IBM Systems Lab Services

PowerHA Tools for IBM i
IASP Manager
Installation Guide

September 12, 2017
Version 4.3

1 Introduction

PowerHA Tools for IBM i IASP Manager was previously known as iSeries Copy services Manager (ICSM) and Advanced Copy Services for IBM i (ACS). The decision to change the name was to avoid any confusion with the newly released IBM Copy Services Manager (CSM) which replaced TPC-R as IBM's strategic Copy Services management tool.

The following picture shows an overview of the PowerHA for IBM i IASP Manager (IASP Manager) relationships between various entities involved in a HA and/or DR architecture for an IBM i environment.

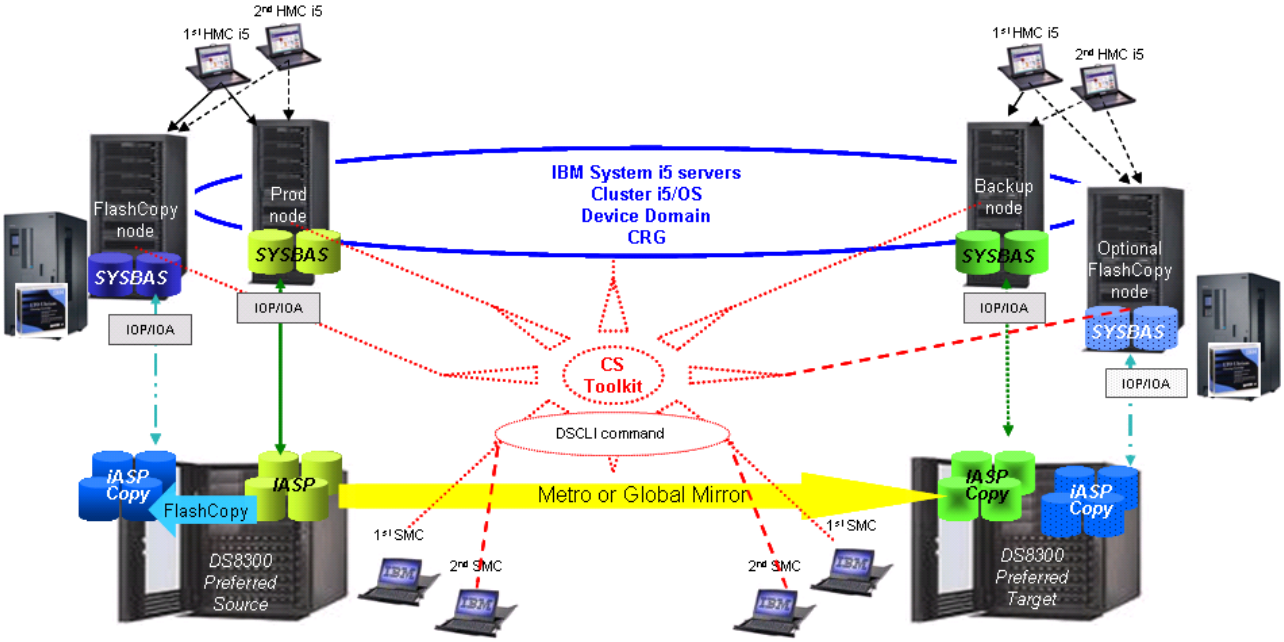


Figure 1-1

1.1 Planning

Planning for IASP Manager installation is part of the services engagement associated with purchasing this product. This includes planning for the IASPs, locations of the DISK IOPs/IOAs, and ensuring that all requirements/restrictions are followed. An overview of the Requirements and Restrictions is included below.

1.2 Requirements

Prior to the start of installation, the services representative must ensure the following tasks have been completed.

IBM i Release	IASP Manager 4.1/4.2/4.3	ACS/ICSM 3.1	ACS/ICSM 3.0
i5/OS V5R4	Not supported	Not supported	Not supported
i 6.1	Not supported	Not supported	*Only supported version
i 7.1	Preferred	Supported	Supported but no fixes**
i 7.2	Preferred	Supported	Supported but no fixes**
i 7.3	Preferred	Supported	Supported but no fixes**

*Customer must have extended maintenance support for V6R1 to have support for the copy services tools
** No new fixes are provided for this level. An upgrade is required for any defect found

- Recommended high availability PTFs are installed. They are available from IBM service at the following URL
  http://www-912.ibm.com/s_dir/slkbase.nsf/recommendedfixes
- Each system/partition has its own Fiber Channel attachment card(s), or access to NPIV adapters
- IBM i clustering has been setup on all nodes
- The IASP has been created on the production system
- Copy Services FlashCopy and/or PPRC code enabled on the IBM System Storage.

1.3 Installation Overview Checklist

The following checklist is provided to facilitate the installation process of the Copy Services Toolkit. Each installation task has been cross referenced with a page number, where instructions on completing the task can be found.

Number	Task Name
	Planning Considerations
1.	IASP Manager Subsystem Considerations
2.	Clustering Security Requirements
	Prerequisites Before Starting Toolkit Installation
3.	Configure System i clustering on all nodes if using IASPs
4.	Install HA Switchable Resources (57xxSS1 Opt 41)
5.	PowerHA (57xxHAS)
6.	Restore the ACS library (QZRDHASM)
7.	Change Object Ownership
8.	Install DSCLI on IBM i Partitions
9.	Install and configure CSM, if applicable
	Configuration Steps
11.	Create IASP device description
12.	Create QLPAR user profile
13.	Create a CSE CRG
14.	Create the environments in WRKCSE
15.	If using CSM, copy .jar files to IBM i systems
	DSCLI Scripting
16.	Establish an SMC user for DSCLI
	Starting Mirroring
17.	Start Metro Mirror
18.	Start Global Mirror

1.4 Whats new in 4.2 for IASP manager

1.4.1 Security

IASP manager 4.2 provides a major ease of use update to the way the IBM i partitions communicate to the DS8Ks . All previous releases of the tools use an encrypted password file on each partition that needs to be setup to communicate to every DS in the environment. Issues can occur when not all the security files have the correct information, and this is not found until first switchover. The use of the password file is being replaced

by toolkit credentials information that stores DS8K (and other devices) passwords encrypted within Clustering. This means the password only needs to be entered on a single node and it will be spread around the cluster

The second enhancement to security is the ability to use a user profile other than qlpar to communicate to the DS. In the past the toolkit was hard coded to use qlpar. Now the toolkit will use whatever profile is configured within the credential storage for the IP address of the DS8K .

The CSE credentials list is also used for any CSM server communication for customers running 3 site replication. An entry must be created for each CSM server.

The highlights of these changes are

- Use of custom user profiles up to 16 Chars in length
- Each DS connected to a cluster can use a different user profile
- Use of a password up to 16 Chars in length (up from previous hardcoded limit)
- A cluster can only have 1 profile for a specific DS
- Multiple clusters can have different profiles for a DS
    - Audit requirement
    - Ability to use resource groups to prevent one cluster from modifying another clusters copy services
- When entering an environment, if a credential entry for a DS is not found in the cluster, a prompt will force the user to create one before continuing
- No more password files required on each partition (profiles created will not have a pwfile line)

```
                          Change a GMIR Environment
Type choices, press Enter.

DS unit SMC information:
  Source hmc1 . . . . . .   9.5.168.19              IPv4
  Source hmc2 . . . . . .                          IPv4
  Source port . . . . . .   1751                   1750, 1751
  Target hmc1 . . . . . .   9.5.168.11             IPv4, *SAME
  Target hmc2 . . . . . .                          IPv4, *SAME
  Target port . . . . . .   1751                   1750, 1751

Comment:
  Text  . . . . . .

Press Enter to add DS8K credentials for 9.5.168.19, press F12 to cancel
```

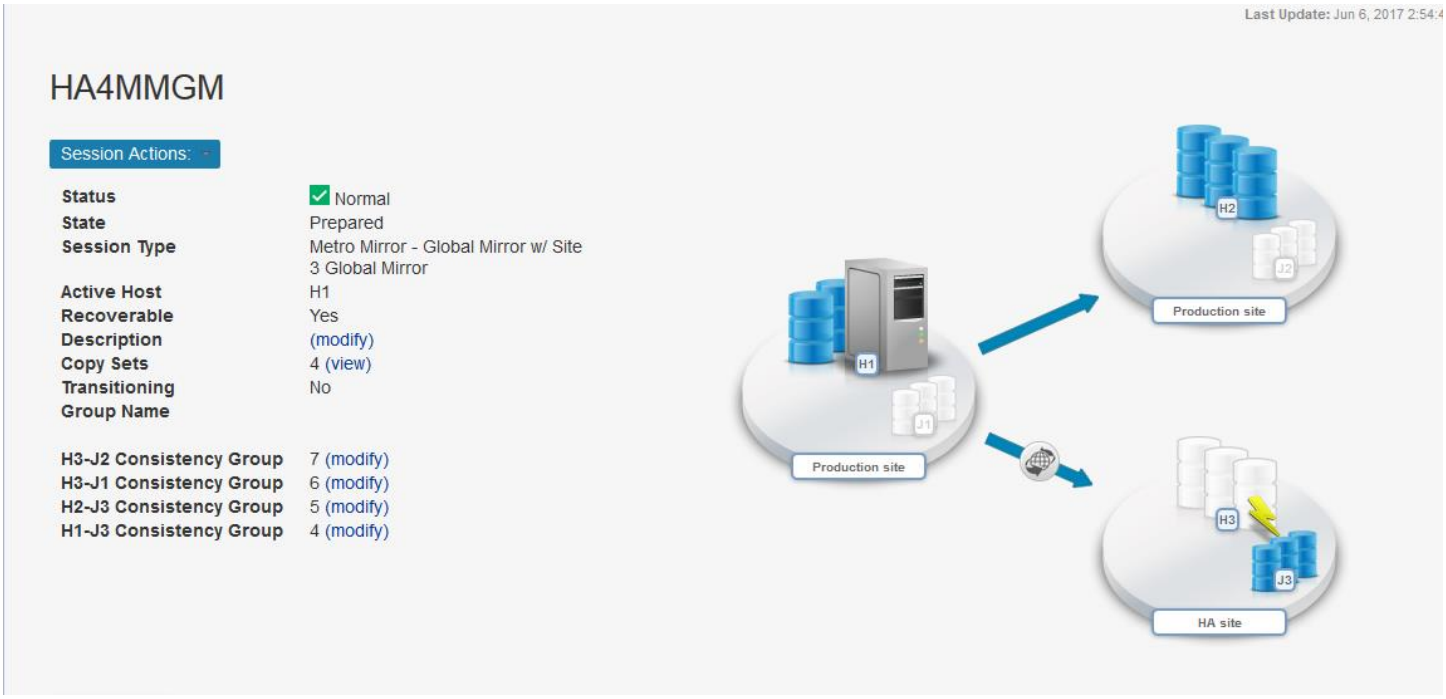
```
                    Add CSE Credential Entry (ADDCSECRDE)

Type choices, press Enter.

Host IP address  . . . . . > '9.5.168.19'  nn.nn.nn.nn
User ID  . . . . . > powerha
Password . . . . . >
Confirm password . . . . . >
Host description . . . . . .   IASP manager profile for DS8000
```

NOTE: If using Smart Assist for any DSCLI commands, you must upgrade to version dated May 2017 or later. Earlier versions won't work with the credentials list

1.5 Metro Mirror – Global Mirror with Site 3 Global Mirror

IASP Manager 4.2 now supports Global Mirror in reverse via the CSM interface . This is done by selecting the Metro Mirror Global Mirror with site 3 Global Mirror from the list of 3 site solutions. We will not support adding volumes for Global Mirror in reverse with out this solutions

Example



2 Upgrade Considerations

2.1 Upgrade information

IASP Manager is delivered as a single library (QZRDHASM). For any existing IASP Manager or previous tools users the library should be restored directly over the existing library. The RUNSETUP command will ensure that any required files are be updated appropriately.

2.2 PowerHA and Cluster versions

Many functions in IASP Manager rely on the clustering functionality provided at different levels in the OS. These functions may not work correctly if the PowerHA level in IBM i is not set to the latest level.

Update the cluster version and PowerHA version to the highest possible level as follows:

Issue the DSPCLUINF command to check the current cluster and PowerHA versions. The current cluster-wide levels are on the first page of DSPCLUINF. Make note of these levels. The potential versions for each node are found by pressing Enter 2 or 3 times depending on OS level.

Check the current level vs. the potential versions and levels for each node. If the potential versions and/or levels for ALL nodes are higher than the current cluster-wide level, perform the following to bring the current cluster-wide level up to match the potential level. If multiple level values are not matching, you will need to change each level independently. Update the current Cluster and/or PowerHA levels by running the following commands in sequence:

- If the potential and current cluster versions don't match, run:
  CHGCLUVER CLUSTER(CLUSTERNAM) CLUVER(*UP1VER) HAVER(*SAME)

- If the potential and current HA versions don't match, run:
  CHGCLUVER CLUSTER(CLUSTERNAM) CLUVER(*SAME) HAVER(*UP1VER)

- If the potential and current HA versions are the same, but the modification levels are different, run:
  CHGCLUVER CLUSTER(CLUSTERNAM) CLUVER(*SAME) HAVER(*UP1MOD)

2.3 Upgrade information for ACS 3.1 and prior environments

Every data CRG used for previous releases MUST be deleted and recreated when upgrading to IASP Manager 4.1, 4.2 or 4.3

Run the following steps to do this:

1) Prior to restoring the 4.3 library, use DSPCSEDTA to collect the information for each environment
2) Ensure that all cluster nodes are active.
3) Use WRKCLU option 9 (Work with cluster resource groups)
4) Delete the data CRG for each environment
5) Ensure no users are in WRKCSE menu
6) On all nodes in the cluster, restore the 4.3 IASP Manager library using ALWOBJDIF(*ALL) and MBROPT(*ALL). Two data queues may not restore – this is normal.
7) On all nodes in the cluster, issue RUNSETUP command
8) After restoring the 4.3 IASP Manager library, Use CRTCSEDTA and CHGCSEDTA to recreate the data CRGs in the new IASP Manager 4.3 format.

All WRKCSE records must be updated after upgrading to IASP Manager 4.3. All parameters should be double-checked – especially the new ones for SVC/V7K and FlashCopy.

For V7K FlashCopy environments, there are new fields to be populated. The first is in the environment.

