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Simple Configuration Example for Storwize V7000 FlashCopy and PowerHA SystemMirror for i

Introduction

In April 2012, IBM® PowerHA® SystemMirror® for i (5770-HAS) is adding support of IBM Storwize® V7000 and SAN Volume Controller storage systems to its Metro Mirror, Global Mirror, and IBM FlashCopy® functions with PTF SI45741. This support was originally made available in October 2011 through a no-charge PRPQ. With this latest PTF, the PRPQ is no longer required, and this enhancement is fully supported and translated in the PowerHA product.

By using FlashCopy, you can make a copy of IASP and access data in an IASP from a target node by attaching it to the target node. This process minimizes your backup window by running a backup operation on the target node side.

This IBM Redpaper™ complements the *PowerHA SystemMirror for IBM i Cookbook*, focusing on Storwize V7000 FlashCopy function. It introduces how to configure IBM PowerHA SystemMirror for i and FlashCopy of Storwize V7000 with simple configuration example.

For more information about IBM PowerHA SystemMirror for i and Storwize V7000 FlashCopy function, see the *PowerHA SystemMirror for IBM i Cookbook*, SG24-7994 at:

http://www.redbooks.ibm.com/abstracts/sg247994.html?Open

Software Prerequisites for IBM PowerHA SystemMirror for i and Storwize V7000 FlashCopy

Configuring IBM PowerHA SystemMirror for i and Storwize V7000 FlashCopy has these software prerequisites:

- IBM i 7.1 TR3 or later
- Portable Utilities for IBM i (5733-SC1)
- IBM PowerHA SystemMirror for i Standard Edition or Enterprise Edition (5770-HAS)
- PTF 5770-HAS SI45741, which is included in High Availability PTF Group SF99706 Level 1

Both the source node and a target node must satisfy all of these prerequisites.

Sample Environment Overview

Figure 1 on page 3 shows the sample environment that is used in the rest of this IBM Redpaper. There are two IBM i partitions within a single Power Systems™ server. One of these is for production use, and the other is for backup operations. The IBM i partition for production use is called the “source node”, and the one for backup operation is the “target node”. Both IBM i partitions are hosted by VIOS because this is a requirement on IBM i to use logical drives within Storwize V7000.

Each IBM i partition has two disk drives. One disk is 75 GB and for a System ASP, and another disk is 25 GB and for an IASP that is called “IASP01”.

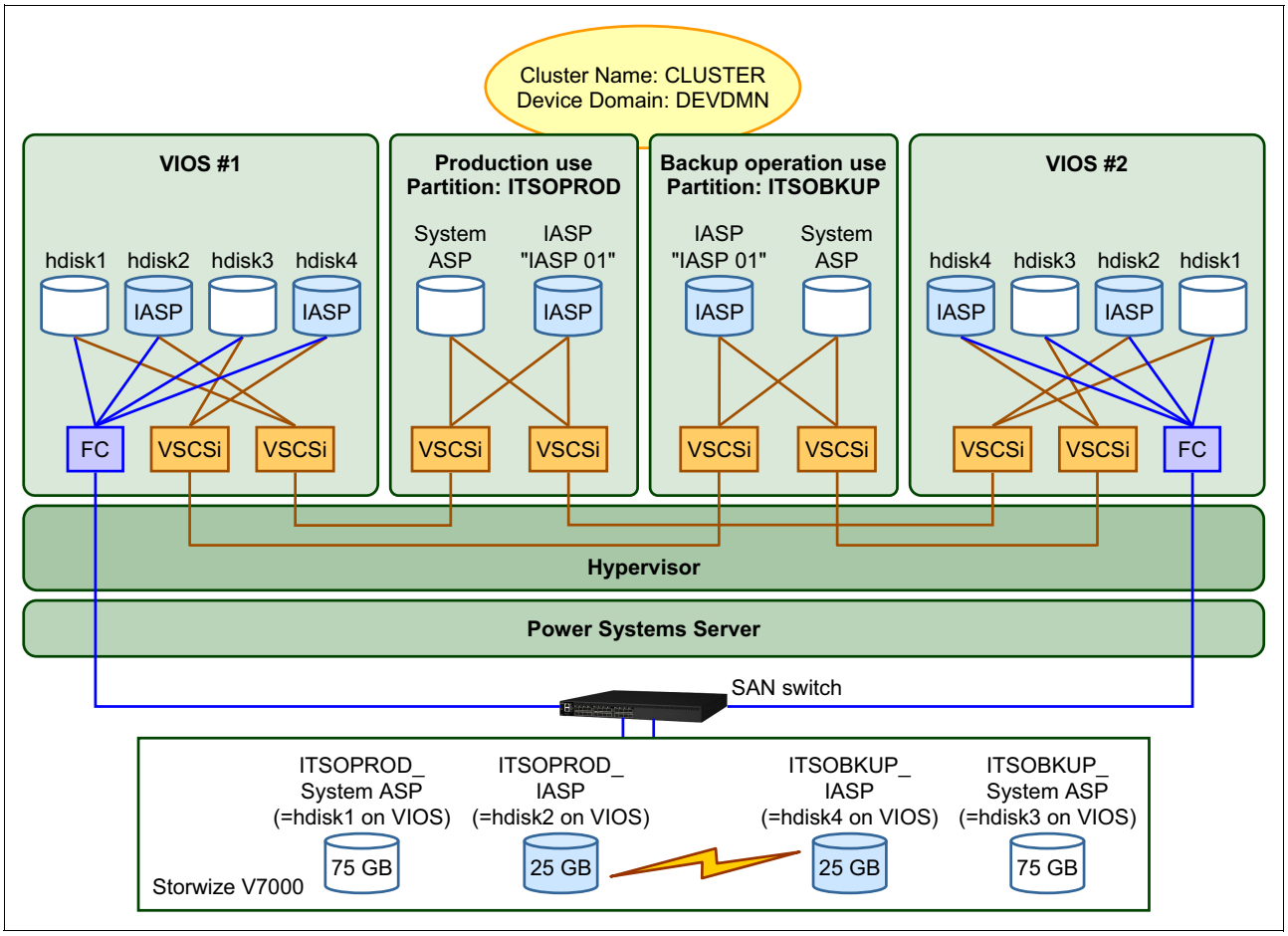

Figure 1 Overview of the sample environment for IBM PowerHA SystemMirror for i and Storwize V7000 FlashCopy

Table 1 lists the settings of this scenario.

