

**IBM Systems Lab Services**

**PowerHA Tools for IBM i  
IASP Manager  
Users Guide**

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# 1 Architecture for IASP Manager

IASP Manager takes advantage of two clustering features in PowerHA for – Device Domain Data and ASP Copy Descriptions. These new system objects reside within the clustering framework so that their information is accessible to all nodes in the cluster.

Device Domain Data provides a cluster-wide 32K “user space” that can be used to store and share information for all environments across all cluster nodes. An ASP CopyD, which is fundamental to PowerHA, is a system object that contains a description of an IBM DS8000 external storage device and the set of LUNS that will be used for a specific environment. A separate ASP CopyD exists for each environment within a cluster.

When an environment is created using WRKCSE, all information is stored in Device Domain Data. The information related to the IBM DS8000 external storage device is also stored in an ASP CopyD but only after it has been validated:

- User ID ‘qlpar’ must exist on the DS8000 HMC
- The IP address must be PINGable ( port 1750 and 1751 accessible if firewall is in place )
- The device ID must be correct
- The IASP must exist

**Note:** Creating an ASPCPYD will sign on to the DS8000 to validate correct information has been given.

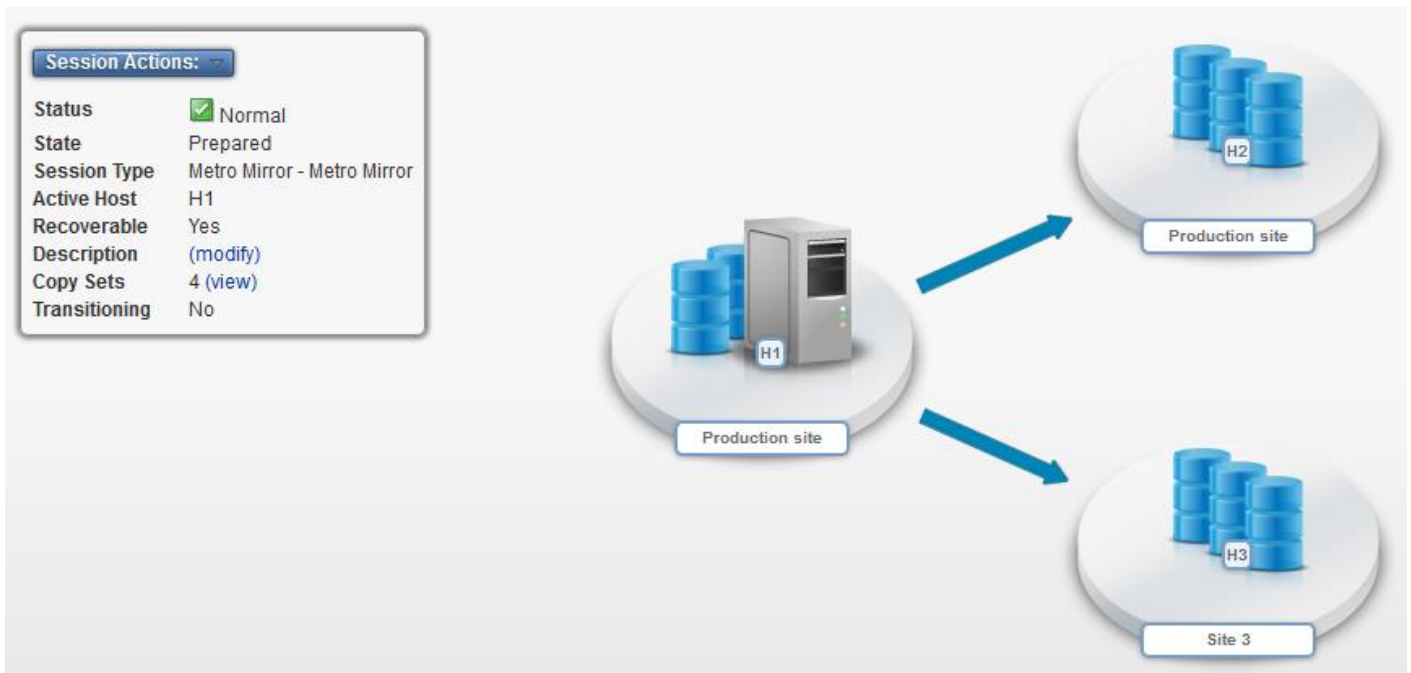
If any of these cannot be verified, the ASP CopyD is not created. However, the environment information is saved in the Device Domain Data. After repairing the validation problems, select WRKCSE option 2=Change for the environment to create the ASP CopyD.

There are many benefits to using a cluster-wide configuration, but the three most important are:

- 1) Single keying for a specific environment across cluster nodes
- 2) Reuse of ASP CopyDs in multiple environments to provide added protection against mis-keying and environment configuration, and
- 3) All replication environments are available on all nodes – this allows for a FlashCopy at a replication target to perform a check of the replication prior to performing the flash function. Previously, the customer had to rely on CHKPPRC to tell them when replication was broken and to stop the Flash function from running.

## 1.1 Copy Services Manager (CSM)

This is a separately-priced product that can enhance system availability for Metro Mirroring and Global Mirroring environments. With IASP Manager 4.3, it is **required** for Multi-target environments, and can be used for normal Metro Mirror environments as well. Following is a CSM display of a Multi-target Metro Mirror environment.



### Interpretation:

- H1 is the Preferred Source for MMIR.
- H2 is the Preferred Target for MMIR.
- H3 is a second Preferred Target for MMIR.

**Note:** The diagram shows that both MMIR PPRC pairs (H1-H2 and H1-H3) are currently replicating in the normal direction.

## 2 Flash Copy

### 2.1 Check FlashCopy (CHKFLASH) command

This command checks the status of the CSE CRG, nodes and hardware resources to determine if a FlashCopy can be started (STRFLASH). All errors found during a CHKFLASH are logged in the “qzrdhasm.log” file which is located in the /qibm/qzrdhasm” directory on the IBM i partition where the command was run.

### 2.2 Start a FlashCopy Backup (STRFLASH) command

Purpose: Perform the steps necessary to FlashCopy the current Production partition IASP to the FlashCopy (backup) partition IASP and make the FlashCopy (backup) partition IASP available. This command can be run on any node in the cluster/recovery domain to perform the steps necessary to make a second copy of the designated IASP available. The copy will be taken from the designated source node which might also participate in a metro mirror or global mirror relationship regardless of the direction of replication. For cold FlashCopy, the Production partition IASP will be varied off automatically, and the FlashCopy data will be an exact copy of the Production data. For warm FlashCopy, the Production partition IASP remains varied on so the FlashCopy could be missing some data that had not yet been flushed to disk on the Production partition.

To start a FlashCopy, key **STRFLASH** and press F4=Prompt. Press F10=Additional parameters.

```

                                Start a FlashCopy Backup (STRFLASH)

Type choices, press Enter.

Environment name . . . . . _____ Name
Flash Target Node Name . . . . . *LOCAL Character value, *LOCAL
Vary on after flash . . . . . *YES *YES, *NO
Quiesce Action . . . . . *ENV *ENV, *QUIESCE, *FRCWRT...

                                Additional Parameters

Cluster Resource Group . . . . . *ENV Character value, *ENV
Preflashed . . . . . *NO *YES, *NO
Connect hosts . . . . . *ENV *ENV, *CURRENT, *NO...
Wait for completion . . . . . *ENV *ENV, *YES, *NO
Completion timeout . . . . . *ENV 1-30, *ENV
Vary on Source . . . . . *ENV *ENV, *YES, *NO
Exit Program . . . . . *ENV Name, *ENV, *NONE
Library . . . . . _____ Name

                                Bottom
```

Parameter descriptions:

- Environment name = The name of the FLASH CSE environment to use

- Flash Target Node Name = **\*LOCAL** or **<FC node>** <<The name of the FlashCopy target node
- Vary on after flash = **\*YES** or **\*NO** << for the IASP on the FlashCopy node
- Quiesce Action = **\*ENV** or one of the following:
  - **\*QUIESCE** = Flush memory to disk and temporarily suspend PPRC during the flash
  - **\*FRCWRT** = Flush memory to disk but do NOT suspend PPRC during the flash
  - **\*NONE** = Do NOT flush memory to disk before starting the flash
- Cluster Resource Group = **\*ENV** or **<CRG name>** << CRG name if different from environment name
- Preflashed = **\*NO** or **\*YES** << \*YES if the FlashCopy is already completed
- Connect hosts = **\*ENV** or one of the following:
  - **\*CURRENT** = Assume the current connections are correct
  - **\*REQUIRED** = It is required that the host connections are modified. If volume groups are not assigned, continue and run the add script when appropriate. If volume groups are assigned, verify that they are for this environment. If not, terminate the STRFLASH.
  - **\*ATTEMPT** = Same as for **\*REQUIRED** except that if incorrect volume groups are assigned, do not vary on the IASP.
  - **\*NO** = Do nothing with host connect but still mark the environment as **\*FLASHED**.
- Wait for completion = **\*ENV**, **\*YES** or **\*NO** << Since the vary on of the IASP is now done asynchronously, you must wait for vary on completion before starting the save.
- Completion timeout = **1-600**, **\*ENV** << The number of minutes to wait for vary on completion before sending a failure message to QSYSOPR.
- Vary on Source = **\*YES** or **\*NO** << for the IASP on the Production node
- Exit program and library = **\*ENV** or **<name>** << Name of program to be submitted as soon as the IASP is 'AVAILABLE.'

As the STRFLASH command runs, status messages are displayed on the bottom of the green screen to show progress.

### 2.2.1 FlashCopy Process

- 1) Perform basic checks of the cluster, device domain, connectivity to the DS, etc.
- 2) Activate an exit program on the FlashCopy node to perform additional checks:
  - a. Is the IASP varied off?
  - b. Is DSCLI installed correctly?
  - c. Discover what host connects are attached?
  - d. Is this the source or target of a Metro Mirror or Global Mirror. If so, is the replication in the correct state for the FlashCopy to proceed?
- 3) The STRFLASH program issues a quiesce/frcwrt/vary off to the production node if requested in the command or the environment.
- 4) The STRFLASH program submits a job to the FlashCopy node to perform the following tasks.
  - a. Set the Flash status to 20 to allow the STRFLASH command running on a different node to know that the Flash job has been successfully submitted. The STRFLASH command will error if the job is not started within 60 seconds.
  - b. Perform the mkflash script or start the ASP session depending on the level of IBM i.



- c. Set the Flash status to 90 to allow the STRFLASH command running on a different node to continue processing a resume of the production system if required and end successfully if wait for complete is \*NO.
  - d. Vary on the IASP if requested ( along with associated release, resets and multipath resets )
  - e. Set the Flash status to 100 (\*FLASHED ) to allow STRFLASH to end successfully if wait for completion is \*YES
- 5) When the FlashCopy Status changes to '90', the STRFLASH program continues:
- a. If the Production node was quiesced or varied off, an exit program is submitted to resume or vary on.
  - b. If the wait for completion is set to \*YES, the STRFLASH program stays active until the FlashCopy is completed, and the Status is changed to '100'.
  - c. If wait for completion is set to \*NO, the STRFLASH program is ended successfully.

### 2.2.2 Notes about the FlashCopy Process

- If all defaults are used, the effective process will appear identical to the ACS 2.1 FlashCopy process with wait for completion = \*YES and connect hosts = \*CURRENT.
- The log of the process is now distributed across up to three systems. Performing problem determination now requires looking at logs on all systems involved.
- The FlashCopy program runs separately from the FlashCopy process. It should be monitored to ensure it runs correctly.
- A successful STRFLASH command does NOT mean the IASP was connected and varied on successfully. You must still check the IASP status at the end of the FlashCopy process.

### 2.3 End a FlashCopy Backup (ENDFLASH) command

Purpose: To perform the steps required to remove all FlashCopy IASPs from the partition and make them ready for future FlashCopy operations by any of the IASP environments.

The ENDFLASH command will NOT end multiple FlashCopies in ACS 3.0 or IASP Manager 4.0. The default of \*ONLY can only be used if only one FlashCopy environment is configured in the cluster.

To end a FlashCopy, key ENDFLASH and press F4=Prompt.

```

                End a FlashCopy Backup (ENDFLASH)

Type choices, press Enter.

Environment name . . . . .  *ONLY           Name, *ONLY
```

Press F10 to display additional parameters.

**Additional Parameters**

|   |                    |                   |
|---|--------------------|-------------------|
| <b>Cluster Resource Group . . . . .</b> | <u><b>*ENV</b></u> | <b>Name, *ENV</b> |
| <b>Disconnect hosts . . . . .</b>       | <u><b>*NO</b></u>  | <b>*YES, *NO</b>  |

Steps performed by the end flash function are:

- 1) Vary off all the FlashCopy IASPs with a force \*YES
- 2) Remove flash on the DS8000 if not using an incremental FlashCopy
- 3) Modify the CSEDTA to indicate no Flash Active - if using incremental, this means ready for next flash.

Alternatively, ENDFLASH can name a specific environment to end.

