Overland Storage

SnapSAN™ Data Migration

User Guide

S5000

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Preface

This user guide explains how to use the Data Migration function. Data migration is a function to copy the data on a logical volume of the source disk array onto a logical disk of the destination disk array without change. This guide assumes that you are familiar with computer hardware, data storage, and network administration terminology and tasks. It also assumes you have basic knowledge of Internet SCSI (iSCSI), Serial-attached SCSI (SAS), Serial ATA (SATA), Storage Area Network (SAN), and Redundant Array of Independent Disks (RAID) technology.

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Product Documentation and Firmware Updates

Overland Storage [prod_name] product documentation and additional literature are available online, along with the latest release of the [prod_name] nn software.

Point your browser to:

http: //docs.overlandstorage.com/snapsan

Follow the appropriate link to download the **latest** software file or document. For additional assistance, search at http: //support.overlandstorage.com.

Overland Technical Support

For help configuring and using your [prod_name] nn, search for help at:

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For a complete list of support times depending on the type of coverage, visit our web site at:

http: //support.overlandstorage.com/support/overland_care.html

Conventions

This user guide exercises several typographical conventions:

Convention	Description & Usage
Boldface	Words in a boldface font (**Example**) indicate items to select such as menu items or command buttons.
Ctrl-Alt-r	This type of format details the keys you press simultaneously. In this example, hold down the **Ctrl** and **Alt** keys and press the **r** key.
NOTE	A Note indicates neutral or positive information that emphasizes or supplements important points of the main text. A note supplies information that may apply only in special cases—for example, memory limitations or details that apply to specific program versions.
IMPORTANT 	An Important note is a type of note that provides information essential to the completion of a task or that can impact the product and its function.
CAUTION 	A Caution contains information that the user needs to know to avoid damaging or permanently deleting data or causing physical damage to the hardware or system.
WARNING 	A Warning contains information concerning personal safety. Failure to follow directions in the warning could result in bodily harm or death.
Menu Flow Indicator (**>**)	Words in bold font with a greater than sign between them indicate the flow of actions to accomplish a task. For example, **Setup > Passwords > User** indicates that you should press the Setup button, then the Passwords button, and finally the User button to accomplish a task.

Information contained in this guide has been reviewed for accuracy, but not for product warranty because of the various environments, operating systems, or settings involved. Information and specifications may change without notice.

Contents

Appendix A - Notes

Appendix B - Licenses

Index

Chapter 1

Data Migration

Overview

Data migration is a function to copy the data on a logical volume of the source disk array onto a logical disk of the destination disk array without change. This function is installed on the destination disk array. You can operate data migration by running commands for data migration on the destination disk array.

To replace an existing disk array with a new disk array, you must migrate the data accumulated on the existing disk array to the new disk array. Previously, for data migration, it was necessary to examine means of migrating data in individual cases. To address this, a new function is provided to facilitate data migration from an existing disk array to a new disk array.

Features

The data migration function has the following features:

- Since this function is incorporated in the disk array, it is no longer necessary to copy data on the server for data migration.
- Data can be migrated faster than the conventional data migration method using the tape and LAN.
- Data can be migrated from the disk array without the remote Volume Cloning function or purchased license.
- Data can be migrated even if the source logical disk and the destination logical disk have different capacities (However, the capacity of the destination logical disk must be equal to or larger than that of the source logical disk capacity).

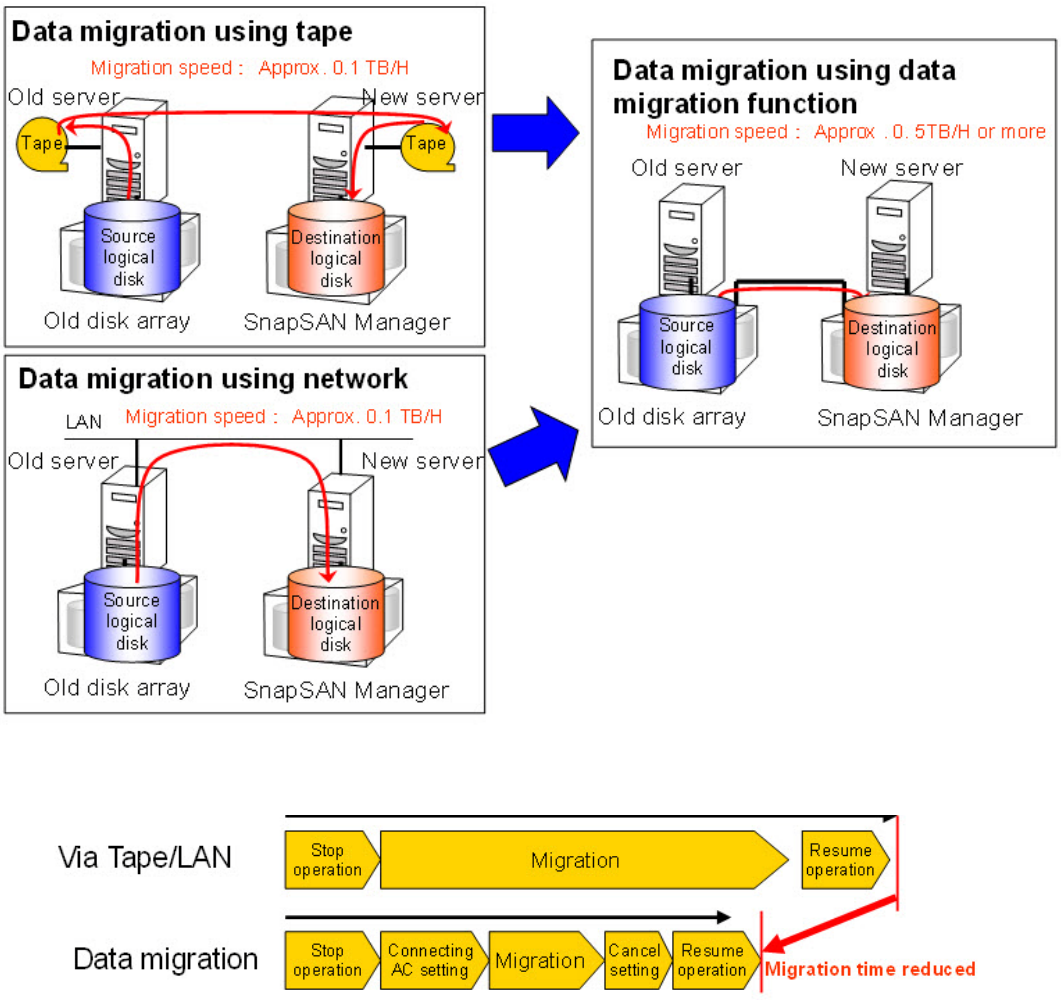


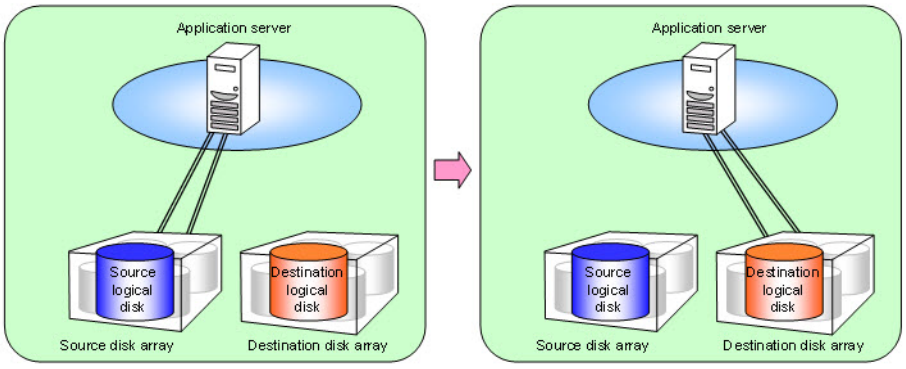
Figure 1-1: Reduction in Migration Time Realized with the Data Migration Function

In data migration, data is acquired from a logical disk of the source disk array and copied onto a logical disk of the destination disk array by executing the data migration function on the destination disk array.Input/output to/from the source logical disk must be completely stopped during data migration. Select whether to migrate data stopping operations without stopping the server or to migrate data stopping the server, depending on the configuration of existing disk array connection or the configuration of migration target device.

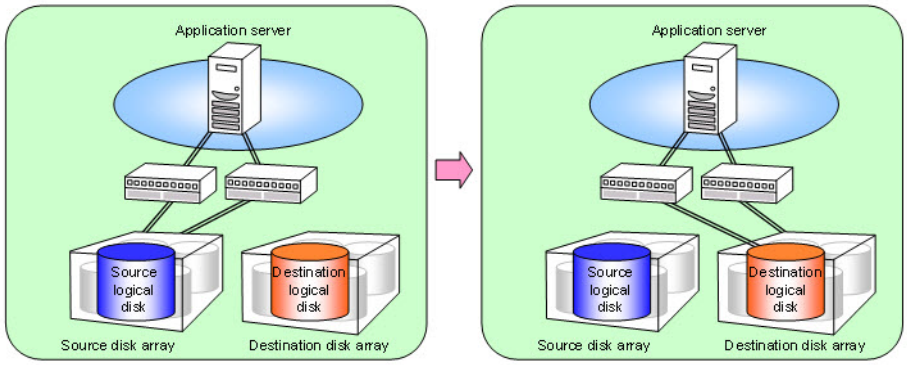
Migration Patterns

Migration patterns for which the data migration function can be used are shown below.

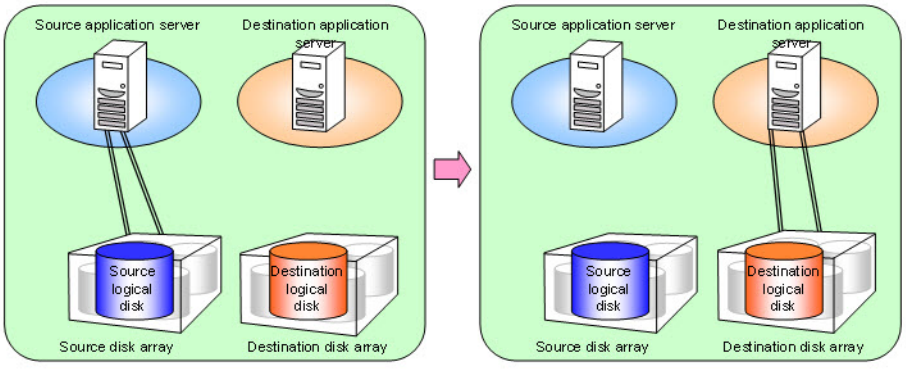
1. When migrating the disk array only from the environment where the application server and the source disk array are connected directly through FC.



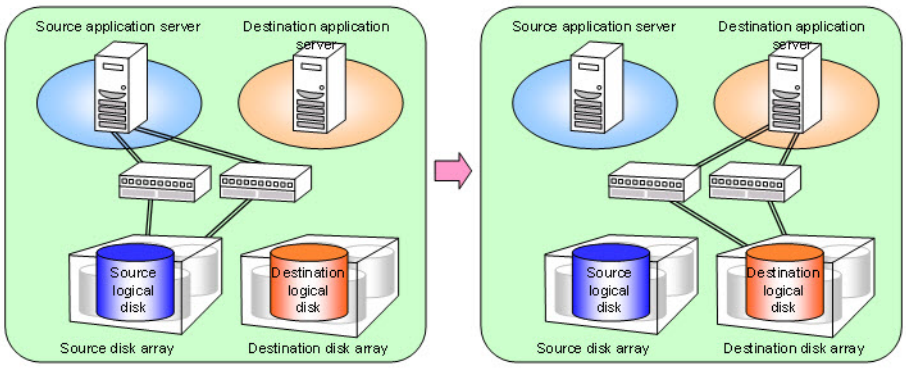
2. When migrating the disk array only from the environment where the application server and the source disk array are connected via the FC switch.



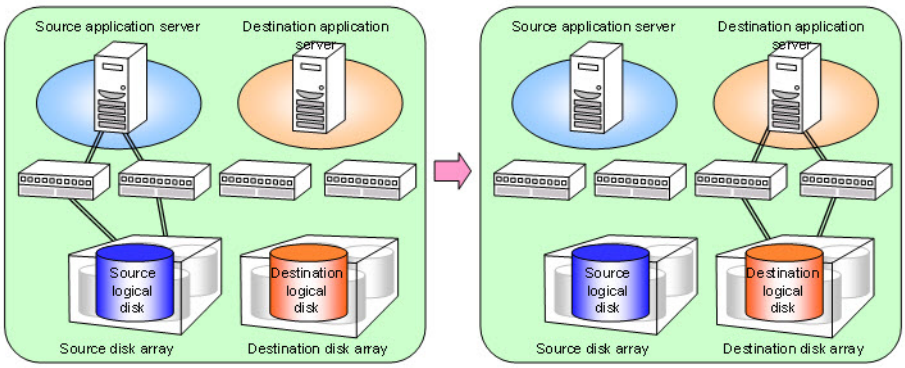
3. When migrating the disk array and the application server from the environment where the application server and the source disk array are connected directly through FC.



4. When migrating the disk array and the application server from the environment where the application server and the source disk array are connected via the FC switch.



5. When migrating the disk array, the application server, and the FC switch from the environment where the application server and the source disk array are connected via the FC switch.



Source and Destination Disk Arrays

This chapter describes the data migration function including the combinations of disk arrays that are supported for data migration.