Table 1 Settings for the FlashCopy scenario

	Source Node	**Target Node**
Purpose	Production use	Running a backup operation
System Name	ITSOPROD	ITSOBKUP
Cluster name	CLUSTER	
Device domain	DEVDMN	
Cluster node name	ITSOPROD	ITSOBKUP
Cluster interface IP address	192.168.71.56	192.168.71.57
IASP name	IASP01	IASP01
RDBDIRE for IASP	IASP01	IASP01
Copy description name	FLC_PROD	FLC_BKUP
SAN Volume Controller session name	FLC_SSN	
Storwize V7000 IP address	192.168.71.17	

	Source Node	Target Node
Storwize V7000 user ID	itsouser	
SSH key file location	/QIBM/UserData/HASM/hads/.ssh/id_rsa	
Volume IDs for volumes to be FlashCopy	9	10

Setting up an IBM i and Storwize V7000 FlashCopy environment

To configure IBM PowerHA SystemMirror for i and Storwize V7000 FlashCopy, complete the following steps:

1. Configuring IBM i clustering
2. Setting up SSH connection settings between IBM i and Storwize V7000
3. Configuring an IASP on the source node
4. Initializing disk drives and creating an IASP device description on the target node
5. Configuring ASP copy descriptions for Storwize V7000 FlashCopy

Configuring IBM i clustering

You can create a clone IASP in a blank on a Storwize V7000 by using FlashCopy function. However, you cannot access data by just attaching the clone IASP to your source system. Instead, configure an IBM i clustering environment and attach the clone IASP to a target system.

To configure IBM i clustering between the source and target nodes, complete these steps:

1. On both of nodes, run CHGNETA command to allow it to participate a IBM i cluster environment:

   ```
   CHGNETA ALWADDCLU(*ANY)
   ```

2. On both of nodes, run STRTCPSVR command to start *INETD, if not started yet. *INETD is set to auto-start by default:

   ```
   STRTCPSVR SERVER(*INETD)
   ```

3. On the source node, run CRTCLU command to create a IBM i cluster that is named CLUSTER, and register both of nodes to this cluster:

   ```
   CRTCLU CLUSTER(CLUSTER) NODE((ITSOPROD ('192.168.71.56')) (ITSOBKUP
   ('192.168.71.57')))
   ```

4. On the source node, run the STRCLUNOD command twice to start cluster nodes:

   ```
   STRCLUNOD CLUSTER(CLUSTER) NODE(ITSOPROD)
   STRCLUNOD CLUSTER(CLUSTER) NODE(ITSOBKUP)
   ```

5. On the source node, run ADDDEVDMNE command to register the production cluster node to the device domain that is named “DEVDMN”:

   ```
   ADDDEVDMNE CLUSTER(CLUSTER) DEVDMN(DEVDMN) NODE(ITSOPROD)
   ```

6. On the source node, run the ADDDEVDMNE command to register the backup cluster node to the device domain that is named “DEVDMN”:

   ```
   ADDDEVDMNE CLUSTER(CLUSTER) DEVDMN(DEVDMN) NODE(ITSOBKUP)
   ```

Setting up SSH connection settings between IBM i and Storwize V7000

IBM i and Storwize V7000 are connected through SSH. IBM PowerHA SystemMirror for i submits a command to run FlashCopy to Storwize V7000 through this connection.

To establish an SSH connection between IBM i and Storwize V7000, generate an asymmetric encrypted key pair on the source node. Then register a public key to a user ID of Storwize V7000, and distribute a private key to the target node. This process allows you to establish an SSH connection from the target node and the source node.

To set up SSH configuration, complete these steps:

1. On both of nodes, run MKDIR command to create the directory **"**`/QIBM/UserData/HASM/hads/.ssh`**"**. An SSH key pair is generated into this directory.

   ```
   MKDIR DIR('/QIBM/UserData/HASM/hads/.ssh')
   ```

2. On the source node, run STRQSH to generate an SSH asymmetric encrypted key pair in QSHELL, as shown in Example 1.

   Example 1 Generating an SSH key pair on the source node

   ```
   > cd /QIBM/UserData/HASM/hads/.ssh
   $
   > ssh-keygen -t rsa -f id_rsa -N ''
     Generating public/private rsa key pair.
     Your identification has been saved in id_rsa.
     Your public key has been saved in id_rsa.pub.
     The key fingerprint is:
     3d:66:ae:8a:f6:25:7b:4d:41:80:33:fb:52:48:0f:f2
   qsecofr@ITSOPROD.RCHLAND.IBM.COM
   $
   > ls -la
     total: 32 kilobytes
     drwx--Sr-x  2 QSECOFR  0                  8192 Sep 26 16:01 .
     drwx--Sr-x  3 QSYS     0                  8192 Sep 26 15:59 ..
     -rw-------  1 QSECOFR  0                  1675 Sep 26 16:01 id_rsa
     -rw-r--r--  1 QSECOFR  0                   415 Sep 26 16:01 id_rsa.pub
   $
   ```

3. You must import the public key into a user of Storwize V7000. The user is then used for various operations by PowerHA SystemMirror for i.

   To import the public key into the user of Storwize V7000, complete these steps:

   a. Transfer the public key (id_rsa.pub) from the node source to the workstation where you started the web GUI of the Storwize V7000.

   b. Access the management interface for the Storwize V7000 through a web browser on your workstation and login to this interface, as shown in Figure 2 on page 6.

Figure 2 Storwize V7000 Management GUI

c. Select **Users** option in the **User Management** menu from the left pane of the management interface, as shown in Figure 3.

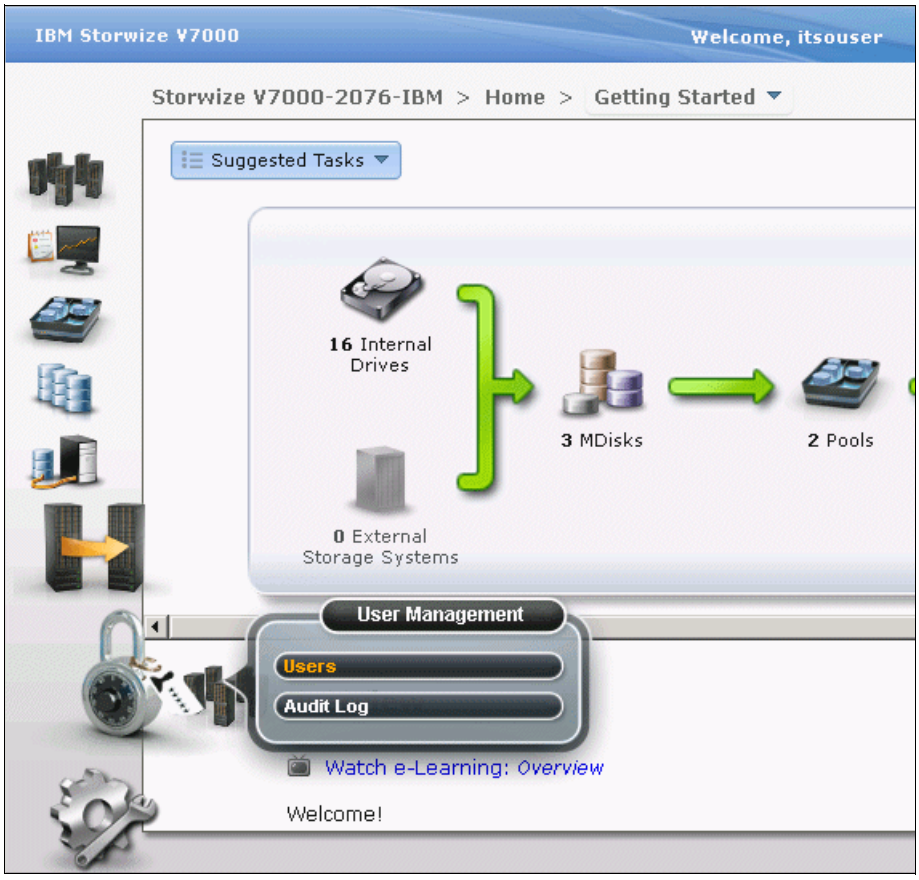

Figure 3 Users option in the User Management menu

d. Right-click **itsouser** and select **Properties**, as shown in Figure 4.