**Note:** The FlashCopy Status field must be \*FLASHED to use this command.

## 2.4 Displaying a FlashCopy Environment

Use the Work with Copy Services Environments (WRKCSE) command to view details of the FlashCopy configuration and scripts and profile used for operations. (**Note:** Your organization may have implemented security for some of the WRKCSE options. If you are denied access, please contact them for more information.)

```
Copy Services Environments

Type options, press Enter.
  1=Add   2=Change   4=Delete  5=Display  12=Work with
 14=List Stream files  16=Define host connections  18=Make PPRC Paths

Opt  Name      Type  Text
---  ---
---  PYSHT      MMIR
---  SEKIU      FLASH
---  SEQUIM     GMIR

Command
====>
F1=Help  F3=Exit  F4=Prompt  F9=Retrieve  F10=View log  F12=Cancel
F14=List All

Bottom
```

Option 5=Display

```
Display a FLASH Environment

Press Enter to continue.

Environment . . . : SEKIU           Primary ASP . . . : nnn
Type . . . . . : FLASH           Storage device . . : IBM.2107-ABC1234
Storage Type . . : DS8K
Device name . . . : SEKIU
Source CopyD . . . : CPYDSRC
Target CopyD . . . : CPYDTGT
Source node . . . : SOURCE
Target node . . . : TARGET

More...

Volume relationships:
SOURCE           Flash
Volumes          Volumes
0A00-0A01        12B0-12B1
0B00-0B02        13B0-13B2

Bottom
```

On the first *More...* page:

```
Display a FLASH Environment
Press Enter to continue.

Full FlashCopy . . : *YES
Resync FlashCopy . : *YES
Multi incremental
  resync . . . . . : *YES
Space Efficient . . : *NO
Shared . . . . . : *NO
Target PPRC . . . : *NO

GMIR D-Copy
  target flash . . : *NO
Varyon Source
  IASP . . . . . : *YES
Quiesce Action . . : *NONE
Connect hosts . . . : *CURRENT
Wait for
  Completion . . . : *YES

More...

Volume relationships:
SOURCE          Flash
Volumes         Volumes
0A00-0A01       12B0-12B1
0B00-0B02       13B0-13B2

Bottom
```

And on the second *More...* page:

```
Display a FLASH Environment
Press Enter to continue.

Completion
  timeout . . . . : 180
Exit program . . . : *NONE
  Library . . . . :
GMIR CG timeout . . : 60
GMIR CG Failure
  Action . . . . . : *FAIL

Storage hmcl . . . : n.n.n.n
Source port . . . . : 1751
Volume sets . . . . : 5

Bottom

Volume relationships:
SOURCE          Flash
Volumes         Volumes
0A00-0A01       12B0-12B1
0B00-0B02       13B0-13B2

Bottom
```

### Option 12=Work with

```
Work with FlashCopy Environment

Environment . . : SEKIU
Status . . . . : None

Select one of the following:

    1. Start ( make flash )
    2. Stop  ( remove flash )

    12. Work with Volumes

    14. List Stream files

Selection
  —

F1=Help  F3=Exit  F5=Refresh Status  F10=View log  F12=Cancel
```

**Note:** The Status reflects the “clustering status” of the FlashCopy only. This is to show whether an ENDFLASH is required for an IASP before another flash is taken. If there is no CRG, then a status of \*\*\* will always be shown.

### Option 12=Work with Volumes

```
Work with FlashCopy Volumes

Environment . . : SEKIU                Direction . . :
Copy Service . . :                      Source device : IBM.2107-ABC1234
Type . . . . . : FLASH                Target device : IBM.2107-ABC1234

Type Volume options; 2=Pause, 3=Resume, press Enter.

Opt  Src : Tgt  Preferred Source Status
—   0A00:12B0  0A
—   0A01:12B1  0A
—   0B00:13B0  0B
—   0B01:13B1  0B
—   0B02:13B2  0B

F1=Help  F3=Exit  F5=Refresh Status  F10=View log  F12=Cancel

Bottom
```

## Option 14=List Stream files

```
CS Environment Stream Files
Type options; 2=Change, 4=Delete, 5=Display, 9=Run, press Enter.

Opt Stream file name                IFS directory
--  flash.profile                    ...profiles/SEKIU_FLASH
--  flash_9.profile                   ...profiles/SEKIU_FLASH
--  pprc_9_PS.profile                 ...profiles/SEKIU_FLASH
--  pprc_9_PT.profile                 ...profiles/SEKIU_FLASH
--  runds.profile                     ...profiles/SEKIU_FLASH
--  lsallhostconn_PS.script           ...scripts/SEKIU_FLASH
--  lsallhostconn_PT.script           ...scripts/SEKIU_FLASH
--  lsfbvol_PS.script                 ...scripts/SEKIU_FLASH
--  lsfbvol_PT.script                 ...scripts/SEKIU_FLASH
--  lsflash.script                    ...scripts/SEKIU_FLASH
--  lsflash_all.script                ...scripts/SEKIU_FLASH
--  lsflash_long.script               ...scripts/SEKIU_FLASH
--  lsflash_long_tgt.script           ...scripts/SEKIU_FLASH
--  mkflash.script                    ...scripts/SEKIU_FLASH

Command
====>
F1=Help  F3=Exit  F4=Prompt  F9=Retrieve  F10=Viewlog  F12=Cancel
```

It is possible to run any of these scripts interactively by selecting option 9. It is also possible to start an interactive session to the IBM System Storage by selecting option 9 for a profile.

## 2.5 Use case scenarios

### 2.5.1 Run a FlashCopy locally on the Flash node. Start backups after the Flash is completed

To run this standard scenario, all defaults should be taken. The wait for complete must be \*YES to ensure that the Flash Program which is submitted to run independently is completed before the backup is started. The connect hosts should be \*CURRENT as checking the hostconnects is extra overhead that is not required.

If the FlashCopy program fails – the Flash status will be set to 88, and the STRFLASH command will fail.

### 2.5.2 Run FlashCopy from the Production node. Resume batch as soon as the Flash is completed.

To run the FlashCopy from the production node, the Flash Target Node Name must be provided on the command. To resume the batch immediately after the actual FlashCopy is performed on the storage, use wait for completion \*NO. To submit the backup on the Flash Node once the Flash Program as completed use the Exit Program parm.

Note: Since nothing is monitoring the Flash program due to the STRFLASH command completing, it will be necessary either to monitor for errors on the Flash node, or with a program on the production node checking for 100 ( Flash completed ) or 88 ( Flash program failed ).

### 2.5.3 Run multiple FlashCopies of the same IASP from production. Attach the copies one at a time on the Flash node for backup.

Prod node:

Run the STRFLASH command with Flash Target Node Name filled in, and Connect Hosts = \*NO. This will allow the STRFLASH to work even when the Flash Node has volumes that are not part of this environment attached and in use.

Flash Node:

Use a program to automate attaching the copies one at a time with STRFLASH Preflashed = \*YES, Connect Hosts = \*REQUIRED. An ENDFLASH with Disconnect Hosts \*YES must be run before the next STRFLASH can be run.

## 3 Metro Mirror

### 3.1 Metro Mirror Overview

Metro Mirror is a complex disaster recovery environment that includes two separate sets of volumes: Preferred source volumes and preferred target volumes. A copy of the data on the Production node is maintained synchronously on the HA/DR node; the Production node waits for update acknowledgement from the HA/DR node before proceeding. Performance considerations require that the two sets of volumes be in rather close proximity to each other so that the wait is minimized.

### 3.2 Switching Metro Mirror

#### 3.2.1 Check PPRC (CHKPPRC) command

This command checks the status of the CSE CRG, nodes and hardware resources to determine if a Switch PPRC (SWPPRC) can be successfully performed. This command primarily checks the state of things but will add the appropriate fiber adapters to the Production node if not currently assigned and correct the HMC profiles to match. All errors found during a CHKPPRC are logged in the “**qzrdhasm.log**” file, which is located in the “**/qibm/qzrdhasm**” directory on the IBM i partition where the command was run.

**Note:** CHKPPRC will indicate success only if all components of both the Production and Target nodes are operational. Thus, it will indicate failure even though a SWPPRC would be successful if the failing components were on the Production node.

**Note:** If dual CSM servers are being used, CHKPPRC will automatically switch to the backup server if it cannot communicate with the primary server.

To check the status of a PPRC CSE CRG, use the following green screen command on the current Backup node.

**CHKPPRC ENV(<name of IASP>) TYPE(\*)** ( or \*GMIR, \*LUN, \*MMIR, \*GMIR2, \*MMIR2, \*MMIR3 )

TYPE(\*) is allowed if there is only one type for the environment. TYPE must be specified when there are two or more.

**Note:** If CHKPPRC is to be run on both the Production and HA/DR nodes, they cannot be run concurrently because of conflicts when both try to access the Clustering Resources at the same time.

The CHKPPRC command displays status messages on the bottom of the green screen to show progress:

The following list outlines the steps completed by this command.

1. Status message: Getting the cluster information
  - a. Check the PPRC status, indicated in the CSE CRG.
  - b. Identify the current HA/DR node.
  - c. Identify the current Production Node.
2. Status message: Checking cluster nodes
  - a. Check that cluster nodes are active.
  - b. Check that all nodes are in Device Domain.
3. Status message: Checking HA/DR node hardware assignments
  - a. Execute DSCLI lspprc scripts to ensure that PPRC is in Full Duplex state.
4. If configuration is correct: CHKPPRC reports “A PPRC check for IASP CRG <IASPname> completed successfully.”

**Note:** With CSM, CHKPPRC issues an escape message IAS00AE if a CSM server is missing. This is a warning message to indicate that the configuration is operational, but action is required for full redundancy. When monitoring the CHKPPRC function, a CL program should differentiate between an IAS0070 ( failed ) and IAS00AE.

### **3.2.2 Switch PPRC (SWPPRC) command with \*SCHEDULED option**

**Note:** If dual CSM servers are being used, SWPPRC will automatically switch to the backup server if it cannot communicate with the primary server.

To reverse the Production and HA/DR node roles, key green screen command **SWPPRC** and press F4=Prompt on the current HA/DR node.



```

Switch PPRC (SWPPRC)

Type choices, press Enter.

Environment name . . . . .
Switch type . . . . . *SCHEDULED Name *SCHEDULED, *UNSCHEDULED...
Type . . . . . * *, *GMIR, *LUN, *MMIR
Auto Vary On . . . . . *YES *YES, *NO
Auto replicate . . . . . *DFT *DFT, *YES, *NO

```

Switch type = \*SCHEDULED is used when both the Production and HA/DR nodes and the storage device are operational but their roles need to be reversed.

The default for auto replicate for a scheduled switch is to use the environment specification.

The following steps are performed:

1. Send \*INQ message to QSYSOPR on the Production node: IAS0021 “Perform SWPPRC command for IASP device <IASP name>? (G C)” Reply G to continue, C to cancel.
2. Vary off the IASP with a force \*YES on the current Production node.
3. Run PPRC Failover tasks for the IASP device using DSCLI.
4. Release/Reset the IOP/IOA resources on the HA/DR partition and get the disks to register correctly as the IASP.
5. If requested, vary on the IASP on the current HA/DR node (which then becomes the Production node).

### 3.2.3 Switch PPRC (SWPPRC) command with \*UNSCHEDULED option

Switch type = \*UNSCHEDULED is used when the Production node has failed, and the HA/DR node needs to assume the role of production.

The default for auto replicate for an unscheduled switch is \*NO.

An additional prompt is displayed if TYPE(\*MMIR) is specified:

```

Switch paused MMIR . . . . . *NO *YES, NO

```

The default of \*NO prevents the switch from being performed if CHKPRC finds that the PPRC is suspended. \*YES would allow it to proceed even though PPRC is suspended.

- This command attempts to complete all the steps outlined for a scheduled switch but will allow a switch to happen even if the following errors are detected:
  - Production node failure
  - Production storage device failure (i.e., failbackpprc task not able to be run)
- Step 1 displays an “Unscheduled PPRC Switch Warning” panel if running interactively; \*INQ message IAS0727 is sent to QSYSOPR on the HA/DR node if running in batch.

- *An unscheduled switch will most likely be an incomplete switch due to failures. The SWPPRC \*COMPLETE command must be run when failures have been corrected to complete the PPRC failover process.*

### 3.2.4 Switch PPRC (SWPPRC) command with \*COMPLETE option

Switch type = \*COMPLETE is used after an unscheduled switch when errors prevented all the normal switchover tasks from being completed. This command should be run on the current HA/DR node in order to complete the PPRC failover process.

## 3.3 Displaying a Metro Mirror Environment

Use the Work with Copy Services Environments (WRKCSE) command to view details of the MMIR configuration and scripts and profile used for operations. (**Note:** Your organization may have implemented security for some of the WRKCSE options. If you are denied access, please contact them for more information.)

```

Copy Services Environments

Type options, press Enter.
 1=Add   2=Change   4=Delete   5=Display   12=Work with
 14=List Stream files  16=Define host connections  18=Make PPRC Paths

Opt  Name      Type  Text
---  ---      ---  ---
---  PYSHT      MMIR
---  SEKIU      FLASH
---  SEQUIM     GMIR

Command
====>
F1=Help  F3=Exit  F4=Prompt  F9=Retrieve  F10=View log  F12=Cancel
F14=List All
Bottom

```

Option 5 (Display)

```
Display a PPRC Environment
Press Enter to continue.

Environment . . . . . : PYSHT
Type . . . . . : MMIR
Storage Type . . . . . : DS8K
ASP Device name . . . . . : MMIR
Source Copy Description . . : CPYDPROD
Target Copy Description . . : CPYDBACK

Volume relationships:
  PROD          BACKUP
  Volumes       Volumes
  1200-1202     1300-1302

F1=Help  F3=Exit  F8=PPRC Paths  F12=Cancel

More...
Bottom
```

On the first *More...* page:

```
Display a PPRC Environment
Press Enter to continue.

CSM Replication . . . . . : *NO
Source node . . . . . : PROD
Target node . . . . . : BACKUP
Primary ASP . . . . . : nnn
Source device . . . . . : IBM.2107-ABC1234
Target device . . . . . : IBM.2107-XYZ9876

Volume relationships:
  PROD          BACKUP
  Volumes       Volumes
  1200-1202     1300-1302

More...
Bottom
```

And on the second *More...* page:

```
Display a PPRC Environment
Press Enter to continue.

Source hmcl . . . . . : n.n.n.n
Source port . . . . . : 1751
Target hmcl . . . . . : n.n.n.n
Target port . . . . . : 1751
Volume sets . . . . . : 3
PPRC Paths . . . . . : 0

Volume relationships:
  PROD          BACKUP
  Volumes       Volumes
  1200-1202     1300-1302

Bottom
Bottom
```

## Option 12 (Work with)

```
Work with MMIR Environment

Environment . . : PYSHT                Direction . . . : Reversed
Mirror type . . : MMIR                 Status . . . . : Running

Select one of the following:

    2. Pause
    3. Resume

    8. Detach
    9. Reattach

   12. Work with Volumes
   13. Display Out of Sync sectors
   14. List Stream files

Selection _____ Bottom

F1=Help  F3=Exit  F5=Refresh Status  F10=View log  F12=Cancel
```

**Note:** Options 2 and 3 (Pause and Resume) are inoperative for CSM environments. Use the CHGPPRC command or the CSM GUI interface for these actions.

