# Quick-install of the PowerHA Full System Replication Manager
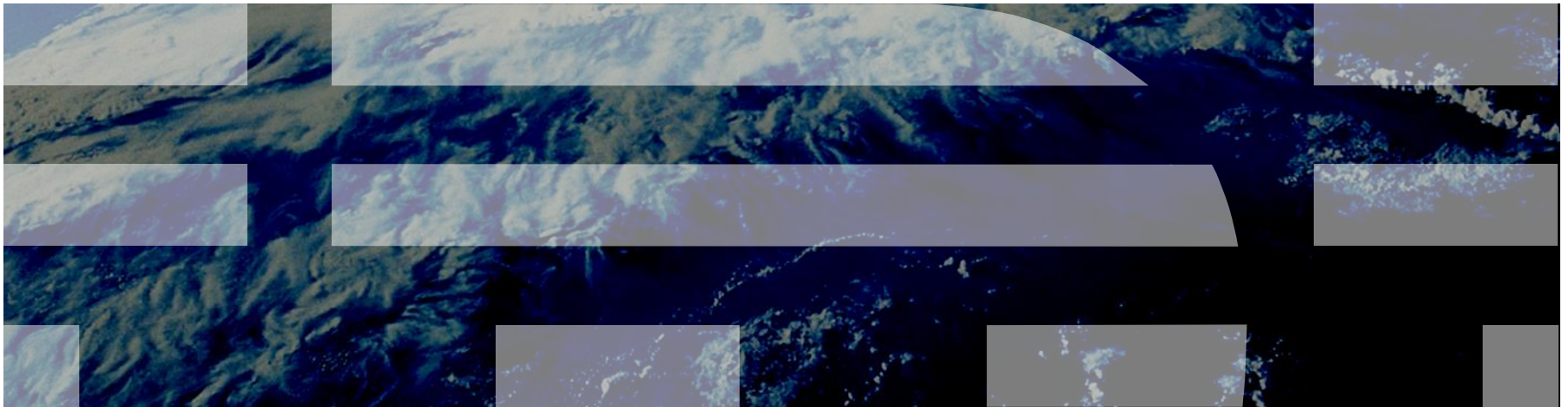
Version 4.5

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Monday, November 1, 2021
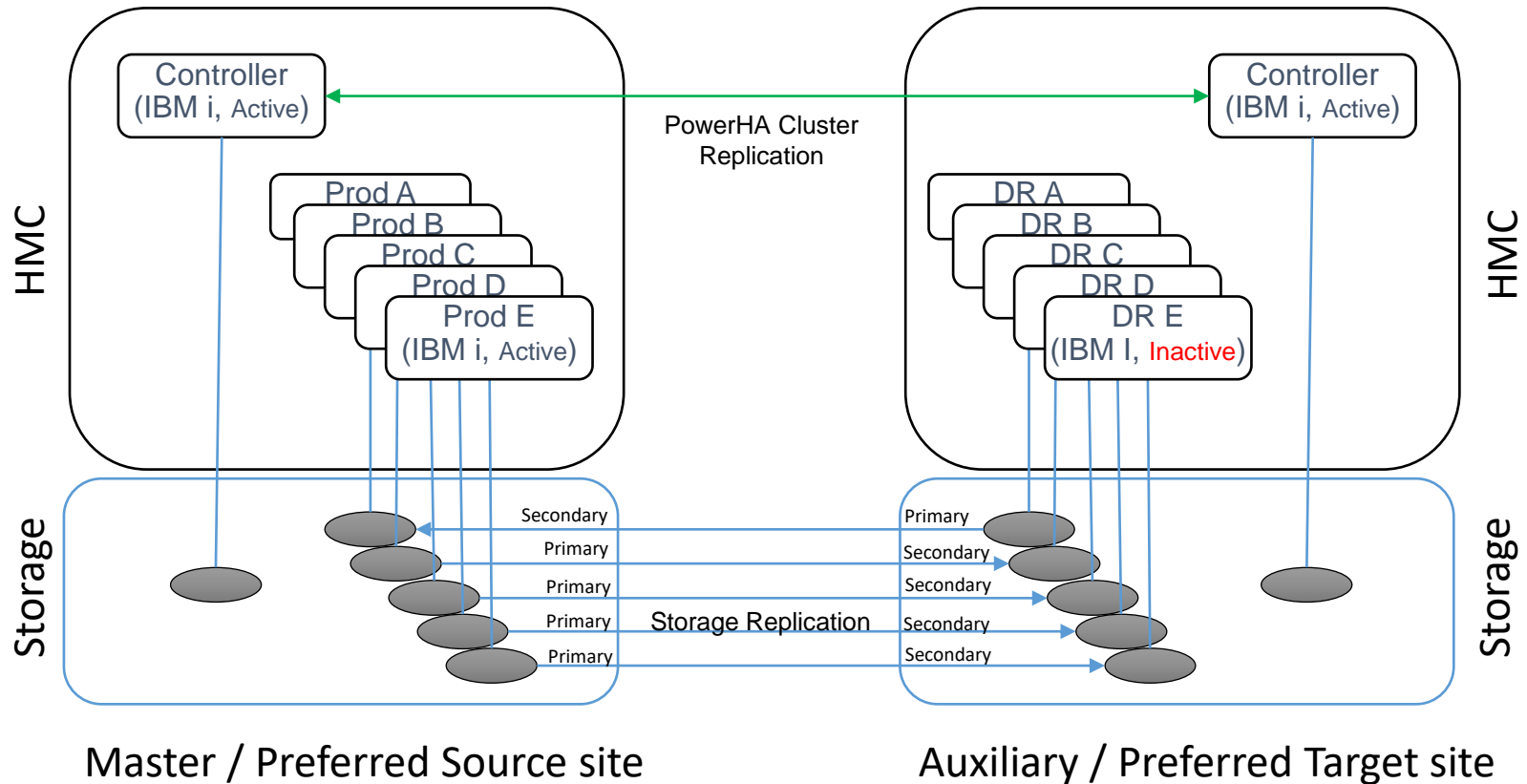
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**ibm.com/systems/services/labservices**