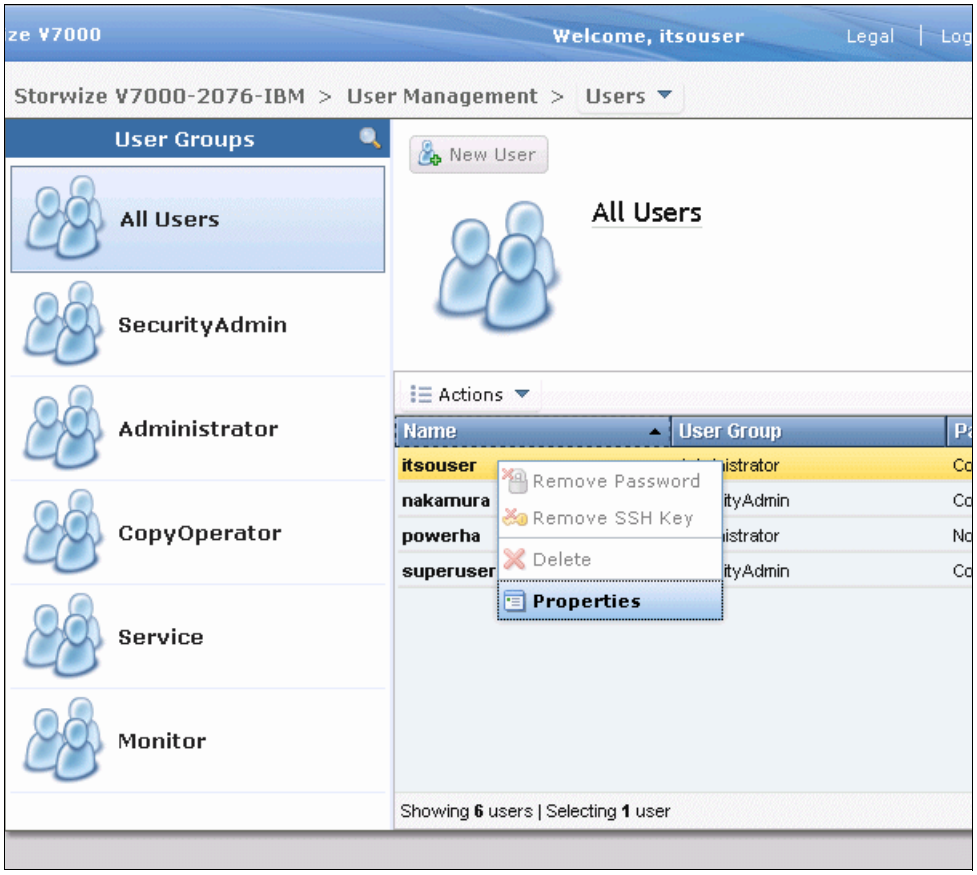

Figure 4 Starting User Properties

e. Specify the path for the `id_rsa.pub` file on your workstation by clicking **Browse** for the SSH Public Key in the User Properties window, then click **OK**, as shown in Figure 5.

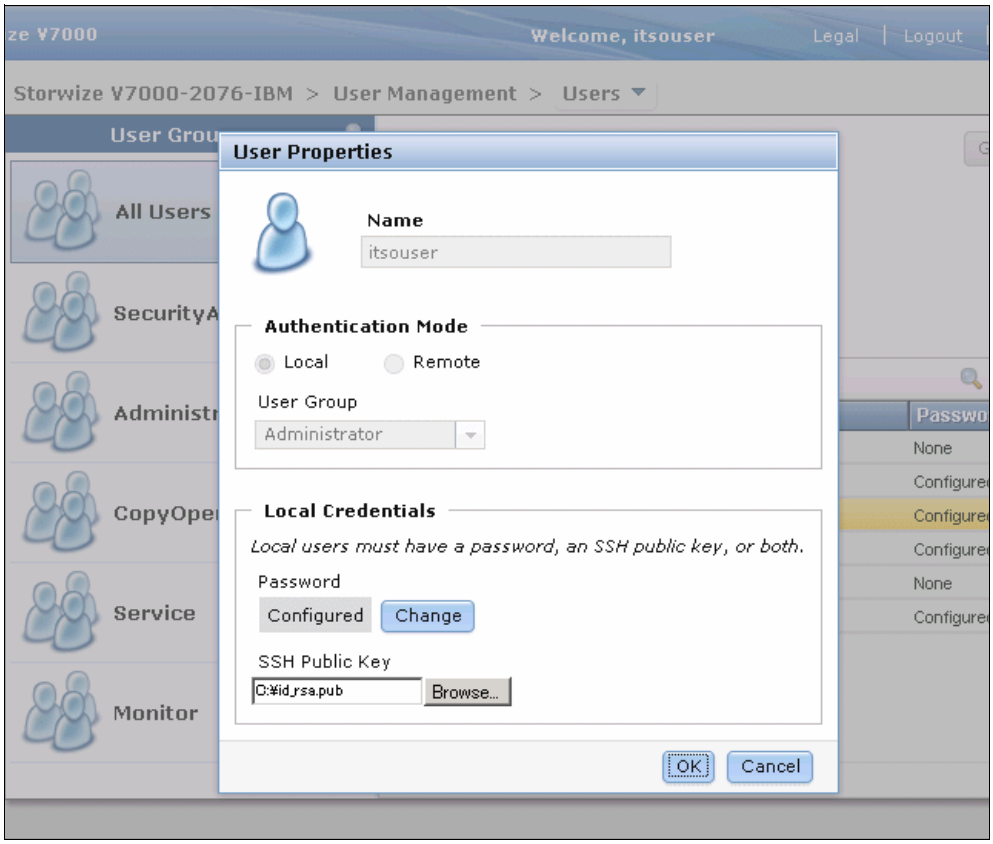

Figure 5 Setting an SSH Public Key to a user

4. Distribute the private key to the directory **"**`/QIBM/UserData/HASM/hads/.ssh`**"** on the target node to establish an SSH connection from the target node.