**Note:** Option 12 (Work with Volumes) is not available if CSM servers are being used.

## Option 12 (Work with Volumes)

```
Work with MMIR PPRC Volumes

Environment . . : PYSHT                Direction . . . : Reversed
Copy Service                                         Source device  : IBM.2107-ABC1234
Type . . . . . : MMIR                 Target device  : IBM.2107-XYZ9876

Type Volume options; 2=Pause, 3=Resume, press Enter.

Opt  Src : Tgt  Preferred Source Status      Preferred Target Status
_    1200:1300 Target Full Duplex - Metro  Full Duplex - Metro Mirror
_    1201:1301 Target Full Duplex - Metro  Full Duplex - Metro Mirror
_    1202:1302 Target Full Duplex - Metro  Full Duplex - Metro Mirror

F1=Help  F3=Exit  F5=Refresh Status  F10=View log  F12=Cancel

Bottom
```

Option 13 will show the out-of-sync sectors for an environment. This is useful when either creating a new PPRC connection, adding disk, or catching up after a failover.

```

                                Display Out of Sync Sectors

Press Enter to refresh.

Environment name . . . : PYSHT
Copy Service Type . . : MMIR
Out of Sync Sectors . : 0
Pending results:
None

                                                                    Bottom

F1=Help   F3=Exit   F5=Refresh Status   F10=View log   F12=Cancel

```

### Option 14 (List Stream files)

```

                                CS Environment Stream Files

Type options; 2=Change, 4=Delete, 5=Display, 9=Run, press Enter.

Opt  Stream file name                IFS directory
---  ---
pprc_PS.profile                      ..profiles/PYSHT_MMIR
pprc_PT.profile                      ..profiles/PYSHT_MMIR
pprc_9_PS.profile                   ..profiles/PYSHT_MMIR
pprc_9_PT.profile                   ..profiles/PYSHT_MMIR
runds_PS.profile                    ..profiles/PYSHT_MMIR
runds_PT.profile                    ..profiles/PYSHT_MMIR
failoverpprc_to_PS.script           ..scripts/PYSHT_MMIR
failoverpprc_to_PT.script           ..scripts/PYSHT_MMIR
lsallhostconn_PS.script             ..scripts/PYSHT_MMIR
lsallhostconn_PT.script             ..scripts/PYSHT_MMIR
lsavailpprcport_PS.script           ..scripts/PYSHT_MMIR
lsfbvol_PS.script                   ..scripts/PYSHT_MMIR
lsfbvol_PT.script                   ..scripts/PYSHT_MMIR
lspprc_long_PS.script               ..scripts/PYSHT_MMIR

                                                                    More...

Command
====>
F1=Help   F3=Exit   F4=Prompt   F9=Retrieve   F10=Viewlog   F12=Cancel

```

#### Notes:

1. **PS** stands for Preferred Source
2. **PT** stands for Preferred Target

## 4 Global Mirror

### 4.1 Global Mirror Overview

Global Mirror is a complex disaster recovery environment that can include up to six separate sets of volumes. A copy of the data on the Production node is replicated asynchronously to the HA/DR node; the Production node does not wait for update acknowledgement from the HA/DR node before proceeding. At a configured interval, a Consistency Group (CG) is created on the source side storage server. The source side storage server then initiates a Flashcopy on the target storage server after it ensures that all changes in that consistency group have been sent to the target storage system. This Flashcopy can then be used during a failover to return the Target volumes to the state of the last known good consistency copy. Global Mirror can be set up to operate in a single direction only or in either direction (symmetrical).

IASP Manager uses the following terms for the six volume sets:

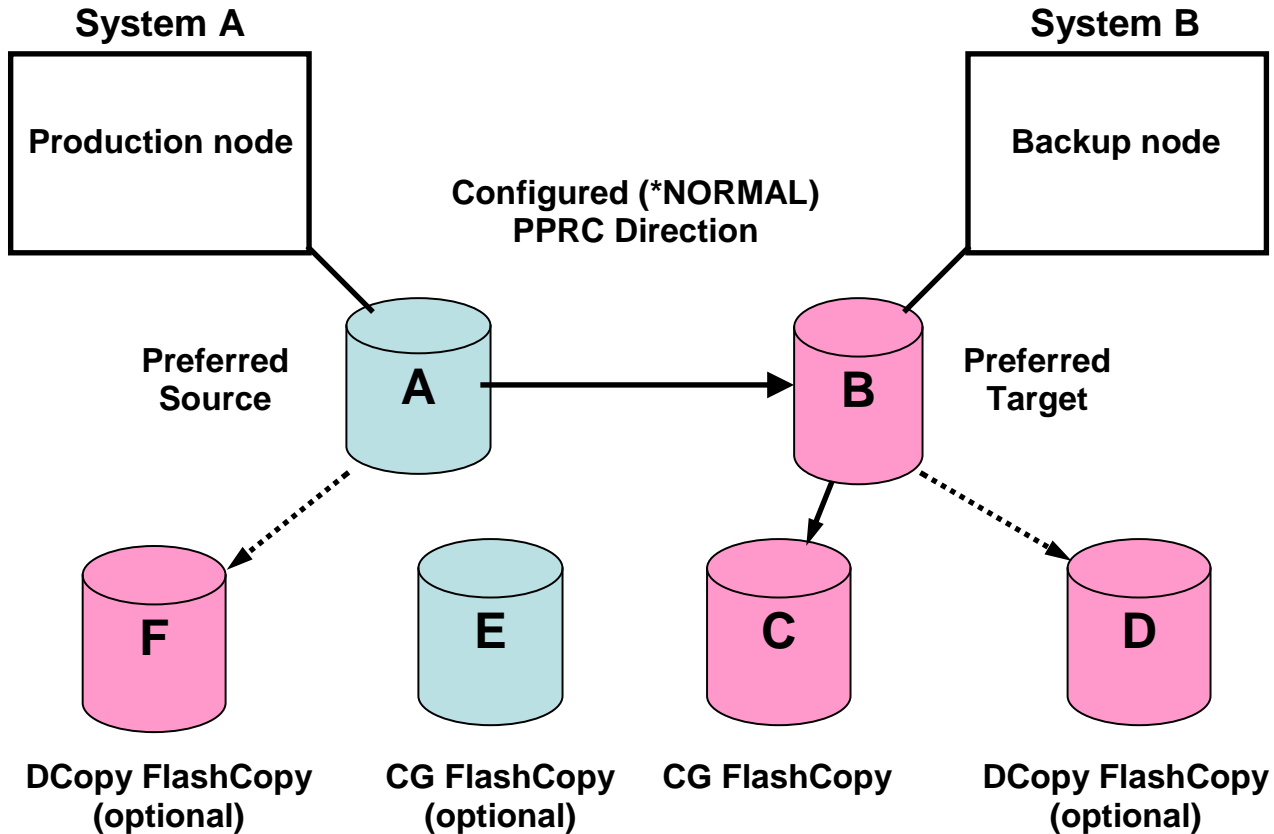
**Source volumes (A)** -- these are the volumes normally in use by applications on the Production node (Preferred Source).

**Preferred Source CG Flash volumes (E)** -- These volumes are used by Global Mirror to store consistency information (CGs) on the storage server when Global Mirror is running in the reversed direction, Preferred Target to Preferred Source (symmetrical only), to track changes that have been made to the PS volumes since the last consistency group was formed.

**Target volumes (B)** -- These volumes are normally used on the HA/DR node (Preferred Target) to maintain a copy of the data from the Production node. Since PPRC operates asynchronously in Global Mirror, the data updates lag behind the contents of the Source volumes.

**Preferred Target CG Flash volumes (C)** -- These volumes are used by Global mirror to store consistency information (CGs) when Global Mirror is running in the normal direction, Preferred Source to Preferred Target. These volumes are used by the target storage server to track changes that have been made to the PT volumes since the last consistency group was formed.

**Global Mirror target FlashCopy (DCcopy) volumes (D and F)** -- These volumes are used to make a copy of the data available on the storage server which is currently the target of global mirror. This copy can be varied on for test or save purposes.



## 4.2 Global Mirror Environments

### 4.2.1 Global Mirror basic environment (non-symmetrical)

Volume sets -- A, B and C

This environment provides disaster/recovery protection when running in the normal direction by using the C volumes to keep a consistent copy, but when switched, it cannot create consistent copies in the reverse direction. Customers will typically run on the B volumes for as short a time as possible if forced to switch before performing a manual switch back to return to their preferred production node.

### 4.2.2 Global Mirror symmetrical environment

Volume sets -- A, B, C and E

A symmetrical environment allows Global Mirror to run with consistency in either normal or reversed direction. This environment is similar to most HA implementations, except that when a failover occurs, there will always be some data that is not part of the consistent image. This data is not retrievable. However, scheduled switchovers have zero data loss.

### 4.2.3 Practice Failover – (Global Mirror target FlashCopy (DCopy))

Volume sets – D and F (Can be added to any GM environment)

A Practice Failover is a process where global mirror is paused, the Target volumes are made consistent (pprc failover, and fast restore), and a new Flashcopy is created to a set of volumes other than the ones used for global mirror consistency. Global mirror is then restarted. This process creates volumes that can be used for testing or saves.

## 4.3 Restrictions on switchover and failover with Global Mirror

Global Mirror customers may choose to use some of the Flashcopy volumes for multiple purposes during normal operations. While this is supported, it can create conditions where a switchover/failover may not be able to be done until the volumes are freed up for use by Global Mirror.

In general, there are two main restrictions that must be noted:

### 4.3.1 Practice Failover (Target-side flash) in progress prevents switchover or failover.

When doing a practice failover (target-side flash) in the normal direction, the B volumes have multiple FlashCopy relationships established. To minimize the amount of time these multiple relationships are active, IASP Manager only supports taking the DCopy as a full disk copy.

Part of the unscheduled switchover process is to perform a fast restore from the C volumes to the B volumes. This will fail if there is an existing B volumes to D volumes relationship as this would be a “cascading” FlashCopy which is not supported.

To handle this, IASP Manager will always perform a check on the D volumes if they exist in the configuration, and fail the check on a switchover if the DCopy has not completed. At this time, you can either wait for the DCopy to complete, or use WRKCSE to run the **rmflash\_GM\_Dcopy\_PT.script**; then run the SWPPRC command again.

### 4.3.2 Practice Failover with mult incremental FlashCopy

IASP Manager now supports Multiple incremental FlashCopy for any flash environment, including the D-Copy of a Global Mirror. We have enhanced the support for this by applying the following rules

- If the multiple incremental flag is on, the SWPPRC for a DS failure will first list the D-Copy environment.
- If the D-Copy has zero out of sync sectors I.e the background incremental copy has completed, the flash will be automatically removed and the unscheduled switch will continue. Note: Removing the



FlashCopy relationship does NOT affect the data on the disk and backups on the FlashCopy node can continue. An end flash should still be run after the back is completed as normal.

- If the D-Copy still has outstanding sectors to copy, the SWPPRC will fail. The customer has the choice to remove the Flash manually and retry, or wait for the background copy to complete.

### **4.3.3 Flash Volumes in use on Production node prevents a symmetrical switchover or failover**

When running in a symmetrical environment, it is common to use the Production node CG FlashCopy Volumes (C or E volumes) for day-to-day saves to tape. However, the FlashCopy used for saves does not have the same parameters and functions as a Global Mirror FlashCopy. So if a symmetrical switchover or failover is requested, IASP Manager will interrogate the preferred source CG FlashCopy volumes to ensure that no FlashCopy is active. If a FlashCopy is active, the CHKPPRC portion of the switchover will fail, and the customer must either wait until they have finished using the volumes or run an ENDFLASH command on their HA/DR node to remove the FlashCopy relationship. Then run the SWPPRC command again.

## **4.4 Switching Global Mirror**

### **4.4.1 Check PPRC (CHKPPRC) command**

This command checks the status of the CSE CRG, nodes and hardware resources to determine if a Switch PPRC (SWPPRC) could be successfully performed. This command takes no corrective action to the Global Mirror replication; it simply checks the state of things. All errors found during a CHKPPRC are logged in the “**qzrdhasm.log**” file, which is located in the “**/qibm/qzrdhasm**” directory on the IBM i partition where the command was run.

To check the status of a PPRC CSE CRG, use the following green screen command on the current HA/DR node.

```
CHKPPRC ENV(<name of IASP>) TYPE(*)      ( or *GMIR, *LUN, *MMIR, *GMIR2,  
                                           *MMIR2, *MMIR3 )
```

TYPE(\*) is allowed if there is only one type for the environment. TYPE must be specified when there are two or more.

**Note:** If CHKPPRC is to be run on both the Production and HA/DR nodes, they cannot be run concurrently because of conflicts when both try to access the Clustering Resources at the same time.

**Note:** If dual CSM servers are being used, CHKPPRC and SWPPRC will automatically perform a CSM takeover to the backup server if they cannot communicate with the primary server.

**Note:** If a CSM server takeover has been performed, and the old primary CSM server is found to be active, CHKPPRC and SWPPRC will automatically restart the CSM in HA mode but the old primary will now be backup.

The CHKPPRC command displays status messages on the bottom of the green screen to show progress:

The following list outlines the steps completed by this command.

1. Status message: Getting the cluster information
  - a. Check the PPRC status, indicated in the CSE CRG.
  - b. Identify the current HA/DR node.
  - c. Identify the current Production Node.
2. Status message: Checking cluster nodes
  - a. Check that cluster nodes are active.
  - b. Check that all nodes are in Device Domain.
3. Status message: Checking HA/DR node hardware assignments
  - a. Execute DSCLI lsprrc scripts to ensure that PPRC is in Copy Pending state.
4. If configuration is correct: CHKPPRC reports “A PPRC check for IASP CRG <IASPname> completed successfully.”

#### 4.4.2 Switch PPRC (SWPPRC) command with \*SCHEDULED option

**Note:** If dual TPC-R servers are being used, SWPPRC will automatically perform a TPC-R takeover to the backup server if it cannot communicate with the primary server.

To reverse the Production and HA/DR node roles, key green screen command **SWPPRC** and press F4=Prompt on the current HA/DR node.

```

Switch PPRC (SWPPRC)

Type choices, press Enter.

Environment name . . . . .
Switch type . . . . . *SCHEDULED      Name
Type . . . . . *                          *, *GMIR, *LUN, *MMIR...
Auto Vary On . . . . . *YES             *YES, *NO
Auto replicate . . . . . *DFT         *DFT, *YES, *NO
  
```

Switch type = \*SCHEDULED is used when both the Production and HA/DR nodes and the storage device are operational but their roles need to be reversed. The following steps are performed:

1. Send \*INQ message to QSYSOPR on the Production node: IAS0021 “Perform SWPPRC command for IASP device <IASP name>? (G C)” Reply G to continue, C to cancel.
2. Vary off the IASP with a force \*YES on the current Production node.
3. Run PPRC Failover tasks for the IASP device using DSCLI.
4. Release/Reset the IOP/IOA resources on the HA/DR partition and get the disks to register correctly as the IASP.
5. If requested, vary on the IASP on the current HA/DR node (which then becomes the Production node). The default is \*YES.