# What the heck is this document for?

- This is a quick-install guide for configuring the Full System Replication Manager for the following storage products:
    - SVC family (V3700, V5000, V7000, V9000)
    - DS8K family

- Customers can have it, but it is designed to be performed by a Systems Lab Services consultant

- It does not explain details or how to handle errors or special/complex situations

- Primary documentation is the FSR Manager Wiki

- Has more detail and explanations
    - https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/IBM%20i%20Advanced%20Copy%20Services/page/Full%20System%20Replication%20Manager

# Overview of Full System Replication topography



**Master/Auxiliary or Preferred Source/Target:** Denotes the site, does not change.
**Primary/Secondary:** Denotes replication direction (from Primary to Secondary)

# Customer actions prior to our engagement

- ❑ Provide Systems Lab Services with the IBM i serial numbers so we can generate license keys

- ❑ Source and Controlling LPARs configured with IBM i OS
  - ❑ Install the <u>LPP's</u> and <u>PTF's</u> on pages 5 and 6
  - ❑ PowerHA (Enterprise Edition) installed and licensed
    - ❑ We will help you set up the clusters
  - ❑ Place FSR Manager savefile QZRDHASM45 in QGPL on the controlling and production LPARs
    - ❑ We will send this to you before we arrive

- ❑ Get IP addresses, administrative user IDs and passwords for:
  - ❑ HMC
  - ❑ LPAR's (including the secondary)
  - ❑ Storage devices (SVC / DS8K)

# Controlling LPAR LPPs and PTFs

| 7.2 | 7.3 | 7.4 |
|---|---|---|
| 5733SC1 *Base, 1 | 5733SC1 *Base, 1 | 5733SC1 *Base, 1 |
| 5770SS1 30,33,41 | 5770SS1 30,33, 41 | 5770SS1 30,33, 41 |
| 5770JV1 *Base, 14 | 5770JV1 *Base, 16 | 5770JV1 *Base, 16 |
| 5770HAS *Base, 1 | 5770HAS *Base, 1 | 5770HAS *Base, 1 |
| 5770WDS *Base, 21 | 5770WDS *Base, 21 | 5770WDS *Base, 21 |
| Group PTFs<br>SF99776, SF99716 | Group PTFs<br>SF99876, SF99725 | Group PTFs<br>SF99666, SF99665 |
| 55770HAS PTF<br>SI57302, SI62180, SI65314<br><br>5770999 PTF<br>MF62565 | 5770999 PTF<br>MF62566 | |

# Source LPAR PTFs

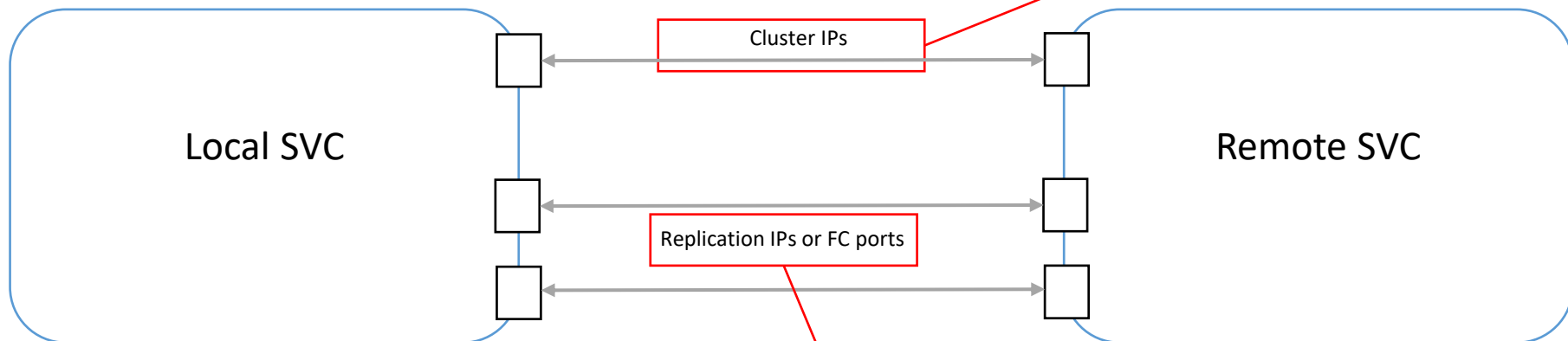| 7.2 | 7.3 | 7.4 |
|---|---|---|
| 5770999 PTF MF62565 | 5770999 PTF MF62566 | |