Destination Disk Array Source Disk Array	FC Model	iSCSI Model
FC Model	✓	-
iSCSI Model	-	-
FC/iSCSI Model (mixed)	✓*(1)	-

✓: Available for data migration -: Not available for data migration

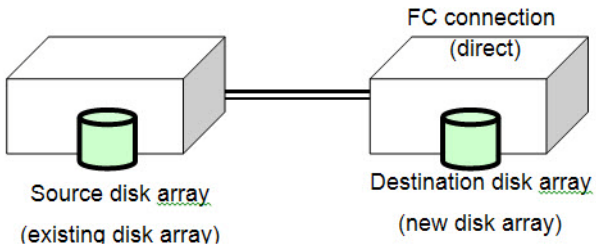
*1: When an FC port is installed

* Data migration is supported only when the source and destination disk arrays are connected by FC.

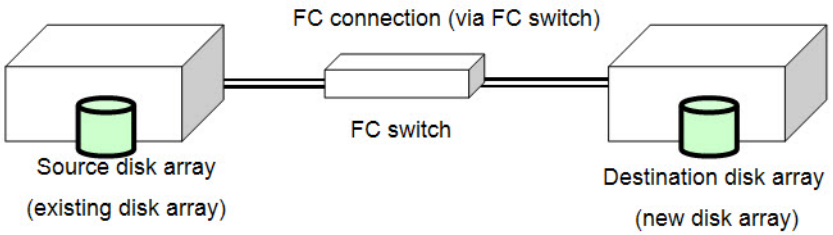
Disk Array Connection Configuration

The following disk array connection patterns are supported for data migration:

- Configuration in which the source and destination disk arrays are connected directly to each other by FC



- Configuration in which the source and destination disk arrays are connected via an FC switch



* In the above configurations, if the source disk array and destination disk array have already been linked by the Remote Replication function, the source disk array will not be subject for data migration.

Data Migration Methods

There are two types of data migration: migration on the per-operation basis and migration during which the application server is stopped. Determine the migration method to use by referring to the flowcharts shown below.

Data Migration Method	Advantages	Disadvantages
Data migration stopping operations	Operations not using the logical disk of which data is being migrated can be continued.	Operation and data migration may cause performance degradation of each other.
Data migration stopping the server	The steps are easier than data migration stopping operations and data can be more quickly migrated.	Because the server is stopped, all operations using the source or destination disk array must be stopped.

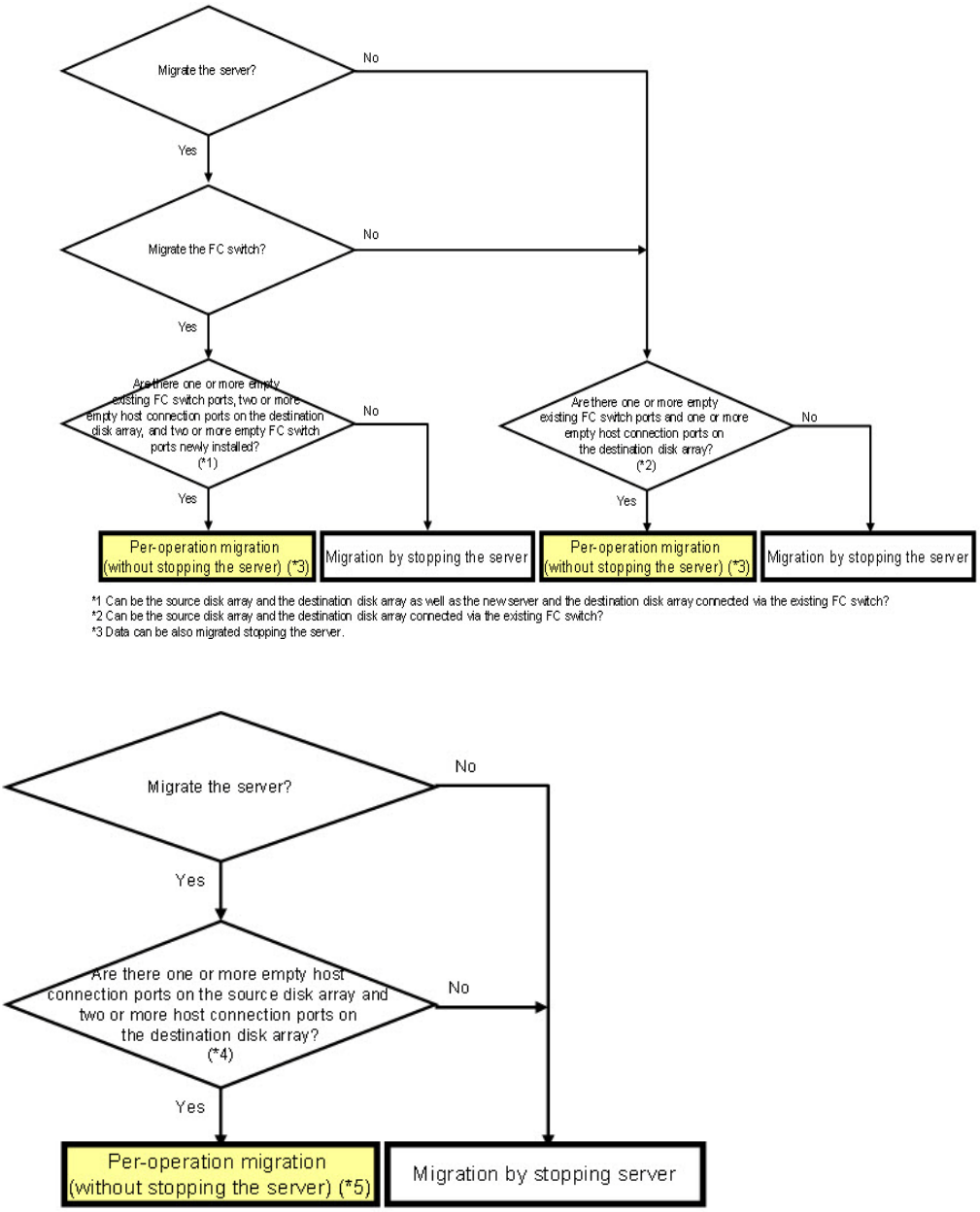


Figure 2-1: Determination of Data Migration Method (FC Direct Connection Configuration)

Data Migration States and State Transition

Data Migration States

Activity	Data Migration State	Description
Data migration (Migrate)	Not-migrated	A pair of source and destination logical disks has just been set.
	Queued	Waiting for the start of copying the data from the source logical disk to the destination logical disk to be started.
	Migrating	The data is being copied from the source logical disk to the destination logical disk.
	Migrating(stop)	The instruction to stop copying the data is issued, and the remaining data is being copied from the source logical disk to the destination logical disk. The state will transit to Migrated when copying all the data will be complete.
	Migrated	Copying the data from the source logical disk to the destination logical disk is complete.
	Suspended	Copying the data from the source logical disk to the destination logical disk is suspended by the suspend instruction. Copying the remaining data can be started by the restart instruction.
	Fault	Copying the data from the source logical disk to the destination logical disk is stopped due to a copy fault.
	Cancelled	Copying the data from the source logical disk to the destination logical disk is stopped by the cancel instruction.

* You can check the current data migration state by using the iSMmc_query command that is used to show the copy state of the data migration pair.

Relationship between the data migration operations and pair status transition is shown.

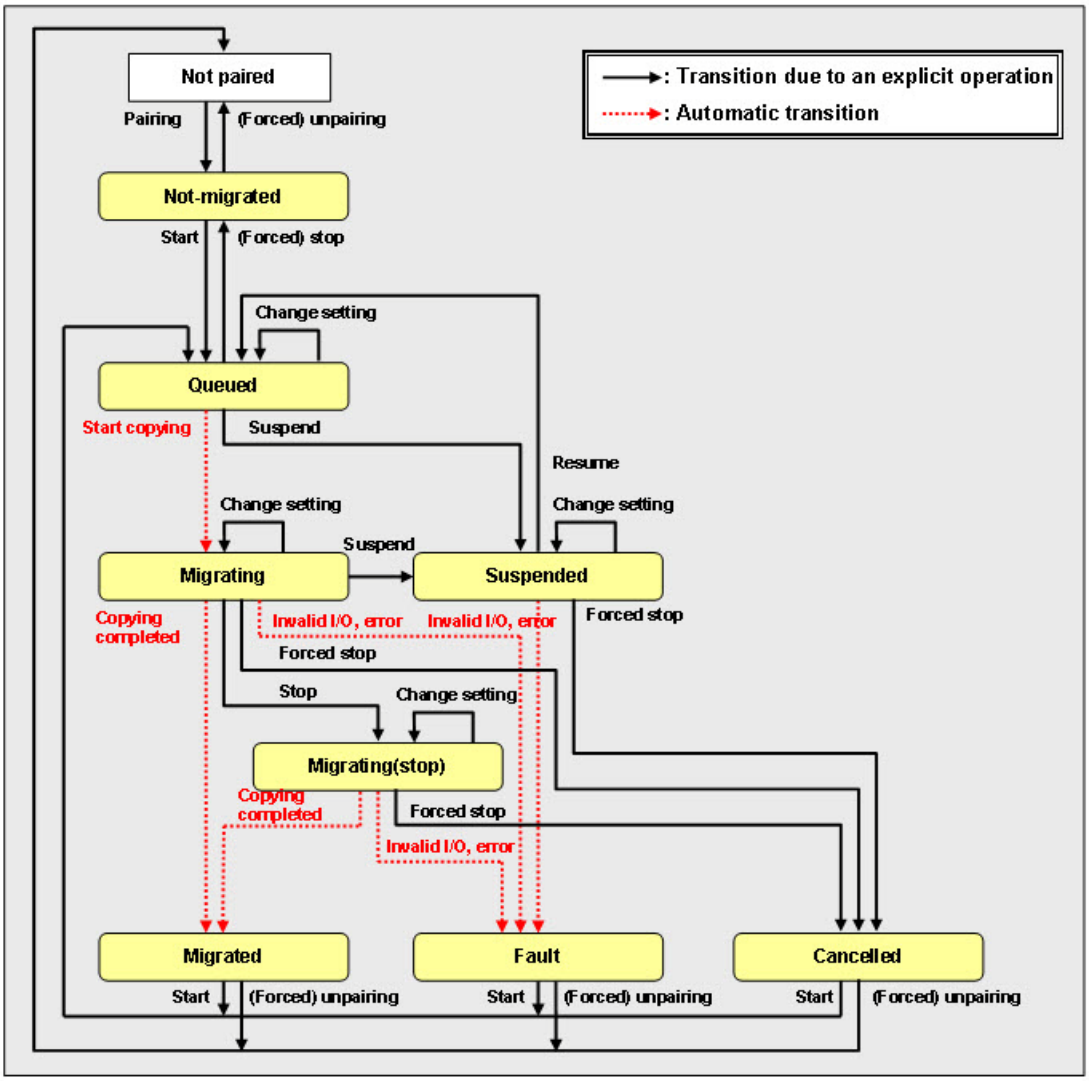


Figure 2-2: Data Migration State Transition Diagram

System Configuration

System Configuration

Hardware Configuration

Select hardware components considering the operation mode, required performance requirements and disk capacity. A configuration example of hardware components for using the data migration function is shown below.

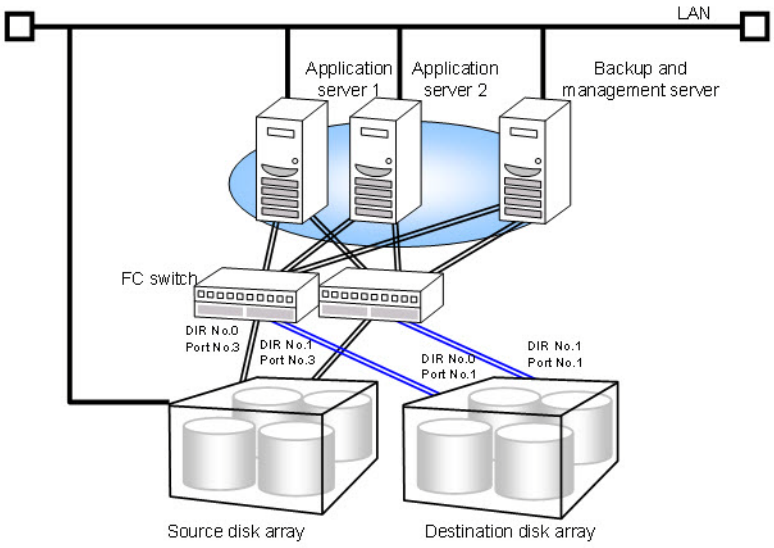


Figure 3-1: Hardware Configuration

Software Configuration

Select software to use considering the operating devices and the operation mode. A configuration example of software components for using the data migration function is shown below.

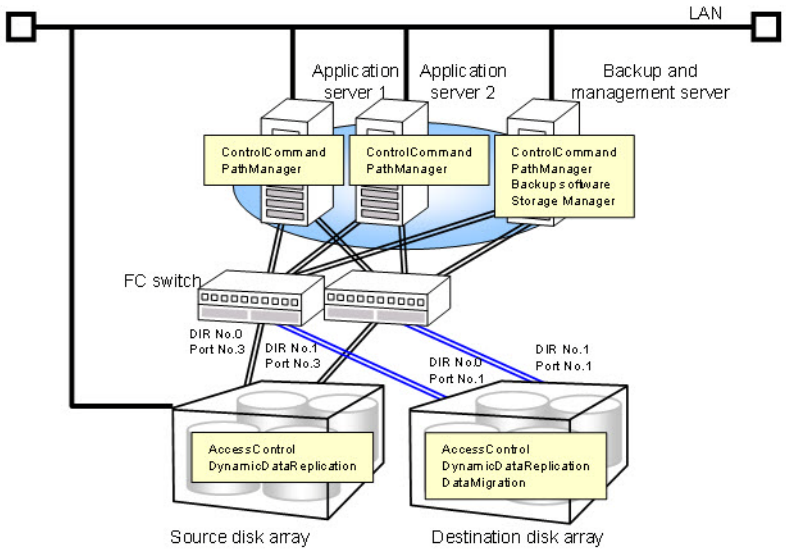


Figure 3-2: Software Configuration

Phases

Execution of migration is divided into the following phases: pre-migration processing, migration processing, and post-migration processing.