### 4.4.3 Switch PPRC (SWPPRC) command with \*UNSCHEDULED option

Switch type = \*UNSCHEDULED is used when only the HA/DR node and its storage device are operational. Because the current Production node is not available, some of the steps performed during a \*SCHEDULED switch cannot be completed. The following steps are performed:

- 1 Display an “Unscheduled PPRC Switch Warning” panel on the HA/DR node if running interactively; send \*INQ message IAS0727 to QSYSOPR on the HA/DR node if running in batch. IAS0727: “An Unscheduled SWPPRC command was issued for IASP device <IASP name>? (G C)” Reply G to continue, C to cancel.
- 2 Run PPRC Failover tasks for the IASP device using DSCLI.
- 3 Release/Reset the IOP/IOA resources on the HA/DR partition and get the disks to register correctly as the IASP.
- 4 If requested, vary on the IASP on the current HA/DR node (which then becomes the Production node). The default is \*YES.

## 4.5 Displaying a Global Mirror Environment

Use the Work with Copy Services Environments (WRKCSE) command to view details of the GMIR configuration and scripts and profile used for operations. (**Note:** Your organization may have implemented security for some of the WRKCSE options. If you are denied access, please contact them for more information.)

```
Copy Services Environments

Type options, press Enter.
 1=Add   2=Change   4=Delete   5=Display   12=Work with
14=List Stream files  16=Define host connections  18=Make PPRC Paths

Opt  Name      Type  Text
---  ---
---  PYSHT      MMIR
---  SEKIU      FLASH
---  SEQUIM     GMIR

Command
====>

F1=Help  F3=Exit  F4=Prompt  F9=Retrieve  F10=View log  F12=Cancel
F14=List All

Bottom
```

### Option 5 (Display)

```
Display a PPRC Environment
Press Enter to continue.

Environment . . . . . : SEQUIM
Type . . . . . : GMIR
Storage Type . . . . . : DS8K
ASP Device name . . . . . : GMIR
Source Copy Description . . : CPYDPROD
Target Copy Description . . : CPYDBACK

Volume relationships:
  PROD      BACKUP      BACKUP      PROD
  PPRC Vols  PPRC Vols  CG Flash Vols  CG Flash Vols
  1000-1002  1100-1102  1700-1702  1800-1802

F1=Help  F3=Exit  F8=PPRC Paths  F12=Cancel

More...
Bottom
```

On the first *More...* page:

```
Display a PPRC Environment
Press Enter to continue.

CSM Replication . . . . . : *NO
Source node . . . . . : PROD
Target node . . . . . : BACKUP
Primary ASP . . . . . : nnn

Volume relationships:
  PROD      BACKUP      BACKUP      PROD
  PPRC Vols  PPRC Vols  CG Flash Vols  CG Flash Vols
  1000-1002  1100-1102  1700-1702  1800-1802

More...
Bottom
```

And on the second *More...* page:

```
Display a PPRC Environment
Press Enter to continue.

Symmetric . . . . . : *YES
D-Copy Flash normal . . . . . : *YES
D-Copy Flash reversed . . . . . : *YES
Multi incremental resync . . . . . : *YES
Override Master LSS . . . . . : *NO
Source Mstr LSS . . . . . : 10

Volume relationships:
  PROD      BACKUP      BACKUP      PROD
  PPRC Vols  PPRC Vols  CG Flash Vols  CG Flash Vols
  1000-1002  1100-1102  1700-1702  1800-1802

More...
Bottom
```

And on the third *More...* page:

```
Display a PPRC Environment
Press Enter to continue.

Target Mstr LSS . . . . . : 11
Source device . . . . . : IBM.2107-ABC1234
Target device . . . . . : IBM.2107-XYZ9876
Session number . . . . . : 01
Reverse Session . . . . . : 02
CG interval . . . . . : 0

Volume relationships:
PROD          BACKUP          BACKUP          PROD
PPRC Vols    PPRC Vols    CG Flash Vols  CG Flash Vols
1000-1002    1100-1102    1700-1702     1800-1802

More...

Bottom
```

And on the fourth *More...* page:

```
Display a PPRC Environment
Press Enter to continue.

Spc Eff CG Flashes . . . . . : *NO
Spc Eff Reversed CG Flashes : *NO
Source hmc1 . . . . . : n.n.n.n
Source port . . . . . : 1751
Target hmc1 . . . . . : n.n.n.n
Target port . . . . . : 1751

Volume relationships:
PROD          BACKUP          BACKUP          PROD
PPRC Vols    PPRC Vols    CG Flash Vols  CG Flash Vols
1000-1002    1100-1102    1700-1702     1800-1802

More...

Bottom
```

And on the last *More...* page:

```
Display a PPRC Environment
Press Enter to continue.

Volume sets . . . : 3
PPRC paths . . . : 0

Volume relationships:
PROD          BACKUP          BACKUP          PROD
PPRC Vols    PPRC Vols    CG Flash Vols  CG Flash Vols
1000-1002    1100-1102    1700-1702     1800-1802

Bottom

Bottom
```

## F8=PPRC Paths

```

                                Display a PPRC Environment
Press Enter to continue.

Environment . . . . . : SEQUIM
Type . . . . . : GMIR
Storage Type . . . . . : DS8K
ASP Device name . . . . . : GMIR
Source Copy Description . . : CPYDPROD
Target Copy Description . . : CPYDBACK

                                                                More...

PPRC Connection Paths:
Source   Target
Port    : Port

                                                                Bottom

F1=Help   F3=Exit   F8=Volumes   F12=Cancel
```

Note: PPRC Connection Paths are shown only if the paths were created using option 18=Make PPRC Paths.

## Option 16 (Define host connections)

```

                                Define Host Connections

Environment . . : SEQUIM                Device . . . . : IBM.2107-ABC1234
Type . . . . . : GMIR

Type Host Connection options; 1=Add, 2=Change, 4=Delete, press Enter.

   Opt      Volume      Host
   ---      - - - - -   - - - - -
   ---      - - - - -   - - - - -

                                                                Bottom

F1=Help   F3=Exit   F12=Cancel
```

Host connections are defined on the IBM System Storage. Here, you specify an already-existing connection along with option 1=Add to create scripts for use in custom programming solutions to logically attach/detach this environment to/from the system. This is very useful if a system is being used for both PPRC and FlashCopy.

### Option 18 (Make PPRC Paths)

```

                                Available PPRC Paths

Environment . : SEQUIM           Source device : IBM.2107-ABC1234
Type . . . . : GMIR             Target device : IBM.2107-XYZ9876

Select all connection pairs to be used, press Enter.
These selections replace all paths currently in use for this environment.
1=Select

Opt      PPRC Connection Path
-        I0003 : I0003
-        I0040 : I0040

                                Bottom

F1=Help  F3=Exit  F12=Cancel
```

Performance is helped by having multiple connection paths to the IBM System Storage. You should select all available PPRC paths, up to four.

### Option 12 (Work with)

```

                                Work with GMIR Environment

Environment : SEQUIM           GMIR Status : Running
Mirror type : GMIR             GCP Status  : Running
Direction . : Normal

Select one of the following:

    2. Suspend Global Mirror and Global Copy with forced consistency
    3. Resume Global Mirror (and Global Copy)

    8. Detach
    9. Reattach

    12. Work with Volumes
    13. Display Out of Sync sectors
    14. List Stream files

                                More...

Selection
    —

F1=Help  F3=Exit  F5=Refresh Status  F10=View log  F12=Cancel
```

**Note:** Options 2, 3 and 15 (Suspend and Resume) are inoperative for CSM environments. Use the CHGPPRC command or the CSM GUI interface for these actions.

**Note:** Option 12 (Work with Volumes) is not available if CSM servers are being used.

**Note:** Option 15 (Suspend Global Mirror Only) is on the *More...* page.

### Option 12 (Work with Volumes)

Work with GMIR PPRC Volumes

Environment . . : SEQUIM                      Direction . . : Normal  
Copy Service                      Source device : IBM.2107-ABC1234  
Type . . . . : GMIR                          Target device : IBM.2107-XYZ9876

Type Volume options; 2=Pause, 3=Resume, press Enter.

| Opt | Src : Tgt | Preferred Source Status | Preferred Target Status      |
|-----|-----------|-------------------------|------------------------------|
| -   | 1000:1100 | Copy Pending - Global   | Target Copy Pending - Global |
| -   | 1001:1101 | Copy Pending - Global   | Target Copy Pending - Global |
| -   | 1002:1102 | Copy Pending - Global   | Target Copy Pending - Global |

Bottom

F1=Help    F3=Exit    F5=Refresh Status    F10=View log    F12=Cancel

### Option 13 (Display Out of Sync sectors)

Display Out of Sync Sectors

Press Enter to refresh.

Environment name . . . : SEQUIM  
Copy Service Type . . : GMIR  
Out of Sync Sectors . . : 0

Pending results:  
None

Bottom

F1=Help    F3=Exit    F5=Refresh Status    F10=View log    F12=Cancel



## Option 14 (List Stream files)

```
CS Environment Stream Files
Type options; 2=Change, 4=Delete, 5=Display, 9=Run, press Enter.

Opt  Stream file name                IFS directory
-    flash.profile                    ...profiles/SEQUIM_GMIR
-    flash_9.profile                   ...profiles/SEQUIM_GMIR
-    pprc_PS.profile                   ...profiles/SEQUIM_GMIR
-    pprc_PT.profile                   ...profiles/SEQUIM_GMIR
-    pprc_9_PS.profile                 ...profiles/SEQUIM_GMIR
-    pprc_9_PT.profile                 ...profiles/SEQUIM_GMIR
-    runds_PS.profile                 ...profiles/SEQUIM_GMIR
-    runds_PT.profile                 ...profiles/SEQUIM_GMIR
-    chflash_GM_CG_PT.script           ...scripts/SEQUIM_GMIR
-    chsession_GM_add_PS.script         ...scripts/SEQUIM_GMIR
-    chsession_GM_add_PT.script         ...scripts/SEQUIM_GMIR
-    chsession_GM_remove_PS.script     ...scripts/SEQUIM_GMIR
-    chsession_GM_remove_PT.script     ...scripts/SEQUIM_GMIR
-    failoverpprc_GM_to_PS.script      ...scripts/SEQUIM_GMIR
                                          More...

Command
===>
F1=Help  F3=Exit  F4=Prompt  F9=Viewlog  F12=Cancel
```

### Notes:

1. **PS** stands for Preferred Source
2. **PT** stands for Preferred Target

## 4.6 Recovering from a failover

A failover occurs when the Production node IBM System Storage device or its HMC/SMC is not available during an unscheduled switchover. This means that replication cannot be restarted in the reversed direction so the Global Mirror for this environment will not be operational. This can be seen through the WRKCSE display.

```
Work with GMIR Environment

Environment :   SEQUIM                      GMIR Status  :   Running
Mirror type  :   GMIR                       GCP Status   :   Running
Direction   . :   Normal

Select one of the following:

    2. Suspend Global Mirror and Global Copy with forced consistency
    3. Resume Global Mirror (and Global Copy)

    8. Detach
    9. Reattach

   12. Work with Volumes
   13. Display Out of Sync sectors
   14. List stream files

Selection

More...

F1=Help  F3=Exit  F5=Refresh Status  F10=View log  F12=Cancel
```

**Note:** The GMIR/PPRC Status will be:

1. “Failover-No Repl” if the Production node is operating.
2. “Paused” if the Production node is not operating.

#### 4.6.1 Recovery from a failover of a basic (non-symmetrical) environment

If a failover occurs in a basic environment due to a site loss or loss of the production DS, then a manual recovery will be necessary. A support call against IASP Manager should be placed to get assistance with the recovery.

The first step in recovering a basic environment after a failover is to map out the state of Global Mirror. The status after a failover is assumed to be:

| Task                                   | Script                          | Expected result           |
|--|---------------------------------|---------------------------|
| Check PPRC state                       | lspprc_PT                       | Suspended Host            |
| Check state of PPRC paths              | lspprcpath_PT,<br>lspprcpath_PS | Success on all paths      |
| Check global mirror state              | showgmir_PS                     | It will probably be Fatal |
| Check that the CG flash is not present | lsflash_GM_CG_PT                | No flash Copy found       |

## **Recovery process**

The first step in the recovery process is to restart PPRC in the reverse direction; then wait until PPRC is caught up.

### **Step 1** -- Starting data resync

- If PPRC does not show Suspended Host, place a support call against IASP Manager.
- If the PPRC paths do not show Success, place a support call to storage.
- From the WRKCSE display, select option 14 (List Stream files)
  - Select option 9 (Run) for **replicatepprc\_GM\_from\_PT.script**. NOTE: be *VERY* careful to select the correct script.
  - Select option 9 (Run) for **rmgmir\_PS.script**
- If the GMIR has multiple environments configured,
  - Select option 9 (Run) for **chsession\_GM\_remove\_PS.script**
- From the WRKCSE display, select option 12 (Work with), then option 13 (Display Out of Sync sectors) to watch the recovery of out-of-sync sectors. It may take many hours or days to recover depending on downtime and bandwidth available.

### **Step 2** – Recovering back to the preferred source system

- If full system GMIR, power off the current production system
- If IASP GMIR, vary off the IASP
- From the WRKCSE display, select option 12 (Work with), then option 13 (Display Out of Sync sectors) to wait until all disks have zero out-of-sync sectors; this will not happen until the IASP or system is completely inactive.
- From WRKCSE option 14 (List Stream files)
  - Select option 9 (Run) for **failoverpprc\_GM\_to\_PS.script**
  - Select option 9 (Run) for **replicatepprc\_GM\_from\_PS.script**
  - Select option 9 (Run) for **mkflash\_GM\_CG\_PT.script**
- If GM has multiple environments to be recovered,
  - Select option 9 (Run) for **chsession\_GM\_add\_PS.script**
- If this is the first environment recovered, or the only environment to be recovered,
  - Select option 9 (Run) for **mkgmir\_PS.script**

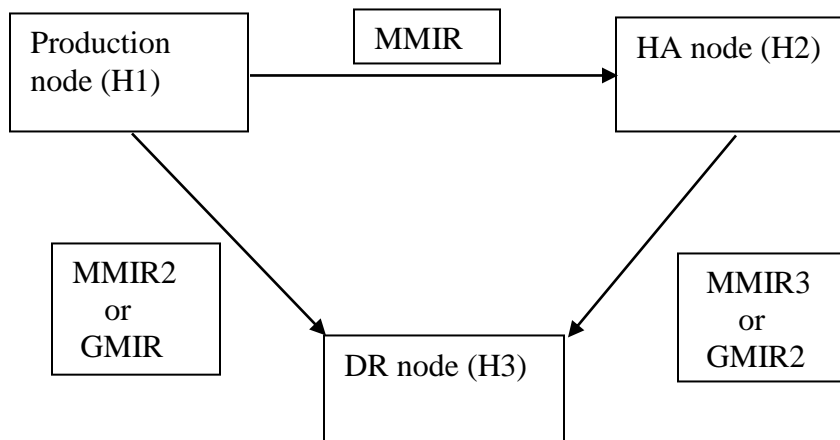
- Power on the Production system and vary on the IASP.