- The IP address of the SVC/V7K (which will default to 64.64.64.64)

The second is in CHGCSEDTA

- SVC PPRC information.

For all FlashCopy environments, check the following via WRKCSE:

- Vary on Source IASP
- Quiesce Action
- Connect hosts
- Wait for completion
- Completion timeout
- Exit program and library
- GMIR CG timeout
- GMIR CG Failure Action

2.4 Upgrade information for IASP Manager 4.3 and prior environments

After restoring the library, use the WRKCSECRDL command to create credential entries for the each DS8000 (even if using qlpar, this is required).
Use option 2 beside each environment and enter through the environment to update it

2.5 Required Global Mirror DS8K session changes

If there is a Global Mirror environment in the existing configuration, changes MUST be made to the existing Global Mirror session.

- Both the source and target session need to have all LSSs and associated volumes included in the sessions at all times except during a failover. As part of the migration, run the lssession script for both PS and PT to see which LSSs/volumes are members of the session. Then run the appropriate chsession_add script to add volumes into the session(s) if not there .
- A Global Mirror session should not be active on the non-production DS. Run the showgmir script for the current target DS. If Global Mirror is active, remove the Global Mirror on the target DS using the appropriate rmgmir_xx script.
- We now require that each WRKCSE environment have its own GMIR session in the DS8K. If this is not the case, then IBM Systems Lab Services should be involved in changing each environment to a new session. This involves removing the volumes from the session, closing the sessions where LSSs were removed, and opening new sessions for each environment.

2.6 New implementation of IASP Manager 4.1+ FlashCopy environments

IASP Manager 4.1+ (and ICSM 3.0 and 3.1) uses a new FlashCopy process to meet the needs of customers who wish to submit the STRFLASH command from any node in the cluster. It also enables multiple FlashCopies of an IASP to be used on a single FlashCopy node by changing the volume group attached to the FlashCopy node.
Key new features of IASP Manager 4.1+ FlashCopy include:

1) The FlashCopy process has been converted to a distributed process by moving most functions into a CRG exit program. This allows the STRFLASH command to be run from any node in the cluster.
2) The *FRCWRT function (force write memory to disk but do not quiesce the database) has been added for customers who do not want their jobs held for a few minutes.
3) Host connection scripts have been added to support the ability to modify which set of LUNs is attached to a FlashCopy node.

2.7 Upgrading from Copy Services toolkit versions to IASP Manager

To upgrade from the Copy services toolkit to ACS should be performed as a new implementation. The old Copy services libraries and IFS files should be deleted as part of the process.

2.8 Upgrade process from IASP Manager to a later version of IASP Manager

After IASP Manager has been restored and RUNSETUP has been executed perform the follow tasks

- Use WRKCSE option 2=Change on every environment (MMIR, GMIR, LUN, and FLASH). There may be additional parameters required, and the internal format of the saved information may change.
- Perform a CHGCSEDTA on every cluster resource group for the toolkit

2.9 Copy Services Manager (TPC-R replacement)

IASP Manager does not support any release of TPC-R. TPC and TPC-R were replaced with Spectrum Control and/or standalone IBM Copy Services Manager (CSM)… both products allow for customers to use the CSM which is required for any 3 site support with IASP Manager.

2.10 New in IASP Manager 4.1+

- **This version does not support DS8300 or DS8100**
- Major release boundary for existing ACS/iCSM customers -- upgrade path from iCSM 3.1
    - ACS 4.0 was only for Full System Replication (FSR) with V7K customers
- This belongs in the FSR documentation, not hereRevised Global Mirror support for IASP
- DS8K Metro-Global Mirror (MGM) support replaced
    - ACS 3.1 is the last release to support old-style (cascaded) MGM
    - Support for Multi-Target Metro/Metro Mirror with CSM
    - Support for Multi Target Metro/Global Mirror with CSM
- Improved SVC/V7K for IASP
- Support for Multi-incremental resync for FlashCopies with DS8K
- Detach capability for DS8K with IASPs:
    - Metro or Global Mirror when used with CSM
    - Global Mirror only without CSM

Global Mirror will no longer support sub-session switching which was required to support more than one IASP on DS8100/DS8300. The difference will be

- The volumes must be registered in the sessions on both PS and PT all the time.
- On a switchover, volumes will not be added/removed from the sessions
- On a switchover, Global Mirror will be ended on the old source
- For a Failover (unscheduled switch caused by failure of the source DS), the target LUNs will be removed from the session before starting the failover routine.
- **Note: This version does not support DS8300 or DS8100!**

Other changes

- Support for SWPPRC Auto replicate *NO for Global Mirror
- Support for SWPPRC *COMPLETE for Global Mirror

No more choice in WRKCSE for multi session support - that only existed for the DS8300 and DS8100 support which did not support multiple sessions

2.11 New/changed commands for IASP Manager IASP Manager 4.1+

Most of these changes support the new Full System Replication environment. Some changes apply to all environments.

Command	Status	Environment
ADDCSECRDE (Add CSE Credential Entry)	New	All
CHGCSECRDE (Change CSE Credential Entry)	New	All
CHGCSEDTA (Change CSE Data)	Changed	All
CHGPPRC (Change PPRC)	New	All
CHKCSE (Check *SYSTEM CSE Environment)	New	Full System Replication
CRTCSEDTA (renamed from CRTCSECRG)	Renamed	All
DSPCSEDTA (Display CSE Data)	Changed	All
FIXSTRPRSC (Fix Startup Resources)	New	Full System Replication
RMVCSECRDE (Remove CSE Credential Entry)	New	All
RUNLPARCMD (Run LPAR Command)	New	Full System Replication
SWCSE (Switch *SYSTEM CSE Environment)	New	Full System Replication
WRKCSE (Work with CSE Environments)	Changed	All
WRKCSECRDL (Work with CSE Credentials List)	New	Full System Replication
WRKSTRPRSC (Work with Startup Resources)	New	Full System Replication

2.12 Multi-target Solutions

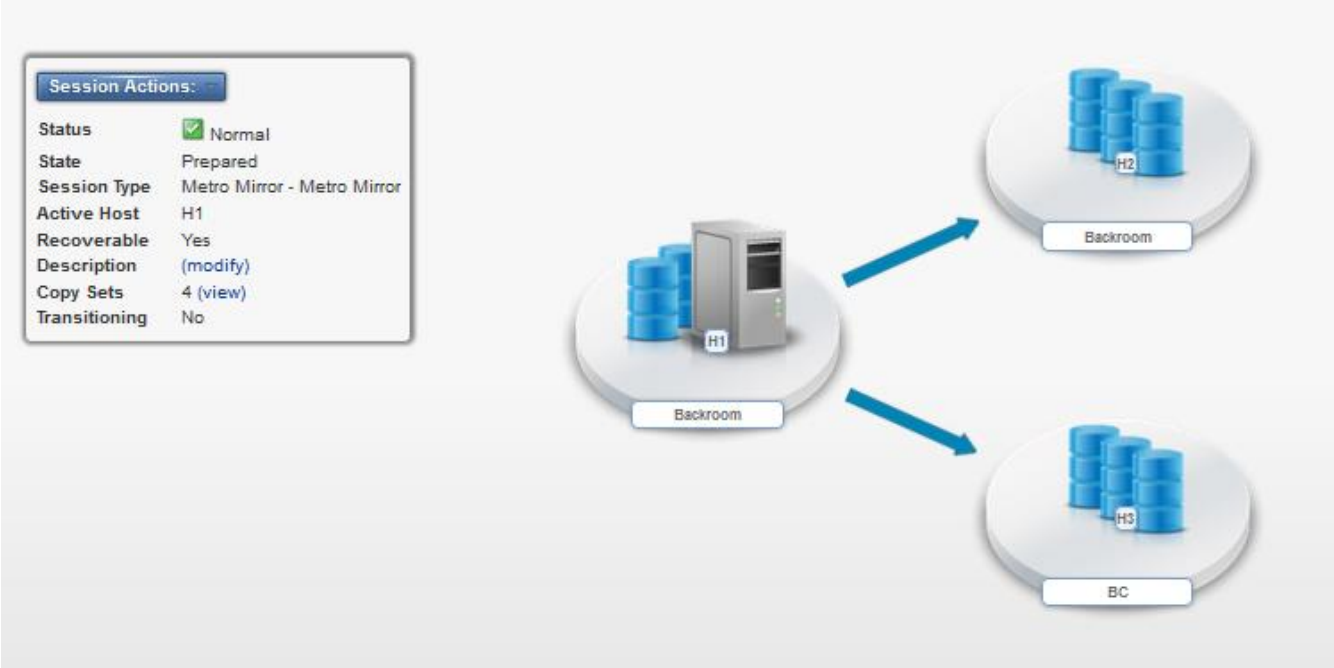
IASP Manager 4.1+ provides support for multi-target solutions – both Metro Mirror and Metro-Global Mirror. Metro Mirror can be configured with two MMIR targets from the Production node source while Global Mirror can be configured with a remote GMIR target and a local MMIR target from the Production node source. Use of licensed program Copy Services Manager (CSM) is required.

Metro Mirror

- Multi Target PPRC support on with IASP Manager allows 2 configuration.
  - Metro/Metro Mirror
  - 2 synchronous sets of pairs providing an RPO of zero data loss at 2 sites
  - Requires 3 DS8870's with 7.4 or higher
  - Requires CSM or complete Spectrum Control solution
  - Requires IBM i 7.1 or higher. This requirement is due to Java requirements for the CSM client
  - CSM can be loaded on any platform including PPC Linux, AIX, windows, zOS or IBM i

In the following figure, H1 is the Production node, H2 is the HA node, and H3 is the DR node.

- H1->H2 is the MMIR PPRC pair
- H1->H3 is the MMIR2 PPRC pair
- H2->H3 is the MMIR3 PPRC pair

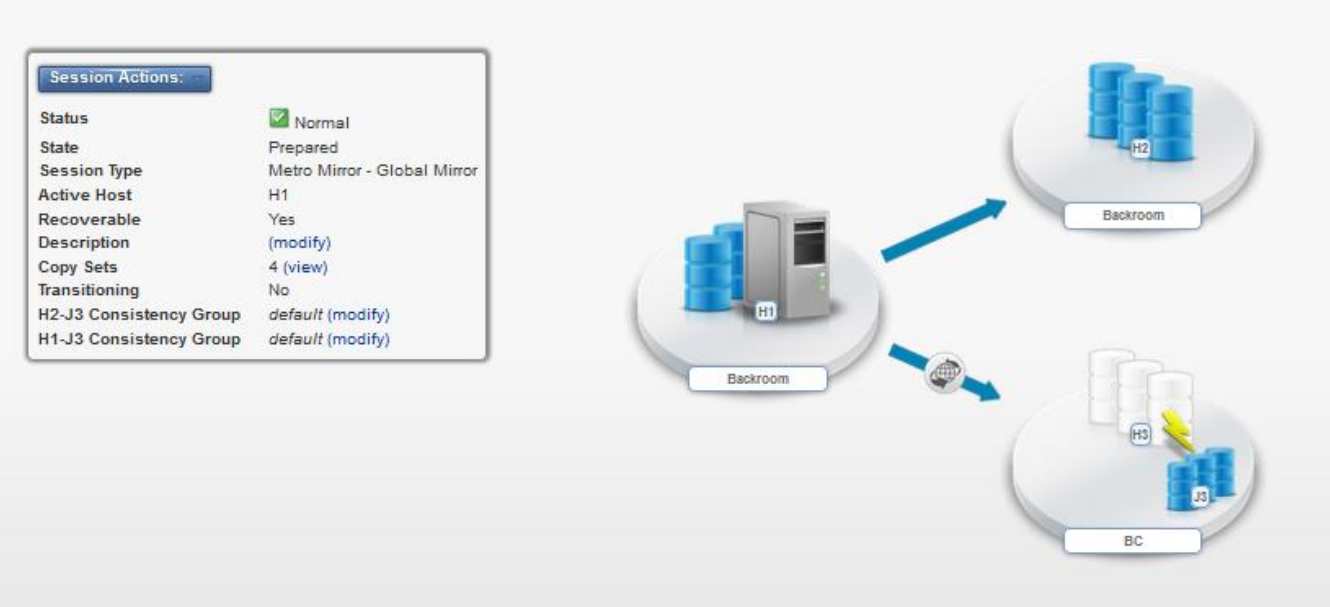


Metro Mirror-Global Mirror

- Multi Target PPRC support on with IASP Manager(ACS) allows 2 configuration.
  - Metro/Global Mirror
  - 1 synchronous set of pairs providing an RPO of zero data loss
  - 1 asynchronous set of pairs providing an undetermined RPO based on bandwidth and writes
  - Requires 3 DS8870's with 7.4 or newer
  - Requires CSM
  - Requires IBM i 7.1 or higher. This requirement is due to Java requirements for the CSM client
  - CSM can be loaded on any IBM platform including the DS hmc, PPC linux, AIX, windows, zOS or IBM i

In the following figure:

- H1->H2 is the MMIR PPRC pair
- H1->H3 is the GMIR PPRC pair
- H2->H3 is the GMIR2 PPRC pair



The Production and HA nodes are normally at the same site while the DR node is at a remote location. When the Production node is the source, the GMIR2 PPRC pair is suspended with a status of *MTIR (Multi-target Incremental Resync). If PPRC is switched, the following table shows the effect:

PPRC source	Active PPRC pairs	Inactive PPRC pair
Production node	MMIR and GMIR	GMIR2 (*MTIR)
HA node	MMIR and GMIR2	GMIR (*MTIR)
DR node	GMIR or GMIR2	Other GMIR (*INELIGIBLE) MMIR (*GCP)

If a GMIR PPRC pair (either GMIR or GMIR2) is specified as symmetric, it is possible to failback to the original source (the Production node for GMIR or the HA node for GMIR2). If not symmetric, GMIR becomes a Global Copy with no failback capability. It does however still have a switchover capability I.e planned switch.

3 Planning Considerations

3.1 IASP Manager Subsystem Considerations

IASP Manager jobs are submitted by IBM i clustering to the *JOBQ specified by the *JOBD associated with the **QLPAR** user profile. The default *JOBD is QDFTJOBD, and its default *JOBQ is QBATCH. This *JOBQ must be configured to allow multiple clustering jobs to run without any delay. Two jobs are submitted for each Copy Services Environment (CSE) CRG.