Pre-migration processing

Make preparations for data migration.

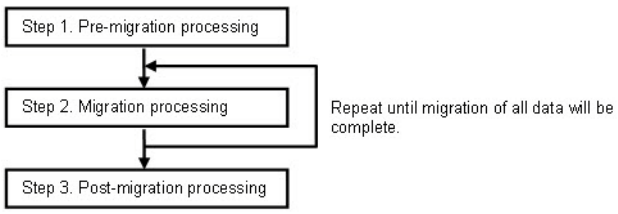
Migration processing

Migrate data and operations.

Usually, repeat migration until all the target logical disks are migrated.

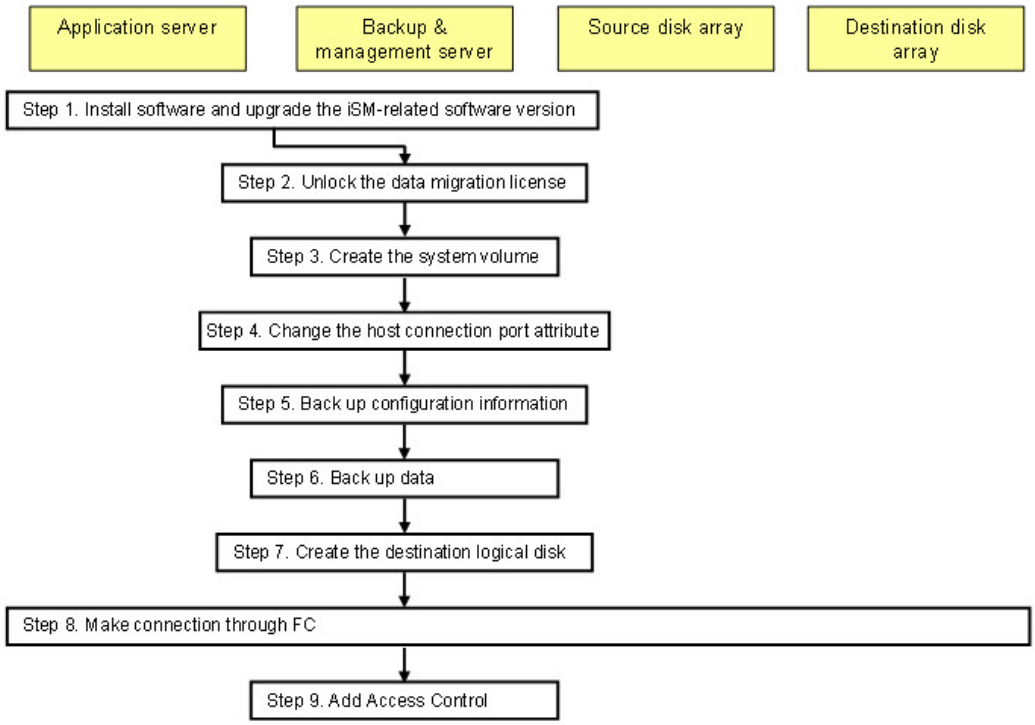
Post-migration processing

Follow up data migration.



Preparation for Data Migration

This flow chart shows an overview of the pre-migration processing.



Details of Pre-Migration Processing

1. Upgrade the SnapSAN Manager-related software to the latest version.
2. For server migration, install the latest version of SnapSAN Manager-related software on the destination server.

- Application server and backup server

  Storage Agent Utility or ControlCommand

  PathManager

- Management server

  SnapSAN Manager (when SnapSAN Manager Express is not used)

3. Unlock the licenses of DataMigration and required program products on the destination disk array.

- BaseProduct (for disk array after SnapSAN S5000)
- AccessControl (for disk array after SnapSAN S5000)
- DataMigration

4. To perform data replication (Volume Cloning or Remote Replication) or snapshot (Snapshots) operation on the destination disk array, unlock the license here.

- Volume Cloning
- Remote Replication
- Snapshots

- Unlock the license by selecting **[Bind] > [Disk array] > [Unlock license]** from the main window menu of SnapSAN Manager Embeded or SnapSAN Manager.

  If you want to use a command for this operation, log in to the destination disk array with the administrator privilege and execute the iSMcfg command.

  iSMcfg command execution example:

```
# iSMcfg licenserelease -code <keycode>
iSM31001:[ licenserelease ]Please wait for a moment........
iSM31000:[ licenserelease ]Command has completed successfully.
ExitStatus:0
```

5. To create the system volume, navigate to **[Bind] >[Logical disk] > [Bind logical disk (for control)]** and select **[Data migration reserved volume]** from the main window menu of SnapSAN Manager Embeded or SnapSAN Manager.

- If you want to use a command for this operation, log in to the destination disk array with the administrator privilege and execute the iSMcfg command.

  In this example, a system volume is created under the logical disk number ffe (hexadecimal) in pool No. 0 and the volume name Pool0000_MSV0FFE is set.

iSMcfg command execution example:

```
# iSMcfg ldbind -poolnumber 0 -ldn 0ffeh -ldattr msv
iSM31001:[ ldbind ]Please wait for a moment........
iSM31000:[ ldbind ]Command has completed successfully.
ExitStatus:0
#
# iSMcfg nickname -ldn 0ffeh -newname :Pool10000_MSV0FFE
iSM31001:[ nickname ]Please wait for a moment........
iSM31000:[ nickname ]Command has completed successfully.
ExitStatus:0
```

6. Change the host port type of destination disk array to the data migration port and add the initiator function. Having both the host port (target) attribute and the data migration (initiator) attribute, the data migration port can be used for operation input/output.

   a. Display the host connection port setting screen by selecting **[Bind] > [Disk array] > [Host connection port] > [Port setting (FC)]** from the main window menu of SnapSAN Manager Embeded or SnapSAN Manager.

   b. Select the port used for data migration from the port list displayed on the host connection port setting screen and select the [Edit] button to display the edit dialog.

   c. Specify [Data migration port] as the port type on the edit dialog and select the [OK] button.

   d. Select the [Next] button, confirm the setting, and select the [Run] button.

   e. Select [Yes] on the confirmation dialog.

   f. When the completion screen is displayed, select the [Complete] button.

   g. Display the host director properties screen to check that the host/data migration port is set.

   - If you want to use a command for this operation, log into the destination disk array with the administrator privilege and execute the iSMcfg command.

   In this example, the port with director number 0 and port number 1 is changed.

iSMcfg command execution example:

```
# iSMcfg setporttype -portnumber 00h-01h -porttype hostdm
iSM31001:[ setporttype ]Please wait for a moment........
iSM31000:[ setporttype ]Command has completed successfully.
ExitStatus:0
```

Failed Data Migration

If rollback is necessary as a result of failed data migration, back up the configuration information of source disk array (especially Access Control information) as follows:

1. Select **[Bind] >[View configuration] > [Configuration display screen] > [Acquire configuration information]** from the main window menu of SnapSAN Manager and save configuration information in an arbitrary file.
2. Perform online backup on the source disk array through replication (Volume Cloning).

   Be sure to create backup using backup software or other application if replication backup operation is not used.
3. Create a logical disk to be the destination on the destination disk array. The capacity of destination logical disk must be equal to or larger than that of the source logical disk.

   To perform the data replication or snapshot operation on the destination disk array perform the following:
4. Specify the same [OS Type] as the source logical disk. The logical disk format indicates the type of OS the uses the logical disk.
5. Assign a logical disk name corresponding to the source logical disk name so that that you can easily see the relationship between the source and the destination logical disks (for example, source_logical_disk_name_NEW).

- If you want to use a command for this operation, log in to the destination disk array with the administrator privilege and execute the iSMcfg command.

  In this example, the logical disk with logical disk number 300 (hexadecimal) and a capacity of 100 GB is created in pool 0 and the logical disk name EXP167_DATA_1_NEW is set.

iSMcfg command execution example:

```
# iSMcfg ldbind -poolnumber 0 -ldn 0300h -capacity 100 -unit gb
iSM31001:[ ldbind ]Please wait for a moment........
iSM31000:[ ldbind ]Command has completed successfully.
ExitStatus:0
# iSMcfg nickname -ldn 0300h -newname :EXP167_DATA_1_NEW
iSM31001:[ nickname ]Please wait for a moment........
iSM31000:[ nickname ]Command has completed successfully.
ExitStatus:0
```

NOTE: Do not set the Access Control setting to the application server or the replication function pair or build the snapshot function here

FC Connection

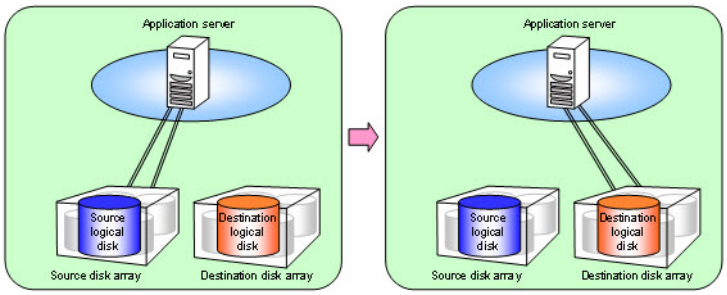
6. Make FC connection at this time, if it is possible to add FC connection between the source disk array and the destination disk array as well as between the application server and the destination disk array (between the destination application server and the destination disk array when migrating the server and between the existing server and the destination disk array otherwise),

During Migration

Make FC connection during migration processing, if it is impossible to add FC connection here.

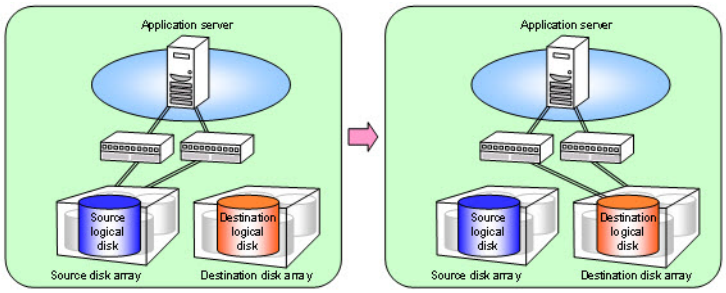
a. When migrating the disk array only from the environment where the application server and the source disk array are connected directly through FC.

- If the source and destination disk arrays individually have one or more empty host connection ports, the source disk array and the destination disk array can be connected.
- It is not usually allowed to add FC connection between the application server and the destination disk array.



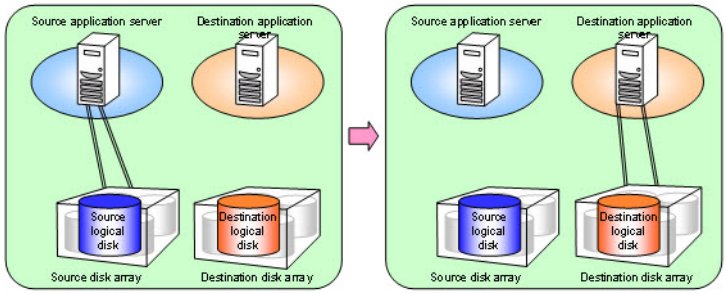
b. When migrating the disk array only from the environment where the application server and the source disk array are connected via the FC switch.

- If the destination disk array has one or more empty host connection ports and the FC switch has one or more empty ports, the source disk array and the destination disk array as well as the application server and the destination disk array can be connected.



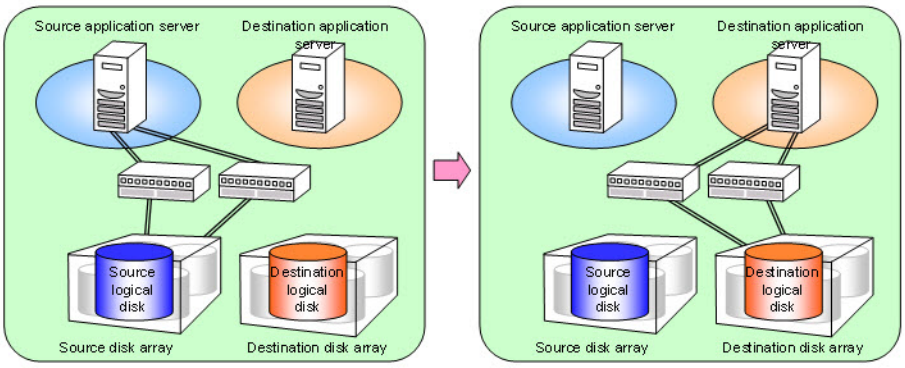
c. When migrating the disk array and the application server from the environment where the application server and the source disk array are connected directly through FC.

- If the source and destination disk arrays individually have one or more empty host connection ports, the source disk array and the destination disk array can be connected.
- If the destination disk array has still one or more empty host connection ports, the application server and the destination disk array can be connected.



d. When migrating the disk array and the application server from the environment where the application server and the source disk array are connected via the FC switch.

- If the destination disk array has one or more empty host connection ports and the FC switch has one or more empty ports, the source disk array and the destination disk array can be connected.
- If the FC switch has still one or more empty ports, the application server and the destination disk array can be connected



e. When migrating the disk array, the application server, and the FC switch from the environment where the application server and the source disk array are connected via the FC switch.