Configuring an IASP on the source node

To configure an IASP, you can use either the CFGDEVASP command or IBM Navigator for i, and System i® Navigator. In this scenario, configure the IASP, which is named IASP01 and consists of a logical drive in Storwize V7000, on the production node:

1. Configure the IASP by using the CFGDEVASP command, as shown in Figure 6:

```
CFGDEVASP ASPDEV(IASP01) ACTION(*CREATE) TYPE(*PRIMARY) UNITS(*SELECT)
```

```
                      Configure Device ASP (CFGDEVASP)

Type choices, press Enter.

ASP device . . . . . . . . . . . > IASP01       Name
Action . . . . . . . . . . . . . > *CREATE      *CREATE, *DELETE
ASP type . . . . . . . . . . . . > *PRIMARY     *PRIMARY, *SECONDARY, *UDFS
Protection . . . . . . . . . . .   *NO          *NO, *YES
Encryption . . . . . . . . . . .   *NO          *NO, *YES
Disk units . . . . . . . . . . . > *SELECT      Name, *SELECT
              + for more values    _____
```

Figure 6 CFGDEVASP command

2. In the Select Non-Configured Disk Units panel, select disk drives that comprise an IASP. In this scenario, specify “1 (=Select)” for the option DHP002 and press Enter, as shown in Figure 7.

```
                      Select Non-Configured Disk Units

ASP device . . . . . . . . . . . . . . . :   IASP01
Selected capacity  . . . . . . . . . . . :   0
Selected disk units  . . . . . . . . . . :   0

Type options, press Enter.
  1=Select

     Resource
Opt  Name        Serial Number    Type Model  Capacity  Rank  Eligible
 1   DPH002      Y2HE7QPFZVBA     6B22 0050      23860  002      Yes
```

Figure 7 Select Non-Configured Disk Units panel

The configuration of the IASP process starts. You can see the configuration status in the message area of the panel, as shown in Figure 8.

```
                                                                      Bottom
F1=Help   F9=Calculate Selection   F11=View 2   F12=Cancel
Configuration of ASP device IASP01 is 3% complete.
```

Figure 8 Configuration status message

After the configuration process is completed, the completion message MSGID CPCB719 is displayed, as shown in Figure 9.

```
F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F13=Information Assistant
F23=Set initial menu
Configure Device ASP *CREATE request completed.
```

Figure 9 Completion message MSGID CPCB719

When you use the CFGDEVASP command to create an IASP, a DEVD for the IASP is also created automatically. However, an RDBDIRE for the IASP is not created. The RDBDIRE for the IASP is created automatically when the IASP is varied on for the first time. You can also add manually by using the ADDRDBDIRE command as shown in Figure 10.

```
ADDRDBDIRE RDB(IASP01) RMTLOCNAME(*LOOPBACK)
```

```
                     Add RDB Directory Entry (ADDRDBDIRE)

Type choices, press Enter.

Entry:
  Relational database  . . . . . > IASP01
  Relational database alias  . .   *NONE
Remote location:
  Name or address  . . . . . . . > *LOOPBACK
  Type . . . . . .                 ____          *SNA, *IP
Port number or service program     *DRDA
Remote authentication method:
  Preferred method . . . . . .    *USRENCPWD     *USRENCPWD, *USRID...
  Allow lower authentication . .   *ALWLOWER     *ALWLOWER, *NOALWLOWER
```

Figure 10 ADDRDBDIRE command

Initializing disk drives and creating an IASP device description on the target node

Unlike the source node, you do not need to configure an IASP that consists of logical drives in Storwize V7000. Instead, you must format drives, which are recognized as DPHxxx and create an IASP device description.

To format drives and create an IASP device description, complete these steps:

1. Run the STRSST command to start system service tools (SST), specify a service tool user profile and password, and press Enter.
2. Click **option 3 (Work with disk units)** → **option 3 (Work with disk unit recovery)** → **option 2 (Disk unit problem recovery procedures)** → **option 1 (Initialize and format disk unit)** in SST.

3. On the Select Disk Units for Initialize and Format panel, select the disk drives that you want to initialize. In this scenario, select **1 (=Select)** for the option **DHP002** and press Enter, as shown in Figure 11.

```
                Select Disk Units for Initialize and Format

Type option, press Enter.
  1=Select

              Serial                      Resource
OPT Unit  ASP Number          Type Model Name       Status
 1           YKZDU6BQZ3PT    6B22  050  DPH002     Non-configured
```

Figure 11 Initialize and formatting disk drives by using SST

4. When the Problem Report panel is displayed, confirm messages and select **PF10 (=Ignore problems and continue)** to continue processing, as shown in Figure 12.

```
                              Problem Report

Note: Some action for the problems listed below may need to
be taken.  Please select a problem to display more detailed
information about the problem and to see what possible
action may be taken to correct the problem.

Type option, press Enter.
  5=Display Detailed Report

OPT  Problem
 _   Cannot determine if unit possibly configured



F3=Exit      F10=Ignore problems and continue     F12=Cancel
```

Figure 12 Problem Report

5. In the Confirm Initialize and Format Disk Unit panel, select **PF10 (=Confirm)** to start initializing.

During initializing process, you can see the status of this process in the Function Status panel, as shown in Figure 13.

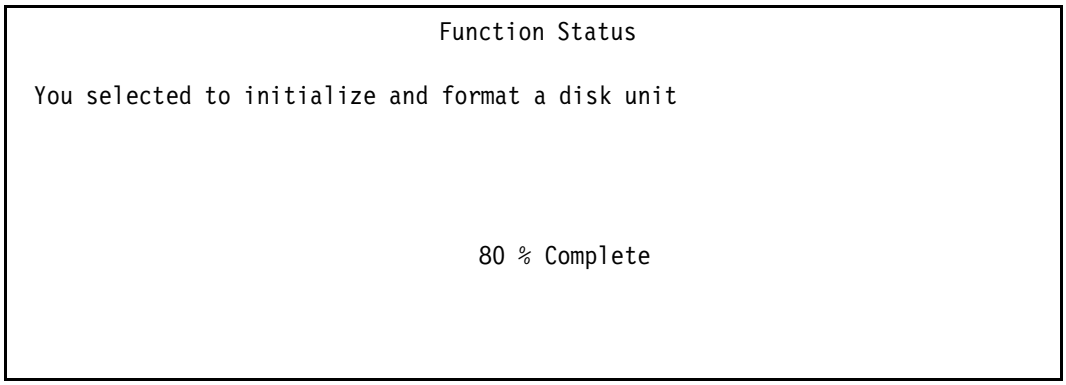

Figure 13 Status of initializing process

When the initialization completed, a completion message is displayed, as shown in Figure 14.