Tip: Create a new *JOBD for clustering that specifies Job Queue QSYSNOMAX. The JOBD parameter of the QLPAR User Profile must be changed to use this new Job Description. This will ensure that all clustering jobs can run as required in the QSYSWRK subsystem.

3.1.1 Running IASP Manager in another subsystem

If running in QBATCH or QSYSNOMAX is not a valid option, then it is possible for the environment to be changed so that the jobs run in an independent subsystem. The standard work management objects must be created: subsystem description, job description, job queue and class. Change user profile qlpar to use these objects.

3.2 Clustering Security Requirements

Note: Some of the TCP/IP servers used by clustering require that the QUSER user profile's STATUS = *ENABLED and that it does NOT have *SECADM or *ALLOBJ special authority. It must also NOT be expired. If this is not possible, the file /QIBM/ProdData/OS400/INETD/inetd.conf must be changed to use a different profile that matches these requirements.

```
Edit File: /QIBM/ProdData/OS400/INETD/inetd.conf
 Record :      10   of      20 by  10                    Column :   1     76 by 126
 Control : ____________________________________________________________          .

CMD ....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8..
    # ##### DO NOT MODIFY THIS FILE #####
    #
    # Any changes made to this file will be lost during release upgrade.
    # User-defined services may be defined in file:
    #  /QIBM/UserData/OS400/INETD/inetd.conf
    #
    #
    # Clustering
    as400-cluster  stream  tcp  wait    QUSER  /QSYS.LIB/QCSTINETD.PGM QCSTINETD
    #
```

```
************End of Data*********************
```

Figure 3-1

The ALWADDCLU (Allow Add to Cluster) network attribute must be appropriately set on the target node if trying to start a remote node. This should be set to *ANY or *RQSAUT depending on the environment. If set to *RQSAUT, then -- Digital Certificate Manager (57xxSS1 Option 34) on IBM i 6.1, or later release.

To change the ALWADDCLU (Allow Add to Cluster) network attribute, use the following green screen command:

CHGNETA (Change Network Attributes)
Specify **ALWADDCLU = *ANY** or ***RQSAUT**

3.3 Requirement to coordinate QTIME between all nodes

To prevent simultaneous operations on the same environment, a cluster wide lock per environment has been added, set at the start of SWPPRC, CHKPPRC and STRFLASH operations and released at the end. The default time for automatic release of the lock is 15 minutes, and the time-of-day for the timeout is calculated and communicated to the other nodes in the cluster. Therefore, it is preferable to make sure that the QTIME system value on all systems contain the same time-of-day. You should consider use of the Simple Network Time Protocol (SNTP) TCP server to automate keeping the time synchronized.

Note: If systems are in different time zones or the system times are significantly different, then this locking will work only on the local system.

3.4 PowerHA sessions and Multiple Incremental FlashCopies

By default since IASP manager 3.0, all FlashCopies except Global mirror target flashes use PowerHA sessions to control the FlashCopy. With the introduction of multi incremental FlashCopy, there are times when using Global Mirror, that sessions will cause issues to the configuration. A scenario might be where the D-Copy is configured as an incremental flash, and a Global Mirror failover needs to remove that flash with DSCLI…. That will leave an orphaned session in PowerHA and will cause future flashes to fail.

IASP Manager 4.1+ includes the ability to not use PowerHA sessions for any FlashCopy if that is not desirable. The scenarios include

- Any time multiple incremental FlashCopy is used, since using sessions prevents the changing of the session, and removing and recreating the session requires a full background copy to complete again
- Anytime Global Mirror with D-Copy is used

4 Pre-requisites before starting toolkit Installation

4.1 Configure IBM i clustering on all nodes

Prior to installing IASP Manager, all the nodes that will participate in the Copy Services environment must be active in an IBM i cluster and device domain. This allows the IASPs to be flashed or PPRCed or switched to another partition and made available. IASP Manager also relies on clustering for all intersystem communication.

4.2 Install HA Switchable Resources (57xxSS1 Option 41)

HA (High Availability) Switchable Resources (57xxSS1 Option 41), is required to run IASP Manager.

4.3 Install PowerHA (5761HAS) or IBM PowerHA for i (5770HAS)

A separate licensed program, **IBM i HASM (High Availability Storage Manager, 5761HAS) or IBM PowerHA for i (5770HAS),** is required. This provides system objects (ASP Copy Descriptions) for IASP Manager information formerly stored in the QUSRSYS/QIASPWORK and QUSRSYS/QIASPVOLS files. When migrating an environment, there is an option to import the information from these files into the new ASP Copy Descriptions.

4.4 Install DSCLI on IBM i Partitions

To install DSCLI on each of the partitions that will use IASP Manager, use the DSCLI CD shipped with the DS8000 or download the appropriate code from Fix Central - run the install of the DSCLI for Windows. The first screen has an option of installing on IBM i. A pop-up window appears on the device running the command. The window prompts you for the partition name (or IP address), user name and password. Supply the requested information and press **Enter**. The install wizard for DSCLI is launched. Take all defaults presented by the wizard.

4.5 Install Copy Services Manager (CSM)

If CSM servers are being used, they must be installed and configured. Use of two CSM servers is strongly recommended to achieve higher availability, and IASP Manager requires that both have the same User ID and password. CSM must be at level 6.1.4 or later.

4.5.1 Copy the CSM .jar files to IBM i systems

If CSM servers are being used, the jar files containing the CSM communication API's must be copied from one of the servers to each of the IBM i systems participating in the high availability solution.

The jar files to be transferred via binary ftp are found in the CSM server directory ~csmserver install path/CSM/CLI/lib and should be ftp'ed to /QIBM/QZRDHASM/CSMLIB

- For windows, this is normally C:\Program Files\IBM\
- For Unix, Linux and IBM i it is normally \opt\IBM\

All of the jar files need to be copied to every IBM i partition participating in the environment.

4.5.2 Create a preventReadFromSecondary file

To work correctly with IBM, the CSM servers must also have a file created to ensure that the DS8K LUN's are prevented from allowing reads when they are the target of a PPRC configuration. To create this file, use the OS to create an empty file at

~csmserver install path/csm/liberty/wlp/usr/servers/csmServer/etc/preventReadFromSecondary

Note: this is case sensitive and must be done on BOTH CSM servers!!

Example. On windows, you can use command

```
type Nul > "C:\Program Files\IBM\CSM\liberty\wlp\usr\servers\csmServer\etc\preventReadFromSecondary"
```

4.6 Restore the IASP Manager Library and Licensing

IASP Manager and its supporting objects are contained in one library:

- QZRDHASM - The IASP Manager IASP Manager library

4.6.1 Request the QZRDHASM library from IBM Systems Lab Services

You should have received the following via e-mail:

1. PowerHA Tools for IBM i IASP Manager Installation Guide (this document).
2. PowerHA Tools for IBM i IASP Manager Users Guide.
3. Product access codes for IASP Manager tailored to the specific IBM i systems on which IASP Manager will be installed.

The IASP Manager library can be obtained in 2 ways.

1) A Systems Lab Services representative may deliver the code during the implementation. This will be normal for a new installation
2) Send a note to rchclst@us.ibm.com requesting a copy of the library. The library will be sent in a zipped format which is typically < 4MB. If this is too large, please specify this, and a temporary FTP site will be set up for a download.

4.6.2 Load the IASP Manager save file onto your IBM i systems

The previous steps obtained a single save file, saved from an IBM i system, compiled for i 6.1, or higher.

To load the IASP Manager save file onto your IBM i systems, use FTP. Unzip the phatools410.savf into a directory on your PC and in a DOS window, enter:

1. **cd** <directory containing files you just unzipped>
2. **ftp** <IBM i system name>
3. **binary**
4. **quote site namefmt 1**
5. **put phatools<release number>.savf** (such as phatools410.savf)
6. **quit**

The save file is placed in library QGPL unless your create default library is set differently.

4.6.3 Restore the library for the initial install

To restore the library from the save file, use the following green screen command:

RSTLIB SAVLIB(QZRDHASM) DEV(*SAVF) SAVF(QGPL/phatools< release number>)

Note: Replace QGPL with your default library if it is set differently.

4.6.4 Distribute required objects to other libraries

1. Run the **QZRDHASM/RUNSETUP** command to distribute required objects to other libraries. The following steps are performed:
   a. Ensures that the journal and journal receiver QIASP are in library QUSRSYS.
   b. Ensures that the IASP Manager upgrade of DSCLI is installed. Note: A QDSCLI save file is in library QZRDHASM
   c. Restores TransferAcsCsmJava.jar to the IFS at /QIBM/Qzrdhasm/csmlib .
2. If you are upgrading from a prior version of the Toolkit, it may be necessary to follow the steps for Upgrade Process from Copy Services toolkit in Chapter 2.
3. After RUNSETUP is run, library QUSRSYS contains the following IASP Manager objects:
   - QIASP *JRNRCV
   - QIASP *JRN
   - QIASPCNN *FILE PF-DATA

4.6.5 Add the license key

Add the license key by entering the following green screen commands:

- **ADDLIBLE QZRDHASM**
- **ADDPRDACS ACSCDE(<code>)**
  (where <**code>** is the license key provided in the e-mail from IBM.)

The license key enables use of IASP Manager commands. The key is unique for each of the following:

- The system on which IASP Manager is installed.
- The IASP Manager capabilities to be used (FlashCopy, PPRC, Global Mirroring)
- The model of the IBM System Storage device in use (DS6000 or DS8000)

4.7 Change IASP Manager Object Ownership

All IASP Manager objects are shipped as owned by QPGMR, and the *PUBLIC has *CHANGE authority to them. It is recommended to change the authorities to the objects in the QZRDHASM library based upon the security guidelines of your organization.

4.8 DSCLI for DS8000 Overview

IASP Manager has the capability of automatically running scripts to perform the necessary DSCLI operations to manage the external storage. Using the automated scripting function eliminates the need for access to the Storage Manager Console (SMC) or storage device GUI to manually run Copy Services functions.

In order to use DSCLI and scripting, the following steps must be performed:

1. Establish a user with admin authority on the SMC.
2. Install the DSCLI on IBM i partitions.
3. Create DSCLI profiles on IBM i partitions.
4. Set up a password file on IBM i partitions. (4.1 and below only. 4.2+ uses the new security)
5. Test the password file and SMC user.
6. Create scripts to be run by IASP Manager.

Three additional topics must also be considered when using DSCLI scripts:

1. Upgrading the SMC and DSCLI code
2. Running scripts interactively
3. Choosing the correct PPRC source

4.8.1 Establish an SMC User for DSCLI

If the DS MGT toolkit is included, use STRDSMGT option 20 to perform user profile creation and password storing.

If the DS MGT toolkit is not available you can use either the GUI functions or a DSCLI command to create a new user named qlpar. Before creating the usere "qlpar," verify that it doesn't already exist on the DS8000 by running the following DSCLI command:

lsuser

To create the new user with DSCLI, run the following command:

mkuser –pw <password> -group admin qlpar

The password used when running this command is a one time password. It *must* be changed the first time you use the SMC. Therefore, do not use your desired password when running this command. After creating the user, the first action you must perform is to sign on to the DSCLI using the qlpar profile and change the password to your desired value using the **chuser** command.

chuser –pw <password>

4.8.2 Setting up the DSCLI Password Files on 4.1 and below

Note, if using 4.2 or newer, this section is no longer required.
If the DS MGT toolkit is included, use STRDSMGT option 20 to perform user profile creation and password storing.

4.8.3 Setting up a pwfile on IBM i partitions

Each partition that uses IASP Manager must have a pwfile, /QIBM/QZRDHASM/sec.dat, that contains entries for all storage servers to which it must communicate. The DSCLI that is installed on the partition is used to create and populate the pwfile.

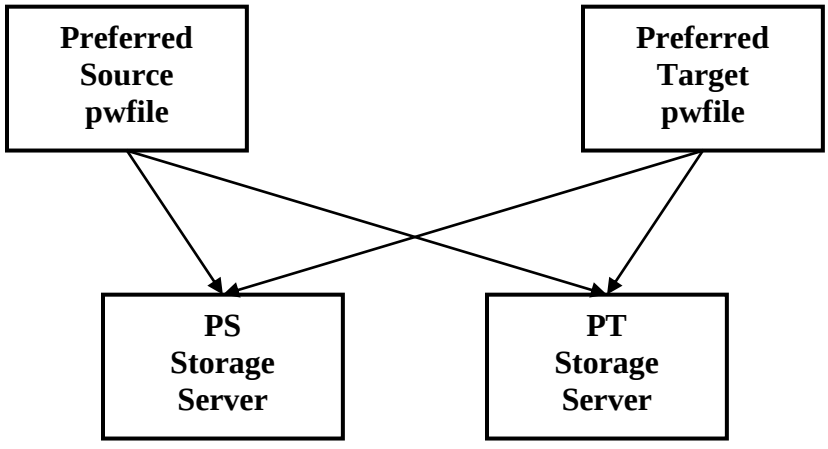


Figure 4-1

1. Run the following green screen commands:
   a. **ADDLIBLE QDSCLI**
   b. **DSCLI** (and press **F4=Prompt**)
2. The DSCLI command prompt screen is displayed:

```
                          Run Copy Services (DSCLI)

 Type choices, press Enter.

 Script: *NONE or name  . . . . .  _____________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________
 Profile  . . . . . . . . . . . .  *DEFAULT                                    .
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________


                                                                        Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 4-2

3. Key the following information and press **Enter**:
   a. *Script* = ***none**
4. The remainder of the parameters are displayed:

```
                          Run Copy Services (DSCLI)

 Type choices, press Enter.