- If the destination disk array has one or more empty host connection ports and the FC switch has one or more empty ports, the source disk array and the destination disk array can be connected.
- If the migration target FC switch has two or more empty ports, the migration target application server and the destination disk array can be connected.

Adding Access Control (management server *target: source disk array)

Access Control can be set by port or WWN.

To set Access Control in the WWN mode, perform the following:

1. Acquire the WWPN for the data migration port on the destination disk array by displaying it on the host director properties screen or checking the output result of the iSMmc_ldlist command executed for the destination disk array.

2. To display the WWPN for the destination disk array, select and right-click the disk array from the product display area in the main window of SnapSAN Manager Embedded or SnapSAN Manager and select [Properties] on the properties screen.

- If you want to use a command for this operation, log in to the destination disk array with the administrator privilege and execute the iSMmc_ldlist command.

  In this example, the host connection port with director number 0 and port number 1 and the host connection port with the director number 1 and port number 1 are set as the data migration ports and their WWPNs are 2200000991050243 and 2A00000991050243, respectively.

  iSMmc_ldlist command execution example:

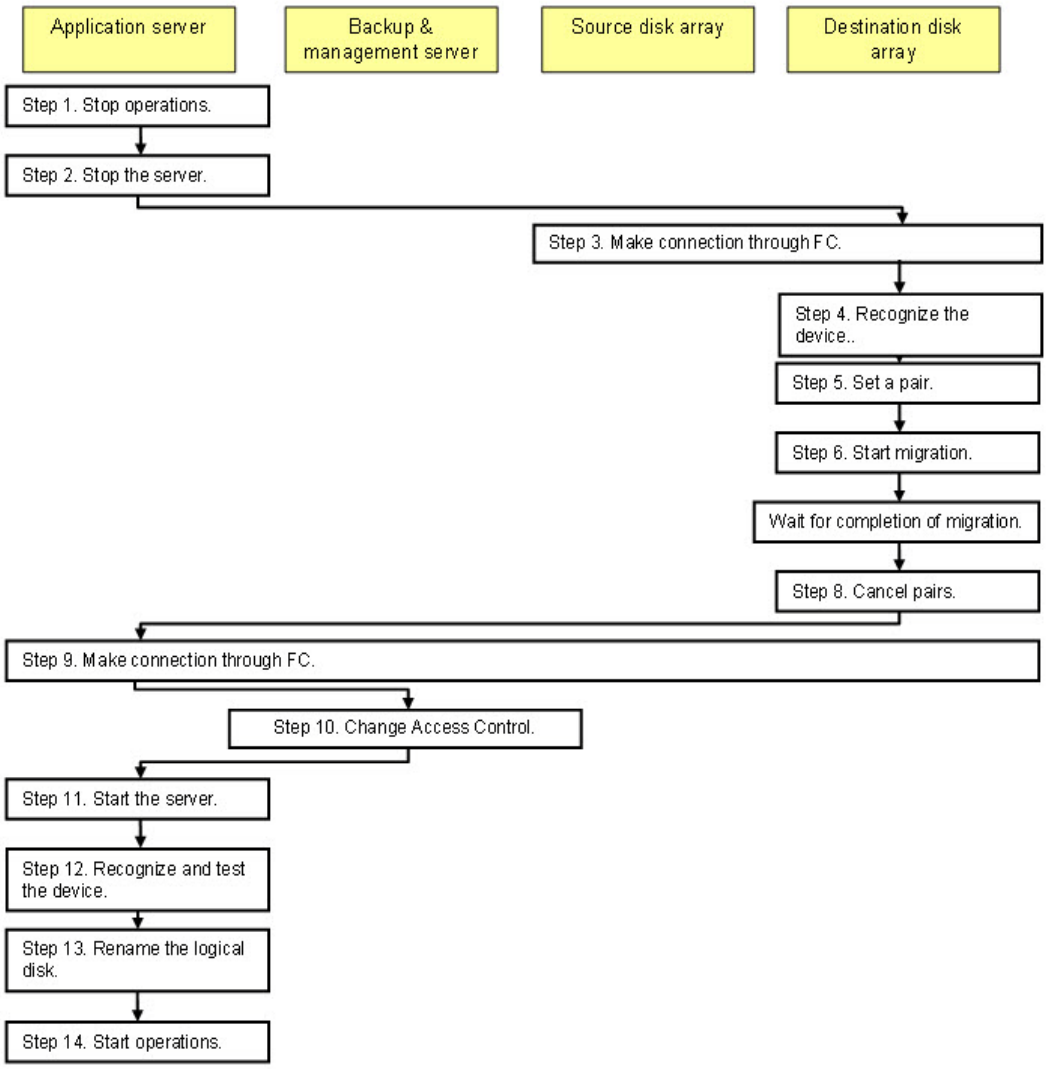
```
# iSMmc_ldlist -wwnlist -scandev
-------------------------------------------------------------
[Port No.(h)]     WWNN/WWPN
  WWNN                      WWPN                      Vendor
-------------------------------------------------------------
[00-01]           2000000991050243/2200000991050243
[01-01]           2000000991050243/2A00000991050243
ExitStatus:0
```

Setting Access Control on the source disk array

1. After selecting the source disk array, select **[Bind] >[Configuration setting]** from the main window menu of SnapSAN Manager to open the "Configuration setting" screen and select [Access Control (FC setting)/Maintain logical disk].
2. Select the [Access Control] tab from the "Logical disk maintenance" screen and create an LD set under an arbitrary name and a platform with an arbitrary value (for example, LD set name: destination disk array name, platform: WN).
3. Select [Link path to path information] for the LD set and specify the WWPN for the data migration port on the destination disk array.
4. If the LD set or logical disk is locked, select [Lock/unlock] from the [Logical disk maintenance] tab to temporally unlock the locked the LD set or logical disk and assign Access Control.

Migration Processing Stopping the Server

This sections contains the flowchart and the data migration processing procedures for stopping the server.



1. Stop operations executed on the source logical disk to stop input/output to/from the source logical disk.
2. Stop the cluster in the case of cluster operation.
3. Stop the operation applications that are using the migration target logical disk.
4. Select the manual start setting in the case of cluster operation.
5. Stop and delete the database.

For Oracle

a. Stop the database.

   * This step is not necessary if the database is stopped because the cluster was previously stopped.

b. When migrating the application server, copy the directories shown below to the source logical disk.

* After copied to the destination logical disk during data migration, these directories are used to restore the database on the new application server.

```
$ORACLE_HOME/dbs/
   $ORACLE_BASE/admin/<SID-name>
   $ORACLE_BASE/diag/rdbms/<SID-name>
```

* This step is not necessary if the application server is not migrated.

c. When migrating the application server, delete the directories shown below and delete the database instance.

```
$ORACLE_HOME/dbs/
   $ORACLE_BASE/admin/<SID-name>
   $ORACLE_BASE/diag/rdbms/<SID-name>
```

For Windows

- Delete services by executing the following command:

```
> oradim -delete -sid <SID-name>
```

* This step is not necessary if the application server is not migrated.

For SQL Server (example)

- Detach the database.

```
sqlcmd -E   -b -Q"EXEC sp_detach_db <database-name>"
```

* This step is not necessary if the database is stopped because the cluster was stopped.

Unmount the logical disk.

* This step is not necessary if the database is stopped because the cluster was stopped.

For Windows

Command example:

```
# MOUNTVOL   <drive-name>: /P
```

* In cluster operation, it is necessary to unmount the logical disks of both nodes.

For UNIX

Command example

```
# umount <mountpoint>
```

For Windows

a. Execute MOUNTVOL /N so that the logical disk is not automatically mounted at OS startup in addition to unmounting the logical disk with the MOUNTVOL /P command.

b. Delete the database and disk monitor settings in the case of cluster operation

c. Shut down the application server and turn the power off.

d. Connect the source disk array and the destination disk array through FC.

* This step is not necessary if the source disk array and destination disk array have been already connected during pre-migration processing.

e. Log in to the destination disk array before performing previous steps.

f. Use ssh, telnet or other tool with the administrator privilege to log in to the destination disk array.

g. Execute iSMmc_ldlist -wwnlist -scandev to check that source disk array is correctly recognized and that the destination disk array recognizes the logical disks in the source disk array.

The following example indicates the source disk array and the destination disk array are connected through FC (duplicated).

iSMmc_ldlist -wwnlist command execution example:

```
# iSMmc_ldlist -wwnlist -scandev
-------------------------------------------------------------
[Port No.(h)]    WWNN/WWPN
  WWNN                    WWPN                    Vendor
-------------------------------------------------------------
[00-01]          2000000991050243/2200000991050243
  200000004C7F0832        200400004C7F0832        NEC
[01-01]          2000000991050243/2A00000991050243
  200000004C7F0832        200800004C7F0832        NEC
ExitStatus:0
```

Port Connection Relationship

Port of Destination Disk array		Port of Source Disk Array	
Port Number	WWPN	WWNN	WWPN
00-01	2200000991050243	200000004C7F0832	200400004C7F0832
10-01	2A00000991050243	200000004C7F0832	200800004C7F0832

h. In addition, check that the vendor name is displayed in the Vendor column.

When the vendor name is displayed, the logical disks in the source disk array are recognized on the destination disk array.

i. Execute iSMmc_ldlist -list -scandev to check that the logical disks in the source disk array are correctly recognized on the destination disk array.

iSMmc_ldlist -list command execution example:

```
 # iSMmc_ldlist -list -scandev
-------------------------------------------------------------
Vendor     WWNN/WWPN
 LUN(h)       Capacity     LD Name
   LDN(h)          Device Identification
-------------------------------------------------------------
Overaland 2000000991050243/--------
 0300h        100.0 GB     EXP167_DATA_1_NEW
   0300h           0009910502430300
 0301h        100.0 GB     EXP167_LOG_1_NEW
   0301h           0009910502430301
 0302h        100.0 GB     EXP167_DATA_2_NEW
   0302h           0009910502430302
 0303h        100.0 GB     EXP167_LOG_2_NEW
   0303h           0009910502430303
 0304h        100.0 GB     EXP167_DATA_3_NEW
   0304h           0009910502430304
 0305h        100.0 GB     EXP167_LOG_3_NEW
   0305h           0009910502430305
 Overland 200000004C7F0832/200400004C7F0832
 0000h        50.0 GB      EXP167_DATA_1
   0100h           00004C7F08320100
 0001h        50.0 GB      EXP167_LOG_1
   0101h           00004C7F08320101
 0002h        50.0 GB      EXP167_DATA_2
   0102h           00004C7F08320102
 0003h        50.0 GB      EXP167_LOG_2
   0103h           00004C7F08320103
 0004h        50.0 GB      EXP167_DATA_3
   0104h           00004C7F08320104
 0005h        50.0 GB      EXP167_LOG_3
   0105h           00004C7F08320105
 Overland 200000004C7F0832/200800004C7F0832
 0000h        50.0 GB      EXP167_DATA_1
   0100h           00004C7F08320100
 0001h        50.0 GB      EXP167_LOG_1
   0101h           00004C7F08320101
 0002h        50.0 GB      EXP167_DATA_2
   0102h           00004C7F08320102
 0003h        50.0 GB      EXP167_LOG_2
   0103h           00004C7F08320103
 0004h        50.0 GB      EXP167_DATA_3
   0104h           00004C7F08320104
 0005h        50.0 GB      EXP167_LOG_3
   0105h           00004C7F08320105
 ExitStatus:0
```

Setting a pair (destination disk array)

1. Execute the iSMmc_pair -create command for pair setting.

iSMmc_pair -create command execution example:

```
 # iSMmc_pair -src EXP167_DATA_1 -srcflg ld -dst EXP167_DATA_1_NEW -
dstflg ld -create
iSMmc_pair: Info:      iSM36005: Pair Create Start 2011/11/19 22:23:59
SRC:EXP167_DATA_1
iSMmc_pair: Info:       iSM36006: Pair Create Normal End 2011/11/19
22:24:09 SRC:EXP167_DATA_1
iSMmc_pair: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
# iSMmc_pair -src EXP167_LOG_1 -srcflg ld -dst EXP167_LOG_1_NEW -dstflg
ld -create
iSMmc_pair: Info:      iSM36005: Pair Create Start 2011/11/19 22:24:10
SRC:EXP167_LOG_1
iSMmc_pair: Info:       iSM36006: Pair Create Normal End 2011/11/19
22:24:13 SRC:EXP167_LOG_1
iSMmc_pair: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
```

2. Execute the iSMmc_pair -list to check that combinations of paired logical disks are correct.

The following example indicates logical disks named EXP167_DATA_1 and EXP167_DATA_1_NEW as well as those named EXP167_LOG_1 and EXP167_LOG_1_NEW are paired.

iSMmc_pair -list command execution example:

```
# iSMmc_pair -list
-------------------------------------------------------------
[src info]
Vendor     WWNN/WWPN
  LUN(h)/LDN(h)      LD Name                    Capacity
    DI Name
   ----------------------------------------------------------
   [dst info]
   Vendor     WWNN/WWPN
     LUN(h)/LDN(h)      LD Name                     Capacity
       DI Name
-------------------------------------------------------------
Overland 200000004C7F0832/200400004C7F0832
  0001h/0101h         EXP167_LOG_1               50.0 GB
    00004C7F08320101
   ----------------------------------------------------------
Overland 2000000991050243/--------
      001eh/001eh         EXP167_LOG_1_NEW          100.0 GB
       000991050243001E
-------------------------------------------------------------
Overland 200000004C7F0832/200400004C7F0832
  0000h/0100h         EXP167_DATA_1              50.0 GB
    00004C7F08320100
-----------------------------------------------------------
Overland 2000000991050243/--------
      0021h/0021h         EXP167_DATA_1_NEW         150.0 GB
       0009910502430021
-------------------------------------------------------------
ExitStatus:0
```