#### 4.6.2 Recovery from a failover of a symmetrical environment

If a failover occurs in a symmetrical environment due to a site loss or loss of the production DS, after the DS is returned to operation, a SWPPRC \*complete should be used to restart the replication.

### 5 Multi-target solutions

IASP Manager no longer supports Metro-Global Mirror, replacing it with multi-target support. Use of separate licensed program Copy Services Manager (CSM) is required. Multi-target solutions support two targets from the Production node: For MMIR, the H1->H2 PPRC pair is named MMIR; the H1->H3 PPRC pair is named MMIR2; and the H2->H3 PPRC pair is named MMIR3. For GMIR, the H1->H2 PPRC pair is also named MMIR but the H1->H3 PPRC pair is named GMIR while the H2->H3 PPRC pair is named GMIR2.



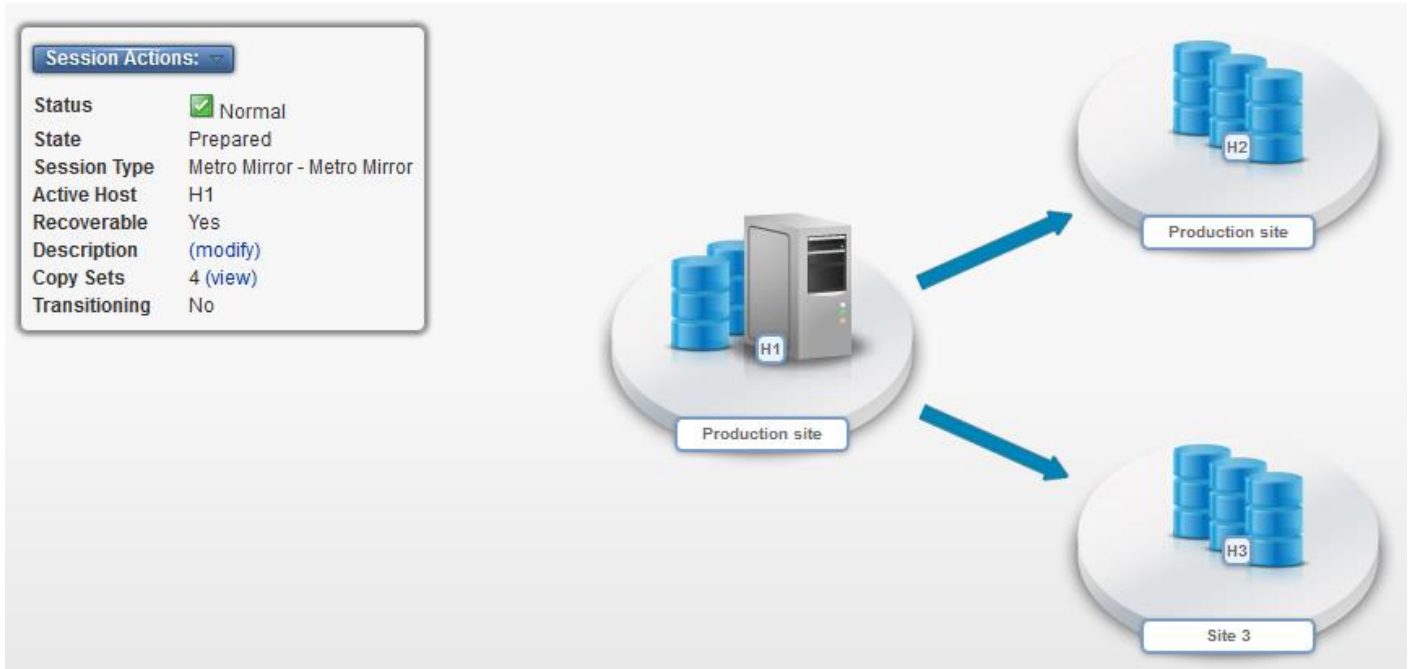
#### 5.1 Metro Mirror-Metro Mirror Overview

Any of the three nodes can be the source for two Metro Mirror relationships. There is also an implicit relationship created between the two Metro Mirror targets... this is called a Multi Target Incremental Resync (MTIR ) relationship

| Source | Active Targets | PPRC Direction                                     | *MTIR Pair     |
|--------|----------------|--|----------------|
| H1     | H2, H3         | Both Normal  | H2->H3 (MMIR3) |
| H2     | H1, H3         | H2->H1 (MMIR) Reversed<br>H2->H3 (MMIR3) Normal    | H1->H3 (MMIR2) |
| H3     | H1, H2         | H3->H1 (MMIR2) Reversed<br>H3->H2 (MMIR3) Reversed | H1->H2 (MMIR)  |

The Switch PPRC (SWPPRC) command can be run on any active target.

And here is how this appears on the CSM server with both MMIR (H1->H2) and MMIR2 (H1->H3) running in the normal direction:



## 5.2 Metro Mirror-Global Mirror Overview

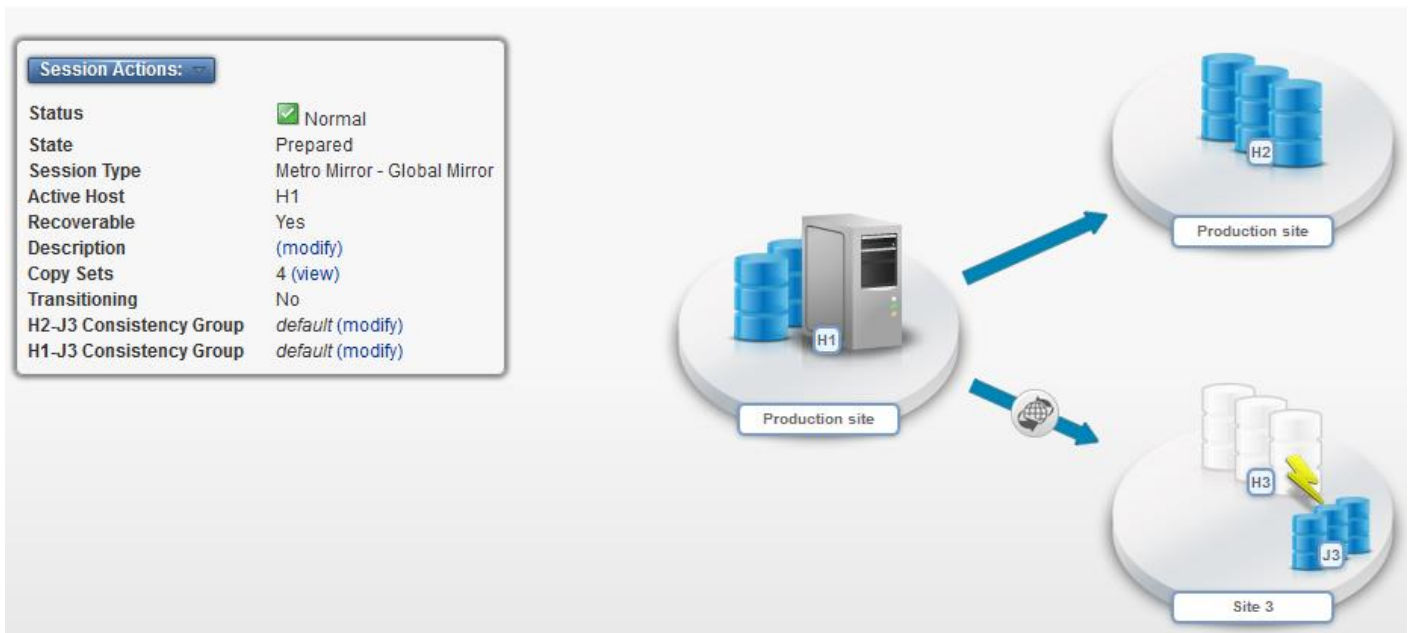
Metro Mirror-Global Mirror combines the synchronous availability of Metro Mirror with the distance availability of Global Mirror. Three systems/partitions are required: Metro Mirror Source, Metro Mirror Target, and Global Mirror Target.

| Source              | Active Targets / PPRC Direction             | Inactive PPRC pair / Status                               |
|---------------------|---|---|
| H1                  | H2 (MMIR) / Normal<br>H3 (GMIR) / Normal    | H2->H3 (GMIR2 *MTIR)                                      |
| H2                  | H1 (MMIR) / Reversed<br>H3 (GMIR2) / Normal | H1->H2 (GMIR *MTIR)                                       |
| H3 (GMIR Reversed)  | H1  | H3->H2 (GMIR2 *INELIGIBLE)<br>H1->H2 (MMIR *GCP *NORMAL)  |
| H3 (GMIR2 Reversed) | H2  | H3->H1 (GMIR *INELIGIBLE)<br>H2->H1 (MMIR *GCP *REVERSED) |

The Switch PPRC (SWPPRC) command can be run on any active target.

Note: When H3 is source (GMIR or GMIR2 \*REVERSED), the MMIR PPRC pair is performing the Global Copy (\*GCP) function. Sector changes are being sent to the MMIR target but without consistency. This means that the node that is the target of the Global Copy cannot be switched to.

And here is how this appears on the CSM server with both GMIR (H1->H3) and MMIR (H1->H2) running in the normal direction:



### 5.3 Additional considerations for Metro Mirror-Global Mirror (MG)

- CHKPPRC should be performed for both environments: MMIR and GMIR.
- Both SCHEDULED and \*UNSCHEDULED SWPPRC are allowed for the GMIR part of MG. If GMIR [or GMIR2] is symmetrical, SWPPRC is supported to return to the normal direction. Otherwise, manual steps are required. The steps to return to normal are in section 5.5 (Recovering Non-symmetric MG back to production after a GMIR switch)

## 5.4 Displaying the status of multi-target environments

### 5.4.1 Metro Mirror-Metro Mirror Example

MMIR (H1-H2) and MMIR2 (H1-H3) replicating in the normal direction; MMIR3 (H2-H3) inactive.

```
Display CSE CRG Data

Press Enter to continue.

Cluster Resource Group Name . . : <CRGname>
Copy type . . . . . : *BOTH
Independent ASP Name . . . . . : <IASPname>
Preferred production node . . . : PROD
Current production node . . . . : PROD

MMIR PPRC information:
Preferred backup node . . . . : HA
PPRC status . . . . . : *READY
PPRC direction . . . . . : *NORMAL

MMIR2 PPRC information:
Preferred backup node . . . . : DR
PPRC status . . . . . : *READY
PPRC direction . . . . . : *NORMAL

More...
```

```
Display CSE CRG Data

Press Enter to continue.

MMIR3 PPRC information:
Preferred backup node . . . . : DR
PPRC status . . . . . : *MTIR
PPRC direction . . . . . :

Automatic PPRC Replicate . . . : *YES
Multi-target replication . . . . : *MM

FlashCopy information:
*
*

More...
```

## 5.4.2 Metro Mirror-Global Mirror Example

MMIR (H1-H2) and GMIR (H1-H3) replicating in the normal direction; GMIR2 (H2-H3) inactive.

```
Display CSE CRG Data

Press Enter to continue.

Cluster Resource Group Name . . : <CRGname>
Copy type . . . . . : *BOTH
Independent ASP Name . . . . . : <IASPname>
Preferred production node . . . : PROD
Current production node . . . . : PROD

MMIR PPRC information:
  Preferred backup node . . . . : HA
  PPRC status . . . . . : *READY
  PPRC direction . . . . . : *NORMAL

GMIR PPRC information:
  Preferred backup node . . . . : DR
  PPRC status . . . . . : *READY
  PPRC direction . . . . . : *NORMAL

More...
```

```
Display CSE CRG Data

Press Enter to continue.

GMIR2 PPRC information:
  Preferred backup node . . . . : DR
  PPRC status . . . . . : *MTIR
  PPRC direction . . . . . :

Automatic PPRC Replicate . . . : *YES
Multi-target replication . . . . : *MG

FlashCopy information:
  *
  *

More...
```

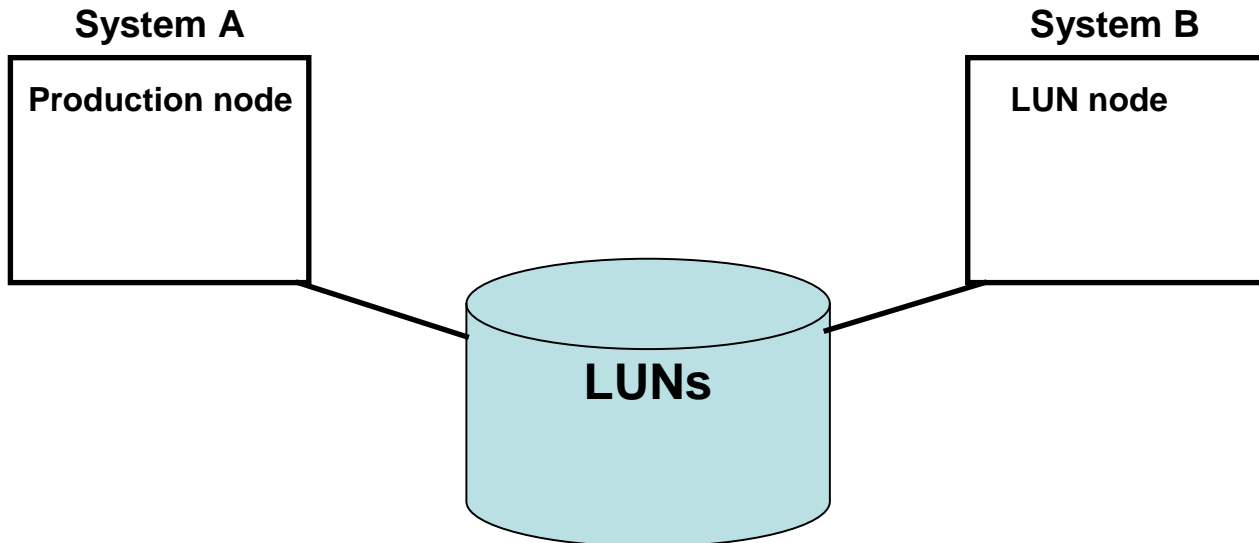
## 5.5 Recovering Non-symmetric MG back to production after a GMIR switch to reversed

If a GMIR pair in a MM/GM environment is switched and there are no consistency group volumes configured for reverse, the only method to switch back to the GMIR source is to perform a scheduled switch. An unscheduled switch is not allowed as the data at the target would not be consistent.