 Script: *NONE or name. . . . . > *NONE                                       .
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________
 Profile  . . . . . . . . . . . .  *DEFAULT                                   .
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________
 HMC1 . . . . . . . . . . . . . .  *PROFILE                                    .
 HMC2 . . . . . . . . . . . . . .  *PROFILE                                    .
 User . . . . . . . . . . . . . .  _____________
 Password . . . . . . . . . . . .
 Install Path . . . . . . . . . .  '/ibm/dscli'                                .
 DSCLI CMD  . . . . . . . . . . .  ____________________________


                                                                        Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 4-3

5. Key the following information and press **Enter**:
   a. *HMC1* = **<IP address of HMC/SMC of storage server>**
   b. *HMC2* = **<IP address of second HMC/SMC>**, if used
   c. *User* = **qlpar**
   d. *Password* = **<password for qlpar>**
   e. *DSCLI CMD* = ***int**
6. The DSCLI command entry screen appears.

```
                                                          Java Shell Display
  Date/Time <month> dd, yyyy hh:mm:ss AM UTC IBM DSCLI Version: 7.7.40.362 DS:
  IBM.2107-ABC1234

  dscli>


===> _____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
F3=Exit   F6=Print F9=Retrieve F12=Exit
F13=Clear F17=Top  F18=Bottom  F21=CL command entry
```

Figure 4-4

7. Enter the following command, with <*ipaddr1*> = the IP address of the HMC/SMC for the storage server to which DSCLI is communicating and <*password*> = the password for qlpar. Optional <*ipaddr2*> = the IP address of a second HMC/SMC attached to the same storage server.

   managepwfile –action add –pwfile /QIBM/QZRDHASM/sec.dat -mc1 <ipaddr1> -mc2 <ipaddr2> -name qlpar -pw <password>

8. Repeat step 7 for each of the other storage servers to which the partition must communicate. (Note, it does not matter which DS you chose to attach to, this information is stored on the local IBM i system only)
9. After completing the pwfile on the Preferred Source node, repeat steps 1 through 8 on the Preferred Target.

Example:

1. Run DSCLI on the Preferred Source to the PS storage server
2. Run managepwfile with <ipaddr1> = IP address of PS storage server
3. Run managepwfile with <ipaddr1> = IP address of PT storage server
4. Run DSCLI on the Preferred Target to the PS storage server
5. Run managepwfile with <ipaddr1> = IP address of PS storage server
6. Run managepwfile with <ipaddr1> = IP address of PT storage server

This creates the password files needed to automatically run DSCLI commands from IASP Manager on either node.

5 Copy Services Cluster Resource Group Configuration Steps

If installing FlashCopy, IASP Manager must be installed on both the Production node and the FlashCopy node.

If installing PPRC, IASP Manager must be installed on both the Production node and the HA / DR node.

Note: In an environment with both PPRC and FlashCopy, IASP Manager will be installed on all nodes.

5.1 Create the IASP Device Description

Prior to configuring a new copy services environment, the following should be checked:

1) Cluster and device domain must be created for all nodes participating in this environment.
2) All nodes in the cluster are started. This includes nodes not participating in this environment to ensure that the new cluster resource group information is correctly stored on each node.
3) Create the Independent Auxiliary Storage Pool (IASP) on the Preferred Source node.
4) The FlashCopy and PPRC target nodes have the IASP device description(s) created on them for the IASP group. If they do not exist, they cannot be varied on during the first switchover. Use the CRTDEVASP command to create each IASP (primary and secondary's). **Note: The Resource name should be the same as the IASP name.**

5.2 Create a QLPAR User Profile.

This profile needs *ALLOBJ, *JOBCTL, *SERVICE and *IOSYSCFG special authorities. However, it should be set to have no password to prevent use of the profile. Use the **CRTUSRPRF** command with:

- ✓ **USRPRF(QLPAR)**
- ✓ **PASSWORD(*NONE)**
- ✓ **SPCAUT(*ALLOBJ *JOBCTL *IOSYSCFG *SERVICE)**
- ✓ **TEXT(PowerHA tools user profile)**

Explanation of use of QLPAR

QLPAR is used by IASP Manager for all access to the DSCLI scripts and results, as well as clustering functions. The DSCLI is provided by the IBM storage team and is used across all platforms.

*ALLOBJ - required to access DSCLI scripts and results. Without this, DSCLI created result files cannot be accessed.
*JOBCTL. - Required to vary off an IASP as part of a switch over
*IOSYSCFG - Required for working with the hardware as part of a switchover or FlashCopy
*SERVICE – Required for resetting the hardware as part of a switchover or FlashCopy

Note: QLPAR must be enabled to allow a user without *SECADM to adopt it.
Note: Change from previous release: The IASP Manager Main Menu option 1 cannot be used for IASP Manager.

5.3 Copy Services Cluster Resource Group (CRG)

Note: Regardless of the node where the CRG is created, it is propagated to all nodes in the cluster.

The cluster resource group is used by the IASP Manager to communicate between all the nodes that are participating in the environment. Creating the cluster resource group requires that the nodes involved must be active at the time of running the command, and all node names used are valid in the cluster.

After creating the Cluster Resource Group, a CRG of type *Data will exist in the cluster. This CRG cannot be started. It is used to submit exit programs as required.

5.4 Create the Cluster Resource Group (CRTCSEDTA)

1. Key **CRTCSEDTA** and press **Enter**.

```
                              Create CSE CRG

Supply all required values, press Enter.

CRG Name . . . . . . . . . . . .   __________        Name

Use  . . . . . . . . . . . . . .   _______           *IASP, *SYSTEM
```

2. On the first *Create CSE CRG* screen, key the following information and press **Enter**.
   a. *CRG Name* = **<name of CRG used to manage the environment>** If this CRG will be used for PPRC, then the CRG name must match the IASP name.
   b. *Use* = ***IASP or *SYSTEM** * System is for full system replication

```
                              Create CSE CRG

Supply all required values, press Enter.

CRG Name . . . . . . . . . . . . :   <CRGname>

Use  . . . . . . . . . . . . . . :   *IASP

Copy type  . . . . . . . . . . .   ______          *FLASH, *PPRC, *BOTH
```

3. On the second *Create CSE CRG* screen, key the following information and press **Enter**.
Copy type = **Enter the correct value for what this CRG will be used for. Either PPRC, FlashCopy or both.**

```
                                Create CSE CRG
Supply all required values, press Enter.

CRG Name . . . . . . . . . . . . :   <CRGname>
Use  . . . . . . . . . . . . . . :   *IASP
Copy type  . . . . . . . . . . . :   *BOTH

Preferred production node  . . .     _________     Name
Preferred MMIR PPRC backup node      _________     Name
Preferred GMIR PPRC backup node      _________     Name
Preferred LUN PPRC backup node       _________     Name
Preferred MMIR2 PPRC backup node     _________     Name
Multi-target replication . . . .     *NONE         *NONE, *MG, *MM
First FlashCopy:
Target node  . . . . . . . . . .     _________     Name
Environment  . . . . . . . . . .     ___________   Name
SVC PPRC information:
  Device Cluster Resource Group      *NONE_____    Name

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

On the third *Create CSE CRG* screen, the information will change based on the Copy Type chosen above. Enter the correct node information into the appropriate lines on the screen. Note… it is never possible to use all the lines… every configuration will result in some lines left blank. The possible entries are as follows

- *Preferred production node* = **<name of Production node system> This entry must always be filled in**

In the Replication section

- *Preferred MMIR PPRC backup node* = **<name of MMIR backup node system> This entry must be filled in if any of Metro Mirror will be used**
- *Preferred GMIR PPRC backup node* = **<name of GMIR backup node system> This entry must be filled in if any of Global Mirror will be used**
- *Preferred LUN PPRC backup node* = **<name of LUN switching node> This entry must be filled in if any of LUN switching will be used**
- *Preferred MMIR2 PPRC backup node* = (leave blank if not Multi-target *MM; else **<name of MMIR2 backup node system>**)
- *Multi-target replication* = ***NONE**, ***MG** (Metro Mirror and Global Mirror targets) or ***MM** (two Metro Mirror targets)

Dependencies.

- If Multi Target replication is *NONE, then only 1 of Preferred MMIR PPRC backup node or Preferred GMIR PPRC backup node can be entered. Preferred MMIR2 PPRC backup node must be left blank.
- If *MG is selected, then both Preferred MMIR PPRC backup node and Preferred GMIR PPRC backup node must be selected
- If *MM is selected, then both Preferred MMIR PPRC backup node and Preferred MMIR2 PPRC backup node must be selected

In the FlashCopy section

- *First FlashCopy Target node* = **<name of FlashCopy node system>**
- *Environment* = **<name of First FlashCopy CSE environment>**
- *SVC PPRC information:*
  - *Device Cluster Resource Group* = ***NONE** This option is for use with SVC/V7K environments where a V7K FlashCopy source is controlled by a PowerHA Device CRG. If creating a CRG for a V7K/SVC environment, and the environment will also use a PowerHA CRG to manage replication, enter the PowerHA CRG name to allow STRFLASH to correctly determine the primary node.

The CSE CRG has now been created. However some additional data or extra FlashCopy Nodes in the CRG may still be entered. To edit the CRG, key green screen command **CHGCSEDTA <CRGname>** and press **Enter**. The first of two *Change IASP CRG Data* screens appears.

5.5 Change the Cluster Resource Group (CHGCSEDTA)

Multiple screens have been collapsed into a single screen here so all option can be seen. What shows will vary based on the Copy Type in the CRG

```
                          Change CSE CRG Data

Supply all required values, press Enter.

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

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

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

```
LUN PPRC information:
  Preferred backup node  . . . .   ________      Name

MMIR2 PPRC information:
  Preferred backup node  . . . .   ________      Name

Automatic PPRC Replicate . . . .   *YES          *YES, *NO
Multi-target . . . . . . . . . .   *NONE         *NONE, *MG, *MM

FlashCopy information:
  FlashCopy node . . . . . . . .   FLASH        Name
  Environment name . . . . . . .   FLASHENV      Name
  Status . . . . . . . . . . . .   *NONE         *NONE, *FLASHED, number
  Warm flash . . . . . . . . . .   *YES          *YES, *NO
  Incremental flash  . . . . . .   *NO           *YES, *NO
  Use Power HA sessions  . . . .   *YES          *YES, *NO

Second FlashCopy information:
  FlashCopy node . . . . . . . .   ________      Name

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    *NONE         Name, *NONE

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

Any information in this screen can be modified to change the Copy Services Type used, the nodes in the CRG etc. Additional FlashCopy nodes can be added or removed from this screen

Verify/modify the following information in the CRG; then press **Enter**.

- *Copy type* = ***PPRC *FLASH or *BOTH**
- *Independent ASP Name* = **<IASPname>** (If different from CRG name)
- *Preferred production node* = **<name of Production node>**
- *For PPRC nodes, use the information in the creation section above*

- *For FlashCopy nodes, add or remove as required and check the addition FlashCopy information section below.*

Additional FlashCopy information:
- *FlashCopy node* = **<name of FlashCopy node>**
- *FlashCopy status* **= *NONE**
- *Warm flash* = ***YES** or ***NO** << *YES leaves the Production IASP varied on
- *Incremental flash* = ***YES** or ***NO** << *YES requests that only changed data since the last flash should be written
- *Use PoweHA Session* = ***YES or *NO**. Allows turning of the use of PowerHA sessions for special environments like Global Mirror Target copies.

Additional information:
- *Automatic PPRC Replicate* **= *YES** or ***NO** << *NO causes IASP Manager not to automatically start replication after a switch. This option is useful if you want to keep the original copy static while making changes to (i.e., upgrading) the other copy (not displayed if Preferred backup node is blank).
  - *Request type* **= 0** << *The CSE CRG must have a Request type of 0 before editing is allowed. Since the CRG is newly created this field should already be 0.*
- *Auto start cluster* **= *YES** or ***NO** << *YES allows IASP Manager to try to start any required nodes when attempting a SWPPRC. *NO may be appropriate if other clustering products are installed.
- *Wait time* = **60** << This value determines how long to wait for the IOA to reset and the disks to report in before starting the vary on of the IASP.
- *Suspend timeout* = 2 << This value does not apply to PPRC.
- *Message Queue* = ***SYSOPR** << default
- *Library* **= <blank>**

5.6 View the CSE CRG (DSPCSEDTA Command)

To view a CSE CRG, use the **DSPCSEDTA <CRGname>** green screen command.

```
                            Display CSE CRG Data

Press Enter to continue.

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

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

Automatic PPRC Replicate . . . :   *YES
Multi-target replication . . . :   *NONE

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

Figure 5-1

1. To display the second *Display CSE CRG Data* screen, press **Page Down**.

```
                          Display CSE CRG Data

Press Enter to continue.

FlashCopy information:
  FlashCopy node . . . . . :   FLASH
  Environment name . . . . . :   FLASHENV
  Status . . . . . :   *NONE
  Warm flash . . . . . :   *YES
  Incremental flash  . . . . . :   *NO
  Use Power HA sessions  . . . .   *YES           *YES, *NO

SVC PPRC information:
  Device Cluster Resource Group    *NONE          Name, *NONE

Request type . . . . . :   0
Auto start cluster . . . . . :   *YES
Wait time  . . . . . :   60
Suspend timeout  . . . . . :   2
Message Queue  . . . . . :   *SYSOPR
  Library  . . . . . :

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

Figure 5-2

5.7 FlashCopy Exit Program on FlashCopy Nodes

5.7.1 V6R1

It is extremely important not to vary on an IASP on a FlashCopy node if the disk does not contain the correct data. This only applies to FlashCopy NoCopy where remnants of previous changes will remain on the disk. However, IASP Manager will apply the exit program logic regardless of flash type.

Varying on an IASP when a Flash is not active can require a full reload of the FlashCopy partition.

For V6R1, IASP Manager will check for a registered entry of either QZRDIAFCXT or QZRDCUSTOM in library QZRDHASM on every STRFLASH, and if it is not found, QZRDIAFCXT will be automatically registered.

QZRDCUSTOM is checked so that a custom registered exit program can be used instead of the default program shipped with IASP Manager.

The command to register this program and removal information is shown below.

*ADDEXITPGM EXITPNT(QIBM_QDC_VRYEXIT) FORMAT(PRON0100) PGMNBR(*LOW) PGM(QZRDHASM/QZRDIAFCXT) CRTEXITPNT(*YES) PGMDTA(*JOB 8 DEVDASPD)*

*To unregister the program, use the RMVEXITPGM and remove the appropriate entry or *all from QIBM_QDC_VRYEXIT format PRON0100*

5.7.2 V7R1 and above

With V7R1, the new process that removes the disk from SLIC also removes the headers on the LUNS which identify them as configured disk units. This means we no longer have to resister the exit program for FlashCopy partitions as the disk will show as non configured disk after an ENDFLASH has run.

When running the STRFLASH command, the registered exit programs for IASP vary on will be checked, and if we find QZRDIAFCXT registered***, it will be removed.***

6 Configuring a new CSE Environment

This section covers creating the necessary scripts and profiles for FlashCopy, PPRC, or LUN Switching:

Note: PPRC and LUN Switching environments can be created on any node in the cluster. Clustering assures that the information is copied to all nodes. However, FlashCopy environments must be created on the FlashCopy node.

1. Key **WRKCSE** and press **Enter**.

