Storage	LDEV ID	00:03:1E
Machine	Device Name	

LUN Properties table

This table provides information about the selected LUN.

Item	Description
LUN ID	Identifier of the selected logical unit.
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.
Host Group Name / iSCSI Target Alias	Name of the host group or iSCSI target.
iSCSI Target Name	Name of the iSCSI target.
Host Mode	The host mode of the host group.
Host Mode Option	The number of host mode options that are enabled.
Port ID	Identifier of the port on this volume.
Type	Type of the port. Fibre: Fibre channel port. iSCSI: iSCSI port.
Emulation Type	Emulation types for the logical volume (or logical device).

Item	Description
Capacity	Size of the logical volume.
Provisioning Type	Provisioning type assigned to this logical volume. Basic: Internal volume. External: External volume. DP: DP-VOL Snapshot: Thin Image volume.
LDEV Attribute	Displays the attribute of the LDEV. Command Device: Command device. Remote Command Device: Remote command device. Data Direct Mapping: LDEV of the data direct mapping attribute. Hyphen (-): Volume in which the attribute is not defined.
Command Device Attributes	If the logical volume is used as a command device, indicates the status of the attributes on this LDEV. - Security: Indicates the status of command device security is (enable or disable). - User Authentication: Indicates the status of user authentication (enable or disable). - Device Group Definition: Indicates the status of device group definition (enable or disable).
Access Attribute	Access attribute assigned to this LDEV. Read/Write: Both read and write operations are permitted on the logical volume. Read-only: Read operations are permitted on the logical volume. Protect: Neither read nor write operations are permitted.
Number of Paths	Number of paths set for the LDEV.
UUID	User-definable LUN identifier. This field is blank if the UUID is not set.
CLPR	Cache logical partition numbers. For detailed information about CLPRs, see the <i>Performance Guide for Hitachi Virtual Storage Platform Gx00 and Fx00 Models</i> .
Encryption	Displays the encryption information about the pool. - Enable: Encryption setting of a parity group or virtual volume associated with pool-VOLs containing LDEV is enabled. - Disable: Encryption setting of a parity group or virtual volume associated with pool-VOLs containing LDEV is disabled. - Mixed: In the pool, pool-VOLs whose encryption settings are enabled or disabled are intermixed in the pool in which the LDEV is placed.

Item	Description
	Caution: The data encryption is not ensured in the pool that has the Mixed encryption setting. To manage the data encryption securely, use the pool with an encryption setting of Enabled or Disabled. Hyphen(-): External volume. For DP-VOL of Dynamic Provisioning, either the pool-VOL in the pool that owns DP-VOL is an external volume or that pool is being blocked. This item is not displayed when using Virtual Storage Platform G200.
T10 PI	T10 PI attribute setting (Enabled or Disabled) on LDEV.
Data Direct Mapped LDEV	Displays LDEV ID of pool-VOL in the pool of the data direct mapping attribute. A hyphen (-) appears if the data direct mapping attribute is disabled.
Virtual Storage Machine	Information about the virtual storage machine. - Model / Serial Number: Model name and serial number of the virtual storage machine that has LDEV. - LDEV ID: Virtual LDEV ID. If a Virtual LDEV ID is not assigned to LDEV, this column is blank. - Device Name: Virtual device name, which is a combination of the virtual emulation type, virtual LUSE volume number, and the virtual CVS attribute. Values of the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute appear only for items that have been set. This column is blank when the virtual emulation type, virtual LUSE volume number, and virtual CVS attribute are not set. If the virtual CVS attribute is set, CVS is attached as the suffix to the device name. - SSID: Virtual SSID. If Virtual SSID is not set for LDEV, this column is blank. - Attribute: Virtual LDEV attribute. If the attribute is not set for LDEV, this column is blank.

LUNs table

This table provides information about the LUN ID registered for the selected LDEV.

Item	Description
Port ID	Identifier of the port.
Type	Type of the port. Fibre: Fibre channel port. iSCSI: iSCSI port.
Host Group Name / iSCSI Target Alias	Name of the host group or iSCSI target.

Item	Description
iSCSI Target Name	Name of the iSCSI target.
LUN ID	Identifier of the logical unit.

Hosts table

Lists the hosts that belong to the host group in which the selected LUN ID is registered.

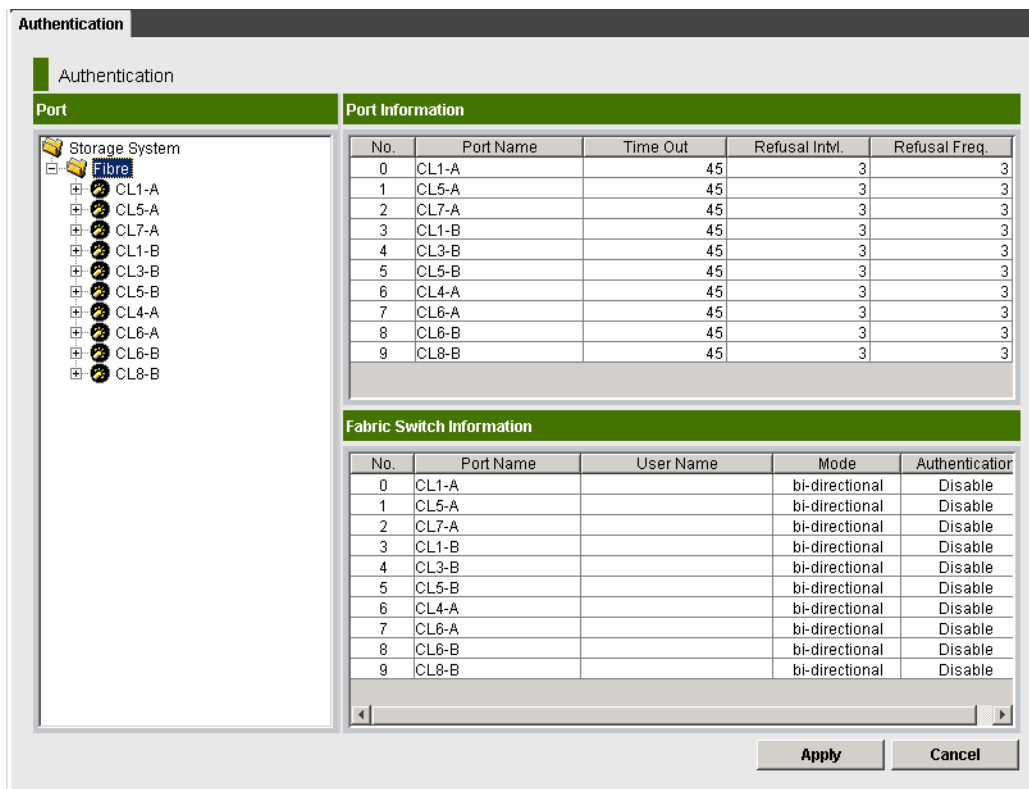
Item	Description
Type	Type of the port. Fibre: Fibre channel port. iSCSI: iSCSI port.
HBA WWN / iSCSI Name	WWN of HBA or iSCSI name.
Host Name	Name of the host.

Authentication window

Authentication window (fibre folder selected)

To display the Authentication window, the Hitachi Device Manager - Storage Navigator secondary window must be usable in advance. If the user authentication settings are performed, you must set the modify mode in the secondary window. The modify mode is a exclusive access control for operations of secondary windows. If you set the modify mode to ON, other users or programs cannot apply settings to a storage system. If you close the secondary window, the modify mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and modify mode, see the *System Administrator Guide*.

On the menu bar, click **Actions, Ports/Host Groups, Fibre**, then **Authentication**. The **Authentication** secondary window opens.



Port tree

The Port tree provides information about user authentication on each port.

Double-click the **Fibre** folder to show the fibre channel ports in the storage system.

If you select the **Fibre** folder, information about ports and fabric switches appears in the table on the right of the tree. The **Fibre** folder is available only if the storage system contains a fibre channel board.

Item	Description
 CLX-Y	This icon indicates a fibre channel port.

Port information list

Item	Description
Port Name	Fibre channel port names.
Time out	The period of time between authentication sessions to a same port. If the previous authentication session to a port failed, the next authentication session starts after the specified period of time elapses. The unit is seconds.
Refusal Intvl.	If authentication fails for the number of times specified in Refusal Freq., connection to the port fails. Refusal Intvl. shows the

Item	Description
	interval (in minutes) from when connection to a port fails to when the next authentication session starts.
Refusal Freq.	Number of times that authentication is allowed for connection to a port. If authentication fails for the specified number of times, connection to the port fails.

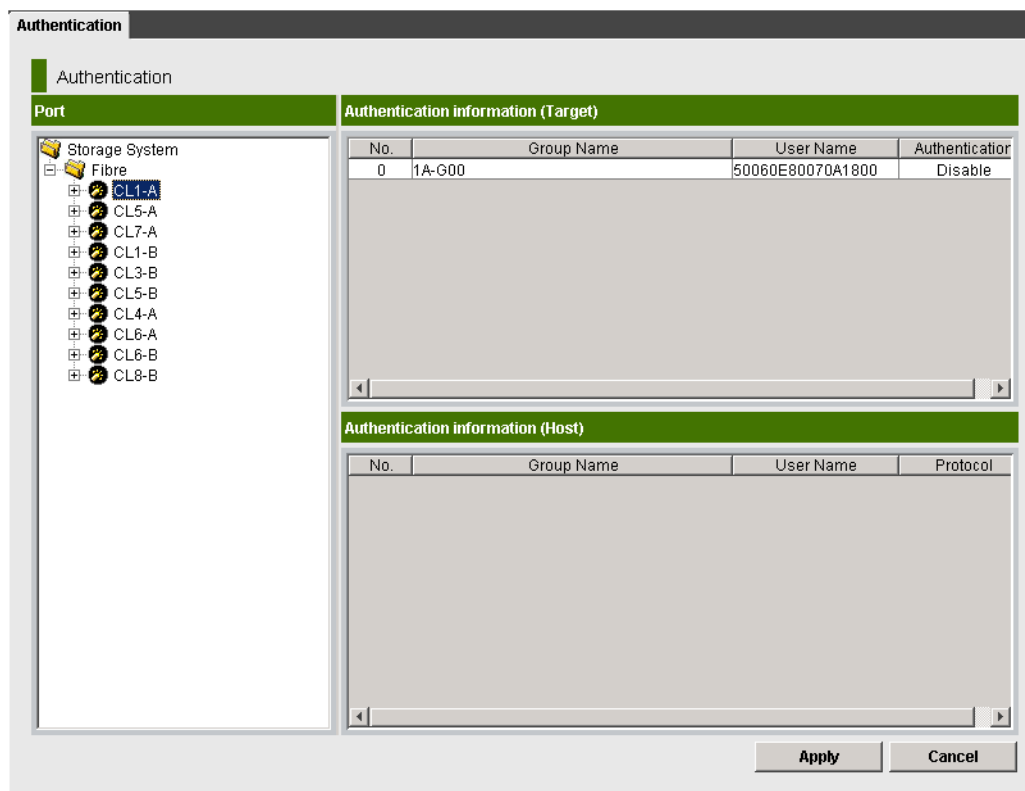
Fabric Switch information list

Item	Description
Port Name	Fibre channel port name.
User Name	User name of the fabric switch.
Mode	Mode of authentication between ports and fabric switches. - bidirectional: The authentication mode is mutual. - unidirectional: The authentication mode is not mutual.
Authentication	Indicates whether to perform authentication for the fabric switch. - Enable: The fabric switch is a target of user authentication. - Disable: The fabric switch is not a target of user authentication.