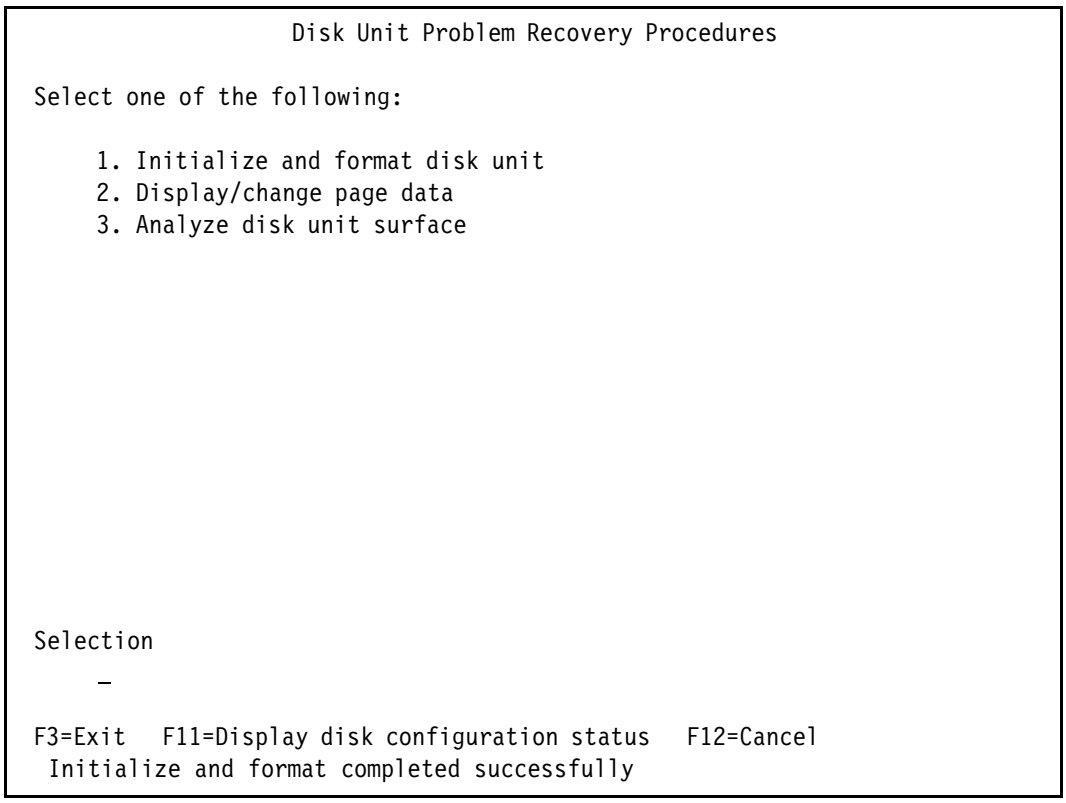

Figure 14 Initialize completion message

6. The resource name of the disk drives has changed from “DPHxxx” to “DDxxx” or “DMPxxx.” You can see the name by selecting **option 3 (Work with disk units)** → **option 1 (Display disk configuration)** → **option 6 (Display disk hardware status)** from the main menu of SST, as shown in Figure 15.

```
                        Display Disk Hardware Status

          Serial                          Resource      Hardware
ASP Unit  Number          Type Model Name               Status
  1    1  YXAQDARA3F78    6B22  050  DMP001             Operational
          YKZDU6BQZ3PT    6B22  050  DMP002             Operational
```

Figure 15 Display Disk Hardware Status panel

7. Exit SST.
8. Run the CRTDEVASP command to create an IASP device description. You must specify the same resource name and RDBDIRE as on the source node.

```
CRTDEVASP DEVD(IASP01) RSRCNAME(IASP01) RDB(IASP01)
```

Configuring ASP copy descriptions for Storwize V7000 FlashCopy

You must configure an ASP copy description to store the information so you can run Storwize V7000 FlashCopy on PowerHA SystemMirror for i. Two ASP copy descriptions must be configured. One is for the IASP on the source node, and the other is for the IASP on the target node.

To configure ASP copy descriptions, complete these steps:

1. On the source node, run the ADDSVCCPYD command with the parameters specified in Table 1 on page 3 to configure the ASP copy description for the IASP on the source node, as shown in Figure 16 on page 15.

```
ADDSVCCPYD ASPCPY(FLC_PROD) ASPDEV(IASP01) CRG(*NONE) SITE(*NONE)
NODE(ITSOPROD) SVCHOST(itsouser '/QIBM/UserData/HASM/hads/.ssh/id_rsa'
'192.168.71.17') VRTDSKRNG((9 9))
```

```
                  Add SVC ASP Copy Description (ADDSVCCPYD)

 Type choices, press Enter.

 ASP copy . . . . . . . . . . . . > FLC_PROD     Name
 ASP device . . . . . . . . . . . > IASP01       Name
 Cluster resource group . . . . . > *NONE        Name, *NONE
 Cluster resource group site  . . > *NONE        Name, *NONE
 Node identifier  . . . . . . . . > ITSOPROD     Name, *CRG, *NONE
 Storage host:
   User name  . . . . . . . . . . > itsouser
   Secure shell key file  . . . . > '/QIBM/UserData/HASM/hads/.ssh/id_rsa'
_____
   Internet address . . . . . . . > '192.168.71.17'
_____
 Virtual disk range:              _
   Range start  . . . . . . . . . > 9            0-8191
   Range end  . . . . . . . . . . > 9            0-8191
              + for more values _
```

Figure 16 ADDSVCCPYD command for the IASP on the source node

2. On the source node, run ADDSVCCPYD with the values specified in Table 1 on page 3 to each parameter to configure the ASP copy description for the IASP on the target node, as shown in Figure 17.

```
ADDSVCCPYD ASPCPY(FLC_BKUP) ASPDEV(IASP01) CRG(*NONE) SITE(*NONE)
NODE(ITSOBKUP) SVCHOST(itsouser '/QIBM/UserData/HASM/hads/.ssh/id_rsa'
'192.168.71.17') VRTDSKRNG((10 10))
```

```
                  Add SVC ASP Copy Description (ADDSVCCPYD)

 Type choices, press Enter.

 ASP copy . . . . . . . . . . . . > FLC_BKUP     Name
 ASP device . . . . . . . . . . . > IASP01       Name
 Cluster resource group . . . . . > *NONE        Name, *NONE
 Cluster resource group site  . . > *NONE        Name, *NONE
 Node identifier  . . . . . . . . > ITSOBKUP     Name, *CRG, *NONE
 Storage host:
   User name  . . . . . . . . . . > itsouser
   Secure shell key file  . . . . > '/QIBM/UserData/HASM/hads/.ssh/id_rsa'
_____
   Internet address . . . . . . . > '192.168.71.17'
_____
 Virtual disk range:              _
   Range start  . . . . . . . . . > 10           0-8191
   Range end  . . . . . . . . . . > 10           0-8191
              + for more values _
```

Figure 17 ADDSVCCPYD command for the IASP on the target node

Tip: To create an ASP copy description for Storwize V7000 or SAN Volume Controller, use the ADDSVCCPYD command. You currently cannot use the ADDASPCPYD command or IBM Navigator for i interface (October 2012).