```
                          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
__    __________

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

Figure 6-1

2. Key the following and press **Enter**:
   a. *Opt*: **1=Add**
   b. *Name*: = **<name of environment>** for FlashCopy, PPRC, or LUN Switching.
      Note: The environment name must be the name of the CRG that controls the environment.

```
                          Add an Environment

Enter Copy Service Type

   Environment name . . . :   <envname>
   Copy Service Type  . . .   _____                    FLASH, GMIR, LUN, MMIR
```

Figure 6-2

3. Key the Copy Service Type and press **Enter**.

6.1 FlashCopy for DS8K environment example

```
                          Add an Environment

 Enter Copy Services and ASP information

   Environment name . . . :   SEKIU
   Copy Service Type  . . :   FLASH
   Flash Target node  . . .   FLASHTGT                Name
   Storage Type . . . . . .   DS8K                    DS8K, SVC

 ASP/SVC Copy Descriptions:
   Preferred Source . . . .   __________              Name, *NONE
   Preferred Target . . . .   __________              Name, *NONE
```

Figure 6-3

1. Key the following information and press Enter.
   a. ASP Copy Description for *Preferred Source* (meaningful name)
   b. ASP Copy Descriptiion for *Preferred Target* (meaningful name)

If there is a QIASPWORK file (from a previous version of the Copy Services toolkit), and it has an entry that matches the Environment name and Copy Service Type, the following screen will appear:

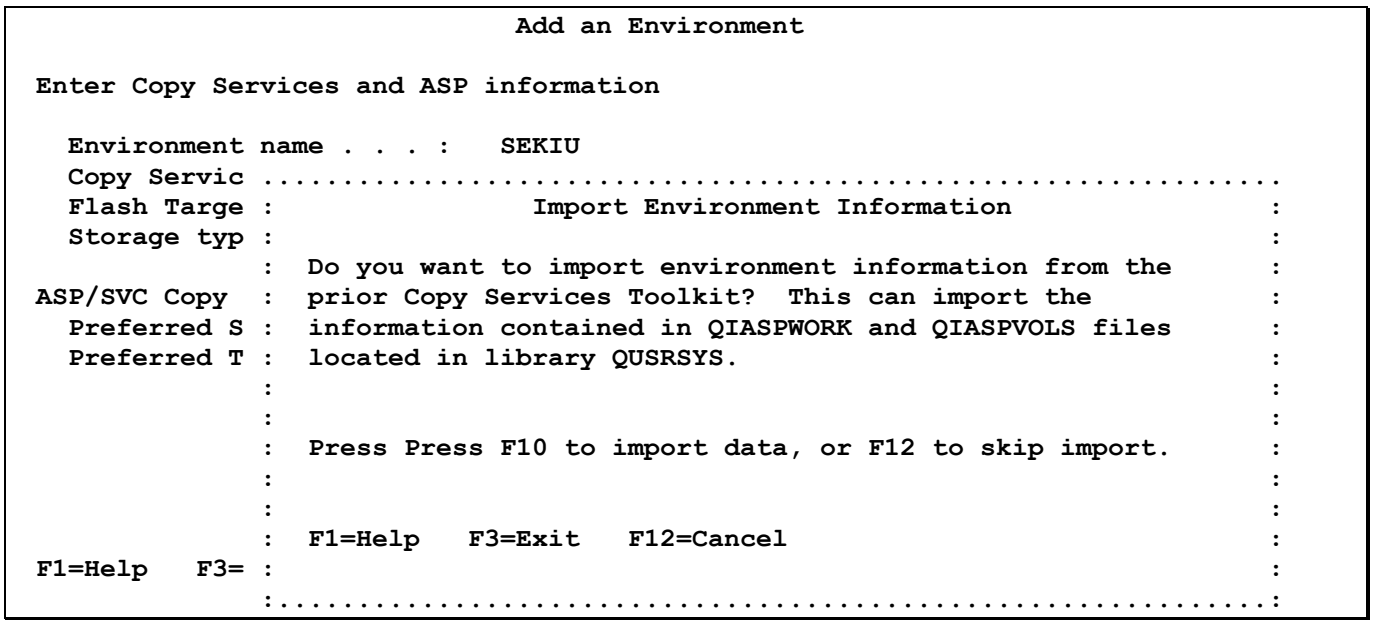


Figure 6-4

Press F10 to continue (import), or F12 to skip importing data and move to the next screen with no data.

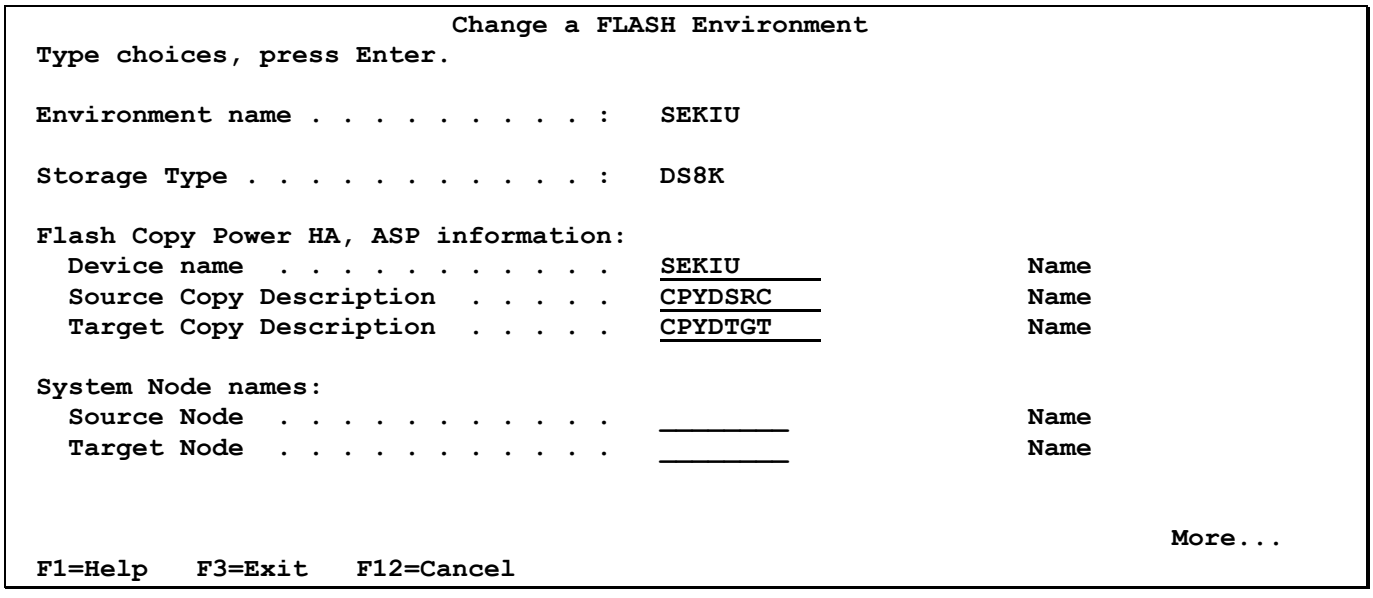


Figure 6-5

```
                        Change a FLASH Environment
Type choices, press Enter.

CRG information:
  Primary ASP  . . . . . . . . . . .   nnn                33 - 255
  Secondary ASP  . . . . . . . . . .   *NONE              33 - 255,
                                                            *NONE
  Secondary ASP  . . . . . . . . . .   *NONE              33 - 255,
                                                            *NONE
  Secondary ASP  . . . . . . . . . .   *NONE              33 - 255,
                                                            *NONE

FlashCopy DS unit information:
  Device . . . . . . . . . . . . . .   ________________    Name

                                                                    More...
```

Figure 6-6

```
                        Change a FLASH Environment
Type choices, press Enter.

Flash Copy IASP Manager options:
  Full FlashCopy . . . . . . . . . .   *NO               *YES, *NO
  Resync FlashCopy . . . . . . . . .   *NO               *YES, *NO
  Multi incremental resync . . . . .   *YES              *YES, *NO
  Space Efficient FlashCopy  . . . .   *NO               *YES, *NO
  Shared . . . . . . . . . . . . . .   *NO               *YES, *NO
  Target PPRC  . . . . . . . . . . .   *NO               *YES, *NO
  GMIR D-Copy target flash . . . . .   *NO               *YES, *NO
  Varyon Source IASP . . . . . . . .   *YES              *YES, *NO
  Quiesce Action . . . . . . . . . .   *NONE             *NONE,
                                                           *QUIESCE
                                                           *FRCWRT
  Connect hosts  . . . . . . . . . .   *CURRENT          *NO, *CURRENT
                                                           *ATTEMPT
                                                           *REQUIRED
  Wait for Completion  . . . . . . .   *YES              *YES, *NO

                                                                    More...
```

Figure 6-7

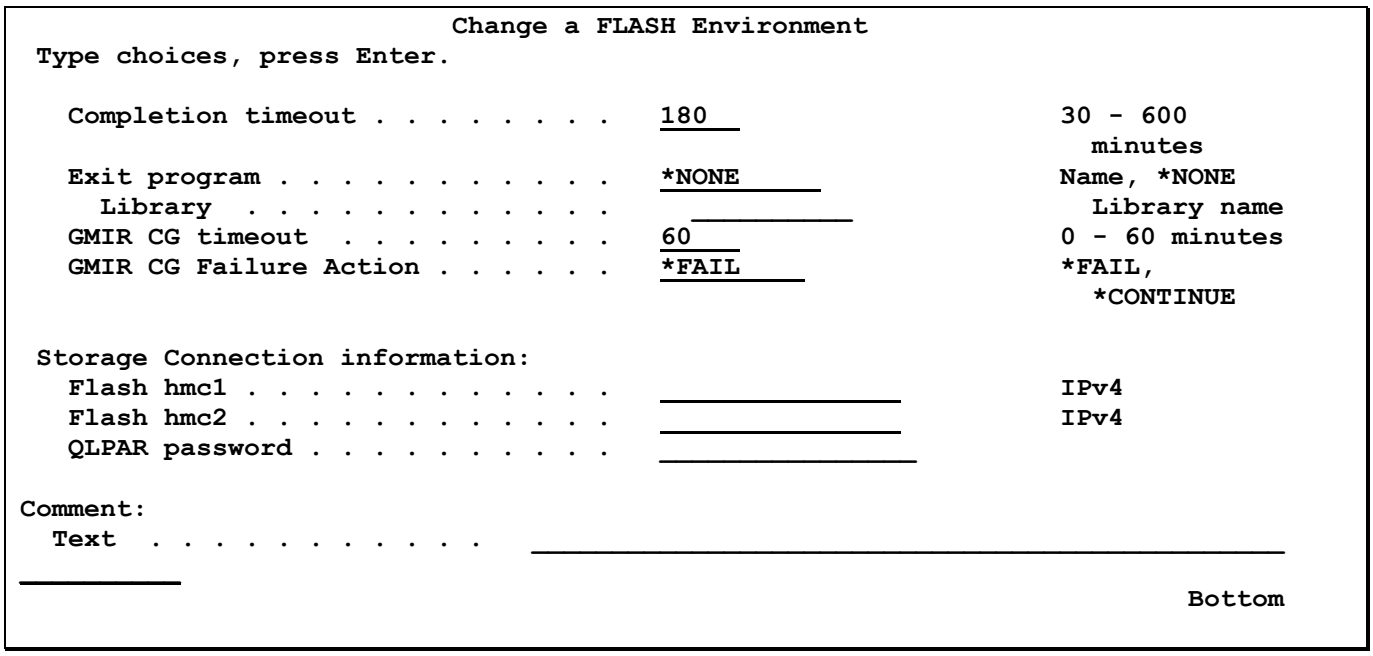


Figure 6-8

2. Key the following information and press Enter.
   System Node names:
   - *a.* *Source Node* name = **<name of Production node>**
   - *b.* *Target Node* name = **<name of FlashCopy node>**

   CRG information:
   - *c.* *Primary ASP* = **<number>** (33-255)
   - *d.* Secondary ASPs = **<number>** (33-255, if desired to override the default of *NONE)

   On the first *More...* page:
   Flash Copy DS unit information:
   - *e.* *Device* = **<storage server ID>** (e.g., IBM.2107-ABC1234)

   On the second *More...* page:
   Flash Copy IASP Manager options:
   - *f.* *Full FlashCopy* = ***YES**, if desired to override the default of *NO
     Note: *NO means FlashCopy no copy
   - *g.* *Resyncflash Copy* = ***YES**, if desired to override the default of *NO
     Note: *YES requires Full FlashCopy *YES
   - *h.* *Space Efficient FlashCopy* = ***YES,** if the FlashCopy volumes are TSE volumes
     Note: *YES requires Full FlashCopy *NO
   - *i.* *Shared* = ***YES**, if desired to override the default of *NO
     Note: *YES allows this FlashCopy environment to be visible from all nodes in the cluster. Only one such FlashCopy environment may exist with this environment name. Scripts can thus exist on all nodes but changes to this environment may only be made on the Flash target node.
   - *j.* *Target PPRC* = *YES, if this FlashCopy target is also the source of a PPRC relationship

k. *GMIR D-Copy target flash* = ***YES**, if this flash will be at the Target of Global mirror (in either direction)
l. *GMIR Multi incremental* = ***YES** or ***NO.** This specifies if multiple incremental FlashCopies will be used
m. *Varyon Source IASP* = ***YES** or ***NO**
n. *Quiesce Action* = ***QUIESCE** or ***FRCWRT**
*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
o. *Connect hosts* = ***CURRENT** or ***ATTEMPT** or ***REQUIRED** or ***NO**
*CURRENT = Use the host connect logic from prior versions of ACS.
*ATTEMPT = Attempt to connect host volumes.
*REQUIRED = Connections to all host volumes are required.
*NO = Do not attempt to connect host volumes.
p. *Wait for Completion* = ***YES** or ***NO** << Completion of the FlashCopy process

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

q. *Completion timeout* = <number> << 30 - 600 minutes
r. *Exit program and Library* = ***NONE** or the name of a user-supplied program
s. *GMIR CG timeout* = <number> << 0 – 60 minutes << Time for wait for CG consistency
t. *GMIR CG Failure Action* = ***FAIL** or ***CONTINUE**

Storage Connection information:

u. *Flash hmc1 and hmc2* = **< SMC IP addresses>** (hmc1 required)
v. *QLPAR password* = **<password>** for the qlpar user on the SMC. This is required during an add, but optional on a change.