Authentication window (fibre channel port selected)

Hitachi Device Manager - Storage Navigator secondary windows must be defined for use in advance. When you select **Modify** from this window to make user authentication settings, other users or programs are prevented from changing storage system settings. When you close the secondary window, **Modify** mode is released. For more information on Hitachi Device Manager - Storage Navigator secondary windows and **Modify** mode, see the *System Administrator Guide*.

On the menu bar, click **Actions, Ports/Host Groups, Fibre**, then **Authentication**. The **Authentication** secondary window opens.



Port tree

Use this tree to find information about user authentication on each port. When you select a port from this tree, the Authentication Information (Target) list on the right provides user information of the hosts that are registered on the port. In addition, the Authentication Information (Host) list below the Authentication Information (Target) list provides the user information of the selected port.

Double-click the **Fibre** folder to view all fibre channel ports in the storage system. The **Fibre** folder is available only if the storage system contains a fibre channel board. Double-click the fibre channel ports to view host groups in that port. The host group name appears beside the icon.

Item	Description
 CLX-Y	Indicates a fibre channel port.
 host group name	Indicates that the host group performs authentication of hosts.
 host group name	Indicates that the host group does not perform authentication of hosts.

Authentication information (target) list

The list on the right provides user information of the host groups that are allowed to connect to the port or host group specified in the tree.

Item	Description
Group Name	Names of the host group.
User Name	User name of the host group. When the user name is not defined for a host group, this column is blank.
Authentication	Indicates whether to perform user authentication for the host. - Enable: The host is a target of user authentication. - Disable: The host is not a target of user authentication.

Authentication information (host) list

Below the User Information (Target) list appears a list that provides user information of the host selected in the port or host group in the tree. In this list, you can register up to 64 user information items.

Item	Description
Group Name	Name of the host group.
User Name	User name of the host. When the user name is not defined for a host, this column is blank.
Protocol	Indicates the protocol in use for user authentication. Always CHAP.

Add New User Information (Host) window

Item	Description
Group Name	Select the group name where the user is registered.
User Name	Specify the user name of the host. Up to 16 hexadecimal characters can be used. A user name is not case-sensitive.
Secret	Specify the secret to be used for host authentication. Use 12 to 32 characters, including alphanumeric, spaces, and the following symbols: . - + @ _ = : / [] , ~
Re-enter Secret	Specify the secret again for confirmation. An error occurs if you enter incorrect characters, then click OK .

Item	Description
Protocol	Protocol to be used for user authentication. This protocol is always CHAP (Challenge-Handshake Authentication Protocol).

Change User Information (Host) window

Item	Description
Group Name	Group name where the user is registered.
User Name	Specify the user name of the host. Up to 16 hexadecimal characters can be used. A user name is not case-sensitive.
Secret	Specify the secret to be used for host authentication. Use 12 to 32 characters, including alphanumerics, spaces, and the following symbols: . - + @ _ = : / [] , ~
Re-enter Secret	Specify the secret again for confirmation. An error occurs if you enter incorrect characters, then click OK .
Protocol	Protocol to be used for user authentication. This protocol is always CHAP (Challenge-Handshake Authentication Protocol).

Clear Authentication information window

No.	Group Name	User Name
0	1A-G00	50060E80070A1800

Item	Description
No	Item number.
Group Name	Group name to be deleted.
User Name	The name of the user to be deleted.

Specify Authentication Information window

When selecting a port

When selecting a host group

Item	Description
Port Name	Port name where the authentication information is specified in the window that opens when you select a port.
Group Name	Group name where the authentication information is specified in the window that opens when you select a host group.
User Name	Specify the user name of the host. Up to 16 hexadecimal characters can be used. A user name is not case-sensitive.
Secret	Specify the secret to be used for host authentication. Use 12 to 32 characters, including alphanumerics, spaces, and the following symbols: . - + @ _ = : / [] , ~

Item	Description
Re-enter Secret	Specify the secret again for confirmation. An error occurs if you enter incorrect characters, then click OK .

Set Port Information

Set Port Information

Time Out	45	sec	(15-60)
Refusal Interval	3	minutes	(1-60)
Refusal Frequency	3	times	(1-10)

OK

Cancel

Item	Description
Time out	Specify the period of time from when authentication fails to when the next authentication session is ended. This period of time is between 15 to 60 seconds. The initial value is 45.
Refusal Interval	Specify the interval from when connection to a port fails to when the next authentication session starts, with up to 60 minutes. The initial value is 3.
Refusal Frequency	Specify the number of times of authentication allowable for connection to a port with up to 10 times. The initial value is 3.

Default Setting(User Name/Secret) window

Default Setting(User Name/Secret)

Port Name	CL3-A		
User Name	50060E80070A5020	(In disable, it may not input.)	
Secret	*****	(12-32 characters) (In disable, it may not input.)	
Re-enter Secret	*****		

OK

Cancel

Item	Description
Port Name	Fibre channel port names.
User Name	Specify the user name of the fibre channel switch with up to 16 characters. You can use hexadecimal characters in a user name. A user name is not case-sensitive.
Secret	Specify the secret (that is, a password used in CHAP authentication) between 12 to 32 characters. You can use alphanumeric characters, spaces, and the following symbols in a secret:

Item	Description
	. - + @ _ = : / [] , ~
Re-enter Secret	Specify the secret, again, for confirmation.

Edit Command Devices wizard

The System Administrator can enter CCI commands from open-system hosts to perform such as TrueCopy or ShadowImage operations or both on logical devices. For example, CCI commands can be used to create and split pairs. To allow the System Administrator to enter CCI commands from open-system hosts, you must specify at least one logical device as the command device. If desired, you must also apply command device security to other logical devices in the storage system.

Use **Edit Command Devices** window to edit command devices.

To open the Edit Command Devices window:

1. Select LDEVs in one of the following ways.
 - In the **Storage Systems** tree on the left pane of the main window, click **Logical Devices** and select the **LDEVs** tab.
 - In the **Storage Systems** tree on the left pane of the main window, expand the **Ports / Host Groups / iSCSI Targets** node. Select each port and each host group. Select the **LUNs** tab.
2. On the menu bar, click **Actions, Logical Device**, then **Edit Command Devices**. Or, click **Edit Command Devices**. The **Edit Command Devices** window opens.



Caution: The following volumes cannot be specified as a command device:

- Volume whose access attribute is other than read/write
- TrueCopy pair volume
- The global-active device pair volume
- ShadowImage pair volume
- Universal Replicator pair volume
- Virtual volume (V-VOL) for Thin Image
- Volume reserved by Data Retention Utility
- Journal volume
- Pool volume
- Remote command device
- LDEV of the ALU attribute.
- Quorum disk for global-active device.

Edit Command Devices window

To enable command device security, user authentication, and device group definition, you must enable the command device in this window.

If the command device is disabled, you cannot enable command device security, user authentication, and device group definition.

Edit Command Devices

1.Edit Command Devices > 2.Confirm

This wizard lets you edit one or more properties. Select the new value and click Finish to confirm.

Command Device : ☐ Enable ☒ Disable

Command Device Attributes :

Command Device Security : ☐ Enable ☐ Disable

User Authentication : ☐ Enable ☐ Disable

Device Group Definition : ☐ Enable ☐ Disable

BackNextFinishCancel?

Item	Description
Command Device	Select Enable to enable command devices. Select Disable to release command devices.
Command Device Security	Select Enable to apply command device security to a logical device in a storage system. Select Disable to release command device security. To protect logical volumes from the use of CCI commands, you must apply command device security to the logical volumes. If command device security is applied to a logical device, the logical device will not be affected by CCI commands issued via command devices from the hosts.*
User Authentication	Select Enable to apply user authentication to a command device. Select Disable to release user authentication.*
Device Group Definition	Select Enable to apply device group definition to a command device. Select Disable to release device group definition.*
* For details about a command device attribute settings, see the <i>Command Control Interface User and Reference Guide</i> .	

Edit Command Devices confirmation window

Confirm proposed settings, name the task, then click **Apply**. The task is added to the execution queue.

Edit Command Devices

1.Edit Command Devices > 2.Confirm

Enter a name for the task. Confirm the settings and click Apply to add task in Tasks queue for execution.

Task Name: 150707-EditCommandDevices
(Max. 32 Characters)

LDEV ID	LDEV Name	Parity Group ID	Capacity	Provisioning Type	Command Device	Command Dev Security
00:00:10		1-1	16.00 GB	Basic	Enabled	Disabled

Total: 1

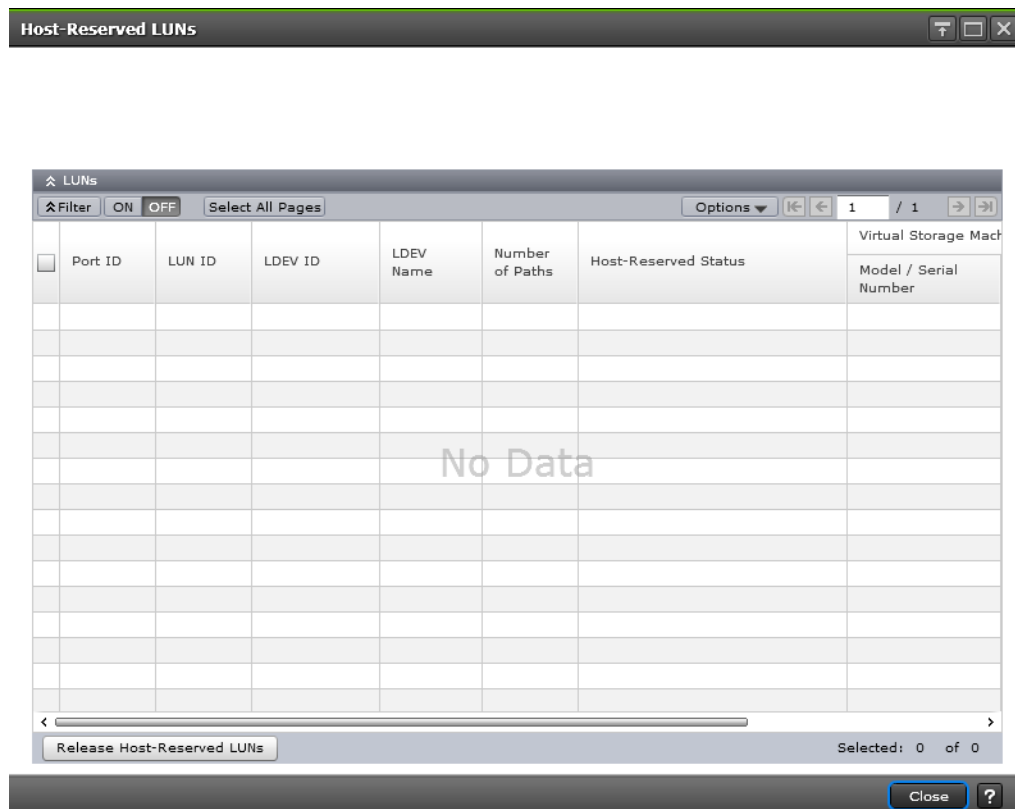
☐ Go to tasks window for status
Back
Next
Apply
Cancel
?