3. You can see the ASP copy descriptions that you create by using WRKASPCPYD command, as shown in Figure 18.

```
                    Work with ASP Copy Descriptions               ITSOPROD
                                                          10/03/12  16:04:33
Type options, press Enter.
  2=Change copy    4=Remove copy   5=Display copy   22=Change session
  24=End session   25=Display session

        ASP           ASP           ASP              Session
Opt     Device        Copy          Session            Type
__      IASP01        FLC_PROD                         *NONE
__      IASP01        FLC_BKUP                         *NONE
```

Figure 18 WRKASPCPYD command for listing ASP copy descriptions

Running Storwize V7000 FlashCopy through IBM PowerHA SystemMirror for i

After you set up an IBM i clustering, an SSH connection, and ASP copy descriptions, you can use Storwize V7000 FlashCopy function through PowerHA SystemMirror for i. To run FlashCopy and backup operations on the target node, you must complete these steps.

1. Stopping an access to an IASP on the source node
2. Starting an ASP session for Storwize V7000 FlashCopy
3. Accessing data in IASPs on both the source node and the target node
4. Ending an ASP session for Storwize V7000 FlashCopy

Stopping an access to an IASP on the source node

Before running Storwize V7000 FlashCopy, you must stop the access to the IASP on the source node. The most reliable way to stop is to vary-off the IASP. You can also use an ASP quiesce option. A quiesce brings the database to a consistent state by flushing modified data from main memory to disk and suspending database operations and transactions. The vary-on of the FlashCopy IASP on the target node will still be abnormal. However, a lengthy database recovery is avoided, which makes the vary-on process shorter. This operation must be run on the source node.

In this scenario, run the CHGASPACT command on the source node with the following values to quiesce the IASP, as shown in Figure 19 on page 17.

```
CHGASPACT ASPDEV(IASP01) OPTION(*SUSPEND) SSPTIMO(60)
```

```
                    Change ASP Activity (CHGASPACT)

Type choices, press Enter.

ASP device . . . . . > IASP01      Name, *SYSBAS
Option . . . . . > *SUSPEND    *SUSPEND, *RESUME, *FRCWRT
Suspend timeout  . . . . . > 60          Number
Suspend timeout action . . . . .  *CONT        *CONT, *END
```

Figure 19 CHGASPACT command to quiesce an IASP

After you vary-off or quiesce an IASP, you can start an ASP session for FlashCopy.

Starting an ASP session for Storwize V7000 FlashCopy

When you run Storwize V7000 FlashCopy by using PowerHA SystemMirror for i, you must run the STRSVCSSN command on the target node. By running STRSVCSSN on the target node, PowerHA SystemMirror for i makes an SSH connection to Storwize V7000. The QHAUSRPRF user profile and the information that is defined in ASP copy description is used to make a connection and run FlashCopy on the Storwize V7000.

In this scenario, run the STRSVCSSN command on the target node with the following values, as shown in Figure 20.

```
STRSVCSSN SSN(FLC_SSN) TYPE(*FLASHCOPY) ASPCPY((FLC_PROD FLC_BKUP))
```

```
                     Start SVC Session (STRSVCSSN)

Type choices, press Enter.

Session  . . . . . > FLC_SSN     Name
Session type . . . . . > *FLASHCOPY    *METROMIR, *GLOBALMIR...
ASP copy:
  Preferred source . . . . . > FLC_PROD    Name
  Preferred target . . . . . > FLC_BKUP    Name
              + for more values _
Incremental flash  . . . . . *NO          *NO, *YES
Copy rate  . . . . . 0           0-100
Cleaning rate  . . . . . 0           0-100
Grain size . . . . . 256         256, 64
Consistency group  . . . . . *GEN
Reverse consistency group  . . .  *GEN
```

Figure 20 STRSVCSSN command

In STRSVCSSN, you can specify the value of the copy rate and the cleaning rate. These values affect the data rate of the background copy and the cleaning process. These data rates are determined by the combination of the copy rate, the cleaning rate, and the grain

size. If you specify a copy rate of 0, FlashCopy with the nocopy option is run on Storwize V7000. For more information about the copy rate, the cleaning rate and the grain size, see the Storwize V7000 Information Center at:

http://pic.dhe.ibm.com/infocenter/storwize/unified_ic/topic/com.ibm.storwize.v7000.unified.doc/svc_flashcopybackgroundcopy_4iry45.html

And you can also use an incremental FlashCopy function through PowerHA SystemMirror for i. The incremental flash option is available in the STRSVCSSN command. For more information about incremental FlashCopy and PowerHA SystemMirror for i, see “Incremental FlashCopy and PowerHA SystemMirror for i” on page 21.

When the STRSVCSSN command is run correctly, you see the completion message MSGID HAC002B, as shown in Figure 21. You can then vary on the IASP on the target node.

```
F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F13=Information Assistant
F23=Set initial menu
Command STRSVCSSN completed successfully.
```

Figure 21 Completion message for STRSVCSSN

Remember: If the user profile QHAUSRPRF does not have adequate authority for the SSH private key `id_rsa` in the directory `/QIBM/UserData/HASM/hads/.ssh`, STRSVCSSN with MSGID HAE2041 might fail.

After the STRSVCSSN command completes, you can access data in IASPs on both the source node and the target node independently.

Displaying an ASP session for Storwize V7000 FlashCopy

To confirm the status of FlashCopy, run the following DSPSVCSSN command on the target node, as shown in Figure 22.

```
DSPSVCSSN SSN(FLC_SSN)
```

```
                            Display SVC Session                        ITSOBKUP
                                                              10/04/12  13:29:31
Session . . . . . . . . . . . . . . . . . . . :   FLC_SSN
Type  . . . . . . . . . . . . . . . . . . . . :   *FLASHCOPY

Incremental flash . . . . . . . . . . . . . . :   *NO
Copy rate . . . . . . . . . . . . . . . . . . :   0
Cleaning rate . . . . . . . . . . . . . . . . :   0
Grain size (KB) . . . . . . . . . . . . . . . :   256
Consistency group . . . . . . . . . . . . . . :   fccstgrp1
Reverse consistency group . . . . . . . . . . :   fccstgrp0
Storage cluster name  . . . . . . . . . . . . :   Storwize V7000-2076-

                                                                        Bottom
                               Copy Descriptions

ASP         ASP copy              ASP         Replication
device      name        Role      Status         state     Node
IASP01      FLC_PROD    SOURCE    UNKNOWN     ACTIVE       ITSOPROD
            FLC_BKUP    TARGET    VARYOFF                  ITSOBKUP

                                                                        Bottom
                               Copy Descriptions

ASP                               Copy
device      Role      Node      progress  Storage state
IASP01      SOURCE    ITSOPROD    0       Copying
            TARGET    ITSOBKUP

                                                                        Bottom
```

Figure 22 Result of DSPSVCSSN command

The ASP status for the source node is always UNKNOWN because the target node cannot determine the ASP status for the source node. The ASP status for the target node is VARYOFF, but after you vary on the IASP, the status comes up to AVAILABLE. If you specified a copy rate greater than 0 in the STRSVCSSN command, you can check up the actual background copy progress as “Copy progress”.

You can see the status of FlashCopy by clicking **Copy Services** → **FlashCopy** in the web management interface of Storwize V7000, as shown in Figure 23.