Comment:

w. *Text* = **<descriptive text>**

```
                        Add, Change or Delete Volumes

  Environment  . :   SEKIU                 Source device  :   IBM.2107-ABC1234
  Type . . . . . :   FLASH                 Target device  :   IBM.2107-ABC1234
  Volume sets  . :   0

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
           <Source>         Flash
  Opt      Volumes          Volumes
   _       _________        _________


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

Figure 6-9

3. Key the following information and press **Enter**.
   a. Opt: **1=Add**
   b. <Source> Volumes: **<volume range>** (e.g., 1300-1302 … depends upon configuration)
   c. *Flash Volumes*: **<volume range>** (e.g., 1900-1902 … depends upon configuration)

```
                        Add, Change or Delete Volumes

  Environment  . :   SEKIU                 Source device  :   IBM.2107-ABC1234
  Type . . . . . :   FLASH                 Target device  :   IBM.2107-ABC1234
  Volume sets  . :   3

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
           <Source>         Flash
  Opt      Volumes          Volumes

   _       _________        _________
   _       1300-1302        1900-1902


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

Figure 6-10

4. Add additional volume ranges, as required. Press **Enter** to create the environment as specified. Use the **viewprof** and **viewscript** commands to see the scripts and profiles created for FlashCopy.

Note: If the FlashCopy is done on GMIR PT (D-Copy), you need to:

- *Create one CSE environment with type GMIR using the same environment name as for the Production node … and then you must create a second CSE environment of the same name with type FLASH.*
- *The GMIR environment must use the same ASPCPYD as the source of the FLASH.*
- *The GMIR environment must have the D-COPY flag set to *YES in the direction where this FLASH will be used as a D-COPY.*

6.2 MMIR DS8K environment example

```
                              Add an Environment

Enter Copy Services and ASP information

Environment name . . . :   PYSHT
Copy Service Type  . . :   MMIR
Storage Type . . . . . :   DS8K

ASP/SVC Copy Descriptions:
  Preferred Source . . . .   __________              Name, *NONE
  Preferred Target . . . .   __________              Name, *NONE
```

Figure 6-11

1. Key the following information and press Enter.
   a. ASP Copy Description for *Preferred Source* (meaningful name)
   b. ASP Copy Descriptiion for *Preferred Target* (meaningful name)

```
                          Change a MMIR Environment.
Type choices, press Enter.

Environment name  . . . . . :   PYSHT

Storage type  . . . . . :   DS8K

Metro Mirroring Power HA, ASP information:
  Device name . . . . . .   PYSHT_____          Name
  Source Copy Description .   CPYDSRC____        Name
  Target Copy Description .   CPYDTGT____        Name

CSM information:
  CSM Replication . . . . .   *NO_____            *YES, *NO

System Node names:
  Source node . . . . . .   ________              Name
  Target node . . . . . .   ________              Name

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

Figure 6-12

```
                          Change a MMIR Environment.

Type choices, press Enter.

CRG information:
  Primary ASP  . . . . . . . . . . . .  nnn                33 - 256
  Secondary ASP  . . . . . . . . . . .  *NONE              33 - 256, *NONE
  Secondary ASP  . . . . . . . . . . .  *NONE              33 - 256, *NONE
  Secondary ASP  . . . . . . . . . . .  *NONE              33 - 256, *NONE

Metro Mirroring DS unit information:
  Source device  . . . . . . . . . . .  ________________    Name
  Target device  . . . . . . . . . . .  ________________    Name, *SAME

                                                                      More...
```

Figure 6-13

```
                          Change a MMIR Environment.
Type choices, press Enter.

DS unit SMC information:
  Source hmc1 . . . . . . . . . . . . .  ________________    IPv4
  Source hmc2 . . . . . . . . . . . . .  ________________    IPv4
  Source QLPAR password . . . . . . . .  ________________
  Source port . . . . . . . . . . . . .  1751              1750, 1751
  Target hmc1 . . . . . . . . . . . . .  ________________    IPv4, *SAME
  Target hmc2 . . . . . . . . . . . . .  ________________    IPv4, *SAME
  Target QLPAR password . . . . . . . .  ________________
  Target port . . . . . . . . . . . . .  1751              1750, 1751

Comment:
  Text  . . . . . . . . . . . . . . . .  ____________________________________________
_________

                                                                      Bottom
```

Figure 6-14

2. Key the following information and press **Enter**:

CSM information:

a. CSM replication = ***YES** (if CSM servers are being used)

System Node names:

b. Source node = **<name of Preferred Production node>**

c. Target node = **<name of Preferred MMIR node>**

On the first *More…* page:

CRG information:

d. Primary ASP = **<number>** (33-255)

e. Secondary ASPs = **<number>** (33-255, if desired to override the default of *NONE.)

Metro Mirroring DS unit information:

f. Source device = **<storage server ID>** (e.g., IBM.2107-ABC1234)

g. Target device = <**storage server ID**> (e.g., IBM.2107-XYZ9876)

And on the second *More…* page:

Comment:

DS unit SMC information:

h. Source hmc1 and *hmc2* = **< SMC IP addresses>** (hmc1 required)

i. Target hmc1 and *hmc2* = **< SMC IP addresses>** (hmc1 required)

j. QLPAR passwords = **<password>** for the qlpar user on the SMCs for both source and target

k. Port numbers = **1750** or **1751** for both source and target The port number is included in case DS8800 or DS8700 are being used in the configuration. Setting the port to 1750 for these DS's will make the DSCLI connections to these DS's much faster.

l. Text = **<descriptive text>**

```
                        Add, Change or Delete Volumes

  Environment  . :   PYSHT                 Source device  :   IBM.2107-ABC1234
  Type . . . . . :   MMIR                  Target device  :   IBM.2107-XYZ9876
  Volume sets  . :   0

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
           <Source>        <Target>
  Opt      Volumes         Volumes
   _       _________       _________

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

Figure 6-15

3. Key the following information and press Enter:

a. Opt: **1=Add**

b. Source Volumes: **<volume range>** (e.g., 1200-1202 … depends upon configuration)

c. *Target Volumes*: **<volume range>** (e.g., 1300-1302 … depends upon configuration)

Note: If using CSM servers, the volume ranges have already been specified there, and these entries must match. IASP Manager verifies only that the number of volumes is the same.

```
                        Add, Change or Delete Volumes

  Environment  . :   PYSHT                 Source device  :   IBM.2107-ABC1234
  Type . . . . . :   MMIR                  Target device  :   IBM.2107-XYZ9876
  Volume sets  . :   3

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
           <Source>        <Target>
  Opt      Volumes         Volumes

   _       _________       _________
   _       1200-1202       1300-1302
                                                                        Bottom
F1=Help   F3=Exit   F12=Cancel
```

Figure 6-16

3. Add additional volume ranges, as required. Press **Enter** to create the environment as specified. Use the **viewprof** and **viewscript** commands to see the scripts and profiles created for Metro Mirror.

Note: When CSM Replication is specified as *YES, additional information is prompted:

```
CSM information:
   CSM Replication  . . . . . .   *YES                 *YES, *NO
   Primary server . . . . . . .   ________________      IPv4
   Secondary server . . . . . .   ________________      IPv4
   Session name . . . . . . . .   ____________________  Name
   User . . . . . . . . . . . .   ____________________  Profile name
   Password . . . . . . . . . .   ____________________
```

Figure 6-17

Note: Session name, User and Password are case sensitive and must match what was specified during CSM setup.

6.3 GMIR DS8K environment example

```
                          Add an Environment

Enter Copy Services and ASP information

Environment name . . . :   SEQUIM
Copy Service Type  . . :   GMIR
Storage Type . . . . . :   DS8K

ASP/SVC Copy Descriptions:
  Preferred Source . . . .   __________          Name, *NONE
  Preferred Target . . . .   __________          Name, *NONE
```

Figure 6-18

1. Key the following information and press Enter.
   a. ASP Copy Description for *Preferred Source* (meaningful name)
   b. ASP Copy Description for *Preferred Target* (meaningful name)

```
                        Change a GMIR Environment
 Type choices, press Enter.

 Environment . . . . . :   SEQUIM

 Storage type  . . . . . :   DS8K

 Global Mirroring Power HA, ASP information:
   Device name . . . . . .   SEQUIM          Name, *SYSTEM
   Source Copy Description .   CPYDSRC        Name, *NONE
   Target Copy Description .   CPYDTGT        Name, *NONE

 CSM information:
   CSM Replication . . . . .   *NO            *YES, *NO

 System Node names:
   Source node . . . . . .   ________          Name
   Target node . . . . . .   ________          Name

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

Figure 6-19

```
                        Change a GMIR Environment

Type choices, press Enter.

CRG information:
  Primary ASP . . . . . .   nnn               33 - 255
  Secondary ASP . . . . . .   *NONE           33 - 255, *NONE
  Secondary ASP . . . . . .   *NONE           33 - 255, *NONE
  Secondary ASP . . . . . .   *NONE           33 - 255, *NONE

Global Mirroring IASP Manager options:
  Symmetrical Mirroring . . .   *YES          *YES, *NO
  D-Copy Flash normal . . . .   *NO           *YES, *NO
  D-Copy Flash reversed . . .   *NO           *YES, *NO
  Multi incremental resync  .   *YES          *YES, &NO
  Override Master LSS . . . .   *NO           *YES, *NO

                                                              More...
```

Figure 6-20

```
                          Change a GMIR Environment
Type choices, press Enter.

Global Mirroring DS unit information:
   Source device  . . . . . .  ________________    Name
   Target device  . . . . . .  ________________    Name, *SAME
   Session number . . . . . .  __                  Hexadecimal
                                                     number
   Reverse session number . . . . .  __            Required if
                                                     Symmetrical
   CG interval  . . . . . . . . . .  0___          Seconds (0 -
                                                     65535)

Space Efficient FlashCopy options:
  On Normal CG Flashes  . . . . . .  *NO           *YES, *NO
  On Reversed CG Flashes  . . . . .  *NO           *YES, *NO

                                                                  More...
```

Figure 6-21

```
                          Change a GMIR Environment

Type choices, press Enter.

DS unit SMC information:
  Source hmc1 . . . . . . . . . .  ________________  IPv4
  Source hmc2 . . . . . . . . . .  ________________  IPv4
  Source QLPAR password . . . . .  ________________
  Source port . . . . . . . . . .  1751             1750, 1751
  Target hmc1 . . . . . . . . . .  ________________  IPv4, *SAME
  Target hmc2 . . . . . . . . . .  ________________  IPv4, *SAME
  Target QLPAR password . . . . .  ________________
  Target port . . . . . . . . . .  1751             1750, 1751

Comment:
  Text  . . . . . . . . . . . . .  ____________________________________________
________

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

Figure 6-22

2. Key the following information and press **Enter**:

CSM information:

a. CSM Replication = *YES, if CSM servers are being used. This is required for multi-target solutions.

System Node names:

b. Source node = **<name of Preferred Production node>**

c. Target node = **<name of Preferred GMIR node>**

On the first *More...* page:
CRG information:

d. Primary ASP = <**number**> (33-255)

e. Secondary ASP = <**number**> (33-255, if desired to override the default of *NONE)

Global Mirroring IASP Manager options:

f. Symmetrical Mirroring = ***YES**, if Global Mirror will run in both directions

g. D-Copy Flash normal = ***YES**, if a FlashCopy will be taken at the target site while GMIR is running in the normal direction

h. D-Copy Flash reversed = ***YES**, if a FlashCopy will be taken at the target site while GMIR is running in the reversed direction

i. IASP Manager

j. Override Master LSS = ***YES**, if desired to override the default of *NO. *YES is required if using the Total Storage Productivity Center product for MGM support When Enter is pressed, additional prompts request the overriding LSS numbers.

```
Master LSS overrides:
   Source Master LSS  . . .   __                    00 to FF
   Target Master LSS  . . .   __                    00 to FF

                                                                  More...
 F1=Help   F3=Exit   F12=Cancel

 Valid Master LSS values are required.
```

Figure 6-23

And on the second *More...* page:
Global Mirroring DS unit information:

k. Source device = <**storage server ID**> (e.g., IBM.2107-ABC1234)

l. Target device = <**storage server ID**> (e.g., IBM.2107-XYZ9876)

m. Session number = **nn**

n. Reverse session number = **nn**

Note: If using Copy Services Manager (CSM) servers, these session numbers are not used; CSM chooses the session numbers, and IASP Manager retrieves them for display.

o. CG interval = <**number of seconds between consistency groups**>

Space Efficient FlashCopy options:

p. On Normal CG Flashes = ***YES**, if TSE type volumes are configured on the Preferred GMIR node

q. On Reversed CG Flashes = ***YES**, if TSE type volumes are configured on the Preferred Production node

And on the third *More…* page:
DS unit SMC information:

r. Source hmc1 and *hmc2* = < **SMC IP addresses**> (hmc1 required)

s. Target hmc1 and *hmc2* = < **SMC IP addresses**> (hmc1 required)

t. *QLPAR passwords* = **<password>** for the qlpar user on the SMCs for both source and target

u. *Port numbers* = **1750** or **1751** for both source and target

Comment:

v. *Text* = **<descriptive text>**

```
                        Add, Change or Delete Volumes

  Environment  . :   SEQUIM                Source device  :   IBM.2107-ABC1234
  Type . . . . . :   GMIR                  Target device  :   IBM.2107-XYZ9876
  Volume sets  . :   0

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
           <Source>         <Target>          <Target>           <Source>
  Opt      PPRC Vols        PPRC Vols       CG Flash Vols      CG Flash Vols
   _       _________        _________         _________          _________

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

Figure 6-24

3. Key the following information and press Enter:

a. *Opt*: **1=Add**

b. *<Source> PPRC Vols*: **<volume range>** (e.g., 1000-1002)

c. *<Target> PPRC Vols*: **<volume range>** (e.g., 1100-1102)

d. *<Target> CG Flash Vols*: **<volume range>** (e.g., 1700-1702)

e. *<Source> CG Flash Vols*: **<volume range>** (e.g., 1800-1802)

Note: Appears only if the *Symmetrical* = ***YES** option is selected.

f. *<Target> D Flash Vols*: **<volume range>** (e.g., 2000-2002)

Note: Appears only if the *D Flash Copy* = ***YES** option is selected.

Note: If using CSM servers, the volume ranges have already been specified there, and these entries must match. IASP Manager verifies only that the number of volumes is the same.