3. Execute the iSMmc_start command to start data migration.

iSMmc_start command execution example:

```
# iSMmc_start -src EXP167_DATA_1 -srcflg ld
iSMmc_start: Info:        iSM36005: Migrate Start 2011/11/19 22:25:20
SRC:EXP167_DATA_1
iSMmc_start: Info:        iSM36006: Migrate Normal End 2011/11/19
22:25:28 SRC:EXP167_DATA_1
iSMmc_start: Info:        iSM36001: Command has completed successfully.
ExitStatus:0
# iSMmc_start -src EXP167_LOG_1 -srcflg ld
iSMmc_start: Info:        iSM36005: Migrate Start 2011/11/19 22:25:29
SRC:EXP167_LOG_1
iSMmc_start: Info:        iSM36006: Migrate Normal End 2011/11/19
22:25:31 SRC:EXP167_LOG_1
iSMmc_start: Info:        iSM36001: Command has completed successfully.
ExitStatus:0
```

iSMmc_query command execution example:

```
# iSMmc_query -src EXP167_DATA_1 -srcflg ld
Source Volume
   LD Name                      EXP167_DATA_1
   DI                            00004C7F08320100
   Size                         50.0 GB
Destination Volume
   LD Name                      EXP167_DATA_1_NEW
   DI                            0009910502430300
   Size                         100.0 GB
Activity State                 Migrate
Migration State                Migrating
Transferd Size                 5.4 GB
Copy Progress                  10%
Start Time                      2011-11-19   22:25:28
End Time                       -
Remained Copy Time            00h:08m:56s
Level                             3
Previous Migrated Time      -
ExitStatus:0
```

4. Execute the iSMmc_wait command to wait for completion of data migration.

iSMmc_wait command execution example:

```
# iSMmc_wait -src EXP167_DATA_1 -srcflg ld -cond migrated
iSMmc_wait: Info:        iSM36005: Wait Start 2011/11/19 22:27:08
SRC:EXP167_DATA_1
Waiting.....
iSMmc_wait: Info:        iSM36001: Command has completed successfully.
ExitStatus:0
# iSMmc_wait -src EXP167_LOG_1 -srcflg ld -cond migrated
iSMmc_wait: Info:        iSM36005: Wait Start 2011/11/19 22:35:54
SRC:EXP167_LOG_1
iSMmc_wait: Info:        iSM36001: Command has completed successfully.
ExitStatus:0
```

5. Execute the iSMmc_pair command to cancel pairs.

iSMmc_pair -delete command execution example:

```
# iSMmc_pair -src EXP167_DATA_1 -srcflg ld -dst EXP167_DATA_1_NEW -
dstflg ld -delete
iSMmc_pair: Info:      iSM36005: Pair Delete Start 2011/11/19 22:36:00
SRC:EXP167_DATA_1
iSMmc_pair: Info:       iSM36006: Pair Delete Normal End 2011/11/19
22:36:02 SRC:EXP167_DATA_1
iSMmc_pair: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
# iSMmc_pair -src EXP167_LOG_1 -srcflg ld -dst EXP167_LOG_1_NEW -dstflg
ld -delete
iSMmc_pair: Info:      iSM36005: Pair Delete Start 2011/11/19 22:36:03
SRC:EXP167_LOG_1
iSMmc_pair: Info:       iSM36006: Pair Delete Normal End 2011/11/19
22:36:05 SRC:EXP167_LOG_1
iSMmc_pair: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
```

Changing Access Control

6. Connect the application server and the destination disk array through FC.

   * This step is not necessary if the application server and the destination disk array have been already connected during Step 6 on page 3-5 the pre-migration processing.

7. Create new LD sets on all the servers with the Access Control function on the iSM client screen (GUI) or the CLI (iSMCLI) in the destination disk array and assign the migrated logical disks on the destination disk array to the application server.

8. Select **[Bind] > [Assign to host]** from the main window menu of SnapSAN Manager Embedded or SnapSAN Manager to open the allocation to host screen.

9. Select the allocation destination server and the logical disks to be allocated to the server and select the [Next] button.

10. Confirm the setting and select the [Run] button. After the process is complete, select the [Complete] button.

Starting the server (application server)

1. Start the application server previously shut down in Step c on page 3-10.
2. Recognize the device and test it (application server * target: destination disk array).
3. Check that the OS recognizes the destination logical disk and restore operations.
4. Check that the OS recognizes the destination logical disk. If the destination logical disk is not recognized, make the OS recognize it.

For Windows

   a. Update disk information by executing [Rescan disk].

   b. Make the disk online if it is offline.

For Linux

a. Execute the following command with the root privilege.

Command example:

```
# ls /sys/class/fc_host/    ? Assuming that host0 and host1 are
reported here.
# echo "1" > /sys/class/fc_host/host0/issue_lip
# echo "1" > /sys/class/fc_host/host1/issue_lip
```

b. Update and display the volume list and check that the logical disk is correctly recognized.

5. Mount the destination logical disk using device information displayed in the volume list.

For Windows

- Mount the logical disk using the volume name displayed in the volume list.

  Command example:

  ```
  # MOUNTVOL <drive-name>: <volume-name>
  ```

For Linux

- Mount the logical disk using the special file name displayed in the volume list.

Command example:

```
# mount -t ext3 <special-file-name> <mountpoint>
```

6. Restore and start the database.

For Oracle

a. When migrating the application server, copy the directories previously backed up.

Command example:

```
# cp -rp /<mountpoint-of-destination-logical-disk>/dbs/*
$ORACLE_HOME/dbs/
# cp -rp /<mountpoint-of-destination-logical-disk>/admin
$ORACLE_BASE/
# cp -rp /<mountpoint-of-destination-logical-disk>/diag
$ORACLE_BASE/
```

* This step is not necessary if the application server is not migrated.

b. When migrating the application server, start the listener if it is not started.

Command example:

```
#lsnrctl start
```

* This step is not necessary if the application server is not migrated.

c. Migrate the application server. If the application server uses Windows, start the database service.

Command example:

```
>oradim -new -sid <SID-name> -intpwd <password> -startmode manual
```

* This step is not necessary if the application server is not migrated.

For SQL Server (example)

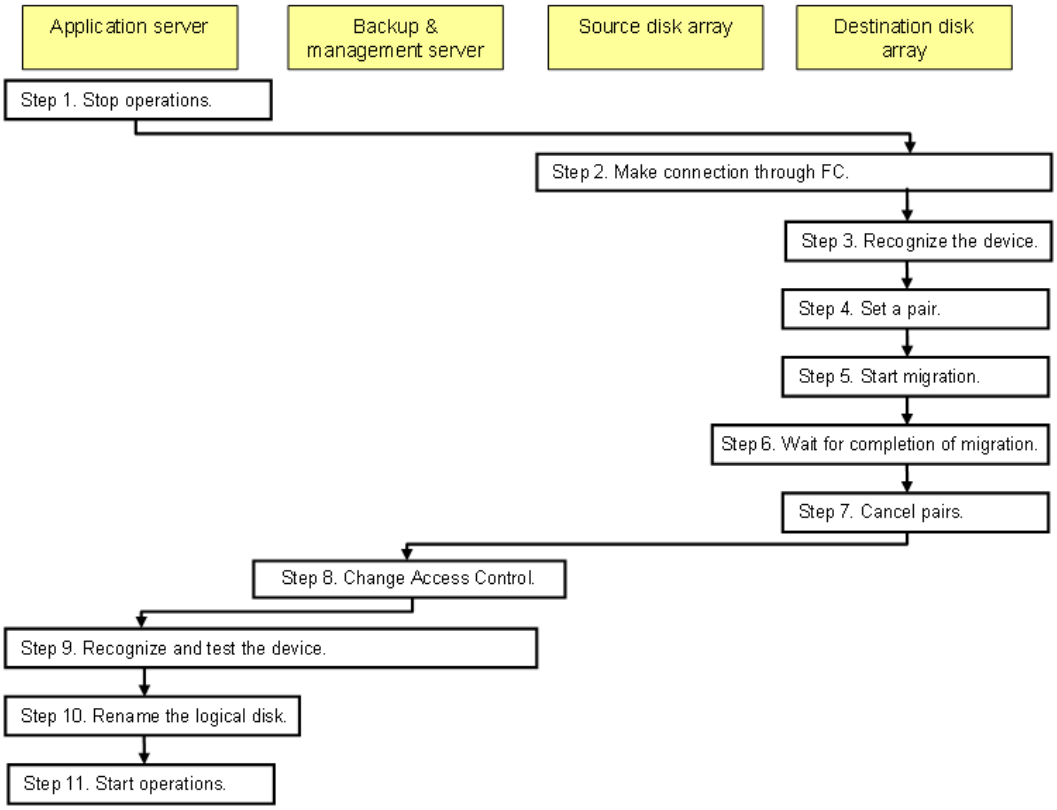
Attach the database.

```
      sqlcmd -E   -b -Q"EXEC sp_attach_db <database-name>, '<mdf-file-
path>', '<ldf-file-path>'"
```

1. Check that the database contents remain the same as before migration.
2. For setting the cluster, perform the following steps:
   a. Temporarily stop the database.
   b. Enable the disk and database monitor settings.
   c. Start the group.
3. Check that operations can be resumed on the application server.
4. To use a logical disk name unique within the system for operation, allocate the logical disk name used on the source disk array to the destination logical disk name.
5. To manage the source and destination disk arrays with a single SnapSAN Manager server, duplicate logical disk names are not allowed. Rename the source logical disk (for example, from DATA_1 to DATA_1_OLD) and then rename the logical disk name in the destination disk array (for example, from DATA_1_NEW to DATA_1).
6. Start operations for which data is completely migrated.

Migration Processing Stopping Operations

This section provides an overview of data migration processing stopping operations (without stopping the server).



This section describes the data migration processing flow.

Stopping Operations (Application Server)

Stop operations executed on the source logical disk to stop input/output to/from the source logical disk.

1. Stop monitoring operation applications and database in the case of cluster operation.
2. Stop the operation applications that are using the migration target logical disk.
3. Select the manual start setting in the case of cluster operation.
4. Stop and delete the database.

For Oracle

a. Stop the database.

b. When migrating the application server, copy the directories shown below to the source logical disk.

* After copied to the destination logical disk during data migration, these directories are used to restore the database on the new application server.

```
$ORACLE_HOME/dbs/
   $ORACLE_BASE/admin/<SID-name>
   $ORACLE_BASE/diag/rdbms/<SID-name>
* This step is not necessary if the application server is not migrated.
```

c. When migrating the application server, delete the directories shown below and delete the database instance.

```
$ORACLE_HOME/dbs/
   $ORACLE_BASE/admin/<SID-name>
   $ORACLE_BASE/diag/rdbms/<SID-name>
```

For Windows

- Delete services by executing the following command:

```
> oradim -delete -sid <SID-name>
```

* This step is not necessary if the application server is not migrated.

For SQL Server (example)

- Detach the database

```
sqlcmd -E  -b -Q"EXEC sp_detach_db <database-name>"
```

5. Unmount the logical disk.

For Windows

Command example:

```
# MOUNTVOL  <drive-name>: /P
```

* The logical disks must be unmounted from both nodes in the case of cluster operation.

For UNIX

Command example:

```
# umount <mountpoint>
```

In Windows, be sure to execute MOUNTVOL /N so that the logical disk is not automatically mounted at OS startup in addition to unmounting the logical disk with the MOUNTVOL /P command.

6. Delete the database and disk monitor settings in the case of cluster operation.
7. Shut down the application server and turn the power off.
8. Connect the source disk array and the destination disk array through FC.

* This step is not necessary if the source disk array and destination disk array have been previously connected during pre-migration processing.

Recognizing the Device (Destination Disk Array)

1. Log in to the destination disk array before performing steps 1 - 9.
2. Use ssh, telnet or other tool with the administrator privilege to log in to the destination disk array.
3. Execute iSMmc_ldlist -wwnlist -scandev to check that source disk array is correctly recognized and that the destination disk array recognizes the logical disks in the source disk array.

The following example indicates the source disk array and the destination disk array are connected through FC (duplicated).

iSMmc_ldlist -wwnlist command execution example:

```
# iSMmc_ldlist -wwnlist -scandev
------------------------------------------------------------
[Port No.(h)]     WWNN/WWPN
   WWNN                          WWPN                          Vendor
------------------------------------------------------------
[00-01]             2000000991050243/2200000991050243
   200000004C7F0832           200400004C7F0832           Overland
[01-01]             2000000991050243/2A00000991050243
   200000004C7F0832           200800004C7F0832           Overland
ExitStatus:0
```

Port Connection Relationship

Port of Destination Disk array		Port of Source Disk Array	
Port Number	WWPN	WWNN	WWPN
00-01	2200000991050243	200000004C7F0832	200400004C7F0832
10-01	2A00000991050243	200000004C7F0832	200800004C7F0832

4. In addition, check that the vendor name is displayed in the Vendor column.

   When the vendor name is displayed, the logical disks in the source disk array are recognized on the destination disk array.