## 6 LUN Switching

### 6.1 LUN Switching Overview



LUN Switching allows a set of LUNs (a single volume group configured on an IBM Storage Server) to be switched between two IBM i systems. Each system has one or two “Fibre cards” attached to the IBM Storage Server, and IASP Manager can be used to control which system is currently connected.

### 6.2 Switching LUNs

To switch the LUNs from one system to the other, key green screen command **SWPPRC** and press **F4=Prompt** on the system that wants to access them.

```
Switch PPRC (SWPPRC)

Type choices, press Enter.

Environment name . . . . . _____ Name
Switch type . . . . . *SCHEDULED *SCHEDULED, *UNSCHEDULED...
Type . . . . . * *, *GMIR, *LUN, *MMIR...
Auto Vary On . . . . . *YES *YES, *NO
Auto replicate . . . . . *DFT *DFT. *YES, *NO
```

The following steps are performed:

1. Send \*INQ message to QSYSOPR on the Production node (the system that currently owns the LUNs): IAS0021 “Perform SWPPRC command for IASP device <IASPname>? (C G)” Reply ‘G’ to continue, ‘C’ to cancel.
2. Vary off the IASP with a force \*YES on the current Production node.
3. Deactivate the host connection(s) to the IBM Storage Server from the current Production node.
4. Activate the host connection(s) to the IBM Storage Server from the current HA/DR node (the system that wants to own the LUNs).
5. Release/Reset the IOP/IOA(s) on the HA/DR node to get the disks to register correctly as the IASP.
6. Vary on the IASP on the current HA/DR node (which then becomes the Production node).

### 6.3 Displaying a LUN Switching Environment

Use the Work with Copy Services Environments (WRKCSE) command to view details of the LUN Switching configuration and scripts and profile used for operations. (**Note:** Your organization may have implemented security for some of the WRKCSE options. If you are denied access, please contact them for more information.)

```
Copy Services Environments

Type options, press Enter.
  1=Add   2=Change   4=Delete   5=Display   12=Work with
  14=List Stream files  16=Define host connections  18=Make PPRC Paths

Opt   Name           Type   Text
---   -----
  1    LUNCRG         LUN    LUN Switching environment

                                           Bottom

Command
====> _____
F1=Help  F3=Exit  F4=Prompt  F9=Retrieve  F10=View log  F12=Cancel
F14=List All
```

### Option 5=Display

```

                                Display a LUN Environment
Press Enter to continue.

Environment . . . : LUNCRG           Production node : PROD
Type . . . . . : LUN                HA node . . . . : BACKUP
DS Device . . . : IBM.2107-ABC1234   Primary ASP . . : nnn

                                                                More...

Host Connections:

  Volume      Production Node      HA Node
  Group       Host Connection  Host Connection
  V21         000A             0009

                                                                Bottom
    
```

On the *More...* page:

```

                                Display a LUN Environment
Press Enter to continue.

DS hmcl . . . . . : n.n.n.n
Port . . . . . : 1751

Bottom
Host Connections:

  Volume      Production Node      HA Node
  Group       Host Connection  Host Connection
  V21         000A             0009

                                                                Bottom
    
```

### Option 14=List Stream files

```

                                CS Environment Stream Files
Type options; 2=Change, 4=Delete, 5=Display, 9=Run, press Enter.

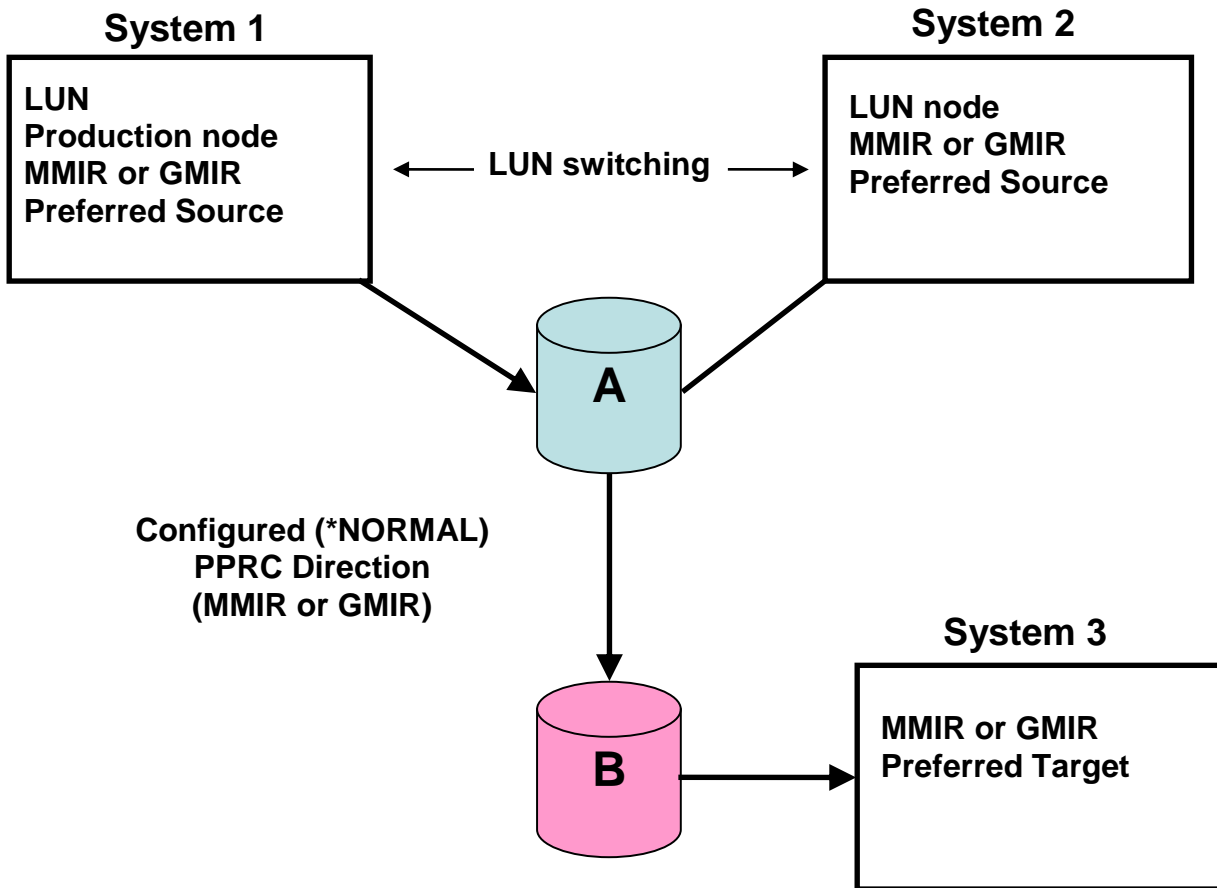
Opt  Stream file name                IFS directory
-   pprc_PS.profile                  ...profiles/LUNCRG_LUN
-   pprc_9_PS.profile                 ...profiles/LUNCRG_LUN
-   runds_PS.profile                  ...profiles/LUNCRG_LUN
-   lsallhostconn_PS.script           ...scripts/LUNCRG_LUN
-   lsallhostconn_PT.script           ...scripts/LUNCRG_LUN
-   lsfbvol_PS.script                 ...scripts/LUNCRG_LUN
-   lsfbvol_PT.script                 ...scripts/LUNCRG_LUN
-   lshostconn_PS.script              ...scripts/LUNCRG_LUN
-   LUN_lshost_HA_PS.script           ...scripts/LUNCRG_LUN
-   LUN_lshost_Prod_PS.script         ...scripts/LUNCRG_LUN
-   LUN_HA_Add_PS.script              ...scripts/LUNCRG_LUN
-   LUN_HA_Drop_PS.script             ...scripts/LUNCRG_LUN
-   LUN_Prod_Add_PS.script            ...scripts/LUNCRG_LUN
    
```

\_ LUN\_Prod\_Drop\_PS.script

...scripts/LUNCRG\_LUN

Bottom

## 6.4 LUN switching with Metro Mirror or Global Mirror



LUN switching is independent from MMIR or GMIR switching; LUNs can be switched even when MMIR or GMIR is *\*REVERSED*. If the PPRC environment is GMIR, it is required to be symmetrical.

## 7 Command Details

### 7.1 Add CSE Credential Entry (ADDCSECRDE)

Used only with Full System Replication. See the documentation for that function for more information.

### 7.2 Add Product Access (ADDPRDACS)

See Installation Guide for details.

### 7.3 Change Build Flag (CHGBLDFLG)

The CHGBLDFLG command is for collecting debug information and allowing the exit program and the Flash program to be debugged.

If a CSM error is occurring support may ask that this command be run to set the \*DEBUGTPC to \*YES. This setting logs much more information about the use of the CSM on IBM i.

### 7.4 Change CSE Credential Entry (CHGCSECRDE)

Used only with Full System Replication. See the documentation for that function for more information.

### 7.5 Change Copy Services Data (CHGCSEDTA)

```

Change Copy Services Data (CHGCSEDTA)

Type choices, press Enter.

Cluster Resource Group . . . . . _____ Name
  
```

#### Metro Mirror environment example

```

Change CSE CRG Data

Supply all required values, press Enter.

Cluster Resource Group Name . . : METROCRG
Copy type . . . . . *PPRC          *FLASH, *PPRC, *BOTH
Independent ASP Name . . . . . METROCRG      Name
Preferred production node . . . PROD          Name
Current production node . . . . PROD

MMIR PPRC information:
  Preferred backup node . . . . BACKUP        Name
  PPRC status . . . . . *READY             *READY, *INCOMPLETE, ...
  PPRC direction . . . . . *NORMAL         *NORMAL, *REVERSED

GMIR PPRC information:
  Preferred backup node . . . . _____    Name

LUN PPRC information:
  Preferred backup node . . . . _____    Name

More...
  
```

Change CSE CRG Data

Supply all required values, press Enter.

MMIR2 PPRC information:

|                                    |              |                 |
|------------------------------------|--------------|-----------------|
| Preferred backup node . . . . .    | _____        | Name            |
| Automatic PPRC Replicate . . . . . | <u>*YES</u>  | *YES, *NO       |
| Multi-target . . . . .             | <u>*NONE</u> | *NONE, *MG, *MM |

FlashCopy information:

|                             |              |                         |
|-----------------------------|--------------|-------------------------|
| FlashCopy node . . . . .    | <u>FLASH</u> | Name                    |
| Environment name . . . . .  | <u>FLASH</u> | Name                    |
| Status . . . . .            | <u>*NONE</u> | *NONE, *FLASHED, number |
| Warm flash . . . . .        | <u>*YES</u>  | *YES, *NO               |
| Incremental flash . . . . . | <u>*NO</u>   | *YES, *NO               |

Second FlashCopy information:

|                          |       |      |
|--------------------------|-------|------|
| FlashCopy node . . . . . | _____ | Name |
|--------------------------|-------|------|

More...

Change CSE CRG Data

Supply all required values, press Enter.

Third FlashCopy information:

|                          |       |      |
|--------------------------|-------|------|
| FlashCopy node . . . . . | _____ | Name |
|--------------------------|-------|------|

Fourth FlashCopy information:

|                          |       |      |
|--------------------------|-------|------|
| FlashCopy node . . . . . | _____ | Name |
|--------------------------|-------|------|

Fifth FlashCopy information:

|                          |       |      |
|--------------------------|-------|------|
| FlashCopy node . . . . . | _____ | Name |
|--------------------------|-------|------|

Sixth FlashCopy information:

|                          |       |      |
|--------------------------|-------|------|
| FlashCopy node . . . . . | _____ | Name |
|--------------------------|-------|------|

SVC PPRC information:

|                               |              |             |
|-------------------------------|--------------|-------------|
| Device Cluster Resource Group | <u>*NONE</u> | Name, *NONE |
|-------------------------------|--------------|-------------|

More...

```

Change CSE CRG Data

Supply all required values, press Enter.

Request type . . . . . 0          Number
Auto start cluster . . . . . *YES    *YES, *NO
Wait time . . . . . 60          Number of seconds
Suspend timeout . . . . . 2        Number of seconds
Message Queue . . . . . *SYSOPR   name, *SYSOPR
Library . . . . . _____ library name

Bottom

```

This information is originally entered via the CRTCS EDTA command. Clustering support assures that the CSE CRG information is maintained on all nodes in the cluster, regardless of where the data is entered.

X

### 7.6 Change Exit Data (CHGEXITDTA)

```

Change Exit Data (CHGEXITDTA)

Type choices, press Enter.

Cluster Resource Group . . . . . _____ Name
Production system . . . . . *SAME    Node name
PPRC status . . . . . *SAME     *SAME, *READY, *NORM, *GMIR
Warm Flash . . . . . *SAME     *SAME, *YES, *NO
Suspend timeout . . . . . *SAME    Seconds
FlashCopy Status . . . . . *SAME    *SAME, *NONE, *FLASHED

```

The CHGCS EDTA command allows changing CSE CRG data interactively. The CHGEXITDTA command allows changing some of the data in a CL program [or interactively].

**Note:** The four parameters related to FlashCopy apply only to the FlashCopy environment (of the six possible) where the command runs.

### 7.7 Change PPRC (CHGPPRC)

```

Change PPRC (CHGPPRC)

Type choices, press Enter.

Environment name . . . . . _____ Name
Type . . . . . _____ *GMIR, *GMIR2, *MMIR...
Option . . . . . _____ *DETACH, *REATTACH...

```

### 7.8 Check \*SYSTEM CSE Environment (CHKCSE)



Used only with Full System Replication. See the documentation for that function for more information.

## 7.9 Check for FlashCopy Readiness (CHKFLASH)

```

                                Check FlashCopy (CHKFLASH)

Type choices, press Enter.

Environment name . . . . . _____ Name
Flash Target Node Name . . . . . *LOCAL Character value, *LOCAL

                                Additional Parameters

Cluster Resource Group . . . . . *ENV Character value, *ENV
Preflashed . . . . . *NO *YES, NO
Connect hosts . . . . . *ENV *ENV, *CURRENT, NO...
Exit program . . . . . *ENV Name, *ENV, *NONE
Library . . . . . _____ Name
  
```

This command performs checks to determine if the prerequisite conditions have been met for the identified Independent ASP FlashCopy environment to be able to perform a STRFLASH.

## 7.10 Check PPRC Status (CHKPPRC)

```

                                Check PPRC (CHKPPRC)

Type choices, press Enter.

Environment name . . . . . _____ Name
Type . . . . . * *, *GMIR, *LUN, *MMIR...
  