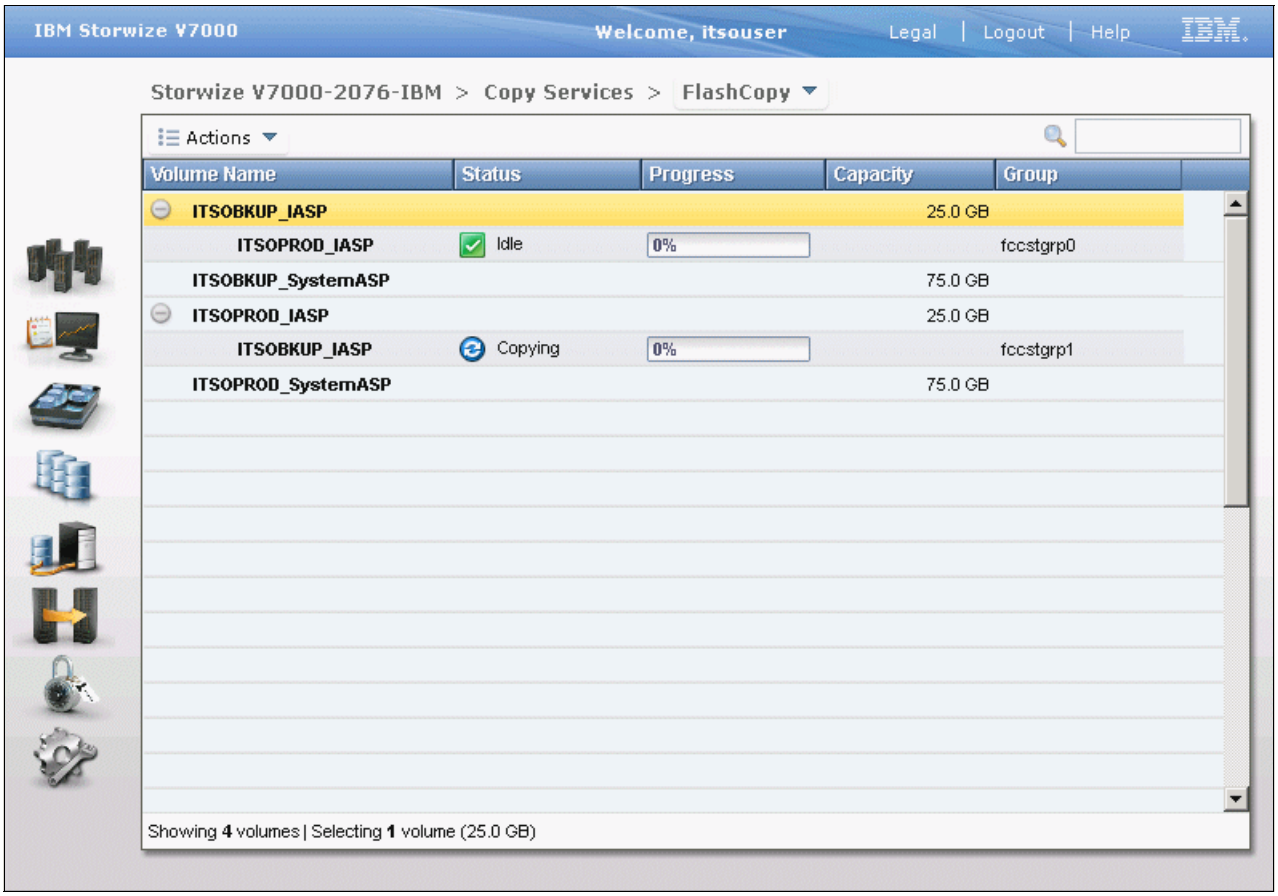

Figure 23 FlashCopy status in the Storwize V7000 management interface

Accessing data in IASPs on both the source node and the target node

During an ASP session for FlashCopy, you can vary-on the IASPs on the source node and the target node independently. You can run the production application on the source node and run a data backup operation on the target node simultaneously.

If you stop an access to an IASP on the source node before STRSVCSSN by using a varying-off operation, you can simply vary-on the IASP again to allow access. If you used an IASP quiesce option, you can allow access to this IASP by using the CHGASPACT command with the *RESUME option, as shown in Figure 24.

```
CHGASPACT ASPDEV(IASP01) OPTION(*RESUME)
```

```
                    Change ASP Activity (CHGASPACT)

Type choices, press Enter.

ASP device . . . . . > IASP01      Name, *SYSBAS
Option . . . . . > *RESUME    *SUSPEND, *RESUME, *FRCWRT
```

*Figure 24 CHGASPACT command with *RESUME option*

You can also access a FlashCopy IASP on the target node by varying-on the IASP on the target node. Then, you can run your data backup operation on that node.

Ending an ASP session for Storwize V7000 FlashCopy

After you finish your data backup operation on the target node, you can end an ASP session for Storwize V7000 FlashCopy by using ENDSVCSSN on the target node, as shown in Figure 25.

```
ENDSVCSSN SSN(FLC_SSN)
```

```
                        End SVC ASP Session (ENDSVCSSN)

Type choices, press Enter.

Session  . . . . . . . . . . . . . > FLC_SSN     Name
Delete consistency group . . . .   *YES          *YES, *NO
```

Figure 25 ENDSVCSSN command

You can choose to delete the consistency group when running ENDSVCSSN. After you run ENDSVCSSN, disk drives in a FlashCopy IASP become non-configured disk units on IBM i. You can no longer use data in a FlashCopy IASP on the target node.

Other topics about Storwize V7000 FlashCopy and PowerHA SystemMirror for i

This section details topics about Storwize V7000 FlashCopy and PowerHA SystemMirror for i that do not fit in the other sections.

Incremental FlashCopy and PowerHA SystemMirror for i

You can use an incremental FlashCopy function with PowerHA SystemMirror for i and normal FlashCopy function. By using incremental FlashCopy, you can reduce amount of cloning data. The function copies data from source node volumes to target node volumes that have been modified since the initial creation of the FlashCopy or the last time an increment operation was performed.