Selected LDEVs table

Item	Description
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Name of the LDEV.
Parity Group ID	Identifier of the parity group.
Capacity	Size of each logical volume.
Provisioning Type	Provisioning types for each logical volume. Basic: Internal volume. External: External volume. DP: DP-VOL Snapshot: Thin Image volume.
Command Device	Indicates whether the selected logical device is a command device. Enabled: The command devices are enabled. Disabled: The logical device is not a command device.
Command Device Security	Indicates whether command device security is applied to the selected command device. Enabled: Command device security is applied to the command device. Disabled: Command device security is not applied to the command device.
User Authentication	Indicates whether user authentication is applied to the selected command device. Enabled: User authentication is applied to the command device.

Item	Description
	Disabled: User authentication is not applied to the command device.
Device Group Definition	Indicates whether the device group definition is applied to the selected command device. Enabled: Device group definition is applied to the command device. Disabled: Device group definition is not applied to the command device.

Host-Reserved LUNs window



LUNs table

LUNs reserved by hosts are displayed.

Item	Description
Port ID	Displays names of ports.
LUN ID	Displays IDs of the LUNs.
LDEV ID	LDEV identifier, which is the combination of LDKC, CU, and LDEV.
LDEV Name	Displays names of LDEVs.

Selected LUNs table

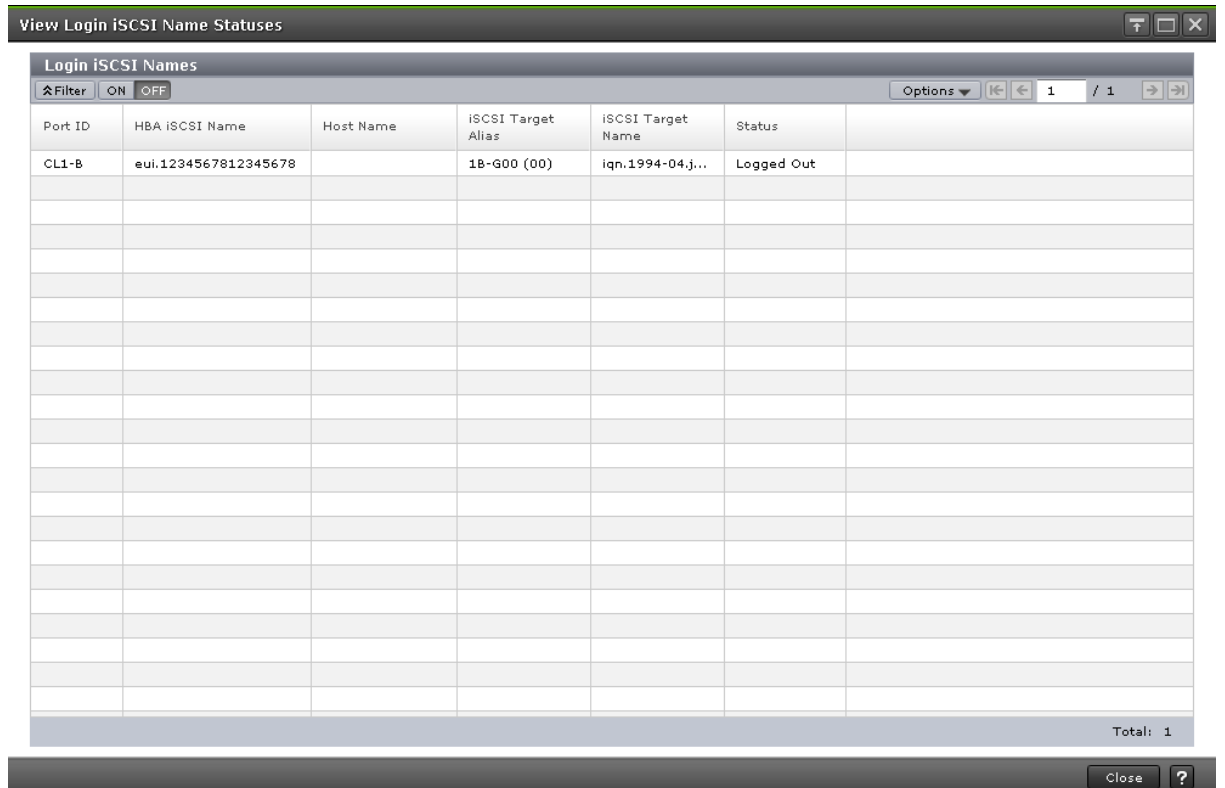
View Login WWN Statuses window

[illegible]

Login WWNs table

Item	Description
Port ID	Displays names of ports.
HBA WWN	Displays the HBA WWNs and their icons.
Host Name	Displays the names of hosts.
Host Group Name	Displays the names of host groups.
Status	Displays the host login status (Logged In or Logged Out).

View Login iSCSI Name Statuses window



Login iSCSI Names table

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	HBA iSCSI name.
Host Name	Host name.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.

Item	Description
Status	Status of the login from the host. Logged In or Logged Out appears.

Port Properties window

Port Properties

Port ID		CL1-B
Type		iSCSI
IPv4	IP Address	192.168.0.104
	Subnet Mask	255.255.255.0
	Default Gateway	0.0.0.0
IPv6	Mode	Enabled
	Link Local Address	fe80:0:0:0:1111:2222:3333:4444
	Link Local Address Status	Disabled
	Global Address	Auto (0:0:0:0:1111:2222:3333:4444)
	Global Address Status	Disabled
	Subnet Prefix	0
	Assigned Default Gateway	0:0:0:0:0:0:0:0
	Current Default Gateway	0:0:0:0:0:0:0:0
	Default Gateway Status	Disabled
Speed		10 Gbps
Security		Disabled
TCP Port Number		3260
Ethernet MTU Size	MTU	1500 Bytes
	Linked MTU	1500 Bytes
MAC Address		00:00:87:93:51:59
Keep Alive Timer		60 Second(s)
Selective ACK		Enabled
Delayed ACK		Enabled
Maximum Window Size		64 KB
iSNS Server	Mode	Enabled
	IP Address	1:2:3:4:5:6:7:8
	TCP Port Number	65535
VLAN	Tagging Mode	Disabled
	ID	-

Close

Port Properties table

Item	Description
Port ID	Identifier of the port.
Type	Type of the port. iSCSI: iSCSI port.
IPv4	Information about IPv4. - IP Address: Specify an IP address. If 2 or more ports are selected, this information cannot be specified. - Subnet Mask: Specify a subnet mask. - Default Gateway: Specify a default gateway.

Item	Description
IPv6	Information about IPv6. • Mode: IPv6 setting (Enabled or Disabled) for the port. • Link Local Address: Link local address for the port. • Link Local Address Status: Link local address status for the port. • Global Address: Global address for the port. • Global Address Status: Global address status for the port. • Subnet Prefix: Subnet prefix for the port address. • Assigned Default Gateway: Assigned default gateway address for the port. • Current Default Gateway: Current default gateway address for the port. • Default Gateway Status: Default gateway status.
Speed	Data transfer speed for the selected port.
Security	LUN security setting (Enabled or Disabled) on the port.
TCP Port Number	TCP port number.
Ethernet MTU Size	MTU size on Ethernet. • MTU: Specified MTU size. • Linked MTU: Present MTU size for the data transfer.
MAC Address	MAC address.
Keep Alive Timer	Keep alive timer setting.
Selective ACK	Selective ACK setting (Enabled or Disabled) of the port.
Delayed ACK	Delayed ACK setting (Enabled or Disabled) of the port.
Maximum Window Size	Maximum window size setting.
iSNS Server	Information about the iSNS server. • Mode: iSNS server setting (Enabled or Disabled). • IP Address: IP address of the iSNS server. • TCP Port Number: TCP port number of the iSNS server.
VLAN	Information about VLAN. • Tagging Mode: Tagging mode setting (Enabled or Disabled) for the port. • ID: VLAN identifier.

CHAP User Properties window

[illegible]

CHAP User Properties table

Item	Description
User Name	User name.
Port ID	Identifier of the port.
Number of iSCSI Targets	Number of iSCSI targets.

iSCSI Targets table

Item	Description
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Authentication	Information about the authentication. Method: Authentication method that is CHAP, None, or Comply with Host Setting

iSCSI Targets table

Item	Description
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Host Mode	Host mode of the host group.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the host group.