# Storage Setup Selector

Click here for SVC setup

Click here for DS8K setup

# SVC setup prior to our engagement

- ❑ Configure the storage unit for Primary, Secondary and Controlling LPAR.
    - ❑ Firmware level 7.5.0.3 or newer
        - ❑ If using FS910 with GMCV and the change volumes are in a data reduction pool (DRP), the SVC must be at firmware level 8.2.1.1 or higher
    - ❑ Create or select user profile
        - ❑ Must be assigned to CopyOperator (or better) user group
    - ❑ LUNs
    - ❑ Host connections
    - ❑ Licenses (Replication, Thin-provision, etc)
    - ❑ Partnerships
        - ❑ We can remotely help you set this up (also ensures you have communication between the SVC's before we arrive)
    - ❑ Start replication
        - ❑ Replication should be completed before we're onsite so that won't have to wait for it to catch up

# Creating the SVC partnerships

| Name ▲ | Location | State | Type | IP Address |
|--------|----------|-------|------|------------|
| ctchav7ka | Local | - | - | - |
| ctchav7kb | Remote | ✔ Fully Configured | IPv4 | 9.5.167.150 |
| ctchav7kc | Remote | ✔ Fully Configured | Fibre Channel | - |

✚ Create Partnership · ☰ Actions · 🔍 Filter

**Local SVC**

**Remote SVC**

Cluster IPs

Replication IPs or FC ports

**Network**

Management IP Addresses

Service IP Addresses

Ethernet Ports

iSCSI

Fibre Channel Connectivity

Fibre Channel Ports

**Ethernet Ports**

The Ethernet ports can be used for iSCSI connections, host attachment, and remote copy.

☰ Actions · 🔍 Filter

| Name | Port ▲ | State | IP | Speed | Host Attach | Remote Copy | IPv6 Remo... |
|------|--------|-------|-----|-------|-------------|-------------|--------------|
| ⊖ io_grp0 | | | | | | | |
| node1 | 1 | ⚠ Unconfigur... | | 1Gb/s | No | | |
| node2 | 1 | ⚠ Unconfigur... | | 1Gb/s | No | | |
| node1 | 2 | ✔ Configured | 150.150.150.15 | 100Mb/s | No | Copy Group 1 | |
| node2 | 2 | ✔ Configured | 150.150.150.25 | 1Gb/s | No | Copy Group 1 | |
| node1 | 3 | ⚠ Unconfigur... | | | No | | |
| node2 | 3 | ⚠ Unconfigur... | | | No | | |
| node1 | 4 | ⚠ Unconfigur... | | | No | | |
| node2 | 4 | ⚠ Unconfigur... | | | No | | |

# Creating the partnerships … details

❑ First create the IP replication or FC ports, LAN or SAN switch configuration etc.

❑ If multiple IP addresses or ports are available via multiple networks, they can be configured to:
   ❑ Combine bandwidth (active/active)
      ❑ Place the ports in the same Remote Copy group
   ❑ Use for redundancy failover (active/inactive)
      ❑ Place the ports in different Remote Copy groups

❑ When creating the partnership, *specify the Cluster IP's, not the replication IP's.*
   ❑ The SVC's will share their port information and use the replication IP's
   ❑ Specify the max bandwidth on the connection
      ❑ This will be the max aggregate throughput the SVC will use for all replication
   ❑ Specify the max % used for background copy
      ❑ Background copy includes initial sync and all GMCV replication

❑ From a command (ssh/putty) use these commands to troubleshoot:
   ❑ *lsportip* to verify which ports are active or for failover
   ❑ *Ping –srcip4 <local ip> <remote ip> to check connectivity*

# Creating the replication consistency group (RCCG)… details

❑ The initial sync can take a long time and should be performed the week before we arrive.

❑ To create a consistency group, select "Remote Copy" then "Create Consistency Group"

❑ Give it a useful name

**Create Consistency Group** ✕

Consistency Group Name: | Some Name |

**Create**    **Cancel**

❑ Indicate where you want to replicate to

Where are the auxiliary volumes located?