```

The CHKPPRC command checks the status of the specified environment to determine whether or not it is ready for a SWPPRC command.

See Section 3.2.1 (Check PPRC (CHKPPRC)) for details regarding CHKPPRC for Metro Mirror.

See Section 4.4.1 (Check PPRC (CHKPPRC)) for details regarding CHKPPRC for Global Mirror.

## 7.11 Create Copy Services CRG (CRTCSEDTA)

See Installation Guide for details.

## 7.12 Dump IASP Manager Information (DMPINF)

This command collects information to submit to IBM Service in the event of a problem that requires their assistance.

### **7.13 Display Copy Services Data (DSPCSEDTA)**

```
Display Copy Services Data (DSPCSEDTA)

Type choices, press Enter.

Cluster Resource Group . . . . . _____ Name
```

This command displays the same information as the CHGCSEDTA command but without input capability.

### **7.14 Display Product Access (DSPPRDACS)**

Displays the details of a specific Systems Lab Services key on the system.

### **7.15 End a FlashCopy Backup (ENDFLASH)**

See Section 2.3 (End a FlashCopy Backup (ENDFLASH) command).

### **7.16 Fix Startup Resources (FIXSTRPRSC)**

Used only with Full System Replication. See the documentation for that function for more information.

### **7.17 Global Mirroring Failover (FALOVRGMIR)**

Used only with Full System (non-IASP) Global Mirror. See the documentation for that product.Log Message (LOGMSG)

## 7.18 Log Message (LOGMSG)

```
                                Log Message (LOGMSG)

Type choices, press Enter.

Message (1-120 characters) . . . _____

-----
Message format . . . . . *STD          *STD, *CMDSTR
Message type . . . . . *INFO         *INFO, *WARNING, *ERROR
```

Writes message text to the IASP Manager log file /QIBM/Qzrdhasm/qzrdhasm.log on the local system. The log can be viewed using the VIEWLOG command.

## 7.19 Reset IASP IO (RESETASPIO)

```
                                Reset IASP IO (RESETASPIO)

Type choices, press Enter.

Environment name . . . . . _____ Name
ASP IO Reset type . . . . . *SOFT      *HARD, SOFT
```

Resets IOAs for the specified environment to make the attached LUNs available for use.

## 7.20 Reset MultiPath IASP CRG (RESETMPATH)

```
                                Reset MultiPath IASP CRG (RESETMPATH)

Type choices, press Enter.

Environment name . . . . . _____ Name
```

Resets disk connections when multiple paths are present.

## 7.21 Release IASP IO (RLSASPIO)

```
Release IASP IO (RLSASPIO)

Type choices, press Enter.

Environment name . . . . . _____ Name
Type . . . . . * * , *FLASH, *GMIR, *LUN, *MMIR
ASP IO Release type . . . . . *SOFT *HARD, *SOFT
```

Releases IOAs from the specified environment. The attached LUNs are no longer available.

## 7.22 Release CSE Lock (RLSCSELCK)

```
Release Copy Services Lock (RLSCSELCK)

Type choices, press Enter.

Environment name . . . . . _____ Name, *ALL
Release type . . . . . *JOB *JOB, *OVR
```

At the start of processing for SWPPRC or STRFLASH, a lock is set for the environment to prevent simultaneous operations on that environment. The lock is released at the end of processing or after 15 minutes, whichever occurs first. However, some SWPPRC and STRFLASH failures may prevent the release but this command can be used if you don't want to wait for the timeout.

## 7.23 Remove CSE Credential Entry (RMVCSECRDE)

Used only with Full System Replication. See the documentation for that function for more information.

## 7.24 Retrieve IASP Manager Information (RTVINP)

```

Retrieve IASP Manager Information (RTVINP)

Type choices, press Enter.

Environment name . . . . . _____ Name
Information . . . . . _____
CL variable for returned value _____ Return value
CL variable for returned value _____ Second return value
CL variable for returned value _____ Third return value
CL variable for returned value _____ Fourth return value
CL variable for returned value _____ Fifth return value
CL variable for returned value _____ Sixth return value

```

This command can be used only in CL programs. The following information can be retrieved:

- \*CLUNODENAME
- \*FLASHNODES
- \*FLASHSTATUS
- \*FLASH2STATUS
- \*FLASH3STATUS
- \*FLASH4STATUS
- \*FLASH5STATUS
- \*FLASH6STATUS
- \*GMIRDIRECTION
- \*GMIRNODEROLE
- \*GMIRSTATE
- \*GMIRSTATEDIRECT
- \*IASPNAME
- \*MMIR3STATE
- \*MMIR3STATEDIRECT
- \*GMIR2DIRECTION
- \*GMIR2NODEROLE
- \*GMIR2STATE
- \*GMIR2STATEDIRECT
- \*PPRCNODEROLE
- \*PPRCNODES
- \*PRODNODE
- \*LUNCONNECTION
- \*LUNNODEROLE
- \*MMIRDIRECTION
- \*MMIRNODEROLE
- \*MMIRSTATE
- \*MMIRSTATEDIRECT
- \*MULTITARGET
- \*MMIR2DIRECTION
- \*MMIR2NODEROLE
- \*MMIR2STATE
- \*MMIR2STATEDIRECT
- \*MMIR3DIRECTION
- \*MMIR3NODEROLE

Refer to the Help text for the command for details regarding the format of the returned information.

## 7.25 Retrieve TPC Commands (RTVTPCCMD)

```
Retrieve TPC Commands (RTVTPCCMD)

Type choices, press Enter.

Environment name . . . . . _____ Name
Type . . . . . _____ *MMIR *GMIR, *MMIR
CL var for 1st TPC command . . . _____ TPC command
CL var for 2nd TPC command . . . _____ TPC command
CL var for 3rd TPC command . . . _____ TPC command
CL var for 4th TPC command . . . _____ TPC command
CL var for 5th TPC command . . . _____ TPC command
CL var for 6th TPC command . . . _____ TPC command
```

This command allows a CL program to retrieve the available commands for a TPC-R session. It is useful when automating additional function to be able to check whether the command that the program will run next is actually available - if not it means an error has occurred.

## 7.26 Retrieve TPC Nodes (RTVTPCNOD)

```
Retrieve TPC Nodes (RTVTPCNOD)

Type choices, press Enter.

Environment name . . . . . _____ Name
Type . . . . . _____ *MMIR *GMIR, *MMIR
CL var for TPC nodes . . . . . _____ TPC nodes
CL var for Master LSS . . . . . _____ Master LSS
CL var for Session . . . . . _____ Session number
```

This command retrieves participating nodes information from IASP Copy Services Manager. It also returns the master LSS and session number.

## 7.27 Run DS Scripted Command (RUNDSCMD)

```

Run DS Scripted Command (RUNDSCMD)

Type choices, press Enter.

Script input file . . . . . _____
_____
_____

Profile input file . . . . . _____
_____
_____

Results output file . . . . . _____
_____
_____

User . . . . . _____ Name

More...

```

```

Run DS Scripted Command (RUNDSCMD)

Type choices, press Enter.

Result validation list:
  Column position . . . . . _____ 1-20
  Expected value . . . . . _____
  Logic to next in list . . . . . _____ *AND, *OR
    + for more values
Result file rows . . . . . _____ *ALL *ONE, *ALL
Summation column . . . . . _____ *NONE *NONE, 1-20
CL variable for returned total _____ TYPE(*DEC) LEN(9 0)
Return column . . . . . _____ *NONE *NONE, 1-20
Return key value . . . . . _____ *NONE
CL variable for returned value _____ TYPE(*CHAR) LEN(80)

Bottom

```

This command can be used only in CL programs – to run any IASP Manager script and analyze the results. The parameters are:

- Script input file (Required). The complete path name for the script. A special value of ‘\*’ indicates that no script is to be run; only a previous .result file is to be analyzed.
- Profile input file (Required). The complete path name for the profile. A special value of ‘\*’ is entered if the Script value is also an ‘\*’.
- Results output file (Required). The complete path name for the .result file – to be created by the script or only analyzed if no script is to be run.
- User (Required). The DS HMC user profile to be used.
- Result validation list. (See command Help for details).

- Result file rows. Whether the expected value must be in all rows or only one row for success.
- Summation column. (See command Help for details).
- CL variable for returned total. (If a summation column is specified).
- Return column. Used in conjunction with the return key to locate a column within a row whose value is to be returned to the CL program for analysis.
- Return key value. A text string used to uniquely identify the row whose column data is to be returned
- CL variable for returned value. For the value located by the previously-specified column and key.

**Note:** There are three groups of validation specifications, and they are mutually exclusive. You can specify:

- VALIDATE / ROWS, or
- SUMCOLUMN / TOTAL, or
- RTNCOLUMN / RTNKEY / RTNVALUE

## 7.28 Run LPAR command (RUNLPARCMD)

Used only with Full System Replication. See the documentation for that function for more information.

## 7.29 Setup IBM i Copy Services Manager (RUNSETUP)

See Installation Guide for details.

## 7.30 Run TPC Action (RUNTPCACT)

```

                                Run CSM Action (RUNTPCACT)

Type choices, press Enter.

Environment name . . . . . _____ Name
Type . . . . . *MMIR          *GMIR, *GMIR2, *MMIR...
Action . . . . . *CHK          *CHK, *RUN, *ACS, *RCS

```

This command allows you to run an available TPC-R (CSM) command

- \***CHK** = Check the status of a CSM session
- \***RUN** = Run an available CSM command
- \***ACS** = Add Copy sets to a session from a file
- \***RCS** = Perform a soft remove of all copy sets from a CSM session



### 7.31 Set CSE Lock (SETCSELCK)

| Set Copy Services Lock (SETCSELCK) |           |         |
|------------------------------------|-----------|---------|
| Type choices, press Enter.         |           |         |
| Environment name . . . . .         | _____     | Name    |
| Timeout minutes . . . . .          | <u>15</u> | minutes |
| Minutes to wait for lock . . . .   | <u>0</u>  | minutes |

To prevent simultaneous operations on an environment, SWPPRC and STRFLASH set a lock. This command allows you to do the same if you would like to prevent other jobs from operating on an environment.

### 7.32 Start a FlashCopy Backup (STRFLASH)

See Section 2.27(Start a FlashCopy Backup (STRFLASH) command).

### 7.33 Switch \*SYSTEM CSE Environment (SWCSE)

Used only with Full System Replication. See the documentation for that function for more information.

### 7.34 Switch PPRC Direction (SWPPRC)

- See MMIR Section 3.2.2 (Switch PPRC (SWPPRC) command with \*SCHEDULED option)
- See MMIR Section 3.2.3 (Switch PPRC (SWPPRC) command with \*UNSCHEDULED option)
- See MMIR Section 3.2.4 (Switch PPRC (SWPPRC) command with \*COMPLETE option)
- See GMIR Section 4.4.2 (Switch PPRC (SWPPRC) command with \*SCHEDULED option)
- See GMIR Section 4.4.3 (Switch PPRC (SWPPRC) command with \*UNSCHEDULED option)
- See LUN Section 6.2 (Switching LUNs)

### 7.35 Update Copy Service Environment (UPDCSE)

```

Update Copy Service Environmen (UPDCSE)

Type choices, press Enter.

Environment name . . . . . _____ Name
Type . . . . . _____ *FLASH, *GMIR, *GMIR2...
Direction . . . . . *NORM *NORM, *REV
Master LSS . . . . . *SAME Character value, *SAME
Session number . . . . . *SAME Character value, *SAME
Symmetric GMIR . . . . . *SAME *YES, *NO, *SAME

```

This command updates local node objects, primarily scripts, for a particular Copy Service Environment from the Device Domain Data associated with IASP Manager. If the Master LSS and/or Session number is being changed, the Direction parameter determines which direction is updated in the environment.

### 7.36 View Log File (VIEWLOG)

See Section 8.1.1 (VIEWLOG (View Log File)).

### 7.37 View Profile Files (VIEWPROF)

```

View Profiles (VIEWPROF)

Type choices, press Enter.

Environment name . . . . . _____ Name
Copy type . . . . . _____ FLASH, MMIR, MMIR2, MMIR3...
System name . . . . . *LOCAL Character value

```

This command runs the **WRKLNK** '/qibm/qzrdhasm/profiles/<envname>\_<copytype>' command.

## 7.38 View Script Files (VIEWSCRIPT)

```

View Scripts (VIEWSCRIPT)

Type choices, press Enter.

Environment name . . . . . _____ Name
Copy type . . . . . _____ FLASH, MMIR, MMIR2, MMIR3...
Which files . . . . . *ALL *ALL, *CSM
System name . . . . . *LOCAL Character value
  
```

This command runs the **WRKLNK** ‘/qibm/qzrdhasm/scripts/<envname>\_<copytype>’ command.

## 7.39 Work with Copy Services Environments (WRKCSE)

There are no parameters on this command.

```

Copy Services Environments

Type options, press Enter.
 1=Add  2=Change  4=Delete  5=Display  12=Work with
14=List Stream files  16=Define host connections  18=Make PPRC Paths

Opt  Name      Type      Text
---  ---      ---      ---
---  GMIR      GMIR     Global Mirror environment
---  MMIR      MMIR      Metro Mirror environment
---  FLASH     FLASH     FlashCopy environment
---  LUNCRG    LUN       LUN Switching environment
  
```

See Section 2.4 (Displaying a FlashCopy Environment) for details regarding WRKCSE for a FlashCopy environment.

See Section 3.3 (Displaying a Metro Mirror Environment) for details regarding WRKCSE for a Metro Mirror environment.

See Section 4.5 (Displaying a Global Mirror Environment) for details regarding WRKCSE for a Global Mirror environment.

See Section 6.3 (Displaying a LUN Switching Environment) for details regarding WRKCSE for a LUN Switching environment.

**Note:** Your organization may have implemented security for some of the WRKCSE options. If you are denied access, please contact them for more information.

## 7.40 Work with CSE Credentials List (WRKCSECRDL)

Used only with Full System Replication. See the documentation for that function for more information.

## 8 Trouble Shooting

### 8.1 IASP Manager Log Files and the VIEWLOG command

IASP Manager uses many parts of the operating system from clustering to LPAR. Some of the errors that the programs may encounter have the messages returned directly in the joblog. These errors typically occur at the start of a command where IASP Manager is starting and checking clustering. If this happens, use the messages in the joblog to find and correct the error.

Once clustering is started, all other messages go to the IASP Manager log file. All problem determination should start with this log file.