```
                        Add, Change or Delete Volumes

  Environment  . :   SEQUIM                Source device  :   IBM.2107-ABC1234
  Type . . . . . :   GMIR                  Target device  :   IBM.2107-XYZ9876
  Volume sets  . :   3

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
           <Source>         <Target>          <Target>           <Source>
  Opt      PPRC Vols        PPRC Vols       CG Flash Vols      CG Flash Vols
   __      _________        _________         _________          _________
   _       1000-1002        1100-1102         1700-1702          1800-1802


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

Figure 6-25

3. Add additional volume ranges, as required. Press **Enter** to create the environment as specified. Use the **viewprof** and **viewscript** commands to see the scripts and profiles created for Global Mirror.

```
                          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

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

Figure 6-26

6.4 LUN Switching DS8K environment example

```
                          Change a LUN Environment
Type choices, press Enter.

  Environment  . . . . . :   LUNCRG

LUN Level DS unit information:
  Device . . . . . .  ________________          Name

System Node names:
  Production node  . . . .  ________            Name
  HA node  . . . . . .  ________                Name

CRG information:
  Primary ASP  . . . . . .  nnn                 33 - 255
  Secondary ASP  . . . . .  *NONE               33 - 255, *NONE
  Secondary ASP  . . . . .  *NONE               33 - 255, *NONE
  Secondary ASP  . . . . .  *NONE               33 - 255, *NONE

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

Figure 6-27

```
                          Change a LUN Environment
Type choices, press Enter.

DS unit SMC information:
  DS hmc1  . . . . . .  ________________          IPv4
  DS hmc2  . . . . . .  ________________          IPv4

Comment:
  Text . . . . . .  ____________________________________________________

                                                                    Bottom
```

Figure 6-28

1. Key the following information and press **Enter**:

LUN Level DS unit information:

a. *Device* = <**storage server ID**> (e.g., IBM.2107-ABC1234)

System Node names :

b. *Production node* = <**name of Preferred Production node**>

c. *HA node* = <**name of Preferred LUN node**>

d. *DS unit SMC information* = < **SMC IP addresses**> (hmc1 required)

CRG information:

e. *Primary ASP* = <**number**> (33-255)

f. *Secondary ASP* = <**number**> (33-255, if desired to override the default of *NONE)

Comment:

g. *Text* = <**descriptive text**>

A second screen is displayed:

```
                    Add, Change or Delete Host Connections

  Environment  . :   LUNCRG                Device . . . . :   IBM.2107-ABC1234
  Type . . . . . :   LUN

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

          Volume     Production Node          HA Node
  Opt     Group      Host Connection     Host Connection
   _       ____           ____                ____

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

Figure 6-29

The LUNs to be switched are in a single volume group on an IBM System Storage, accessed from two IBM i systems.

2. Key the following information and press **Enter**:

a. *Opt* = **1 (Add)**
b. *Volume Group* = **<Vnn>** (Depends upon the IBM System Storage configuration)
c. *Production Node Host Connection* = **<Connection ID on the Production node>**
d. *HA Node Host Connection* = **< Connection ID on the LUN node>**

Note: Multipath is supported for either or both systems. Repeat Step 2 to add the Connection IDs for the second IOA.

6.5 Multi-target Metro Mirror environment

You must create three MMIR environments: MMIR, MMIR2, and MMIR3. MMIR is for the Production node to HA node (H1->H2) PPRC pair and is created first. MMIR2 is for the Production node to DR node (H1->H3) PPRC pair and is created second. Simply add a second MMIR environment of the same name. IASP Manager will recognize it as a duplícate and send the following message:

Record exists. Press Enter to change to type MMIR2, or press F12 to cancel.

Repeat for the third MMIR PPRC pair (H2->H3). For MMIR3, only the CopyDs must be specified since the volumes for H2 and H3 have already been defined.

6.6 Multi-target Metro Mirror-Global Mirror (MM/GM) environment

You must create three environments: MMIR, GMIR, and GMIR2. All three environments must have the same name.

- MMIR is for the Production node to HA node (H1->H2) PPRC pair
- GMIR is for the Production node to DR node (H1->H3) PPRC pair
- GMIR2 is for the HA node to DR node (H2->H3) PPRC pair.

Either MMIR or GMIR may be defined first. After GMIR has been created, add a second GMIR environment of the same name. IASP Manager will recognize it as a duplicate and send the following message:

Record exists. Press Enter to change to type GMIR2, or press F12 to cancel.

When defining the GMIR and GMIR2 environments, "Override Master LSS" must be set to *YES. The source and target master LSS IDs should be filled in based on the CSM session.

After creating GMIR2, this environment must be edited to verify and potentially modify some settings. Only a subset of values are pre-populated on the initial creation.

Additional considerations for multi-target MM/GM:

- CSM supports async replication from H3 back to the storage that was production prior to the switch/failover to H3 only. i.e., if H2 was the current production node, then CSM will allow for H3->H2->H1 only. This replication will be cascading Global Copy.

- IASP Manager (ACS) supports additional CG volumes at H1 and H2 to provide for a consistent DR solution when running on H3. This requirement is due to Government regulations in some countries that require customers to run for 12 hours per year on their D/R site (Singapore especially)
- Supported configuration will be
  - No CG volumes at H1 or H2 (non-symmetric GMIR). In this case, the customer should switch back to H1 or H2 as soon as possible as they are running unprotected.
  - CG volunes at H1. This assumes the customer will always run on H1, and if forced to perform a D/R switch, they will be able to Global Mirror back to H1 and run on H3 for as long as they wish -- but remembering they do not have sync copy with zero RPO at H2.
  - CG volumes at both H1 and H2. The customer can switch to H3 regardless of where their production is and be able to start Global Mirror when the DS becomes available
- All Global Mirror work to run on H3 is performed via DSCLI.
- A scheduled switch back to H1 or H2 removes the Global Mirror and uses CSM to perform the switch
  - CSM turns the connection synchronous and waits for all data to be in sync before switching
- An unscheduled Global Mirror switchover from H3 to either H1 or H2 is performed via the IASP Manager (ACS) DSCLI failover routine. Additional manual cleanup of the environment is required through the CSM GUI afterwards.
- The Global Mirror session number and master LSS in a normal direction are chosen by CSM. Every CHKPPRC reads these numbers and updates our records. Use the CSM GUI interface to determine the normal direction session number.
- The Global Mirror session number and master LSS in the reversed direction are entered into WRKCSE. Make sure to use a high level session number… and **the reversed session number for both GMIR environments must be the same if CG vols are provided on both H1 and H2**

- MM/GM provides a large functional improvement over the former MGM cascaded support.
  - No restrictions on using incremental FlashCopy in the environment.
    - MGM did not allow any FlashCopies to be incremental without causing full resync on switchover
  - No requirement for all environments to use the same LSSs
  - No full resync when switching to DR.
    - MGM required a full resync for any switch to D/R
  - No action required in a multi-target environment when H2 fails
    - MGM required customer to take manual action to remove H2 and start H1->H3 to maintain replication to the third site
  - Any node can be detached for D/R testing (provided it is currently running)
    - MGM had no detach capability
  - A switch from H1 -> H2 can be performed when H1 -> H3 is suspended/failed
    - This would cause a full resync with MGM
  - A switchover from H1 -> H3 is possible if H1 -> H2 is suspended/failed

- This was not possible with MGM

- For MM/GM, a cascaded environment back to H1 then to H2 will be setup by CSM, then a Global Mirror from H3 -> H1 will be started by IASP Manager (ACS)
  - Not possible with MGM… everything is a full resync (and multiple of those)

6.7 Additional CSE Setup tasks

6.7.1 Test the pwfile and profiles

Now that the pwfile and profiles have been created, it is a good idea to test that they are set up correctly. From each of the partitions for which you created a pwfile, perform the following steps for both the pprc_PS and pprc_PT profiles for each of the IASPs for which you have created Copy Services environments.

1) Type **WRKCSE** and press **Enter**.
2) Select option 14 for the environment that has just been set up and press **Enter**.
3) Select option 9 for pprc_PS.profile and press **Enter**.
4) Press **Enter** on the Run Copy Services (DSCLI) screen. (This will have been automatically filled in.)

The DSCLI command entry screen should appear. If a password is requested, the pwfile is not set up correctly.

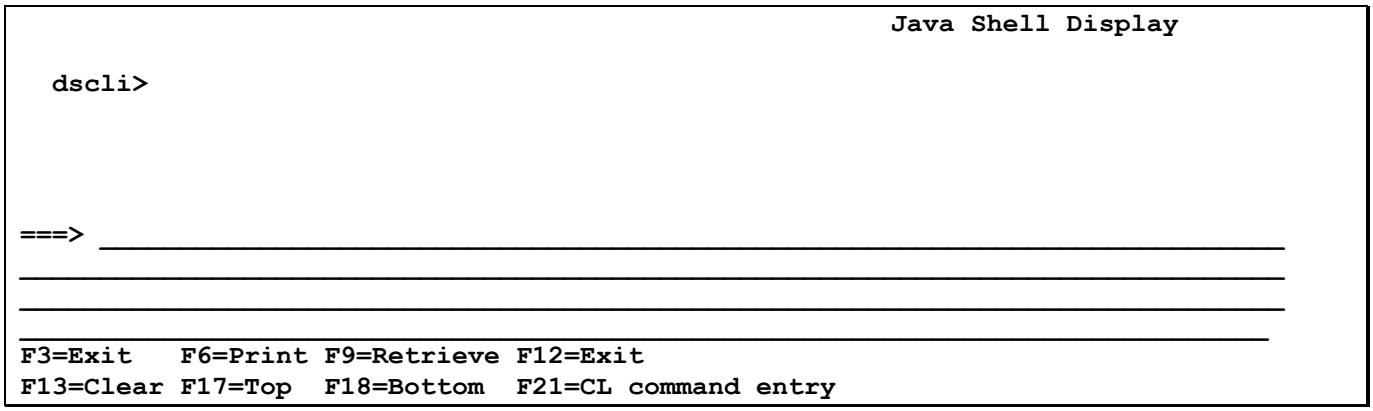


Figure 6-30

Perform the same test using the pprc_PT.profile

6.7.2 Creating hostconnection scripts for custom programs

WRKCSE has a feature to create hostconnection scripts for customers who wish to switch a node between environments. These scripts are typically required where a single node may be used as both a replication target and a FlashCopy target. Scripts can be created for a FlashCopy, MMIR and GMIR environments only. A LUN Hostconnection environment already has hostconnection scripts as part of

the normal configuration. These scripts can be used with custom coding to automate the use of the node between these two tasks.

```
                          Copy Services Environments

Type options, press Enter.
   1=Add   2=Change       3=Copy   4=Delete   5=Display         12=Work with
   14=List Stream files   16=Define host connections   18=Make PPRC Paths

 Opt   Name          Type    Text
 __    ___________
 16    PYSHT         MMIR
 __    SEKIU         FLASH
 __    SEQUIM        GMIR


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

Figure 6-31

```
                        Define Host Connections

  Environment  . :   PYSHT                Device . . . . :   IBM.2107-ABC1234
  Type . . . . . :   MMIR

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

          Volume          Host
  Opt     Group       Connection ID
   1       V13            001A
```

Figure 6-32

The following scripts are created in the environment directory:

- chhostconn_Add.script
- chhostconn_Drop.script
- lshostconn.script

6.7.3 Testing HostConnect scripts with CHKCSECNNL

Since the host connect scripts use a hardcoded DS8000 Host ID, there is a danger that service or configuration actions on the DS may change this ID. If the environment is not modified to match the

change, it is possible that a custom program using these scripts may accidentally operate on a Host Connect for another partitions

To prevent this, the command CHKCSECNNL should be inserted in any customer program using these functions to ensure that the configuration is correct. If any escape message is returned, then the program should not continue.

6.7.4 Creating PPRC Paths

WRKCSE also has a feature to create PPRC paths between the IBM i systems and the IBM System Storage.

```
                          Copy Services Environments

Type options, press Enter.
  1=Add   2=Change       3=Copy   4=Delete   5=Display         12=Work with
  14=List Stream files   16=Define host connections   18=Make PPRC Paths

Opt   Name          Type    Text

__    __________
18    PYSHT         MMIR
__    SEKIU         FLASH
__    SEQUIM        GMIR


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

Figure 6-33

IASP Manager checks the configuration to produce a list of all available PPRC paths.