○ On this system

◉ On another system

| ctchav7kb | ▾ |

# Creating the replication consistency group (RCCG)

**Do you want to add relationships to this group?**

❑ Select "yes" to add relationships

- ⦿ Yes, add relationships to this group
- ◯ No, create an empty consistency group

**Select the type of copy that you want to create:**

❑ Select the copy type
Skip the next panel to use existing
relationships

◯ Metro Mirror

◯ Global Mirror

◯ Global Mirror with Change Volumes

❑ Pick the primary and
secondary volumes

| Master | | Auxiliary |
|--------|---|-----------|
| ctciha9m_ls10 ▾ | → | SteveTest15 ▾ |
| Capacity: 5.00 GiB | | **Add** |

# Creating the replication consistency group (RCCG)

❑ For GMCV, you should create the master change volumes now

**Do you want to add a master Global Mirror change volume?**

◉ **Yes**, add a master volume.

  *An auxiliary volume can be added from the auxiliary system.*

○ **No**, do not add a master volume.

**What type of master volume do you want to use?**

◉ Create a new master volume

○ Use existing volume for the master volume

**Select the master and auxiliary volumes for new remote copy relationships to add to the remote-copy consistency group.**

❑ Repeat for each volume pair. If you have many volumes (> 30 or so) we have a better method using spreadsheets and ssh (not covered here)

**Master**

**Auxiliary**

Add

ctciha9m_ls10 ➡ SteveTest15 ✖

# For GMCV, create auxiliary change volumes

❑ The auxiliary change volumes must be created on the auxiliary SVC after creating the RCCG
❑ Right click on each relationship in the RCCG
  ❑ Select "Global Mirror Change Volumes" then "Create New"
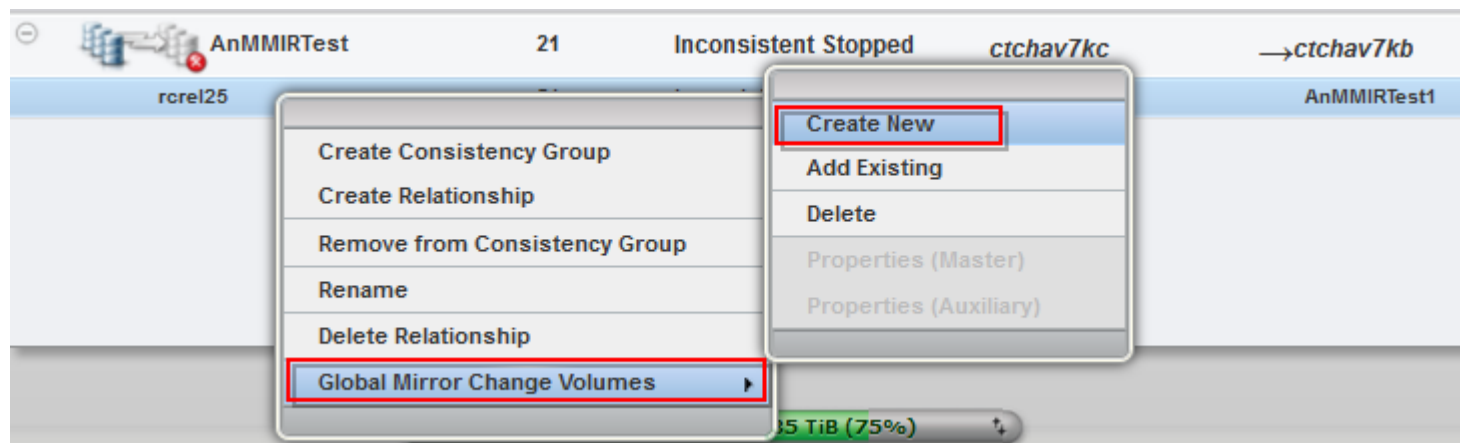


❑ To change the replication type, cycling mode or period:
  ❑ On a paused RCCG select "Edit consistency group"
❑ Cycling mode of "Multiple" indicates GMCV
❑ Cycle Period of 300 is the minimum
  ❑ The interface allows 60 seconds to be input but the cycling periods will never be less than 300 seconds

# Initial volume synchronization

- An initial volume synchronization is not needed if you have not yet loaded IBM i5/OS on the primary volumes.
- If you have already loaded i5/OS or added the volumes to an ASP, the initial synchronization must be performed
- Best Practice Recommendation:
    - Create the volumes (primary and secondary) without formatting them
    - Start replication, indicate they are already synchronized
    - Start loading i5/OS on the primary volumes.
        - If the source LPAR already has already been installed/loaded you MUST indicate they are not synchronized, so the SVC will initiate a full resynchronization.
    - As the volumes are formatted and loaded, these changes will be replicated to the secondary volumes.

Are the volumes already synchronized?

- Yes, the volumes are already synchronized.
- No, the volumes are not synchronized.