#### 8.1.1 VIEWLOG (View Log File)

```
View Log File (VIEWLOG)

Type choices, press Enter.

System name . . . . . *LOCAL      Character value, *LOCAL...
Stream file  . . . . . \/QIBM/Qzrdhasm/qzrdhasm.log' .

-----
Operation to perform . . . . . *DSP          *EDT, *DSP
Job number   . . . . . *ALL           1-999999, *ALL
```

The viewlog command opens the `/qibm/qzrdhasm/qzrdhasm.log` file. This file is a running log of all IASP Manager activity on the system. When the file exceeds 200K, it is copied to `/qibm/qzrdhasm/qzrdhasm.bak`, and a new file is created.

When the file is opened, use a “b” in the control field to go directly to the end of the log. Then page up until the start of the command is found.

The System name parameter can also name a remote system or \*SNMP. The remote system option uses remote IFS which requires that the user ID and password be identical on the remote system that you wish to open the log on. The \*SNMP option displays the SNMP log file on the local system.

**Note:** All logs are included in the information collected by the DMPINF command.

### 8.1.2 DMPINF (Dump IASP Manager Information)

The DMPINF command creates a single stream file containing all the information for the environment and IASP Manager. The stream file is located at `/tmp/qzrdhasm_<host name>.txt` and can be sent to IBM for debugging an IASP Manager issue.

The file contains the following information

- IASP Manager exit data
- Log file and backup log file
- DSCLI scripts and results files
- DSCLI profiles

For TCP-R environments, additional information is included:

- Permanent user space (status etc.)
- Environment IFS directories (XML results)

Retrieving the DMPINF file to send to IBM:

1. Use the **DMPINF** command. This command is in the **QZRDHASM** library.

Once you have collected the above information, you can either FTP the file to your PC to e-mail the documentation to the support representative or use System i Navigator to drag and drop it.

#### **Using FTP**

1. From your PC, FTP to your IBM i system
2. Sign on with a valid user ID and password
3. Enter the following commands:

```
quote site namefmt 1
get \tmp\qzrdhasm_<nodeName>.txt
```

#### **Using System i Navigator**

1. Open System i Navigator
2. Expand the name of the system where the data was collected [click the + sign]
3. Expand 'File Systems'
4. Expand 'Integrated File System'
5. Expand 'Root'
6. Click 'tmp'
7. Drag and drop the 'qzrdhasm\_<nodeName>.txt' file to your desktop or any folder on your PC.

The joblog can be moved to your PC via System i Navigator as well.

1. Open System i Navigator
2. Expand the name of the system where the data was collected
3. Expand 'Basic Operations'
4. Click 'Printer Output'
5. Drag and drop the joblog spool file to your desktop or any folder on your PC.

### 8.1.3 Other trouble shooting tips

#### **Viewscript ( data included in DMPINF file )**

The **viewscript** command takes you directly to the script and result files directory used by the DSCLI for a specific environment.

#### **Viewprof ( data included in DMPINF file )**

The **viewprof** command takes you directly to the profiles directory used by the DSCLI for a specific environment.

## **8.2 Troubleshooting Process**

The first indication that an activity was not completed successfully will normally be a status message, such as one of the following with examples of causes:

1. "A PPRC check for IASP CRG <CRGname> failed."
  - a. Production system name = PPRC system name
  - b. Production system name = name of non-existent system
2. "This command must run on the backup node."
  - a. PPRC system name = Production system name
  - b. SWPPRC attempted on Production system
3. "Clustering not started on node <system name>."
  - a. PPRC system name = name of non-existent system
  - b. All cluster nodes inactive; autostart set to \*NO
  - c. TCP/IP not running on Production system
4. "VRYCFG failed for device <IASPname>"
  - a. TCP/IP failed during IASP vary on
  - b. "Signature" failure

## 8.2.1 Example 1 (PPRC check failed)

Command: CHKPPRC ENV(<name of environment>)

Preferred Source: ITCHA2

Preferred Target: ITCHA3

Current Production node: ITCHA2

Current HA/DR node: ITCHA3

1. Error message: A PPRC check for IASP CRG <CRGname> has failed.

```
Message ID . . . . . : IAS0070      Severity . . . . . : 60
Message type . . . . . : Escape
Date sent . . . . . : 01/24/06      Time sent . . . . . : 11:09:30

Message . . . . . : A PPRC check for IASP CRG <CRGname> has failed.
Cause . . . . . : One or more failures occurred while checking the status of PPRC. A SWPPRC
command request will not operate.
Recovery . . . . . : Refer to the prior diagnostic messages in the job log. Also use the VIEWLOG
command to display additional details. Correct the problem and retry the operation.
```

2. Look at the log file (via **VIEWLOG**); search for messages that indicate a problem. Note: viewlogs from successful SWPPRC operations can be viewed in Appendix A (Page **Error! Bookmark not defined.**).

### VIEWLOG

```
2010-09-01 12:09:07 Start CHKPPRC for <CRGname> starting from job 175969/QUSER/QPADEV000B
Advanced Copy Services version 1.3.0 built Tue Aug 31 16:13:59 2010.
*
*
*
2010-09-01 12:09:28 Processing file
/QIBM/Qzrdhasm/scripts/<CRGname>_MMIR/lsprrc_PS.result. (checkThoseResults)
2010-09-01 12:09:28 Warning Strings Suspended | Duplex | Copy | | not found in any records.
2010-09-01 12:09:28 Warning Expected lsprrc_PS.script results not found. (doPPRCScript)
```

3. Use the VIEWSCRIPT command to display the file containing the unexpected results.

```
Browse : /qibm/qzrdhasm/scripts/<CRGname>_MMIR/lsprrc_PS.result
Record : 1 of 1 by 18 Column : 1 129 by 131
Control :

....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8....+....9....+....0
*****Beginning of data*****
CMUN80027E lsprrc: IBM.2107-75AX032: The DS Network Interface server is not aware of the specified
storage unit or storage image.
*****End of Data*****
```

4. Analysis: The last request was to run the “lsprrc\_PS.script” which points to the preferred source system (ITCHA2). Something is preventing communications with the storage device on ITCHA2.
  - a. lsprrc\_PS.script may have an incorrect storage device ID. Use the **VIEWSCRIPT** command to see.

- b. pprc\_PS.profile (used by lsprrc\_PS) may have an incorrect storage device ID. Use the **VIEWPROF** command to see.
  - c. The storage device may be inoperative
5. In this case, it is an incorrect device ID: IBM.2107-75AX032 in the lsprrc\_PS.script. The contents of scripts and profiles are generated from information supplied when creating a CSE environment. To change the device ID, use WRKCSE Option 2=Change.

### 8.2.2 Example 2 (PPRC check failed)

Command: CHKPPRC ENV(<name of environment>)  
 Preferred Source: ITCHA2  
 Preferred Target: ITCHA3  
 Current Production node: ITCHA2  
 Current HA/DR node: ITCHA3

1. **Error message:** A PPRC check for IASP CRG <CRGname> has failed.

```

Message ID . . . . . : IAS0070      Severity . . . . . : 60
Message type . . . . . : Escape
Date sent . . . . . : 01/26/06      Time sent . . . . . : 08:50:52

Message . . . . . : A PPRC check for IASP CRG <CRGname> has failed.
Cause . . . . . : One or more failures occurred while checking the status of PPRC. A SWPPRC
  command request will not operate.
Recovery . . . . . : Refer to the prior diagnostic messages in the job log. Also use the VIEWLOG
  command to display additional details. Correct the problem and retry the operation.
  
```

2. Look at the log file (via **VIEWLOG**); search for messages that indicate a problem.

### VIEWLOG

```

2010-09-01 12:09:07 Start  CHKPPRC for <CRGname> starting from job 175969/QUSER/QPADEV000B
                          Advanced Copy Services version 1.3.0 built Tue Aug 31 16:13:59 2010.
*
*
*
2010-09-01 12:09:28      Processing file /QIBM/Qzrdhasm/scripts/<CRGname>_MMIR/lsprrc_PS.result.
                          (checkThoseResults)
2010-09-01 12:09:28 Warning Strings Suspended | Duplex | Copy | | not found in any records.
2010-09-01 12:09:28 Warning Expected lsprrc_PS.script results not found. (doPPRCScript)
  
```

3. Use the **VIEWSCRIPT** command to display the file containing the unexpected results.

```

Browse : /qibm/qzrdhasm/scripts/<CRGname>_MMIR/lsprrc_PS.result
Record : 1 of 1 by 18      Column : 129 by 131
Control : _____

....+....1....+....2....+....3....+....4....+....5....+....6....+....7...
*****Beginning of data*****
CMUN00018E lsprrc: : Unable to connect to the management console server
*****End of Data*****
  
```



4. Analysis: This time, checkThoseResults found “CMUN00018E Ispprc: Unable to connect to the management console server” in the first line – not what it expected.
5. Display the details of message CMUN00018E.

**CMUN00018E SOURCE Unable to connect to the storage management console server**

**Explanation**

Your client software cannot connect to the storage management console server. This might be because the server is not enabled, a network problem exists, or the server is refusing connections because the maximum number of clients are connected already.

**Action**

Ensure that the storage management console is online. Ensure that you specify the storage management console IP addresses correctly. Ensure that other connections do not already exist.

6. The easiest thing to check is the SMC IP address, found in the profile used by the script. The Ispprc\_PS.script uses the pprc\_PS.profile. Use the viewprof command to view it.
7. Enter **VIEWPROF ENV(<name of environment>) COPYTYPE(<copytype>)**

```

Work with Object Links

Directory . . . . : /qibm/qzrdhasm/profiles/PYSHT_MMIR

Type options, press Enter.
 2=Edit  3=Copy  4=Remove  5=Display  7=Rename  8=Display attributes
11=Change current directory ...

Opt      Object link
--      pprc_PS.profile
--      pprc_PT.profile
--      pprc_9_PS.profile
--      pprc_9_PT.profile
--      runds_PS.profile
--      runds_PT.profile

Parameters or command
====>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F12=Cancel  F17=Position to
F22=Display entire field  F23=More options
Bottom

```

8. Select option 5=Display for the appropriate profile to view the SMC IP address (hmc1).

```

Edit File: /qibm/qzrdhasm/profiles/PYSHT_MMIR/pprc_PS.profile
Record : 1 of 13 by 10 Column : 1 76 by 126
Control :

CMD .....1.....2.....3.....4.....5.....6.....7.....8.....
*****Beginning of data*****
#
# Advanced Copy Services DS CLI Profile for environment PYSHT, type MMIR.
#
hmc1: 9.5.168.54
#
pwfile: /QIBM/Qzrdhasm/sec.dat
fullid: off
paging: off
format: default
banner: off
header: off
verbose: off
# End of Profile...
*****End of Data*****

F2=Save F3=Save/Exit F12=Exit F15=Services F16=Repeat find F17=Repeat change

```

9. In this case, the hmc1 IP address is incorrect. The contents of scripts and profiles are generated from information supplied when creating a CSE environment. To change the hmc1 IP address, use WRKCSE Option 2=Change.

**8.2.3 CRG PPRC Status Codes**

| Number      | Description   |
|-------------|---|
| 0 or *Ready | PPRC ready for SWPPRC   |
| 10          | PPRC approved received reply from Production node operator or user  |
| 20          | PPRC failover task is complete, received reply from HA/DR operator  |
| 100         | PPRC unscheduled switch is incomplete, a SWPPRC *COMPLETE is required if in a Metro Mirror environment. Global Mirror requires that |
| or          |   |
| *INCOMPLETE | completion be done manually.  |

**8.2.4 CRG FlashCopy Status Codes**

| Number   | Description   |
|----------|---|
| 0 *NONE  | Flash Copy ready for STRFLASH                                       |
| 20       | Flash Copy completed; Operator has replied G to the IAS0001 message |
| 90       | Flash Copy process completed; starting vary on                      |
| 100 or   |   |
| *FLASHED | Flash Copy STRFLASH complete, ready for ENDFLASH                    |

## 8.2.5 CRG Request Codes

| <b>Number</b> | <b>Description</b>  |
|---------------|---|
| 0             | No request, no action taken on any node. used to set exit data only |
| 10            | Flash Copy hardware check   |
| 20            | Flash Copy inquiry message to production system operator or user    |
| 100           | Not a request, used to define FlashCopy/PPRC request boundary       |
| 105           | PPRC check CHKPPRC  |
| 120           | PPRC inquiry message to production system operator or user          |
| 122           | PPRC inquiry message to backup system operator or user              |
| 205           | Perform a pre-Flash check on the FlashCopy node                     |
| 211           | Perform a vary off (cold Flash) on the Production node              |
| 214           | Perform a vary on on the Production node                            |
| 215           | Perform a quiesce on the Production node                            |
| 216           | Perform a resume on the Production node                             |
| 217           | Perform a *FRCWRT on the Production node                            |
| 230           | Submit the FlashCopy program on the FlashCopy node                  |

## 9 Placing a service call for support

### 9.1 Overview

IBM brand services offers multiple different types of support for IASP Manager.

- 1) Initial Defect Support. IBM provides a 60-day defect support period of IASP Manager upon delivery to the customer. Following this period, all services and support are provided via contract only.
- 2) Email support only. This option is available for FlashCopy where the data is not critical to the running of the business. This level of maintenance also entitles the customer to receive version updates to IASP Manager whenever they are available.
- 3) 24 x 7 support through the IBM Rochester support center. This is the default level of support for all IASP Manager customers using PPRC, but it is also available for FlashCopy customers if they decide the FlashCopy process is critical to their business.

### 9.2 Placing a service call

#### 9.2.1 E-mail support

To request support using e-mail support, send an e-mail to **iessspt@us.ibm.com** stating the problem and include as much information as possible. Always include the file created by the DMPINF command (see Section 8.1.2) in the e-mail as this always contains the information needed to start the analysis process.

#### 9.2.2 IBM support with 24 x 7 Maintenance

To place a call on IASP Manager with IBM support, it is important to give the correct information on your IASP Manager environment to ensure the call is directed to Rochester as quickly as possible.

- 1) Place the service call for software
- 2) The product is IBM i
- 3) **The problem description must include “Copy Services toolkit”.** The Copy Services toolkit keyword will direct the call to the correct support queue in Rochester.

It is also beneficial to have the DMPINF (see Section 8.1.2) available to send into IBM so the problem can be diagnosed as quickly as possible.

**Note: The customer is required to have an iSeries Software Maintenance Agreement (MA) as a prerequisite to this Agreement. The iSeries Software MA allows access to IBM's support structure. To assist IBM personnel in correctly routing your problem, request support for IBM i Copy Services Manager, using component identifier 5722SS1CS.**