```
                          Available PPRC Paths

  Environment  . :   PYSHT                Source device  :   IBM.2107-ABC1234
  Type . . . . . :   MMIR                 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  :  I0040
 _        I0040  :  I0003
```

Figure 6-34

Multiple paths can improve performance so you should select all available, up to four. The paths are then created and replace the existing configuration. Use DSCLI to run the chkpprcpath command to see the results.

6.7.5 Work with Copy Services Environments (WRKCSE) Security

The functions of the Work with Copy Services Environments (WRKCSE) menu require the adoption of the QLPAR user profile which has *ALLOBJ special authority. The WRKCSE command is shipped with *PUBLIC authority *CHANGE so it may be desirable to limit access to one or more of the WRKCSE functions.

Note: Command line access from within WRKCSE will be as the original user profile only. No command line access is available when switched to QLPAR.

For most WRKCSE options, the WRKCSE command processing program calls a program named QZRDSECURE in the QZRDHASM library -- a user-written security policy program. If QZRDSECURE is not available, no operations authority checking is done by WRKCSE, and QLPAR is used for all DSCLI function. QZRDSECURE is called when any option is selected for FLASH, MMIR and GMIR environments.

This program must issue an IAS0391 exception message when it detects a user who is not authorized to a specific operation. This message is located in the message file QZRDHASM/QZRDIAMSGF. Any exception message issued by this program will deny access to the operation.

The WRKCSE command processing program passes the following parameters to QZRDSECURE:

1. Environment (IASP CRG) name, char(10).
2. Environment type, char(5);
   - FLASH
   - LUN
   - MMIR
   - GMIR
3. Option, char(2);
   - 1 = Add (‘51’ is passed)
   - 2 = Change (‘52’ is passed)
   - 4 = Delete (‘54’ is passed)
   - 14 = List Stream files.
   - 16 = Define host connections
   - 18 = Make PPRC Paths

If option 12 = Work with is selected on the main menu, QZRDSECURE is not called; the appropriate submenu for the environment is displayed, and its options will call QZRDSECURE with the name and type of environment plus the following options:

Note: The option passed will be a two-digit character value based on the option number from the screen (i.e., '01' is passed for opt 1)
FLASH environment options:

- 1 = Start Flash
- 2 = Stop Flash
- 12 = Work with Volumes
- 14 = List Stream files

MMIR environment options:

- 2 = Pause
- 3 = Resume
- 4 = Failover
- 6 = Start Replication after failover
- 12 = Work with Volumes
- 13 = Display Out of Sync sectors
- 14 = List Stream files

GMIR environment options:

- 2 = Pause
- 3 = Resume
- 4 = Failover
- 5 = Symmetrical switchover
- 12 = Work with Volumes
- 13 = Display Out of Sync sectors
- 14 = List Stream files

Any or all of these parameters may be used to define the client's security policy in regards to the WRKCSE command.

The QCLSRC file in library QZRDHASM contains a skeleton QZRDSECURE program that may be used to get you started. This source code is supplied for example and testing purposes only. If modifications are to be made, this source member should be copied to a library other than QZRDHASM and the modifications made there. Otherwise revised source code may be overlaid by a restore of the QZRDHASM library.

6.8 Setting up FlashCopy for V7000

IASP Manager 4.3 supports FlashCopy automation with V7000 through the same commands. However for V7000, IASP Manager does not auto create the SVC CopyDs or manage the volume numbers as it does for DS8000.

New in IASP Manager 4.1 is the ability to tie the V7000 FlashCopy environment to a PowerHA PPRC environment for additional functionality. To use this function, there are a couple of extra steps to configure over the previous support in 3.1

- Configure the SVC PPRC device CRG information in the CSECRG (described in Chapter 5). This function is supported with V7R1 TR6 and above
- Add the PowerHA replication CRG name in the WRKCSE environment
  This function is supported with V7R2 TR4 and above only

The process for setting up FlashCopy for V7000 is:

- Create the CPYDs with the ADDSVCCPYD command. Note: There is an excellent redbook called PowerHA Cookbook released in Dec 2015 to walk through this setup.
- Create the CSECRG with the CRTCSEDTA command (same as DS8K example in Chapter 5)
- Create the CSE environment (Note: This will fail if the SVC Copy Descriptions cannot be found.)

```
                              Add an Environment

 Enter Copy Services and ASP information

   Environment name . . . :   MY7K
   Copy Service Type  . . :   FLASH
   Flash Target node  . . .   FLASHTGT                 Name
   Storage Type . . . . . .   SVC                      DS8K, SVC

 ASP/SVC Copy Descriptions:
   Preferred Source . . . .   MY7KSRC                  Name
   Preferred Target . . . .   MY7KTGT                  Name
```

Figure 6-35

```
                          Change a FLASH Environment
Type choices, press Enter.

Environment name . . . . . . . . . . :   MY7K

Storage Type . . . . . . . . . . . . :   SVC

Flash Copy SVC information:
  Flash SVC IP address . . . . . . .   nnn.nnn.nnn.nnn
  Source Copy Description  . . . . .   MY7KSRC                  Name
  Target Copy Description  . . . . .   MY7KTGT                  Name
  Session Copy Rate  . . . . . . . .   0                        0 - 100
  Session Cleaning Rate  . . . . . .   50                       0 - 100
  Session Grain Size . . . . . . . .   256                      256, 64

System Node names:
  Source Node  . . . . . . . . . . .   SOURCE                   Name
  Target Node  . . . . . . . . . . .   TARGET                   Name

                                                                More...
```

Figure 6-36

```
                        Change a FLASH Environment
Type choices, press Enter.

CRG information:
  Primary ASP  . . . . . .  .  201                    33 - 255
  Secondary ASP  . . . . . .  .  *NONE                33 - 255,
                                                        *NONE
  Secondary ASP  . . . . . .  .  *NONE                33 - 255,
                                                        *NONE
  Secondary ASP  . . . . . .  .  *NONE                33 - 255,
                                                        *NONE

Flash Copy IASP Manager options:
  Full FlashCopy . . . . . .  .  *NO                  *YES, *NO
  Resync FlashCopy . . . . . .  .  *NO                *YES, *NO

PPRC session  . . . . . .  .  XXXXXXX               *NONE, name

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

Figure 6-37

```
                        Change a FLASH Environment
Type choices, press Enter.

Comment:
  Text  . . . . . .  .  ____________________________________________________

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

Figure 6-38

If a PPRC device CRG is specified in the CSEDTA, then the nodes in that CRG must be added into the FlashCopy CRG…. Otherwise the exit program will not run on those nodes. Use WRKCLU option 9, find the data CRG for the FlashCopy, then use option 6 to add any nodes from the PPRC device CRG that are not already present as replicates.

7 Starting Replication with IASP Manager

7.1 Start Metro Mirror

On the Preferred Source system (Production node):

1. **ADDLIBLE QZRDHASM**
2. **WRKCSE**
3. Select option **14=List Stream files** for your Metro Mirror environment.
4. Select option **9=Run** for **mkpprc_from_PS.script** to start replication from PS to PT.
5. Press **F12** until you return to the *Copy Services Environments* menu.
6. Select option **12=Work with** for the environment.
7. The environment should say *Failed* as it is not currently in synchronous mode.
8. Select option **13=Display Out of Sync sectors**. Every time this screen is refreshed (by pressing the **Enter** key), the number of out-of-sync sectors should decrease.

```
                          Display Out of Sync Sectors

Press Enter to refresh.

  Environment name . . . :   PYSHT
  Out of Sync Sectors  . :   162967

Pending results:
1200:1300 Copy Pending - Metro Mirror 54840
1201:1301 Copy Pending - Metro Mirror 55140
1202:1302 Copy Pending - Metro Mirror 52987
```

Figure 7-1

9. When the *Out of Sync Sectors* reaches 0, and no volumes show in the *Pending results* list, then the PPRC is ready for switching.

1.1 Start Global Mirror

On the Preferred Source system (Production node):

1. **ADDLIBLE QZRDHASM**
2. **WRKCSE**
3. Select option **14=List Stream files** for your Global Mirror environment.
4. Select option **9=Run** for **mkpprc_GM_from_PS.script** to start replication from PS to PT.
5. Press **F12** until you return to the *Copy Services Environments* menu.
6. Select option **12=Work with** the environment.
7. The environment should say *Failed* as it is not currently in synchronous mode.
8. Select option **13=Display Out of Sync sectors**. Every time this screen is refreshed (by pressing the **Enter** key), the number of out-of-sync sectors should decrease.

```
                          Display Out of Sync Sectors

Press Enter to refresh.

  Environment name . . . :   SEQUIM
  Out of Sync Sectors  . :   137470

Pending results:
1000:1100 Copy Pending – Global Copy 45371
1001:1101 Copy Pending - Global Copy 45987
1002:1102 Copy Pending - Global Copy 46112
```

Figure 7-2

9. If the source system is running, it is possible that the Global Copy will never get to zero. Once it is down to a few thousand, proceed to the next step.
10. Press **F12**; then select option **14=List Stream files** again for the environment.
11. Select option **9=Run** for **mkflash_GM_CG_PT.script** to activate the CG FlashCopy volumes on PT.
12. Select option **9=Run** for **lsflash_GM_CG_PT.script**. You should see something like:

```
                                                          Java Shell Display

1100:1701 11 470F9E3E 60 Disabled Enabled Enabled Disabled Enabled . . .
1101:1702 11 470F9E3E 60 Disabled Enabled Enabled Disabled Enabled . . .
1102:1703 11 470F9E3E 60 Disabled Enabled Enabled Disabled Enabled . . .
Java program completed
```

Figure 7-3

13. Start DSCLI on PS and run command:
    a. **mksession -dev <storage server ID on PS> -lss xx n**, where
       xx = **<first two digits>** of the PPRC volume IDs on PS – e.g., 10 for 1000-1002
       n = **<Session number>** you selected when you set up the Global Mirror environment

    Note: You must run mksession once for each different lss. For example, if the PPRC volume IDs were 1000-1004 and 1510-1504, you must run mksession for both lss 10 and lss 15.
14. Start DSCLI on PT and run command:
    a. **mksession -dev <storage server ID on PT> -lss xx n**, where
       xx = **<first two digits>** of the PPRC volume IDs on PT – e.g., 11 for 1100-1102
       n = **<Reverse session number>** you selected when you set up the Global Mirror environment
15. Select option **9=Run** for **chsession_GM_add_PS.script** to add the PPRC volumes to the PS session.
16. Select option **9=Run** for **lssession_GM_PS.script**. You should see *Normal* on all volumes.

```
                                                          Java Shell Display

10 01 Normal 1000 Active Primary Copy Pending Secondary Simplex True . . .
10 01 Normal 1001 Active Primary Copy Pending Secondary Simplex True . . .
10 01 Normal 1002 Active Primary Copy Pending Secondary Simplex True . . .
Java program completed
```

Figure 7-4

17. Select option **9=Run** for **mkgmir_PS.script** to start Consistency Groups (CGs) flowing.
18. Select option **9=Run** for **lssession_GM_PS.script**. You should see *CG in Progress* on all volumes.

```
                                                          Java Shell Display

10 01 CG In Progress 1000 Active Primary Copy Pending Secondary . . .
10 01 CG In Progress 1001 Active Primary Copy Pending Secondary . . .
10 01 CG In Progress 1002 Active Primary Copy Pending Secondary . . .
Java program completed
```

Figure 7-5

19. Select option **9=Run** for **showgmir_PS.script**. You should see:
- ✓ *Copy State* = **Running**
- ✓ *Fatal Reason* = **Not Fatal**
- ✓ *CG Time* = approximately equal to *Current Time*

```
                                                    Java Shell Display

ID                            IBM.2107-ABC1234/10
Master Count                  1
Master Session ID             0x01
Copy State                    Running
Fatal Reason                  Not Fatal
CG Interval (seconds)         0
Coord. Time (milliseconds)    50
Max CG Drain Time (seconds)   30
Current Time                  09/07/2010 11:45:52 CDT
CG Time                       09/07/2010 11:45:51 CDT
Successful CG Percentage      100
FlashCopy Sequence Number     0x470FA4BF
Master ID                     IBM.2107-ABC1234
Subordinate Count             0
Master/Subordinate Assoc      -
Java program completed
```

Figure 7-6

1.2 Upgrading DSCLI on IBM i Partitions

Whenever the DSCLI is upgraded on the SMC, it must also be upgraded on all IBM i partitions. In order to load the new code, delete the library QDSCLI from the IBM i partition. The shipped DSCLI may be located on a CD, memory stick, directory on the SMC, etc.

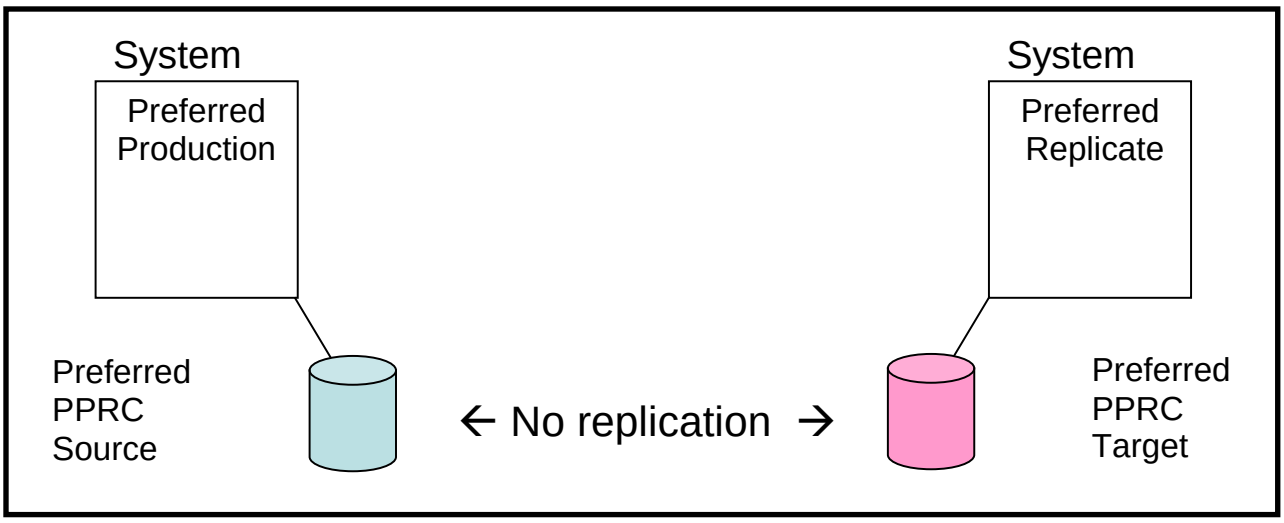
Open the Windows setup program, and select the OS/400 button on the first screen

You see a sign on screen for an IBM i partition. Enter the **Partition name**, **User name**, and **Password**. The install wizard for DSCLI is launched. Accept the license agreement and take the defaults for all other screens EXCEPT the prompt that indicates the password file on the media is older than the current. When this screen appears, choose **NO**. This keeps the existing password file that is used to run the DSCLI commands. If the password file is lost, it can be copied from a partition that has not yet been upgraded. If the pwfile is lost on all partitions, the user ID and password file must be recreated using the procedure documented in section 4.8.2 (**Setting up the DSCLI Password Files).**

Note: IASP Manager uses its own QDSCLI library. The next use of IASP Manager will automatically restore the IASP Manager version again. The IASP Manager version allows for longer path names and error file use.

1.3 Choosing the Correct PPRC Source

When both sets of PPRC disks are available for use, either set may become the PPRC source. The disk configuration appears as shown by the following diagram:



In this state, it is sometimes not possible for IASP Manager to determine which direction the PPRC was switched from. In this case, running a SWPPRC *COMPLETE or using option 6 from the menu will send messages telling you in which direction the PPRC will be started. These messages are very important and should be reviewed carefully. If the wrong PPRC source is chosen, data may be synchronized using obsolete data and changes made to data on the correct source will be lost.