- Select "Yes, start copying now"
    - If these are GMCV volumes, you can't start copying until you create change volumes for auxiliary volumes, in case select "No".
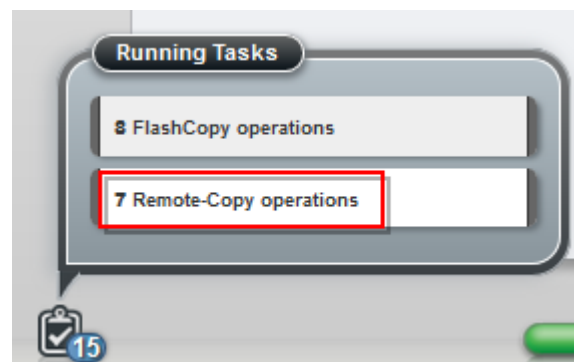
Do you want to start copying now?

- Yes, start copying now.
- No, do not start copying.

# Start and monitor replication

- ❑ To start the replication, right-click on the RCCG and select "start"
- ❑ The RCCG will go to "Inconsistent Synchronized"
  - ❑ "Inconsistent" means the secondary is useless
  - ❑ To monitor the replication, click on the clipboard in the lower left corner and select "Remote-Copy operations
- ❑ Once the progress reaches 100% the RCCG will go to "Consistent Copying" or "Consistent Synchronized"
- ❑ If using GMCV, the freeze time will update.
- ❑ Each freeze time will get progressively closer to your cycle period, depending on the speed of your link.

[Click here to continue to HMC setup](#)

| | | |
|---|---|---|
| TestMMIR | 9 | Inconsistent Copying |
| rcrel25 | 32 | Inconsistent Copying |
| rcrel26 | 33 | Inconsistent Copying |
| rcrel27 | 34 | Inconsistent Copying |
| rcrel48 | 35 | Inconsistent Copying |
| rcrel49 | 36 | Inconsistent Copying |
| rcrel50 | 37 | Inconsistent Copying |
| rcrel123 | 38 | Inconsistent Copying |

**Running Tasks**

8 FlashCopy operations

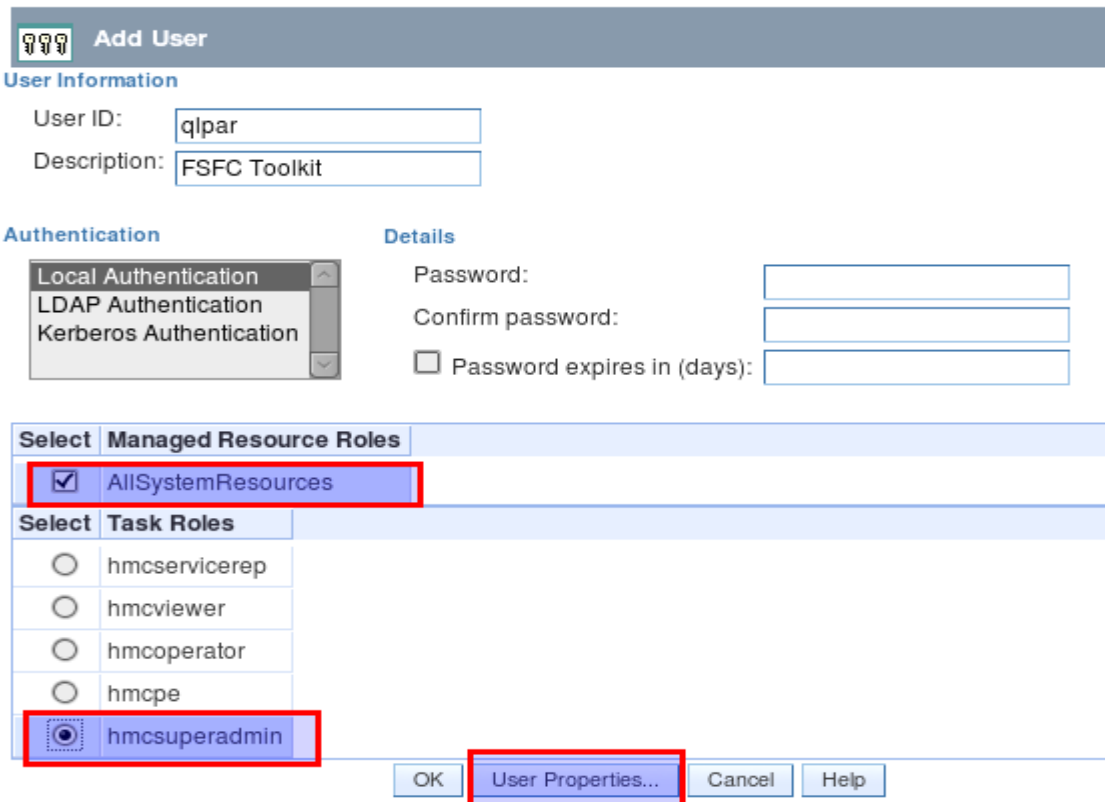7 Remote-Copy operations

15

| Name | Progress |
|---|---|
| System ctchav7kc, volume AnMMIRTest3 → System ctcha... | 2% |
| System ctchav7kc, volume AnMMIRTest4 → System ctcha... | 2% |
| System ctchav7kc, volume AnMMIRTest5 → System ctcha... | 2% |
| System ctchav7kc, volume AnMMIRTest6 → System ctcha... | 2% |
| System ctchav7kc, volume AnMMIRTest7 → System ctcha... | 2% |
| System ctchav7kc, volume AnMMIRTest1 → System ctcha... | 2% |
| System ctchav7kc, volume AnMMIRTest2 → System ctcha... | 2% |