5. Execute iSMmc_ldlist -list -scandev to check that the logical disks in the source disk array are correctly recognized on the destination disk array.

iSMmc_ldlist -list command execution example:

```
# iSMmc_ldlist -list -scandev
-------------------------------------------------------------
Vendor      WWNN/WWPN
 LUN(h)       Capacity     LD Name
   LDN(h)          Device Identification
-------------------------------------------------------------
Overland          2000000991050243/--------
 0300h         100.0 GB     EXP167_DATA_1_NEW
   0300h           0009910502430300
 0301h         100.0 GB     EXP167_LOG_1_NEW
   0301h           0009910502430301
 0302h         100.0 GB     EXP167_DATA_2_NEW
   0302h           0009910502430302
 0303h         100.0 GB     EXP167_LOG_2_NEW
   0303h           0009910502430303
 0304h         100.0 GB     EXP167_DATA_3_NEW
   0304h           0009910502430304
 0305h         100.0 GB     EXP167_LOG_3_NEW
   0305h           0009910502430305
Overland          200000004C7F0832/200400004C7F0832
 0000h         50.0 GB       EXP167_DATA_1
   0100h           00004C7F08320100
 0001h         50.0 GB       EXP167_LOG_1
   0101h           00004C7F08320101
 0002h         50.0 GB       EXP167_DATA_2
   0102h           00004C7F08320102
 0003h         50.0 GB       EXP167_LOG_2
   0103h           00004C7F08320103
 0004h         50.0 GB       EXP167_DATA_3
   0104h           00004C7F08320104
 0005h         50.0 GB       EXP167_LOG_3
   0105h           00004C7F08320105
Overland          200000004C7F0832/200800004C7F0832
 0000h         50.0 GB       EXP167_DATA_1
   0100h           00004C7F08320100
 0001h         50.0 GB       EXP167_LOG_1
   0101h           00004C7F08320101
 0002h         50.0 GB       EXP167_DATA_2
   0102h           00004C7F08320102
 0003h         50.0 GB       EXP167_LOG_2
   0103h           00004C7F08320103
 0004h         50.0 GB       EXP167_DATA_3
   0104h           00004C7F08320104
 0005h         50.0 GB       EXP167_LOG_3
   0105h           00004C7F08320105
ExitStatus:0
```

Setting a Pair (Destination Disk Array)

6. Execute the iSMmc_pair -create command for pair setting.

iSMmc_pair -create command execution example:

```
# iSMmc_pair -src EXP167_DATA_1 -srcflg ld -dst EXP167_DATA_1_NEW -
dstflg ld -create
iSMmc_pair: Info:      iSM36005: Pair Create Start 2011/11/19 22:23:59
SRC:EXP167_DATA_1
iSMmc_pair: Info:       iSM36006: Pair Create Normal End 2011/11/19
22:24:09 SRC:EXP167_DATA_1
iSMmc_pair: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
# iSMmc_pair -src EXP167_LOG_1 -srcflg ld -dst EXP167_LOG_1_NEW -dstflg
ld -create
iSMmc_pair: Info:      iSM36005: Pair Create Start 2011/11/19 22:24:10
SRC:EXP167_LOG_1
iSMmc_pair: Info:       iSM36006: Pair Create Normal End 2011/11/19
22:24:13 SRC:EXP167_LOG_1
iSMmc_pair: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
```

Execute the iSMmc_pair -list to check that combinations of paired logical disks are correct.

The following example indicates logical disks named EXP167_DATA_1 and EXP167_DATA_1_NEW as well as those named EXP167_LOG_1 and EXP167_LOG_1_NEW are paired.

iSMmc_pair -list command execution example:

```
# iSMmc_pair -list
-----------------------------------------------------------------
[src info]
Vendor     WWNN/WWPN
  LUN(h)/LDN(h)      LD Name                    Capacity
    DI Name
    ------------------------------------------------------------
   [dst info]
   Vendor     WWNN/WWPN
      LUN(h)/LDN(h)      LD Name                     Capacity
        DI Name
-----------------------------------------------------------------
Overland         200000004C7F0832/200400004C7F0832
  0001h/0101h         EXP167_LOG_1               50.0 GB
    00004C7F08320101
    ------------------------------------------------------------
    Overland         2000000991050243/--------
       001eh/001eh         EXP167_LOG_1_NEW          100.0 GB
        000991050243001E
-----------------------------------------------------------------
Overland         200000004C7F0832/200400004C7F0832
  0000h/0100h         EXP167_DATA_1              50.0 GB
    00004C7F08320100
    ------------------------------------------------------------
    Overland         2000000991050243/--------
       0021h/0021h         EXP167_DATA_1_NEW         150.0 GB
        0009910502430021
-----------------------------------------------------------------
ExitStatus:0
```

7. Execute the iSMmc_start command to start data migration.

iSMmc_start command execution example:

```
 # iSMmc_start -src EXP167_DATA_1 -srcflg ld
iSMmc_start: Info:       iSM36005: Migrate Start 2011/11/19 22:25:20
SRC:EXP167_DATA_1
iSMmc_start: Info:       iSM36006: Migrate Normal End 2011/11/19
22:25:28 SRC:EXP167_DATA_1
iSMmc_start: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
# iSMmc_start -src EXP167_LOG_1 -srcflg ld
iSMmc_start: Info:       iSM36005: Migrate Start 2011/11/19 22:25:29
SRC:EXP167_LOG_1
iSMmc_start: Info:       iSM36006: Migrate Normal End 2011/11/19
22:25:31 SRC:EXP167_LOG_1
iSMmc_start: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
```

iSMmc_query command execution example:

```
# iSMmc_query -src EXP167_DATA_1 -srcflg ld
Source Volume
  LD Name                    EXP167_DATA_1
  DI                          00004C7F08320100
  Size                        50.0 GB
Destination Volume
  LD Name                    EXP167_DATA_1_NEW
  DI                          0009910502430300
  Size                        100.0 GB
Activity State              Migrate
Migration State             Migrating
Transferd Size              5.4 GB
Copy Progress               10%
Start Time                   2011-11-19   22:25:28
End Time                    -
Remained Copy Time          00h:08m:56s
Level                          3
Previous Migrated Time     -
ExitStatus:0
```

8. Execute the iSMmc_wait command to wait for completion of data migration.

iSMmc_wait command execution example:

```
# iSMmc_wait -src EXP167_DATA_1 -srcflg ld -cond migrated
iSMmc_wait: Info:       iSM36005: Wait Start 2011/11/19 22:27:08
SRC:EXP167_DATA_1
Waiting.....
iSMmc_wait: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
# iSMmc_wait -src EXP167_LOG_1 -srcflg ld -cond migrated
iSMmc_wait: Info:       iSM36005: Wait Start 2011/11/19 22:35:54
SRC:EXP167_LOG_1
iSMmc_wait: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
```

9. Execute the iSMmc_pair command to cancel pairs.

iSMmc_pair -delete command execution example:

```
# iSMmc_pair -src EXP167_DATA_1 -srcflg ld -dst EXP167_DATA_1_NEW -
dstflg ld -delete
iSMmc_pair: Info:      iSM36005: Pair Delete Start 2011/11/19 22:36:00
SRC:EXP167_DATA_1
iSMmc_pair: Info:       iSM36006: Pair Delete Normal End 2011/11/19
22:36:02 SRC:EXP167_DATA_1
iSMmc_pair: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
# iSMmc_pair -src EXP167_LOG_1 -srcflg ld -dst EXP167_LOG_1_NEW -dstflg
ld -delete
iSMmc_pair: Info:      iSM36005: Pair Delete Start 2011/11/19 22:36:03
SRC:EXP167_LOG_1
iSMmc_pair: Info:       iSM36006: Pair Delete Normal End 2011/11/19
22:36:05 SRC:EXP167_LOG_1
iSMmc_pair: Info:       iSM36001: Command has completed successfully.
ExitStatus:0
```

Connection - Canceling pairs (destination disk array)

1. Connect the application server and the destination disk array through FC.

   * This step is not necessary if the application server and the destination disk array have been previously connected at Step 6 on page 3-5 during pre-migration processing.

2. Create new LD sets on all the servers with the Access Control function on the SnapSAN Manager client screen (GUI) or the ControlCommand (SnapSAN ManagerCLI) in the destination disk array and assign the migrated logical disks on the destination disk array to the application server.

   a. Select **[Bind] >[Assign to host]** from the main window menu of SnapSAN Manager Embeded or SnapSAN Manager to open the allocation to host screen.

   b. Select the allocation destination server and the logical disks to be allocated to the server and select the [Next] button.

   c. Confirm the setting and select the [Run] button. After the process is complete, select the [Complete] button.

3. Start the application server previously shut down at

   a. Check that the OS recognizes the destination logical disk and restore operations.

   b. Check that the OS recognizes the destination logical disk. If the destination logical disk is not recognized, make the OS recognize it.

For Windows

   a. Update disk information by executing [Rescan disk].

   b. Make the disk online if it is offline.

For Linux

- Execute the following command with the root privilege.

Command example:

```
# ls /sys/class/fc_host/   ? Assuming that host0 and host1 are reported
here.
# echo "1" > /sys/class/fc_host/host0/issue_lip
# echo "1" > /sys/class/fc_host/host1/issue_lip
```

a. Update and display the volume list and check that the logical disk is correctly recognized.

4. Mount the destination logical disk using device information displayed in the volume list.

For Windows

- Mount the logical disk using the volume name displayed in the volume list.

Command example:

```
# MOUNTVOL <drive-name>: <volume-name>
```

For Linux

a. Mount the logical disk using the special file name displayed in the volume list.

Command example:

```
# mount -t ext3 <special-file-name> <mountpoint>
```

b. Restore and start the database.

For Oracle

a. When migrating the application server, copy the directories preciously backed up.

Command example:

```
# cp -rp /<mountpoint-of-destination-logical-disk>/dbs/*
$ORACLE_HOME/dbs/
# cp -rp /<mountpoint-of-destination-logical-disk>/admin $ORACLE_BASE/
# cp -rp /<mountpoint-of-destination-logical-disk>/diag $ORACLE_BASE/
```

* This step is not necessary if the application server is not migrated.

b. When migrating the application server, start the listener if it is not started.

Command example:

```
#lsnrctl start
```

* This step is not necessary if the application server is not migrated.

c. Migrate the application server. If the application server uses Windows, start the database service.

Command example:

```
>oradim -new -sid <SID-name> -intpwd <password> -startmode manual
```

* This step is not necessary if the application server is not migrated.

For SQL Server (example)

- Attach the database.

```
sqlcmd -E  -b -Q"EXEC sp_attach_db <database-name>, '<mdf-file-path>',
'<ldf-file-path>'"
```

5. Check that the database contents remain the same as before migration.

6. To set the cluster, perform the following steps:

a. Temporarily stop the database.

b. Enable the disk and database monitor settings.

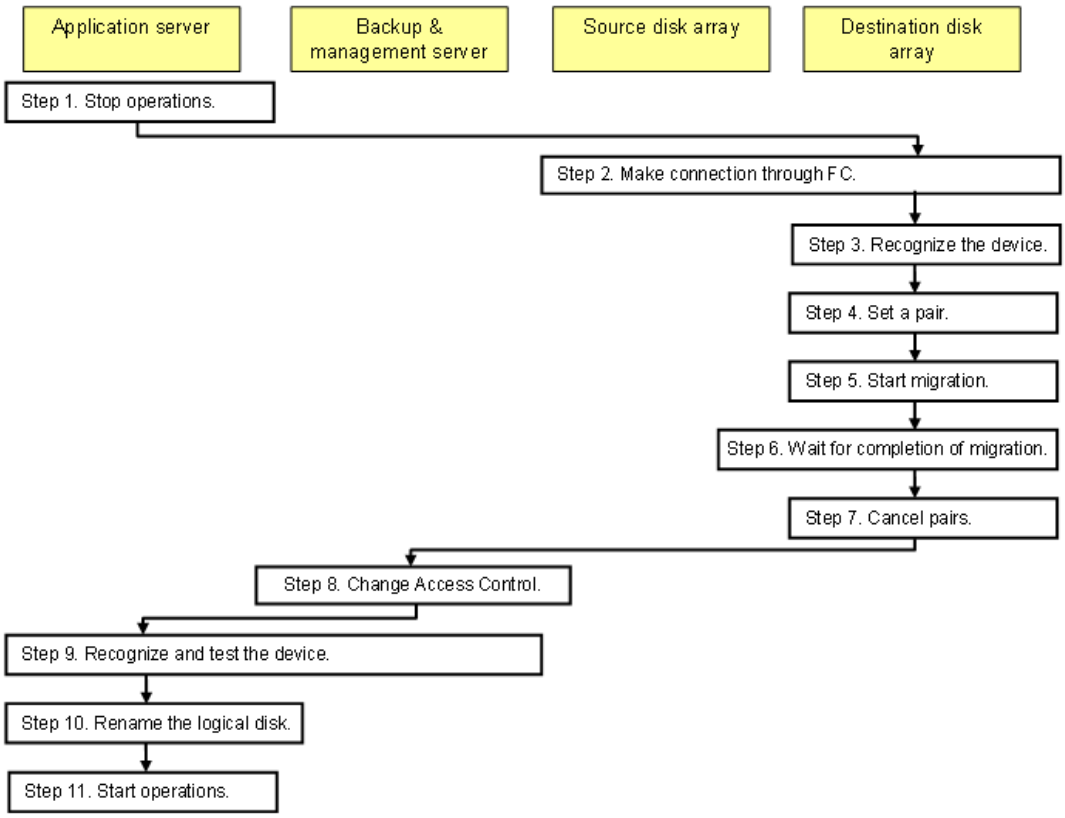
c. Start the group.