Create iSCSI Targets wizard

Create iSCSI Targets window

Setting field

Item	Description
iSCSI Target Alias	- Use Default Name: If this check box is selected, the iSCSI target alias is input by default. - Text box: Specify the iSCSI target alias. If Use Default Name is selected, the default value appears with the following format: <i>Port-ID-GiSCSI-target-ID</i>

Item	Description
	For instance, 1A-G00 appears. If Use Default Name is not selected, the blank field appears. You can enter up to 32 ASCII characters and symbols, except: \ / , ; * ? " < > .
iSCSI Target Name	- iqn or eui: Select the format which you want to use. - Use Default Name: If this check box is selected, the iSCSI target name is input by default. - Text box: Specify the iSCSI target name. If Use Default Name is selected, the default value appears with the following format: For the iqn format: iqn. 1994-04.jp.co.hitachi:rsd.<i>Model-name</i>.t.<i>Serial-number</i>.<i>Port-identifier</i><i>iSCSI-target-identifier</i> For instance, iqn.1994-04.jp.co.hitachi:rsd.h8s.t.62507.1a000 appears. For the eui format: eui.(6-digits-of-OUI)(Fixed-value-given-to-each-storage)(Serial-number)(Port-name)(iSCSI-target-identifier) For instance,eui.02004567A425678D appears. If Use Default Name is not selected, the default value for the iqn format is as follows: For the iqn format: iqn. 1994-04.jp.co.hitachi:rsd.<i>Model-name</i>.t.<i>Serial-number</i>.<i>Port-identifier</i><i>iSCSI-target-identifier</i> You can enter up to 219 ASCII characters and symbols, except: \ / , ; * ? " < > . If Use Default Name is not selected, the default value for the eui format is blank. You can enter fixed to 16 alphanumeric characters that are case-sensitive.
Resource Group Name (ID)	Select the resource group in which the iSCSI target is created. If Any is selected, among all ports being allocated to the user, ports where the host group can be add are available in the Available Ports table. If other than Any is selected, among ports assigned to the selected resource group, ports where the host group can be add are available in the Available Ports table.
Host Mode	Select the host mode from the list.

Host Mode Options table

Item	Description
Mode No.	The ID number of the host mode option.
Option Description	The description of host mode option.
Status	The setting status (Enabled or Disabled) of the host mode option.

Item	Description
Enabled	Indicates that the host mode option is enabled.
Disabled	Indicates that the host mode option is disabled.

Available Hosts table

This table lists information about the registered hosts.

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	iSCSI name of the port.
Host Name	Name of the host.
Number of iSCSI Target	Number of the iSCSI targets.
New Host	Indicates whether the host is newly connected. - Yes: The host is newly added and has never been connected via a cable to any port in the storage system. - No: The host has been connected via a cable to another port.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Add New Host	Adds a new host. Or, select host bus adapters then click to assign a nickname to the host bus adapter.

Available Ports table

This table lists the registered ports.

Item	Description
Port ID	Identifier of the port.
Security	LUN security setting (Enabled or Disabled) on the port.

Authentication Method

Select the CHAP Authentication setting from Enable, Disable, or Use Host Setting.

CHAP Authentication Options

Item	Description
Mutual CHAP	Select the mutual authentication mode to Enable or Disable. If Disable is selected, the unidirectional authentication mode is performed.

Item	Description
User Name	Specify the user name. If Disable is selected in the Mutual CHAP, this item is optionally specified. If Mutual is selected, this item must be specified. Specify the user name between 1 to 223 characters. You can use case-sensitive alphanumeric characters, spaces, and the following symbols: . - + @ _ = : [] , ~
Secret	Specify the secret which is used for host authentication. If Disable is selected in the Mutual CHAP, this item is optionally specified. If Mutual is selected, this item must be specified. Specify the secret (that is, a password used in CHAP authentication) between 12 to 32 characters. You can use alphanumeric characters, spaces, and the following symbols in a secret: . - + @ _ = : [] ~
Re-enter Secret	Specify the secret again for confirmation. If incorrect, an error message appears when clicking Add.

Available CHAP Users table

Item	Description
Port ID	Identifier of the port.
User Name	Name of the user.
User Seq. No.	User sequence identifier.
Number of iSCSI Target	Number of the iSCSI targets.
New CHAP User	Indicates whether the CHAP user is newly added or not. Yes: New CHAP user added by using of the Add New CHAP User window. No: Existing CHAP user.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Add New CHAP User	Click this button to add the new CHAP user. If the new CHAP user is added, Port ID is blank.

Add button

Adds the settings to the Selected iSCSI Targets table.

Selected iSCSI Targets table

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.

Item	Description
Host Mode	The host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the iSCSI target.
Authentication	Information about the authentication. • Method: Authentication method that is CHAP, None, or Comply with Host Setting • Mutual CHAP: Mutual CHAP setting that is Enabled or Disabled • User Name • Number of Users
Resource Group Name (ID)	Resource group name and identifier of the resource group containing the iSCSI target.
Virtual Storage Machine	Model name and serial number of the virtual storage machine.
Detail	Details about the selected iSCSI target.
Remove	Removes the selected iSCSI targets from this table.

Next Task Option

Click **Next** to go to the task setting window, which is indicated in **Next Task Option**.

Create iSCSI Targets confirmation window



Note: If multiple tasks that are connected in one wizard are executed, this window shows all configured items of tasks. To show information of configured items other than this topic, click **Back** to display related setting windows, then click **Help**.

Selected iSCSI Targets table

LUN Manager GUI reference

Item	Description
Detail	Details about the selected iSCSI target.

Edit iSCSI Targets wizard

Edit iSCSI Targets window

Edit iSCSI Targets

1.Edit iSCSI Targets > 2.Confirm

This wizard lets you edit one or more properties. Check the box in front of the property you want to edit, and then enter a new value. If you change the Host Mode, all of the Host Mode Options will be set to default.

☐ iSCSI Target Alias: 1B-G00
(Max. 32 characters)

☐ iSCSI Target Name: ☐ iqn ☒ eui
eui: 1234567890123456
(16 characters)

☐ Host Mode: 01 [VMware]

Host Mode Options:

Mode No.	Option Description	Status
☐ 2	VERITAS Database Edition/Advanced Cluster	Enable
☐ 6	TPRLO	Enable
☐ 7	Automatic recognition function of LUN	Enable
☐ 12	No display for ghost LUN	Enable
☐ 13	SIM report at link failure	Enable
☐ 14	UD To Cluster with Time-Dependent function	Enable

Enable Disable Selected: 0 of 30

☐ Authentication Method: None

☐ Mutual CHAP: ☒ Enable ☐ Disable

☐ User Name:
(Max. 223 characters)

☐ Secret:
(12 - 32 characters)

Re-enter Secret:

Back Next Finish Cancel ?

Item	Description
iSCSI Target Alias	Specify the iSCSI target alias.
iSCSI Target Name	- iqn or eui: Select the format which you want to use. - Text box: Specify the iSCSI target name. For the iqn format: iqn. 1994-04.jp.co.hitachi:rsd.Model-name.t.Serial-number.Port-identifieriSCSI-target-identifier For instance, iqn.1994-04.jp.co.hitachi:rsd.h8s.t.62507.1a000 appears.

Item	Description
	You can enter up to 219 ASCII characters and symbols, except: \ / , ; * ? " < > . For the eui format: eui.(6-digits-of-OUI)(Fixed-value-given-to-each-storage)(Serial-number)(Port-name)(iSCSI-target-identifier) For instance,eui.02004567A425678D appears. You can enter fixed to 16 alphanumeric characters that are case-sensitive.
Host Mode	Select the host mode from the list.

Host Mode Options table

To set the host mode option, select a host mode option, then click **Enable**. If you do not need a host mode option, select an unnecessary host mode option, then click **Disable**.

Item	Description
Mode No.	Number identifier of the host mode option.
Option Description	Description of the host mode option.
Status	Indicates the current status setting (Enabled or Disabled) of the host mode option on this host group.
Enable	Enables the host mode option.
Disable	Disables the host mode option.

Item	Description
Authentication Method	Select the authentication setting from CHAP, None or Comply with Host Setting. If CHAP is selected, following items can be specified.
Mutual CHAP	Select Enable or Disable. If Enable is selected, the mutual authentication mode is performed. If Disable is selected, the unidirectional authentication mode is performed.
User Name	Specify the user name between 1 to 223 characters. You can use case-sensitive alphanumeric characters, spaces, and the following symbols: . - + @ _ = : [] , ~
Secret	Specify the secret (that is, a password used in CHAP authentication) between 12 to 32 characters. You can use alphanumeric characters, spaces, and the following symbols in a secret: . - + @ _ = : [] ~
Re-enter Secret	Specify the secret again for confirmation. If incorrect, an error message appears when clicking Finish.

Edit iSCSI Targets confirmation window



Note: If multiple tasks that are connected in one wizard are executed, this window shows all configured items of tasks. To show information of configured items other than this topic, click **Back** to display related setting windows, then click **Help**.

[illegible]

Selected iSCSI Targets table

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Host Mode	The host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the iSCSI target.
Authentication	Information about the authentication. • Method: Authentication method that is CHAP, None, or Comply with Host Setting • Mutual CHAP: Mutual CHAP setting that is Enabled or Disabled • User Name • Secret: If the secret is specified, the character string of six asterisks (*) appears.

Item	Description
	Number of Users
Detail	Details about the selected iSCSI target.

Add CHAP Users wizard when selected iSCSI target

Add CHAP Users window

Add CHAP Users

1.Add CHAP Users > 2.Confirm

This wizard allows you to add CHAP users to the selected iSCSI targets. Select CHAP users from the Available CHAP Users list, or click Add New CHAP User to add new CHAP user to the list, and then click Add. Click Finish to confirm.

CHAP Users:

Available CHAP Users

Port ID	User Name	User Seq. No.	Number of iSCSI Targets	New CHAP User
CL1-A	ChapTest36	(0)	1	No
CL1-A	ChapUser...	(1)	1	No

Add

Remove

Selected CHAP Users

Port ID	User Name	User Seq. No.	Number of iSCSI Targets
No Data			

Add New CHAP User

Selected: 0 of 2

Selected: 0 of 0

Back Next Finish Cancel ?

Available CHAP Users table

This window lists CHAP users that can be registered to the selected iSCSI target.

Item	Description
Port ID	Identifier of the port.
User Name	Name of the user.
User Seq. No.	User sequence identifier.
Number of iSCSI Target	Number of the iSCSI targets.
New CHAP User	Indicates whether the CHAP user is newly added or not. Yes: New CHAP user added by using of the Add New CHAP User window.

Item	Description
	No: Existing CHAP user.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Add New CHAP User	Click this button to add the new CHAP user. If the new CHAP user is added, Port ID is blank.
Add	Adds CHAP users selected from the Available LDEVs table to the Selected LDEVs table.
Remove	Removes logical volumes from the Selected LDEVs table.

Selected CHAP Users table

This table lists CHAP users that are selected from the Available CHAP Users table.

Item	Description
Port ID	Identifier of the port.
User Name	Name of the user.
User Seq. No.	User sequence identifier.
Number of iSCSI Target	Number of the iSCSI targets.
New CHAP User	Indicates whether the CHAP user is newly added or not. Yes: New CHAP user added by using of the Add New CHAP User window. No: Existing CHAP user.

Add CHAP Users confirmation window

[illegible]

Add CHAP Users table

This table lists added CHAP users.