To use an incremental FlashCopy function, you must start an ASP session by using the STRSVCSSN command with INCR(*YES) option. You must also specify a value for the CPYRATE option greater than 0 as an initial FlashCopy. And you must keep this ASP session active. The example for the STRSVCSSN command is shown in Figure 26.

```
STRSVCSSN SSN(FLC_SSN) TYPE(*FLASHCOPY) ASPCPY((FLC_PROD FLC_BKUP)) INCR(*YES)
CPYRATE(100)
```

```
                        Start SVC Session (STRSVCSSN)

Type choices, press Enter.

Session  . . . . . . . . . . . . > FLC_SSN     Name
Session type . . . . . . . . . . > *FLASHCOPY  *METROMIR, *GLOBALMIR...
ASP copy:
  Preferred source . . . . . . . > FLC_PROD    Name
  Preferred target . . . . . . . > FLC_BKUP    Name
              + for more values
Incremental flash  . . . . . . . > *YES        *NO, *YES
Copy rate  . . . . . . . . . . . > 100         0-100
Cleaning rate  . . . . . . . . .   0           0-100
Grain size . . . . . . . . . . .   256         256, 64
Consistency group  . . . . . . .   *GEN
Reverse consistency group  . . .   *GEN
```

Figure 26 STRSVCSSN command for an initial incremental FlashCopy

You can run an incremental FlashCopy, by using CHGSVCSSN command with OPTION(*INCR) specified on the target node:

```
CHGSVCSSN SSN(FLC_SSN) OPTION(*INCR)
```

Before you run CHGSVCSSN for an incremental FlashCopy, You must complete the background copy of the initial FlashCopy or the last incremental FlashCopy. You can check the status of the background copy by using the DSPSVCSSN command as shown in Figure 27.

```
Display SVC Session                        ITSOBKUP
                                                          10/05/12  13:26:22
Session . . . . . . . . . . . . . . . . . :   FLC_SSN
Type  . . . . . . . . . . . . . . . . . . :   *FLASHCOPY

Incremental flash . . . . . . . . . . . . :   *YES
Copy rate . . . . . . . . . . . . . . . . :   100
Cleaning rate . . . . . . . . . . . . . . :   0
Grain size (KB) . . . . . . . . . . . . . :   256
Consistency group . . . . . . . . . . . . :   fccstgrp1
Reverse consistency group . . . . . . . . :   fccstgrp0
Storage cluster name  . . . . . . . . . . :   Storwize V7000-2076-

                                                                      Bottom
                              Copy Descriptions

ASP                                 Copy
device      Role      Node      progress  Storage state
IASP01      SOURCE    ITSOPROD    100     Idle or copied
            TARGET    ITSOBKUP
```

Figure 27 Result of DSPPSVCSSN command for an incremental FlashCopy

If you run CHGSVCSSN with OPTION(*INCR) while the background copy is running, the CHGSVCSSN fails with MSGID HAE2057, which mentions CMMVC5907E, as shown in Figure 28.

```
                        Additional Message Information

Message ID . . . . . . :   HAE2057       Severity . . . . . . . :   30
Message type . . . . . :   Diagnostic
Date sent  . . . . . . :   10/05/12      Time sent  . . . . . . :   13:13:29

Message . . . . :   An error has error has been returned by the storage
  subsystem.
Cause . . . . . :   The storage subsytem has returned an error.  The error
  details are:
    CMMVC5907E The FlashCopy mapping or consistency group was not started
  because the mapping or consistency group is already in the copying state.
Recovery  . . . :   Refer to the IBM Information Center for the storage
  subsystem for error details and recovery actions.
```

Figure 28 Failure message of CHGSVCSSN command for an incremental FlashCopy

The incremental FlashCopy can be started only by using CHGSVCSSN command. Therefore, the initial ASP session for FlashCopy must be kept active while you run an incremental FlashCopy. After you end the initial ASP session by using ENDSVCSSN command on the target node, you no longer run the incremental FlashCopy. You must then start an ASP

session for an initial FlashCopy by using the STRSVCSSN command with INCR(*YES) option again.

Before you run the incremental FlashCopy by using CHGSVCSSN, stop the access to the IASP on the source as it is done for a normal FlashCopy. For more information about stopping an access to the IASP on the source node, see “Stopping an access to an IASP on the source node” on page 16.

Reverse FlashCopy and PowerHA SystemMirror for i

You can also use the reverse FlashCopy function in Storwize V7000 with PowerHA SystemMirror for i. By using the reverse FlashCopy, you can replace an entire IASP on the source node with data in a FlashCopy IASP on the target node. To use this function, you must start an ASP session for a normal FlashCopy by using STRSVCSSN with a CPYRATE option greater than 0 specified. And you also must keep this ASP session active.

To perform the reverse FlashCopy through PowerHA SystemMirror for i, complete these steps:

1. Perform a normal FlashCopy operation as described from “Stopping an access to an IASP on the source node” on page 16 to “Accessing data in IASPs on both the source node and the target node” on page 20. Use this command to start the ASP session with the background copy:

   ```
   STRSVCSSN SSN(FLC_SSN) TYPE(*FLASHCOPY) ASPCPY((FLC_PROD FLC_BKUP))
   CPYRATE(100)
   ```

   Do not end the ASP session by using ENDSVCSSN. If you do so, you can no longer run the reverse FlashCopy.
2. To replace whole data in the IASP on the source node, vary-off the IASP on the source node.
3. Vary-off or quiesce the IASP on the target node, and then establish the checkpoint of the IASP on the target node.
4. On the source node, run CHGSVCSSN command with OPTION(*REVERSE) specified, as shown in Figure 29.

   ```
   CHGSVCSSN SSN(FLC_SSN) OPTION(*REVERSE)
   ```

```
                      Change SVC Session (CHGSVCSSN)

Type choices, press Enter.

Session  . . . . . . . . . . . . > FLC_SSN     Name
Option . . . . . . . . . . . . . > *REVERSE    *CHGATTR, *SUSPEND...
```

Figure 29 Running the reverse FlashCopy by using CHGSVCSSN command

Even if you have run the reverse FlashCopy from the target node to the source node in the certain ASP session, you must run ENDSVCSSN on the target node when you end this ASP session.

Operation Example for Storwize V7000 FlashCopy and PowerHA SystemMirror for i

Example 2 shows a CL script to be run from the FlashCopy target node for automating a FlashCopy backup. It includes quiescing the IASP on the FlashCopy source node ITSOPROD before starting the FlashCopy session and varying on the IASP on the FlashCopy target node ITSOBKUP for doing the backup to tape. It then varys off the IASP on the FlashCopy node, and removes the FlashCopy session again.

Example 2 CHGASPACT run from the FlashCopy target node for quiescing an IASP

```
PGM
  RUNRMTCMD CMD('CHGASPACT ASPDEV(IASP01) +
            OPTION(*SUSPEND) SSPTIMO(30)') +
            RMTLOCNAME(ITSOPROD *IP) RMTUSER(ITSOUSER) +
            RMTPWD(XXXXXXXX)
  STRSVCSSN SSN(FLC_SSN) TYPE(*FLASHCOPY) +
            ASPCPY((FLC_PROD FLC_BKUP))
  RUNRMTCMD CMD('CHGASPACT ASPDEV(IASP01) +
            OPTION(*RESUME)') +
            RMTLOCNAME(ITSOPROD *IP) RMTUSER(ITSOUSER) +
            RMTPWD(XXXXXXXX)
  VRYCFG CFGOBJ(IASP01) CFGTYPE(*DEV) STATUS(*ON)

  /* INSERT CALL OF YOUR BACKUP PROGRAMS HERE */

  VRYCFG CFGOBJ(IASP01) CFGTYPE(*DEV) STATUS(*OFF)
  ENDSVCSSN SSN(FLC_SSN)
ENDPGM
```

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