# DS8K setup prior to our engagement

- ❑ Configure the storage unit for Primary, Secondary and Controlling LPAR.
  - ❑ Recent firmware level
    - ❑ Install DSCLI on the IBM i from the DS8K CD
    - ❑ Bundle 87.10.91.0 or newer (required for creating GMIR D-Copy)
  - ❑ Create fixed block volumes (requires ranks, arrays, extent pools, space efficient repositories, etc)
  - ❑ Volume groups, ports and host connections
  - ❑ Licenses (Replication, Space Efficient, etc)
  - ❑ PPRC Paths
    - ❑ We can remotely help you set this up (also ensures you have communication between the DS's before we arrive)
  - ❑ Start replication
    - ❑ Replication should be completed before we're onsite so that won't have to wait for it to catch up

# HMC Configuration

❑ Create a user on the LPAR HMCs

❑ Any user name will do (as long as you remember it)

❑ Password is required

❑ Hmcsuperadmin with AllSystemResources

# HMC Configuration

Remote command execution must be enabled (It usually is by default)



**Console Management**

Manage console operations and maintain data for the mana

**Management**

**Users and Security**

Users and Roles

Systems and Console Security

**Systems and Console Security**

Define and manage console certificates and configure remo

**Security Authentication**

⤴ Manage Certificates

⤴ Manage LDAP

⤴ Manage KDC

**Remote Control**

⤴ Enable Remote Command Execution

⤴ Enable Remote Operation

⤴ Enable Remote Virtual Terminal

**Remote Command Execution**

Enable the following option to provide remote command execution through ssh.

☑ Enable remote command execution using the ssh facility

OK    Cancel

# HMC Configuration

## Ssh must be enabled through the firewall

# HMC Configuration

Secure Shell (port 22:tcp) must be allowed.
- Allow all hosts: 0.0.0.0/0.0.0.0
- Allow specified hosts: at least specify the IP of your controlling LPAR

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# Creating the cluster on the **controllers**

❑ If there is only one controller, you must create a single-node cluster. Perform the following steps on the single node only.

❑ On both controllers:
  ❑ STRTCPSVR *INETD
  ❑ CHGTCPSVR *INETD AUTOSTART(*YES)
  ❑ CHGNETA ALWADDCLU(*ANY)

❑ On the Master controller
  ❑ CRTCLU CLUSTER(FSR) START(*YES), PF4, fill in Master Controller node name and IP address
  ❑ ADDCLUNODE CLUSTER(FSR) NODE(Auxiliary Controller node name and IP)

❑ On Auxiliary controller:
  ❑ WRKCLU, validate cluster is started
  ❑ Option 7, create a device domain
    ❑ Enter one node name first, press enter
    ❑ Option 6, add the other node name

# Restoring, creating QLPAR, access codes, setup on both **Controllers**

- ❑ Place the toolkit savefile in QGPL (FTP, scp etc)

- ❑ Restore the toolkit library:
  - ❑ RSTLIB SAVLIB(QZRDHASM) DEV(*SAVF) SAVF(QZRDHASM45)
    - ❑ The '45' refers to the release and may change
  - ❑ ADDLIBLE QZRDHASM

- ❑ The access code is based on serial number will be provided by the Systems Lab Services consulting team
  - ❑ ADDPRDACS SRLNBR(*CURRENT) ACSCDE('??')

- ❑ Run the setup program
  - ❑ SETUPFSR NODEROLE(*CTL)

- ❑ Modify startup program on each node to start the cluster
  - ❑ After IP and QSYSWRK start, before applications,
  - ❑ STRCLUNOD CLUSTER(*) NODE(*ALL)
    - ❑ **This requires *IOSYSCFG so QSTRUPJD should specify a profile like QLPAR**
    - ❑ **CHGJOBD JOBD(QSTRUPJD) USER(QLPAR)**
  - ❑ MONMSG CPF0000
  - ❑ STRSBS QZRDHASM/QZRDFSR
  - ❑ MONMSG CPF0000

# Download the Java Secure Channel code (on the **Controllers**)

❑ Download Java Secure Channel to /QIBM/qzrdhasm/ssh from

   ❑ http://sourceforge.net/projects/jsch/files/jsch.jar/0.1.55/jsch-0.1.55.jar/download

   ❑ Use the latest version, ensure the file /QIBM/Qzrdhasm/ssh/jsch.jar links to what you downloaded. To create a new jsch.jar that points to the jar file, use this command:

      ❑ ADDLNK NEWLNK('/QIBM/Qzrdhasm/ssh/jsch.jar') OBJ('/QIBM/Qzrdhasm/ssh/jsch-0.1.55.jar')

❑ The Java Secure Channel is an open-source implementation of ssh which allows the FSFC toolkit to issue ssh calls programmatically and to review the results.