Item	Description
Port ID	Identifier of the port.
User Name	Name of the user.
Secret	If the secret is specified, the character string of six asterisks (*) appears.
iSCSI Target Alias	iSCSI target alias.
iSCSI Target Name	iSCSI target name.
Host Mode	The host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the iSCSI target.
Authentication	Information about the authentication. Method: Authentication method that is CHAP, None, or Comply with Host Setting

Item	Description
	Mutual CHAP: Mutual CHAP setting that is Enabled or Disabled

Edit CHAP User wizard

Edit CHAP User window

Edit CHAP User

1.Edit CHAP User > 2.Confirm

This wizard lets you edit one or more properties. Check the box in front of the property you want to edit, and then enter a new value.

Port ID: CL1-A

☒ User Name: ChapTest36
(Max. 223 characters)

☐ Secret:
(12 - 32 characters)

Re-enter Secret:

◀ Back Next ▶ Finish Cancel ?

Item	Description
User Name	Specify the user name between 1 to 223 characters. You can use case-sensitive alphanumeric characters, spaces, and the following symbols: . - + @ _ = : [] , ~
Secret	Specify the secret to be used for host authentication. Use characters, including alphanumerics, spaces, and the following symbols: . - + @ _ = : / [] ~
Re-enter Secret	Specify the secret again for confirmation. If incorrect, an error message appears when clicking Finish.

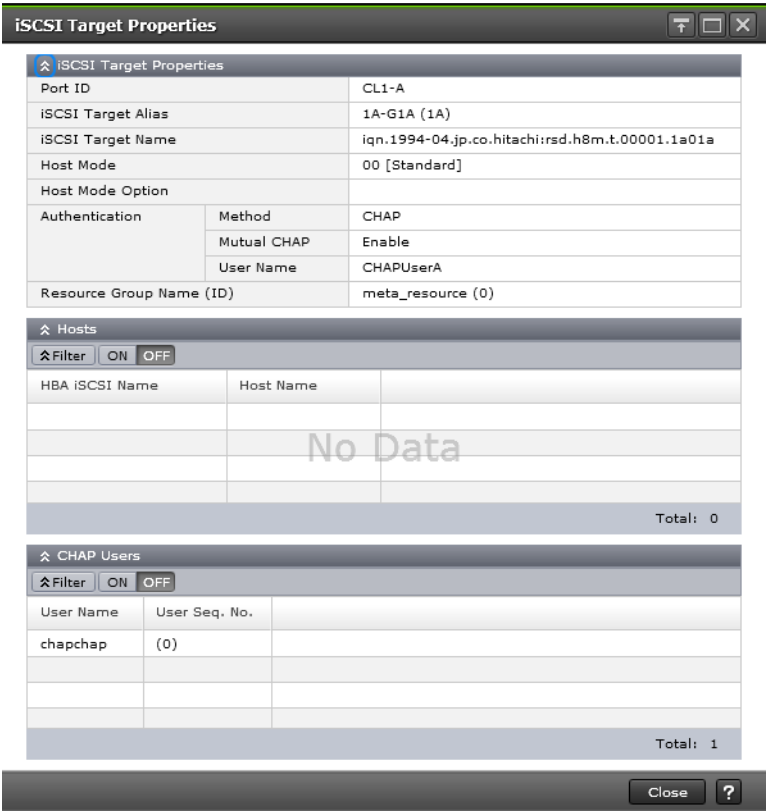
Edit CHAP User confirmation window

[illegible]

Selected CHAP User table

Item	Description
Port ID	Identifier of the port.
User Name	User name.
Secret	If the secret is specified, the character string of six asterisks (*) appears.
Number of iSCSI Targets	Number of iSCSI targets.
Detail	Details about the selected the CHAP user.

iSCSI Target Properties window



iSCSI Target Properties table

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias and identifier.
iSCSI Target Name	iSCSI target name.
Host Mode	The host mode of the iSCSI target.
Host Mode Option	The number of host mode options that are enabled.
Authentication	Information about the authentication. - Method: Authentication method that is CHAP, None, or Comply with Host Setting - Mutual CHAP: Mutual CHAP setting that is Enabled or Disabled - User Name
Resource Group Name (ID)	Resource group name and identifier of the resource group containing the iSCSI target.

Hosts table

Item	Description
HBA iSCSI Name	HBA iSCSI name.
Host Name	Host name.

CHAP Users table

Item	Description
User Name	Name of the user.
User Seq. No.	User sequence identifier.

Add New CHAP User window

Add New CHAP User

This dialog lets you add a CHAP user.

User Name: (Max. 223 characters)

Secret: (12 - 32 characters)

Re-enter Secret:

OK Cancel ?

Setting field

Item	Description
User Name	Specify the user name between 1 to 223 characters. You can use case-sensitive alphanumeric characters, spaces, and the following symbols: . - + @ _ = : [] , ~
Secret	Specify the secret to be used for host authentication. Use characters, including alphanumeric, spaces, and the following symbols: . - + @ _ = : / [] ~
Re-enter Secret	Specify the secret again for confirmation. If incorrect, the error message appears when clicking OK.

Delete iSCSI Targets window

Delete iSCSI Targets

1.Confirm

The selected iSCSI targets will be deleted. Are you sure you want to continue?

Task Name:

140912-DeleteiSCSITargets

(Max. 32 Characters)

Selected iSCSI Targets

	Port ID	iSCSI Target Alias	iSCSI Target Name	Host Mode	Port Security	Number of Hosts	
☒	CL1-A	1A-G00 (00)	iqn.1994-04.j...	00 [Standard]	Disabled...	0	
☐							
☐							
☐							
☐							
☐							
☐							
☐							
☐							
☐							

Detail

Total: 1

☐ Go to tasks window for status

Back

Next

Apply

Cancel

?

Selected iSCSI Targets table

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias name and identifier.
iSCSI Target Name	iSCSI target name.
Host Mode	The host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the iSCSI target.
Detail	Details about the selected iSCSI target.

Delete Login iSCSI Names window

Delete Login iSCSI Names

1. Confirm

This wizard let you delete iSCSI Names that are not connected.
The connected HBA iSCSI Names are not deleted by this action. Are you sure you want to continue?

Task Name:

140909-DeleteLoginiSCSINames

(Max. 32 Characters)

Selected Login iSCSI Names

Port ID	HBA iSCSI Name	Host Name	Number of iSCSI Targets	
CL1-B	eui.1234567812345678		0	

Total: 1

☒ Go to tasks window for status

Back

Next

Apply

Cancel

?

Selected Login iSCSI Names table

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	HBA iSCSI Names and their icons.
Host Name	Name of hosts.
Number of iSCSI Targets	Number of iSCSI Targets

Remove CHAP Users window

Remove CHAP Users

1. Confirm

The selected CHAP users will be deleted from the iSCSI targets,
and then will not be able to access via the host. Are you sure you want to continue?

Task Name:

141105-RemoveCHAPUsers

(Max. 32 Characters)

Selected CHAP Users

Port ID	User Name	iSCSI Target Alias	iSCSI Target Name	Authentication Method	
CL3-A	chapchap	3A-G19 (19)	iqn.1994-04.j...	CHAP	

Total: 1

☐ Go to tasks window for status

Back

Next

Apply

Cancel

?

Selected CHAP Users table

Item	Description
Port ID	Identifier of the port.
User Name	User name.
iSCSI Target Name	iSCSI target name.
iSCSI Target Alias	iSCSI target alias name and identifier.
Authentication	Authentication setting information (CHAP, None, or Comply with Host Setting).

Remove Target CHAP Users window

Remove Target CHAP Users

1.Confirm

The CHAP target users will be deleted from the selected iSCSI targets. Are you sure you want to continue?

Task Name: (Max. 32 Characters)

Selected iSCSI Targets

	Port ID	iSCSI Target Alias	iSCSI Target Name	Host Mode	Port Security	Number of Hosts	Authentication			
							Method	Mutual CHAP	User Name	Number of Users
☒	CL1-A	1A-G0A (0A)	iqn.aaaaaaa...	00 [Standard]	Disabled	0	CHAP	Disabled	aaaaaaa...	0
☐										
☐										
☐										
☐										
☐										
☐										
☐										
☐										

Detail

Total: 1

☐ Go to tasks window for status

Selected iSCSI Targets table

Item	Description
Port ID	Identifier of the port.
iSCSI Target Alias	iSCSI target alias name and identifier.
iSCSI Target Name	iSCSI target name.
Host Mode	The host mode of the iSCSI target.
Port Security	LUN security setting (Enabled or Disabled) on the port.
Number of Hosts	Number of hosts registered in the iSCSI target.
Authentication	Information about the authentication. • Method: Authentication method that is CHAP, None, or Comply with Host Setting • Mutual CHAP: Mutual CHAP setting that is Enabled or Disabled • User Name

Item	Description
	Number of Users
Detail	Details about the selected iSCSI target.

Remove Port CHAP Users window

Remove Port CHAP Users

1.Confirm

The CHAP users will be deleted from the selected ports. Are you sure you want to continue?

Task Name:

(Max. 32 Characters)

Selected Ports

Port ID	CHAP User Name	
CL3-A	CHAPUserA	

Total: 1

☐ Go to tasks window for status

Selected Ports table

Item	Description
Port ID	Identifier of the port.
CHAP User Name	CHAP user name which is set to the port.

Remove Hosts window

Remove Hosts

1.Confirm

Your applications on the selected hosts will not be able to access the data anymore. Are you sure to continue?

Task Name:

140912-RemoveHosts

(Max. 32 Characters)

Selected Hosts

Port ID	HBA iSCSI Name	Host Name	iSCSI Target Alias	iSCSI Target Name	
CL2-A	iqn.test1	hostCL2A	2A-G00 (00)	iqn.1994-04.j...	
CL2-A	iqn.test1	hostCL2A	Target001 (01)	iqn.1994-04.j...	
CL2-A	iqn.test1	hostCL2A	Target002 (02)	iqn.1994-04.j...	

Total: 3

☐ Go to tasks window for status

Back

Next

Apply

Cancel

?

Selected Hosts table

Item	Description
Port ID	Identifier of the port.
HBA iSCSI Name	HBA iSCSI Names.
Host Name	Name of hosts.
iSCSI Target Alias	iSCSI target alias name and identifier.
iSCSI Target Name	iSCSI target name.

Test Communication Statuses window

Test Communication Statuses

Confirm the status of communications between the network devices and the local storage system.
Select a local port ID, enter an IP address, and then click Test to view results.

Item Selection

Local Port ID (From):

CL1-A

IP Address (To):

☒ IPv4
☐ IPv6

Test

Communication Statuses

No.	Status	
		Total: 0

Item Selection

Item	Description
Local Port ID (From)	Port name of the local storage system.
IP Address (To)	Specify an IP address of a device of which the ping command is executed. - IPv4: Select this item if the device is adopted to IPv4. Specify the address in a text box. - IPv6: Select this item if the device is adopted to IPv6. Specify the address in a text box.
Test	Click to execute the ping command.
No.	Number of times of command executions from 1 to 5.
Status	Status of the result of the ping command execution.