Check that Operations can be resumed on the Application Server

7. Rename the logical disk (management server: destination disk array).
   a. To use a logical disk name unique within the system for operation, allocate the logical disk name used on the source disk array to the destination logical disk name.
   b. To manage the source and destination disk arrays with a single SnapSAN Manager server, duplicate logical disk names are not allowed. So, rename the source logical disk (for example, from DATA_1 to DATA_1_OLD) and then rename the logical disk name in the destination disk array (for example, from DATA_1_NEW to DATA_1).
8. Start operations for which data is completely migrated.

Migration Processing Stopping Operations

This section provides an overview of data migration processing stopping operations (without stopping the server).



The data migration processing flow is shown below.

1. Stop monitoring operation applications and database in the case of cluster operation.
2. Stop the operation applications that are using the migration target logical disk.

- Select the manual start setting in the case of cluster operation.

3. Stop and delete the database.

For Oracle

a. Stop the database.

b. When migrating the application server, copy the directories shown below to the source logical disk.

* After copied to the destination logical disk during data migration, these directories are used to restore the database on the new application server.

```
$ORACLE_HOME/dbs/
   $ORACLE_BASE/admin/<SID-name>
   $ORACLE_BASE/diag/rdbms/<SID-name>
```

* This step is not necessary if the application server is not migrated.

c. When migrating the application server, delete the directories shown below and delete the database instance.

```
$ORACLE_HOME/dbs/
   $ORACLE_BASE/admin/<SID-name>
   $ORACLE_BASE/diag/rdbms/<SID-name>
```

For Windows

- Delete services by executing the following command:

```
> oradim -delete -sid <SID-name>
```

* This step is not necessary if the application server is not migrated.

For SQL Server (example)

a. Detach the database

```
sqlcmd -E   -b -Q"EXEC sp_detach_db <database-name>"
```

4. Unmount the logical disk.

For Windows

Command example:

```
# MOUNTVOL   <drive-name>: /P
```

* The logical disks must be unmounted from both nodes in the case of cluster operation.

For UNIX

Command example:

```
# umount <mountpoint>
```

In Windows, be sure to execute MOUNTVOL /N so that the logical disk is not automatically mounted at OS startup in addition to unmounting the logical disk with the MOUNTVOL /P command.

5. Delete the database and disk monitor settings in the case of cluster operation.

These steps are the same as those for data migration stopping the server. See "Stopping Operations (Application Server)."

During data migration stopping operations, the ongoing operations and data migration may affect each other's I/O performance. (Compared to data migration stopping the server, the I/O speed decreases by about 30%.)

- To prevent a decrease in I/O performance, it is recommended to specify the speed level option of the iSMmc_start command as 2 or less, or reduce the number of pairs that will be migrated at the same time.

Changing Access Control (management server *target: destination disk array)

These steps are the same as those for data migration stopping the server. See Step 6 and Step 7 on page 3-15.

6. Check that the OS recognizes the destination logical disk and restore operations.
7. Check that the OS recognizes the destination logical disk. If the destination logical disk is not recognized, make the OS recognize it.

For Windows

a. Update disk information by executing [Rescan disk].

b. Make the disk online if it is offline.

For Linux

- Execute the following command with the root privilege.

  Command example:

  # ls /sys/class/fc_host/ ? Assuming that host0 and host1 are reported here.

  # echo "1" > /sys/class/fc_host/host0/issue_lip

  # echo "1" > /sys/class/fc_host/host1/issue_lip

c. Update and display the volume list and check that the logical disk is correctly recognized.

d. Mount the destination logical disk using device information displayed in the volume list.

For Windows

- Mount the logical disk using the volume name displayed in the volume list.

  Command example:

```
# MOUNTVOL <drive-name>: <volume-name>
```

* The specified drive name must be the same as that of the source disk array.

For Linux

- Mount the logical disk using the special file name displayed in the volume list.

Command example:

```
# mount -t ext3 <special-file-name> <mountpoint>
```

* The specified mountpoint must be the same as that of the source disk array.

8. Restore and start the database.

For Oracle

a. When migrating the application server, copy the directories previously backed up.

Command example:

```
# cp -rp /<mountpoint-of-destination-logical-disk>/dbs/*
$ORACLE_HOME/dbs/
# cp -rp /<mountpoint-of-destination-logical-disk>/admin $ORACLE_BASE/
# cp -rp /<mountpoint-of-destination-logical-disk>/diag $ORACLE_BASE/
```

* This step is not necessary if the application server is not migrated.

b. When migrating the application server, start the listener if it is not started.

Command example:

```
#lsnrctl start
```

* This step is not necessary if the application server is not migrated.

c. Migrate the application server. If the application server uses Windows, start the database service.

Command example:

```
>oradim -new -sid <SID-name> -intpwd <password> -startmode manual
```

* This step is not necessary if the application server is not migrated.

For SQL Server (example)

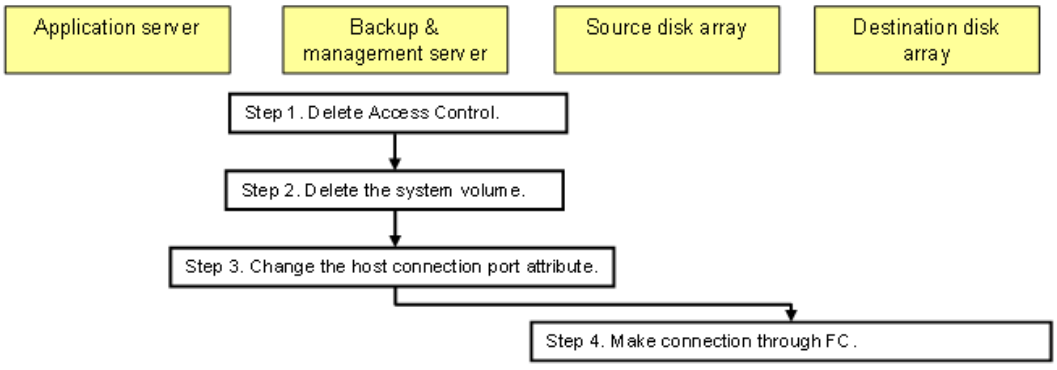
a. Attach the database.

```
sqlcmd -E  -b -Q"EXEC sp_attach_db <database-name>, <mdf-file-path>',
'<ldf-file-path>'"
```

9. Check that the database contents remain the same as before migration.
10. Set the cluster
    a. Temporarily stop the database.
    b. Enable the disk and database monitor settings.
    c. Start the group.
11. Perform a check. See Step 7 and Step 8 on page 3-26.

Post-Migration Processing

This section provides an overview of post-migration processing.



This section describes the post-processing of data migration.

1. When data migration is complete, delete the permission for the application server to access the source logical disk.

2. If you have no plan to use the data migration function, the system volume for data migration can be deleted.
3. Navigate to **[Bind] >[Logical Disk] >[Unbind logical disk] >** from the main window menu of SnapSAN Manager Embeded or SnapSAN Manager, and then select and delete the "volume reserved for data migration".

- If you want to use a command for this operation, log in to the destination disk array with the administrator privilege and execute the iSMcfg command.

4. Changing the host connection port attribute (management server * target: destination disk array)

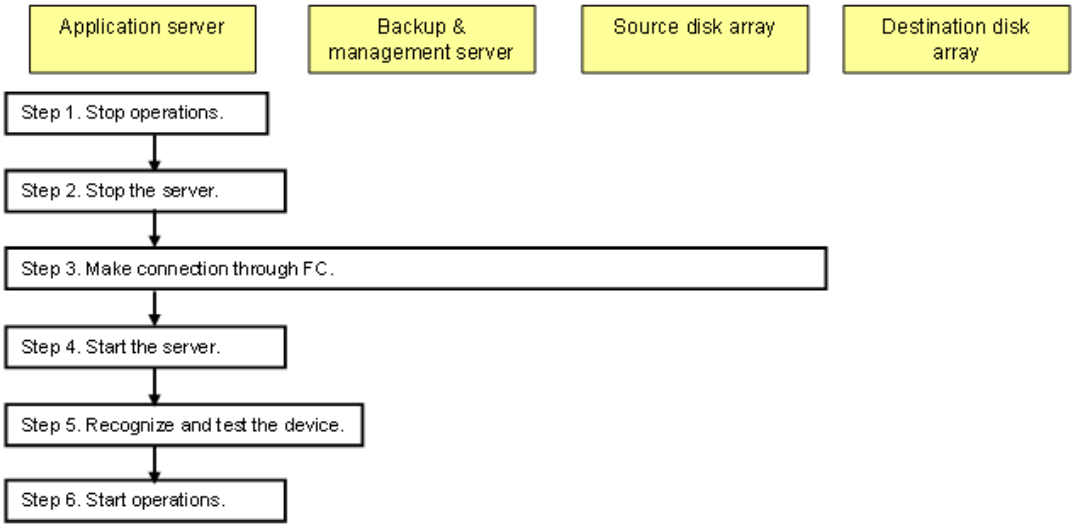
If you do not use the data migration function, the host port type of the destination disk array can be changed to the host port. Perform the following:

1. Display the host connection port setting screen by selecting **[Bind] >**[**Disk Array] >[Host Connection Port] >[Port setting (FC)]** from the main window menu of SnapSAN Manager Embeded or SnapSAN Manager.
2. Select the port used for data migration from the port list displayed on the host connection port setting screen and select the **[Edit]** button to display the edit dialog.
3. Specify **[Host Port]** as the port type on the edit dialog and select the **[OK]** button.
4. Select the **[Next]** button, confirm the setting, and select the **[Run]** button.
5. Select **[Yes]** on the confirmation dialog.
6. When the completion screen is displayed, select the **[Complete]** button.
7. Display the host director properties screen to check that the host/data migration port is set

- If you want to use a command for this operation, log in to the destination disk array with the administrator privilege and execute the iSMcfg command.
- If you have no plan to use the data migration function, disconnect the source disk array and the destination disk array connected through FC.

Rollback Procedure

This section describes the rollback procedure when stopping data migration in the middle.



1. Stop operations executed on the destination logical disk to stop input/output to/from the destination logical disk.
2. Stop the server if data was being migrated stopping the server.
   This step is not necessary if data is migrated stopping operations.
3. Connect the application server and the source disk array through FC.
   * This step is not necessary if the application server and the source disk array have already been connected at step 8 during pre-migration processing.
4. Start the server if data was being migrated stopping the server.
   This step is not necessary if data is migrated stopping operations.
5. Make the OS recognize the source logical disk and restore operations.
6. Start operations for which data is completely rolled back.

Commands

Command List

This chapter describes how to use the functions provided by the data migration function and run on the destination disk array (SnapSAN S3000/S5000).

Command Name	Description
iSMmc_ldlist	Listing information about logical disks and disk arrays used for data migration
iSMmc_query	Displaying the status of data migration
iSMmc_pair	Setting and releasing the pairing for data migration, listing the pairs, and removing the data migration attribute.
iSMmc_start	Starting data migration
iSMmc_stop	Stopping data migration
iSMmc_suspend	Suspending data migration
iSMmc_resume	Restarting data migration
iSMmc_wait	Waiting for completion of data migration
iSMmc_setconfig	Setting and displaying the configuration of data migration
iSMmc_change	Changing the data migration settings

Volume Types

Volume types to specify to be handled by data migration commands are as follows.

Type	Description	Identifier
Logical disk name	Specifies the logical disk name set on the disk array.	ld
Device identifier	Specifies the device identifier (T10/EUI/NAA) set on the disk array.	di

The identifier is a character string that indicates the volume type and is used in the following cases:

- When specifying the volume type by an argument (-srcflg, -dstflg, or -volflg) of a data migration command.
- When specifying the volume type in the data migration operation file.

Data Migration Operation File

Use the data migration operation file to process multiple pairs in batch when executing the data migration or pair operation command.

Using the data migration operation file enables you to specify the operation target pairs in the file to manage and share them. This is effective in terms of system operation and maintainability during data migration.

An example of data migration operation file is shown below.

```
#Type:SRC_V   Type:DST_V
ld:dev001     ld:dev101
ld:dev002     ld:dev102
```

Transfer the data migration operation file to the disk array with the ftp command. The ftp directory is located directly under the ftp login directory. Transfer the data migration operation file to this ftp directory.

Execute the data migration command with the -file option as the user who logged in through ftp. Specify the data migration operation file name using the relative path from the ftp directory in the -file option.

iSMmc_start command execution example

```
# iSMmc_start -file ftp/pairlist.txt
iSMmc_start: Info:        iSM36005: Migrate Start 2011/11/19 22:25:20
SRC:dev001
iSMmc_start: Info:        iSM36006: Migrate Normal End 2011/11/19
22:25:28 SRC:dev001
iSMmc_start: Info:        iSM36005: Migrate Start 2011/11/19 22:25:29
SRC:dev002
iSMmc_start: Info:        iSM36006: Migrate Normal End 2011/11/19
22:25:31 SRC:dev002
iSMmc_start: Info:        iSM36001: Command has completed successfully.
ExitStatus:0
```

Listing Information about Logical Disks and Disk Arrays Used for Data Migration

Use the iSMmc_ldlist command to acquire and display the information on the external disk array connected to the destination disk array through FC and the logical disk that is permitted to access the destination disk array by Access Control on the external disk array.

Main Options

The iSMmc_ldlist command recognizes the following options.

-wwnlist option

Displays the WWNN and WWPN of the external disk arrays connected to the port for data migration.

-list option

Displays the information on the disk array that is executing the command or the logical disk permitted to access that disk array that is executing the command by Access Control on the external disk array connected to the data migration port through FC.

-all option

Acquires or displays the information of logical disks in the disk array where this command is executed and those in all the external disk arrays connected to the data migration port.

-wwnn option

Acquires or displays the information of logical disks in the external disk array with the specified WWNN.