❑ Because it is open-source, IBM Legal requires that you download it yourself (i.e. we can't bundle it with our toolkit)

❑ Download to desktop, FTP to both IBM i controllers, place it into directory /QIBM/qzrdhasm/ssh/

```
ftp> bin
200 Representation type is binary IMAGE.
ftp> put jsch-0.1.55.jar /QIBM/qzrdhasm/ssh/jsch-0.1.55.jar
local: jsch-0.1.55.jar remote: /QIBM/qzrdhasm/ssh/jsch-0.1.55.jar
227 Entering Passive Mode (9,5,168,177,167,46).
150-NAMEFMT set to 1.
150 Sending file to /QIBM/qzrdhasm/ssh/jsch-0.1.55.jar
226 File transfer completed successfully.
249282 bytes sent in 0.742 secs (336.12 Kbytes/sec)
ftp>
```

# Create the credentials on either **controller**

❑ FSR uses userid/password to log into the HMCs, DS8Ks and SVCs. Use WRKCSECRDL or ADDCSECRDE to manage these credentials.

❑ The 'Role' should be *USER if the host is not a CSM server

❑ Enter the IP address, user ID, password and a description of the host for:

   ❑ SVCs

   ❑ DS8Ks

   ❑ HMCs

❑ This information is encrypted and placed into the device data domain and is kept consistent on both of the controllers.

❑ WRKCSECRDL uses PowerHA to keep the controllers in sync

```
                    Work with CSE Credentials List


Type options, press Enter.
  1=Add   2=Change   4=Remove


Opt     IP Address           Role         User ID              Description


        9.5.95.139           *USER        qlpar                CTCHAHMC2
        9.5.167.58           *USER        qlpar                IBM.2107-75XA511
```

# SVC vs. DS8K configuration

SVC Environment Configuration

DS8K Credentials and Environment Configuration

# Create the SVC environments on the **controller**

❑ An FSR Environment describes the storage to the toolkit. Use WRKCSE to manage the environments.

   ❑ Option 1 creates a new environment

   ❑ Enter *NONE when prompted for ASP Copy Descriptions

❑ The environments are stored in the device data domain and is kept in sync with both controllers.

❑ On the SVC, remote copy consistency groups can be changed between MMIR, GMIR and GMCV, but environment types are static. If you plan to change a consistency group type, create multiples types of environments.

❑ NOTE: F6 to validate only works after we have created the CSE data (that's next).

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

Environment name . . . . . :   TEST

Storage type . . . . . . . :   SVC

Primary ASP  . . . . . . . .    *SYSTEM                    33 - 255, *SYSTEM




                                                             More...

F1=Help    F3=Exit   F6=Validate SVC    F12=Cancel
```

# Finding the Remote copy consistency group Id

❑ The environment requires the Remote copy consistency group Id.

❑ It can be different on the master and auxiliary SVCs

❑ To find it, view the remote copy consistency groups and enable the Id column
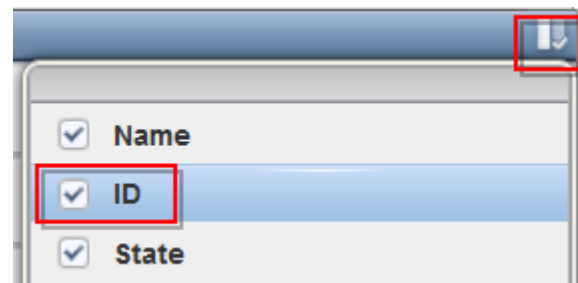
**Copy Services**

- FlashCopy
- Consistency Groups
- FlashCopy Mappings
- Remote Copy
- Partnerships

| ✓ | Name |
| ✓ | ID |
| ✓ | State |

| ➕ Create Consistency Group | ≔ Actions | 🔍 Filter | |
|---|---|
| **Name** | **ID** |
| ⊕ 🗂🗂🗂 *Not in a Group* | - |
| ⊕ 🗂➡🗂 AAKyle_MMIR | 1 |
| ⊕ 🗂➡🗂 ctciha4w_mmir | 4 |
| ⊕ 🗂🗂 ctciha8z_iasp | 5 |
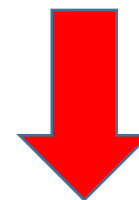
[Click here to continue with CSE Data](#)

# Create the DS environments on the controller

❑ An FSR Environment describes the storage to the toolkit. Use WRKCSE to manage the environments.

   ❑ Option 1 creates a new environment

   ❑ Enter *NONE when prompted for ASP Copy Descriptions

❑ The environments are stored in the device data domain and is kept in sync with both controllers.

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

Environment name  . . . . . . . . . :      FSR

Storage type  . . . . . . . . . . . :      DS8K

Metro Mirroring Power HA, ASP information:
  Device name . . . . . . . . . . .       *SYSTEM              Name, *SYSTEM
  Source Copy Description . . . . .       *NONE                Name, *NONE
  Target Copy Description . . . . .       *NONE                Name, *NONE

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

Production node . . . . . . . . . .       CTCHAFS2             Name

Metro Mirroring DS unit information:
  Source device . . . . . . . . . .       IBM.2107-75XA511     Name
  Target device . . . . . . . . . .       IBM.2107-75HH571     Name, *SAME
```

# Enter the DS information

Enter the DS information (IP addresses and LUNs). Ignore the password field.