Edit T10 PI Mode wizard

Edit T10 PI Mode window

Edit T10 PI Mode

1.Edit T10 PI Mode > 2.Confirm

Set the T10 PI Mode and click Finish to confirm.

Selected Ports

Filter ON OFF

Port ID	T10 PI Mode	
CL1-A	Disabled	
CL3-A	Disabled	

Total: 2

T10 PI Mode:

☐ Enable ☒ Disable

Back

Next

Finish

Cancel

?

Selected Ports table

Item	Description
Port Name	Port name.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.

Information setting area

Item	Description
T10 PI Mode	Select the T10 PI mode on the port. - Enabled: T10 PI mode on the port is enabled. - Disabled: T10 PI mode on the port is disabled.

Edit T10 PI Mode confirmation window

Edit T10 PI Mode

1.Edit T10 PI Mode > 2.Confirm

Enter a name for the task.
Confirm the settings in the list and click Apply to add the task in the Tasks queue for execution.

Task Name:

150911-EditT10PIMode

(Max. 32 Characters)

Selected Ports

Port ID	T10 PI Mode	
CL1-A	Disabled	
CL3-A	Disabled	

Total: 2

☐ Go to tasks window for status

Back

Next

Apply

Cancel

?

Selected Ports table

Item	Description
Port Name	Port name.
T10 PI Mode	T10 PI Mode setting (Enabled or Disabled) on the port.



Glossary

This glossary defines the special terms used in this document. Click the letter links below to navigate.

A

access attribute

The setting on a logical volume (open-systems) that determines whether hosts can read and/or write to the volume.

administrative logical unit (ALU)

An LU used for the conglomerate LUN structure, a SCSI architecture model. In the conglomerate LUN structure, all host access is through the ALU, which functions as a gateway to sort the I/Os for the subsidiary logical units (SLUs) grouped under the ALU. The host requests I/Os by using SCSI commands to specify the ALU and the SLUs grouped under the ALU. An ALU is called a Protocol Endpoint (PE) in vSphere. See also *subsidiary logical unit (SLU)*.

Adr

address

AL

arbitrated loop

alias device

A formatted but unused mainframe logical device (LDEV) whose address can be used as an alias for a Parallel Access Volume (PAV) base device. See also *base device*.

allocated volume

A logical device (LDEV) for which one or more host paths are defined.

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

AL-PA

arbitrated-loop physical address

alternate path

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

ALU

See *administrative logical unit*.

AMS

Hitachi Adaptable Modular Storage

API

application program interface

APLB

active path load balancing

array

Another name for a RAID storage system.

array domain

All functions, paths, and drives controlled by one back-end director (BED) feature (pair of boards). An array domain can contain a mix of mainframe and open-systems volume types. RAID-level intermix (all RAID types) is also allowed within an array domain.

array group

See *RAID group*.

ASL

Array Support Library

async

asynchronous

at-time split

Operation that allows multiple pairsplit operations to be performed at a pre-determined time.

audit log

Files that store a history of the operations performed from Hitachi Device Manager - Storage Navigator, commands that the storage system received from hosts, and data encryption operations.

ave, avg

average

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

B

back-end director (BED)

The hardware component that controls the transfer of data between the drives and cache. A BED feature consists of a pair of boards. A BED is also referred to as a back-end director (DKA).

base emulation type

Emulation type that is set when drives are installed. Determines the device emulation types that can be set in the RAID group.

BC

business continuity

BCM

Business Continuity Manager

BED

See *back-end director (BED)*.

BLK, blk

block

bmp

bitmap

C

C/T

See *consistency time (C/T)*.

ca

cache

cache logical partition (CLPR)

Consists of virtual cache memory that is set up to be allocated to different hosts in contention for cache memory.

capacity

The amount of data storage space available on a physical storage device, usually measured in bytes (MB, GB, TB, etc.).

CCI

Command Control Interface software

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

CFW
cache fast write

CG
See *consistency group (CTG)*.

CLI
command line interface

CLPR
See *cache logical partition*.

cluster
Multiple-storage servers working together to respond to multiple read and write requests.

command device
A dedicated logical volume used only by Command Control Interface to interface with the storage system. Can be shared by several hosts.

concatenated parity group
A configuration where the VDEVs corresponding to a pair of RAID 10 (2D+2D) or RAID 5 (7D+1P) parity groups, or four RAID 5 (7D+1P) parity groups, are interleaved on a RAID stripe level on a round-robin basis. A logical RAID stripe line is created as a concatenation of the individual RAID stripe lines. This has the effect of dispersing I/O activity over twice or four times the number of disks, but it does not change the number, names, or size of VDEVs, and hence it does not make it possible to assign larger LDEVs to them. Note that we often refer to RAID 10 (4D+4D), but this is actually two RAID 10 (2D+2D) parity groups interleaved together.

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 Command Control Interface instance.

consistency group (CG, CTG)
A group of pairs on which copy operations are performed simultaneously; the pairs' status changes at the same time. See also *extended consistency group (EXCTG)*.

consistency time (C/T)
Shows a time stamp to indicate how close the target volume is to the source volume. C/T also shows the time stamp of a journal group and extended consistency group.

controller chassis
The hardware component that houses the controller components of the VSP G200, G400, G600, G800 or VSP F400, F600, F800 storage system, including the front-end directors, virtual storage directors, cache and control memory, switches, and back-end directors. Your storage system can be configured with one or two controller chassis.

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

controller

The component in a storage system that manages all storage functions. It is analogous to a computer and contains a processors, I/O devices, RAM, power supplies, cooling fans, and other sub-components as needed to support the operation of the storage system.

copy pair

A pair of volumes in which one volume contains original data and the other volume contains the copy of the original. Copy operations can be synchronous or asynchronous, and the volumes of the copy pair can be located in the same storage system (local copy) or in different storage systems (remote copy).

A copy pair can also be called a volume pair, or pair.

CT, C/T

See *consistency time (C/T)*.

CTG

See *consistency group (CTG)*.

CU

control unit

custom volume (CV)

A customized (variable-sized) volume whose size is defined by the user using Virtual LVI/Virtual LUN.

CV

See *custom volume (CV)*.

CVS

custom volume size

CYL, cyl

cylinder

D**data drive**

A physical data storage device that can be a hard disk drive (HDD), flash drive (also called a solid-state device), or a flash module drive (FMD).

data path

The physical paths used by primary storage systems to communicate with secondary storage systems in a remote replication environment.

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

data pool

One or more logical volumes designated to temporarily store original data. When a snapshot is taken of a primary volume, the data pool is used if a data block in the primary volume is to be updated. The original snapshot of the volume is maintained by storing the to-be-changed data blocks in the data pool.

DC

data center

DCR

Dynamic Cache Residency

DEV, dev

device

device

A physical or logical unit with a specific function.

device emulation

Indicates the type of logical volume. Open-systems device emulation types provide logical volumes of variable size, called logical units (LUs), that contain ASCII data in FBA format. The typical open-systems device emulation type is OPEN-V.

DF700

The factory model name for the Hitachi TagmaStore® Adaptable Modular Storage and Workgroup Modular Storage arrays.

DF800

The factory model name for the Hitachi Adaptable Modular Storage 2000 storage system.

differential data

Changed data in the primary volume not yet reflected in the secondary volume of a copy pair.

disk array

Disk array, or array, is another name for a RAID storage system.

disk controller (DKC)

The hardware component that manages front-end and back-end storage operations. The term DKC is also used to refer to the entire RAID storage system.

DKC

disk controller. DKC can refer to the RAID storage system or the controller components.

DKCMAIN

disk controller main. Refers to the firmware for the RAID storage system.

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

DP

Hitachi Dynamic Provisioning

DP-VOL

A logical volume in a storage system that has no physical storage space. Thin Image uses V-VOLs as secondary volumes of copy pairs. In Dynamic Provisioning, Dynamic Tiering, or active flash, V-VOLs are referred to as DP-VOLs.

drive chassis

The hardware component of the VSP G200, G400, G600, G800 or VSP F400, F600, F800 storage system that contains data drives and no controller components. A drive chassis can also be called a disk unit (DKU).

DRU

Hitachi Data Retention Utility

dump

A collection of data that is saved to a file when an error or crash occurs. The data is used by support personnel to determine the cause of the error or crash.

Dump Tool

Downloads Hitachi Device Manager - Storage Navigator configuration information for backup and troubleshooting purposes.

dynamic provisioning

An approach to managing storage. Instead of "reserving" a fixed amount of storage, it removes capacity from the available pool when data is actually written to disk. Dynamic provisioning is also referred to as thin provisioning.

E**EBCDIC**

extended binary-coded decimal interchange code

ECKD

extended count-key data

DAR

Encryption License Key

emulation

The operation of the Hitachi RAID storage system to emulate the characteristics of a different storage system.

RAID storage system operates the same as the storage system being emulated.

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

emulation group

A set of device emulation types that can be intermixed within a RAID group and treated as a group.

env.

environment

EXCTG

See *extended consistency group (EXCTG)*.

EXG

external volume group

ext.

external

extended consistency group (EXCTG)

A set of journal groups in which data consistency is guaranteed. When performing copy operations between multiple primary and secondary systems, the journal groups must be registered in an EXCTG.

external volume

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

F

failback

The process of switching operations from the secondary path or host back to the primary path or host, after the primary path or host has recovered from failure. See also *failover*.

failover

The process of switching operations from the primary path or host to a secondary path or host when the primary path or host fails.

FBA

fixed-block architecture

FC

fibre channel; FlashCopy

FC-AL

fibre-channel arbitrated loop

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

flash drive

A data drive that is a solid-state memory device instead of a rotating hard disk drive. A flash drive can also be called a solid-state drive (SSD).

flash module drive (FMD)

A high-speed data drive that includes several flash memory (SSD) modules on a single PCB.

free capacity

The amount of storage space (in bytes) that is available for use by the host systems.

FV

fixed-size volume

FX

Hitachi Cross-OS File Exchange

G**GID**

group ID

GUI

graphical user interface

H**HBA**

host bus adapter

HCS

Hitachi Command Suite (previously called Hitachi Storage Command Suite)

HDD

hard disk drive

HDP

Hitachi Dynamic Provisioning

HDS

Hitachi Data Systems

HDT

Hitachi Dynamic Tiering software

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

host failover

The process of switching operations from one host to another host when the primary host fails.

host group

A group of hosts of the same operating system platform.

host mode

Operational modes that provide enhanced compatibility with supported host platforms. Used with fibre-channel ports on RAID storage systems.

host mode option

Additional options for fibre-channel ports on RAID storage systems. Provide enhanced functionality for host software and middleware.