-wwpn option

Acquires or displays the information of logical disks in the external disk array connected from the specified WWPN port.

-local option

Acquires or displays the information of logical disks in the disk array where this command is executed.

-scandev option

Acquires and displays the information of the disk array specified with -wwnlist or -list.

Displayed information

A list of WWNNs and WWPNs of the external disk array is displayed. (iSMmc_ldlist -wwnlist)

```
[local_port_number]      wwnn/wwpn
wwnn                          wwpn                          vendor_name
```

Description

local_port_number: "Host director number-Port number" of the local disk array port that is set as the port for data migration

WWNN: World Wide Node Name of the local disk array or that of the external disk array connected to the port for data migration

WWPN: World Wide Port Name of the local disk array or that of the external disk array connected to the port for data migration

Vendor: Vender name of the external disk array

A list of logical disks is displayed. (iSMmc_ldlist -list)

```
Vendor      wwnn/wwpn
   lun           capacity      ld_name
      ldn             device_identification
```

Description

Vendor: Vendor name

LUN: Logical Unit Number

Capacity: Disk capacity

LDN: Logical Disk Number

LD Name: LD name

Device Indentifier: Device identifier

Displaying the Status of Data Migration

The iSMmc_query command displays the copy state of the disk array pair for data migration.

Main options

The iSMmc_query command recognizes the following options.

Specification of volumes to be paired

- Source logical disk specification (-src src -srcflg srcflg)
  Specify the source logical disk and its volume type.
- Destination logical disk specification (-dst dst -dstflg dstflg)
  Specify the destination logical disk and its volume type.

Displayed information

```
 Source Volume
   LD Name                      src_logical_disk_name
   DI                            src_device_identification
   Size                         src_size
Destination Volume
   LD Name                      dst_logical_disk_name
   DI                            dst_device_identification
   Size                         dst_size
Activity State                 activity_state
Migration State                migration_state
Transferred Size               transferred_size
Copy Progress                   copy_progress
Start Time                     start_time
End Time                        end_time
Remained Copy Time            remained_copy_time
Level                             level
Previous Migrated Time      previous_migrated_time
```

Description

src_logical_disk_name:

- LD name of the source logical disk

src_device_identification:

- Device identifier of the source logical disk

src_size: Size of the source logical disk
dst_logical_disk_name:

- LD name of the destination logical disk

dst_device_identification:

- DI of the destination logical disk

dst_size: Size of the destination logical disk
activity_state: Activity state of the data migration
migration_state: Data migration state
transferred_size: Size of the data that has been migrated
copy_progress: Progress
start_time: Start time of the data migration
end_time: End time of the data migration
remained_copy_time:

- Estimated remaining time until the data migration is completed

level: Speed level of the data migration
previous_migrated_time:

- Time when the last data migration was complete

iSMmc_pair command

The iSMmc_pair command sets or deletes a pair for data migration, displays information about the pairs, and removes the data migration attribute.

Main options

The iSMmc_pair command recognizes the following options:

Specification of pair setting or cancellation

Specify whether to set or cancel a pair.

Pair setting (-create)

- Set a pair for the specified data migration pair volume.

Pair cancellation (-delete)

- Cancel a pair for the specified data migration pair volume.

Specification of volumes to be paired

Specify the source and destination logical disks.

Source logical disk specification (-src src -srcflg srcflg)

- Specify the source logical disk and its volume type.

Destination logical disk specification (-dst dst -dstflg dstflg)

- Specify the destination logical disk and its volume type.

Forced cancelation (-force)

Even if normal pair cancellation is not allowed (for example when connection between disk arrays fails), you can cancel the pair specifying the -force option.

List (-list)

Displays a list of pairs for data migration.

Removal of the data migration attribute

- Removes the data migration attribute set to the volumes when they have been paired for data migration.

It is necessary to remove the data migration attribute, if the volume of the source disk array(*) , which have been paired for data migration, still have the data migration attribute after the volume was forcibly unpaired due to a connection error.

* If the source disk array is an SnapSAN S3000/S5000 disk arrays that can use the data migration function

Removal of the data migration attribute (-clrattr)

- Removes the data migration attribute from the specified volume.

Specification of the volume of which data migration attribute is removed (-vol vol -volflg volflg)

Specifies the logical disk from which the data migration attribute will be removed and its volume type.

Displayed information

A list of pairs for data migration is displayed

```
vendor_name     wwnn/wwpn (Information about the source)
   lun/ldn      ld_name                      capacity
     di_name
    ------------------------------------------------------------
    vendor_name     wwnn/wwpn                                (Information
about the destination)
       lun/ldn      ld_name                       capacity
         di_name
```

Description

vendor_name: Vendor name

wwnn: World Wide Node Name of the external disk array connected to the port for data migration

wwpn: World Wide Node Number of the external disk array connected to the port for data migration

lun: Logical unit number

ldn: Logical Disk Number

ld_name: LD name

capacity: Disk capacity

di_name: Device identifier

Execution conditions

The following conditions must be satisfied before setting or cancelling a data migration pair

- To cancel a data migration pair when an error occurs in a volume reserved for data migration, forcibly cancel the pair by specifying the -force option. Also, specify the volume type of the source and destination logical disks by using a device identifier.
- The following operations cannot be carried out when the destination logical disk is used as a master volume (MV) or replication volume (RV) by the replication function.
- Data cannot be restored from a RV when the destination logical disk is used as a MV.
- Data cannot be replicated to a MV when the destination logical disk is used as a RV.
- Data cannot be restored to a MV when the destination logical disk is used as a RV.
- The RV access mode cannot be set when the destination logical disk is used as a RV.
- The volume update function cannot be executed on the destination logical disk.
- The following operations cannot be carried out when the destination logical disk is used as a base-volume (BV) by the snapshot function.
- Data cannot be restored from a snapshot-volume (SV) when the destination logical disk is used as a BV.
- The destination logical disk cannot be associated with a link-volume (LV) when it is used as a BV.
- Volumes of the destination logical disk cannot be protected by the WORM function.
- Using volumes of the destination logical disk cannot be stopped by the power saving function.

- The destination logical disk cannot be changed from a preserve group to a reserve group.
- When binding a logical disk on the destination disk array (SnapSAN S3000/S5000) through the iSM Express or SnapSAN Manager GUI screen, the actual capacity of the source disk array may be different from that of the destination disk array even if the logical disk is bound by specifying the same capacity (recommended capacity) as the source disk array. When the destination logical disk capacity is smaller than the source logical disk capacity, a data migration pair cannot be created. Therefore, bind a destination logical disk so that its capacity is equal to or larger than the source logical disk capacity. To minimize the capacity difference between the source logical disk and the destination logical disk, bind the destination logical disk by specifying the logical disk capacity down to the MB by using the SnapSAN ManagerCLI logical disk bind command provided by the SnapSAN S3000/S5000 disk arrays.

The following condition must be satisfied to remove the data migration attribute.

- After the disk arrays were forcibly unpaired, there is a volume with the data migration attribute on the source disk array having the data migration function.

Starting Data Migration

The iSMmc_start command starts data migration.

Start copying data to the destination paired with the source using the iSMmc_start command.

Main options

The iSMmc_start command recognizes the following options and arguments:

Source logical disk specification (-src src -srcflg srcflg)

Specify the source logical disk and its volume type.

Data migration speed level specification (-level level)

Specify the speed level of data migration. For level, specify a value from 1 to 5. Data migration processing is given priority corresponding to the specified level, with level 5 as the highest level. If this option is omitted, the value specified in environment setting is assumed to be specified.

Data migration completion waiting specification

Waiting specification (-wait [second])

When -wait is specified, the system monitors the progress of data migration of pair at certain time intervals waiting for completion of migration. Specify the monitoring time interval between 1 and 30 seconds (interval) in second.

Execution conditions

The following conditions must be specified before starting data migration.

- The following operations cannot be carried out when the destination logical disk is used as a master volume (MV) or replication volume (RV) by the replication function.
- Data migration cannot be started if the activity is "restored", when the destination logical disk is used as a MV.
- Data migration cannot be started if the activity is "replicated", when the destination logical disk is used as a RV.

- Data migration cannot be started if the activity is "restored", when the destination logical disk is used as a RV.
- The following operations cannot be carried out when the destination logical disk is used as a base-volume (BV) by the snapshot function.
- Data migration cannot be started if data is restored from a snapshot-volume (SV), when the destination logical disk is used as a BV.
- Data migration cannot be started if the destination logical disk is associated with a link-volume (LV), when it is used as a BV.
  - Data migration cannot be started if volumes of the destination logical disk are protected by the WORM function.
  - Data migration cannot be started if using volumes of the destination logical disk is stopped by the power saving function.
  - Data migration cannot be started if the destination logical disk is set as a reserve group.
- The multiplicity of copies from the source logical disk to the destination logical disk differs depending on the speed level option specification. In addition, the effectiveness the speed level option differs depending on the load and performance of the disk array, I/O performance of the source and destination logical disks, and configuration of the connection between the source disk array and destination disk array.
- During data migration stopping operations, the ongoing operations and data migration may affect each other's I/O performance. (Compared to data migration stopping the server, the I/O speed decreases by about 30%.) To prevent a decrease in I/O performance, it is recommended to specify the speed level option of the iSMmc_start command as 2 or less, or reduce the number of pairs that will be migrated at the same time.

Stopping Data Migration

The iSMmc_stop command stops data migration.

When the command is issued during data migration, the data migration is stopped. After the differences are completely copied, the data migration is completed. Forced stop can stop the migration immediately.

Main options

The iSMmc_stop command recognizes the following options and arguments:

Source logical disk specification (-src src -srcflg srcflg)

- Specify the source logical disk and its volume type.

Forced stoppage specification (-force)

- By specifying the -force option, data migration can be forcibly stopped.

Suspending Data Migration

The iSMmc_suspend command suspends data migration.

Main options

The iSMmc_suspend command recognizes the following options and arguments:

Source logical disk specification (-src src -srcflg srcflg)

Specify the source logical disk and its volume type.

Restarting Data Migration

The iSMmc_resume command resumes data migration for the pair for which the data migration has been suspended.

Main options

The iSMmc_resume command recognizes the following options:

Source logical disk specification (-src src -srcflg srcflg)

Specify the source logical disk and its volume type.

Data migration speed level specification (-level level)

Specify the speed level of data migration. For level, specify a value from 1 to 5. Data migration processing is given priority corresponding to the specified level, with level 5 as the highest level. If this option is omitted, the value specified in environment setting is assumed to be specified.

Waiting for Completion of Data Migration

The iSMmc_wait command waits for the data migration to be completed.

Main options

The iSMmc_wait command recognizes the following options and arguments:

Source logical disk specification (-src src -srcflg srcflg)

Specify the source logical disk and its volume type.

Specify the condition for terminating the waiting. (-cond)

Completion of data migration (-cond migrated)

- Waits for the data migration to be completed.

Specify the time interval to monitor the progress of data migration. (-interval interval_time)

Specify, in seconds, the interval time at which to monitor the data migration state.

The acceptable values are 1 to 30 seconds (integer). If omitted, monitoring is performed at intervals of 5 seconds.

Specify the time limit to monitor the progress of data migration. (-limit)

Specify the time limit to wait for completion of data migration. If the completion condition specified with the -cond option is not satisfied by the specified time limit after the system starts waiting for completion, waiting is stopped and the processing abnormally terminates. If this option is omitted, the system indefinitely waits for completion.

- Time specification (-limit limit_time)

  Waits until the time specified in limit_time after the system starts waiting for completion. The specifiable range is between 0 to 86400 seconds (integer).
- No time restriction (-limit nolim)

  Waits unlimitedly.

Setting the Environment for Data Migration

The iSMmc_setconfig command makes and displays environment setting to carry out data migration.

Main options

The iSMmc_setconfig command recognizes the following options:

Data migration speed level specification (-level level)

Specify the speed level of data migration. For level, specify a value from 1 to 5. Data migration processing is given priority corresponding to the specified level, with level 5 as the highest level. The default value is 3.

List (-list)

Displays the data migration environment setting values.

Displayed information

The following information is displayed.

Description

disk_array_name: Displays the disk array name.

level: Displays the speed level set to the displayed disk array.

Changing the Data Migration Settings

The iSMmc_change command changes the data migration speed level settings

Main options

The iSMmc_change command recognizes the following options:

Source logical disk specification (-src src -srcflg srcflg)

Specify the source logical disk and its volume type.

Data migration speed level specification (-level level)

Specify the speed level of data migration. For level, specify a value from 1 to 5. Data migration processing is given priority corresponding to the specified level, with level 5 as the highest level. If this option is omitted, the value specified in environment setting is assumed to be specified.

Appendix A

Notes

General Notes for Data Migration.

- The disk arrays can be used as a source disk array. However, the 1G FC storage and the FC switch environment are not supported by the data migration function.
- The disk arrays (however, excluding the M10e) can be used as a destination disk array.
- Before executing data migration, it is necessary to stop all operations on the application server that use the destination volumes so that accessing those volumes is stopped.
- Keep access to the source volume stopped during data migration.
- Prevent access to the destination volume during data migration.
- To use the data migration function, a data migration reserved volume must be created for a control logical disk.
- When all the data migration pairs are canceled, the data migration reserved volume can be unbound.
- Access Control set to the logical disk which was set as a data migration pair cannot be canceled. Cancel the Access Control settings after cancelling the data migration pair.
- The logical disk set as a data migration pair cannot be unbound. Unbind the logical disk after cancelling the data migration pair.
- Data migration cannot be executed if 32 application servers are set to be able to reference a logical disk for a data migration port.

Appendix B

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Index

S

T

V