HSCS

Hitachi Storage Command Suite. This suite of products is now called the Hitachi Command Suite.

HUR

Hitachi Universal Replicator

I**int.**

interval

initial copy

An initial copy operation is performed when a copy pair is created. Data on the primary volume is copied to the secondary volume.

internal volume

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

IO

input/output

IOPS

I/Os per second

IPv4

Internet Protocol, Version 4

IPv6

Internet Protocol, Version 6

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

J

JNL

journal

JNLG

See *journal group (JNLG)*.

journal group (JNLG)

In a Universal Replicator system, journal groups manage data consistency between multiple primary volumes and secondary volumes. See also *consistency group (CG, CTG)*.

journal volume

A volume that records and stores a log of all events that take place in another volume. In the event of a system crash, the journal volume logs are used to restore lost data and maintain data integrity.

In Universal Replicator, differential data is held in journal volumes on until it is copied to the S-VOL.

L

LCU

logical control unit

LDEV

logical device

LDKC

See *logical disk controller (LDKC)*.

loc.

location

logical device (LDEV)

An individual logical data volume (on multiple drives in a RAID configuration) in the storage system. An LDEV can or can not contain any data and can or can not be defined to any hosts. Each LDEV has a unique identifier or "address" within the storage system 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 disk controller (LDKC)

A group of 255 control unit (CU) images in the RAID storage system that is controlled by a virtual (logical) storage system within the single physical storage system. For

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

example, the Hitachi Universal Storage Platform V/VM storage system supports two LDKCs, LDKC 00 and LDKC 01.

logical partition (LPAR)

A subset of a system's hardware resources that is virtualized as a separate system. For a storage system, logical partitioning can be applied to cache memory.

logical unit (LU)

A logical volume that is configured for use by open-systems hosts (for example, OPEN-V).

logical unit (LU) path

The path between an open-systems host and a logical unit.

logical volume

See *volume*.

logical volume image (LVI)

A logical volume that is configured for use by mainframe hosts (for example, 3390-9).

LPAR

logical partition

LU

logical unit

LUN

logical unit number

LUNM

Hitachi LUN Manager

LV

logical volume

LVM

Logical Volume Manager; logical volume management

M

main control unit (MCU)

A storage system at a primary or main site that contains primary volumes of remote replication pairs. The MCU is configured to send remote I/Os to one or more storage systems at the secondary or remote site, called remote control units (RCUs), that contain the secondary volumes of the remote replication pairs. See also *remote control unit (RCU)*.

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

master journal (M-JNL)

Holds differential data on the primary Universal Replicator system until it is copied to the restore journal (R-JNL) on the secondary system. See also *restore journal (R-JNL)*.

max.

maximum

MCU

See *main control unit (MCU)*.

MIB

message information block

mig.

migration

mirror

In Universal Replicator, each pair relationship in and between journal groups is called a "mirror". Each pair is assigned a mirror ID when it is created. The mirror ID identifies individual pair relationships between journal groups.

M-JNL

main journal

MU

mirror unit

multi-pathing

A performance and fault-tolerant technique that uses more than one physical connection between the storage system and host system. Also called multipath I/O.

N**no.**

number

NUM

number

O**OPEN-V**

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

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

P

PA

physical address

pair

Two logical volumes in a replication relationship in which one volume contains original data to be copied and the other volume contains the copy of the original data. The copy operations can be synchronous or asynchronous, and the pair volumes can be located in the same storage system (in-system replication) or in different storage systems (remote replication).

pair status

Indicates the condition of a copy pair. A pair must have a specific status for specific operations. When an operation completes, the status of the pair changes to the new status.

parity group

See *RAID group*.

path failover

The ability of a host to switch from using the primary path to a logical volume to the secondary path to the volume when the primary path fails. Path failover ensures continuous host access to the volume in the event the primary path fails.
See also *alternate path* and *failback*.

PDEV

physical device

PDL

Product Documentation Library

PG

parity group. See *RAID group*.

PFM

Hitachi Performance Monitor

physical device

See *device*.

pool

A set of volumes that are reserved for storing Thin Image, Dynamic Provisioning, Dynamic Tiering, or active flash write data.

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

pool volume (pool-VOL)

A logical volume that is reserved for storing snapshot data or write data for Dynamic Provisioning, Dynamic Tiering, or active flash.

PP

program product; physical partition

P-P

point-to-point

primary site

The physical location of the storage system that contains the original data to be replicated and that is connected to one or more storage systems at the remote or secondary site via remote copy connections. A primary site can also be called a "main site" or "local site".

The term "primary site" is also used for host failover operations. In that case, the primary site is the host computer where the production applications are running, and the secondary site is where the backup applications run when the applications at the primary site fail, or where the primary site itself fails.

primary volume (P-VOL)

The volume in a copy pair that contains the original data to be replicated. The data in the primary volume is duplicated synchronously or asynchronously on the secondary volume.

The following Hitachi products use the term P-VOL: ShadowImage, TrueCopy, Universal Replicator.

See also *secondary volume*.

PV

physical volume

P-VOL

See *primary volume*.

Q**quick format**

The quick format feature in Virtual LVI/LUN in which the formatting of the internal volumes is done in the background. This allows system configuration (such as defining a path or creating a TrueCopy pair) before the formatting completes. To execute quick formatting, the volumes must be in blocked status.

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

R

RAID group

A redundant array of inexpensive drives (RAID) that have the same capacity and are treated as one group for data storage and recovery. A RAID group contains both user data and parity information, which allows the user data to be accessed in the event that one or more of the drives within the RAID group are not available. The RAID level of a RAID group determines the number of data drives and parity drives and how the data is "striped" across the drives. For RAID1, user data is duplicated within the RAID group, so there is no parity data for RAID1 RAID groups.

A RAID group can also be called an array group or a parity group.

RAID level

The type of RAID implementation. RAID levels include RAID0, RAID1, RAID2, RAID3, RAID4, RAID5 and RAID6.

RC

reference code (of a service information message)

RCU

See *remote control unit (RCU)*.

RCU target port

A fibre-channel port that is configured to receive remote I/Os from an initiator port on another storage system.

remote control unit (RCU)

A storage system at a secondary or remote site that is configured to receive remote I/Os from one or more storage systems at the primary or main site.

remote copy connections

The physical paths that connect a storage system at the primary site to a storage system at the secondary site. Also called data path.

remote site

See *secondary site*.

restore journal (R-JNL)

Holds differential data on the secondary Universal Replicator system until it is copied to the secondary volume.

resync

resynchronize

RIO

remote I/O

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

R-JNL

restore journal

RM

RAID Manager. Another name for Command Control Interface.

R-SIM

remote service information message

R-site

remote site (used for Universal Replicator)

S**S#**

serial number

S/N

serial number

secondary site

The physical location of the storage system that contains the primary volumes of remote replication pairs at the main or primary site. The storage system at the secondary site is connected to the storage system at the main or primary site via remote copy connections. The secondary site can also be called the "remote site". See also *primary site*.

secondary volume (S-VOL)

The volume in a copy pair that is the copy. The following Hitachi products use the term "secondary volume": ShadowImage, TrueCopy, and Universal Replicator. See also *primary volume*.

seq.

sequential

Server Priority Manager (SPM) group

A set of host bus adapters (HBAs) managed as a group. All HBAs in an SPM group must be of the same priority. Prioritized WWNs (that is, high priority HBAs) and non prioritized WWNs (that is, low priority HBAs) cannot be mixed in the same group.

service information message (SIM)

SIMs are generated by a RAID storage system when it detects an error or service requirement.

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

shared volume

A volume that is being used by more than one replication function. For example, a volume that is the primary volume of a TrueCopy pair and the primary volume of a ShadowImage pair is a shared volume.

SHRED

Volume Shredder

shredding

See *volume shredding*.

SI

Hitachi ShadowImage®

sidefile

An area of cache memory that is used to store updated data for later integration into the copied data.

SIM

service information message

size

Generally refers to the storage capacity of a memory module or cache. Not usually used for storage of data on disk or flash drives.

SLU

See *subsidiary logical unit*.

SM

control memory

SN

serial number; Hitachi Device Manager - Storage Navigator

snapshot

A point-in-time virtual copy of a primary volume (P-VOL). The snapshot is maintained when the P-VOL is updated by storing pre-updated data (snapshot data) in a data pool.

SOM

See *system option mode (SOM)*.

space

Generally refers to the data storage capacity of a disk drive or flash drive.

SPM

Hitachi Server Priority Manager

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

SSB

sense byte

SSD

solid-state drive. Another name for a flash drive. In this guide, *single level cell* (SLC), *multi level cell* (MLC) and *flash module drive* (FMD) are called collectively as SSD.

SSID

storage subsystem ID. SSIDs are used for reporting information from the CU to the mainframe operating system. Each group of 64 or 256 volumes requires one SSID, so there are one or four SSIDs per CU image. The user-specified SSIDs are assigned during storage system installation and must be unique to all connected host operating environments.

storage tiers

See *tiered storage*.

subsidiary logical unit (SLU)

An LU used for the conglomerate LUN structure, a SCSI architecture model. An SLU is an LU that stores actual data. You can use a DP-VOL or snapshot data (or a V-VOL allocated to snapshot data) as an SLU. All host access to SLUs is through the administrative logical unit (ALU). An SLU is called a virtual volume (VVol) in vSphere. See also *administrative logical unit (ALU)*.

S-VOL

See *secondary volume or source volume (S-VOL)*.

sync

synchronize; synchronous

syslog

The file on SVP that contains information released to both the syslog and audit log files and information released only to the syslog file.

system option mode (SOM)

Additional operational parameters for the RAID storage systems that enable the storage system to be tailored to unique customer operating requirements. SOMs are set on the service processor.

T**target port**

A fibre-channel port that is configured to receive and process host I/Os.

TC

Hitachi TrueCopy®

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

TGT

target; target port

THD

threshold

TID

target ID

tiered storage

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

TLCU

target logical control unit

total capacity

The aggregate amount of storage space in a data storage system.

TRK

track

U**unallocated volume**

An LDEV for which no host paths are assigned.

UR

Hitachi Universal Replicator

USP V/VM

Hitachi Universal Storage Platform V/VM

USP VM

Hitachi Universal Storage Platform VM

USP V/VM

Hitachi Universal Storage Platform V/VM

UVM

Hitachi Universal Volume Manager

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

V

VDEV

See *virtual device (VDEV)*.

virtual device (VDEV)

A group of logical devices (LDEVs) in a RAID group. A VDEV typically consists of some fixed volumes (FVs) and some free space. The number of fixed volumes is determined by the RAID level and device emulation type.

Virtual LVI/LUN volume

A custom-size volume whose size is defined by the user using Virtual LVI/LUN. Also called a custom volume (CV).

virtual volume (V-VOL)

The secondary volume in a pair. When in PAIR status, the V-VOL is an up-to-date virtual copy of the primary volume (P-VOL). When in SPLIT status, the V-VOL points to data in the P-VOL and to replaced data in the pool, maintaining the point-in-time copy of the P-VOL at the time of the split operation.

When a V-VOL is used with Dynamic Provisioning, Hitachi Dynamic Tiering software, or active flash, it is called a DP-VOL.

VLL

Hitachi Virtual LVI/LUN

VLUN

Hitachi Virtual LUN

VLVI

Hitachi Virtual LVI

VM

volume migration; volume manager

VMA

volume management area

VOL, vol

volume

volser

volume serial number

volume

A logical device (LDEV). A mainframe volume is called a logical volume image (LVI), and an open-systems volume is called a logical unit (LU).

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

volume pair

See *copy pair*.

volume shredding

Deleting the user data on a volume by overwriting all data in the volume with dummy data.

VPG

virtual parity group

VPM

Hitachi Virtual Partition Manager

VSN

volume serial number

VSP

Hitachi Virtual Storage Platform

VSP G200, G400, G600, G800

Hitachi Virtual Storage Platform G200, G400, G600, G800

VSP F400, F600, F800

Hitachi Virtual Storage Platform F400, F600, F800

V-VOL

See *virtual volume (V-VOL)*.

V-VOL management area

Contains the pool management block and pool association information. The V-VOL management area is created automatically when additional control memory is installed.

W**WWN**

worldwide name

Z**zero data**

The number 0 (zero). A zero-formatting operation is one that writes zero data to the entire data drive area.

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

zero formatting

A formatting operation that writes zero data to the entire data drive area.

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

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

Index

A

access attributes

- assigning to a volume 6-4
- changing to read-only or protect 6-5
- changing to read/write 6-6
- configuring 6-1
- expiration lock 6-7
- overview 6-2
- permitted operations 6-3
- requirements 6-2
- reserving volumes 6-9
- restrictions 6-3
- retention term 6-8
- workflow 6-4

alternate LU paths 7-5

Attribute command 6-5, 6-7

authentication

- configuring on fibre channel ports 7-47
- configuring on fibre channels 7-41
- fabric switch 7-38
- fibre channel 7-33
- host settings 7-34
- hosts and host groups 7-35
- hosts, enabling fibre channel switch 7-52
- mutual 7-34
- mutual of ports 7-41
- port settings 7-35
- users 7-33

B

basic provisioning

- overview 1-3

workflow 1-6

boundary values for RAID levels 4-16

C

capacity of a slot 4-17

Changing External LDEV Capacity 5-123

CHAP authentication 7-33, 7-34, 7-36, 7-37, 7-38, 7-39, 7-40, 7-42, 7-43, 7-46, 7-49, 7-50

Command Control Interface

- access attributes restrictions 6-3

command device 6-5

control memory requirements for provisioning 1-22

correspondence table for defining devices 7-23

Create LDEV function 4-18

Creating LDEVs

- Viewing LDEVs 8-1

custom-sized provisioning

- overview 1-5

D

data retention strategies 1-19

Data Retention window E-2

data transfer speed

- fibre channel ports 7-7

devices

- correspondence table 7-23

DP-VOL

- requirements 5-7

DP-VOLs

- full allocation 5-128

E

- editing virtualization management settings 2-4
- Error Detail dialog box 9-7
- expiration lock E-2
 - enabling/disabling 6-7

F

- fabric switch 7-38
- fabric topology 7-11
- FC-AL (fibre channel-arbitrated loop) topology 7-11
- fibre channel authentication
 - setting 7-33
- fibre channel ports
 - addresses 7-9
 - configuring 7-7, 7-10
 - configuring authentication 7-41, 7-47
 - data transfer speed 7-7
 - registering user information 7-48
 - setting port information 7-47
- fibre channel switch
 - authentication settings and connection results 7-40
 - clearing user information 7-50
 - enabling or disabling authentication 7-52
 - registering user information 7-49
 - setting authentication mode 7-51
- fibre channel topology
 - overview 7-11
- fixed-sized provisioning
 - overview 1-3

G

- Global-active device 5-14

H

- HBA iSCSI name
 - changing 7-73
- host authentication
 - disabling in a host group 7-41
 - enabling in a host group 7-41
- host bus adapters
 - changing HBA iSCSI name 7-73
 - changing WWNs 7-53
 - deleting from host group 7-56

- host group 0 7-30
 - initializing 7-55
- host groups 7-4
 - adding 7-58, 7-59
 - authentication 7-35
 - changing host mode 7-54
 - changing name 7-54
 - creating 7-18
 - deleting 7-57
 - deleting host bus adapters 7-56
- host mode options
 - listed and defined 7-14
- host modes
 - listed and defined 7-13
- hosts
 - authentication 7-35
 - changing host user information 7-43
 - configuring 7-12
 - configuring workflow 7-13
 - deleting host user information 7-44
 - registering host group user information 7-45
 - registering host user information 7-42
 - registering in host group 7-18
 - registering in iSCSI target 7-62
 - removing from iSCSI target 7-76

I

- iSCSI target
 - changing setting 7-74
 - creating 7-62
- iSCSI Targets
 - adding 7-78
- iSCSI targets
 - deleting 7-77
 - remove hosts 7-76

L

- LDEVs
 - blocking 4-23, 4-24
 - changing settings 4-22
 - creating 4-18
 - deleting (converting to free space) 4-27
 - editing name 4-26
 - formatting 4-28, 4-30
 - formatting in a parity group 4-31
 - removing from registering task 4-23

- restoring if blocked 4-24, 4-25
- leap year 6-6
- logical units 7-3
- logical volumes
 - managing 7-1
- login iSCSI names
 - deleting 7-76
- LU paths 7-3
 - configuration workflow 7-21
 - configuring 7-20
 - configuring on fibre-channel 7-3
 - defining 7-21, 7-70
 - defining alternate 7-24, 7-71
 - deleting 7-26
 - managing 7-25
 - rules, restrictions, and guidelines 7-5
 - viewing settings 7-27
- LUN
 - defined 7-5
- LUN security
 - enabling on ports 7-31
 - example of disabling 7-30
 - example of enabling 7-29
 - settings for authentication of hosts 7-34
 - settings for authentication of ports 7-35
- LUN security on ports 7-29
 - disabling 7-32

M

- management area capacity
 - open-systems volume 4-16
- managing hosts for fibre channel 7-53
- managing hosts for iSCSI 7-73
- managing logical volumes
 - rules, restrictions, and guidelines 7-5
 - workflow 7-6
- meta_resource 3-6
- monitoring capacity 5-105
- mutual authentication 7-34
 - ports 7-41, 7-45

N

- nicknames
 - changing 7-53, 7-73

O

- operating system and file system capacity 5-10

P

- Parity groups
 - formatting 4-10
- parity groups
 - configuring volumes 4-17
 - creating 4-7
- performance
 - optimizing by setting data transfer speed for a fibre channel port 7-7
- Performance Monitor
 - automatic starting considerations 6-3
- point-to-point topology 7-11
- pool capacity
 - decreasing 5-117
 - increasing 5-114
 - stop decreasing 5-120
- pool information
 - viewing 5-112
- pool name
 - changing 5-116
- pool subscription limit
 - changing 5-110
- pool threshold
 - changing 5-110
- pool-VOLs
 - requirements 5-5
- pools
 - creating 5-88
 - deleting 5-122
 - managing 5-112
 - recovering 5-116
 - requirements 5-4
- ports
 - mutual authentication 7-41
 - rules, restrictions, and guidelines 7-5
- provisioning key terms 1-20

Q

- Quick Format function 4-29

R

RAID levels

- boundary values 4-16

- reclaiming pages in a V-VOL 5-126

- reserving volumes with access attributes 6-9

resource groups

- adding resources to 3-9

- assignments 3-7

- changing name 3-10

- creating 3-8

- deleting 3-11

- example not sharing a port 3-4

- example sharing a port 3-2

- license requirements 3-7

- meta_resource 3-6

- overview 3-1

- removing resources from 3-10

- resource lock 3-6

- rules, restrictions, and guidelines 3-7

- strategies 1-19

- system configuration 3-2

- user groups 3-6

- resource lock 3-6

retention term

- changing access attributes 6-8

S

- S-VOL disable attribute 6-8

- secret, in CHAP authentication 7-34

- ShadowImage 5-16

SIM reference codes

- listed 5-111

SIMs

- overview 5-111

- slot capacity 4-17

- subscription limit of a pool

- changing 5-110

- system requirements for provisioning 1-22

T

- Technical Support Center 9-11

thin provisioning

- advantages 1-9

- configuring 5-1

- example 1-15

- overview 1-7, 5-3

- requirements 5-3

- workflow 1-15, 5-18

tier capacity

- reserving 5-53

- reserving example 5-54

tier relocation

- rules, restrictions, and guidelines 5-28

tiering

- workflow 5-70

tiering policy 5-51

- changing execution modes example 5-57

- notes on using 5-56

- overview 5-48

- relationship with graphs 5-52

- relationship with tiers 5-51

- reserving tier capacity 5-53

- setting on a V-VOL 5-51

topology 7-11

- example of FC-AL and point-to-point 7-12

troubleshooting 9-1

- provisioning while using CCI 9-8

- thin provisioning 9-2

- TrueCopy 5-14

U

- Unbinding LDEVs 8-1

- Universal Replicator 5-15

used pool capacity

- viewing 5-112

- user authentication 7-33

UUID

- clearing settings 7-27

- setting 7-22

V

V-VOLs

- changing name 5-124

- creating 5-101

- deleting 5-130

- increasing capacity 5-123

- managing 5-112

- releasing pages 5-126

- requirements for increasing capacity 5-8

- stop releasing pages 5-128

- Viewing formatted pool capacity 5-113, 5-131, 5-132, 5-133
- Viewing rebalancing progress 5-114
- Virtual LUN size calculations 4-13
- Virtual LUN specifications 4-12
- Virtual Partition Manager 5-17
- Volume Migration
 - automatic starting considerations 6-3

W

- World Wide Name 7-18
- WWN 7-18
 - changing 7-53
 - deleting from WWN table 7-56
 - deleting old WWNs 7-56
 - finding on different operating systems 7-18

Z

- zero pages
 - reclaiming 5-125
- Zero Read Cap mode E-4

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