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

DS unit SMC information:
  Source hmc1 . . . . . . . . . . . .      9.5.167.58              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 and fill in the source and target LUNs

```
                 Add, Change or Delete Volumes

  Environment  . :    FSR              Source device  :   IBM.2107-75XA511
  Type . . . . . :    MMIR             Target device  :   IBM.2107-75HH571
  Volume sets  . :    6

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

    =
    _         8810-8812           8810-8812
    _         8910-8912           8910-8912
```

# DS8K Credentials

❑ Past versions of the toolkit used password files.

❑ Starting in version 4.2, the toolkit now uses encrypted userid/passwords.

❑ Enter your DS8K userid / password into WRKCSECRDL

    ❑ It does not have to be QLPAR.

❑ Test communications with WRKCSE opt 14, then opt 9, F10 on the lsfbvol_PS.script script.

❑ You should receive a list of the fixed block volumes.



**Storage configuration is finished – continue with configuration**

# Enter the Copy Services Environment (CSE) Data on either **Controller**

❑ The CSE Data describes the non-storage elements of an environment.

❑ This data is stored in the Cluster Resource Group (CRG) and ==the CSEDTA Name must match the environment name==

   ❑ The toolkit will create the CRG. It will always remain inactive

❑ WRKCSEDTA, CRTCSEDTA, CHGCSEDTA and DSPCSEDTA can be used to work with this information.

   ❑ Stored in the CRG so the data is synchronized between the controllers

❑ To delete the CSE data, remove the CRG (WRKCLU, opt 9, opt 4)

```
                              Create CSE CRG

 Supply all required values, press Enter.

 CRG Name . . . . . . . . . . . . :   TEST
 Use   . . . . . . . . . . . . . :   *SYSTEM
 Copy type  . . . . . . . . . . . :   *PPRC

 Environment name . . . . . . . .     TEST
 Production node name . . . . . .
 FSR communications port  . . . .     55920
 Controlling node name  . . . . .     _____
 Secondary controlling node name      _____

 Preferred source details:
   IP address . . . . . . . . . .     _____
   HMC LPAR name  . . . . . . . .     _____
   HMC Profile name . . . . . . .     _____
   HMC managed system . . . . . .     _____
   Primary HMC IP . . . . . . . .     _____
   Secondary HMC IP . . . . . . .     _____
```

# Enter the Copy Services Environment (CSE) Data on either **Controller**

❑ Enter the Preferred Source and Preferred Target information.

❑ If the LPARs participate in LPM or LUN Switches then use *SEARCH for the HMC Managed system.

❑ Use F6 to prompt the HMC for the Managed System, LPAR and Profile names

```
                           Create CSE Data

Supply all required values, press Enter.

CSE Data Name  .  .  .  .  .  .  .  .  .  :    TESTFSR
Use  .  .  .  .  .  .  .  .  .  .  .  .  .  :    *SYSTEM
Copy type  .  .  .  .  .  .  .  .  .  .  .  :    *PPRC

Environment name .  .  .  .  .  .  .  .        _____
Production node name .  .  .  .  .  .          _____
FSR communications port  .  .  .  .            55920_____
Primary controlling node .  .  .  .            _____        Name
Secondary controlling node .  .  .             _____        Name

Preferred source details:
  IP address .  .  .  .  .  .  .  .  .  .        1.2.3.4_____
  Primary HMC IP .  .  .  .  .  .  .  .          1.2.3.5_____
  Secondary HMC IP .  .  .  .  .  .  .           _____
  HMC managed system .  .  .  .  .  .           *SEARCH_____
  HMC LPAR name  .  .  .  .  .  .  .  .          _____
  HMC Profile name .  .  .  .  .  .  .           _____
                                                                     _      More...
F1=Help    F3=Exit    F4=Prompt    F6=Query HMC    F12=Cancel
```

# Power Down Command on the **Controller**

❑ The "Power down command" must entered and it will be called on the production LPAR.

❑ Use PWRDWNSYS or another command that will perform any necessary shutdown tasks.

❑ The LPAR should be NOT be restarted (let FSR do that for you)

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

Preferred target details:
   IP address  .  .  .  .  .  .  .  .  .      _____
   HMC LPAR name  .  .  .  .  .  .  .  .      _____
   HMC Profile name .  .  .  .  .  .  .       _____
   HMC managed system .  .  .  .  .  .        _____
   Primary HMC IP .  .  .  .  .  .  .  .      _____
   Secondary HMC IP .  .  .  .  .  .          _____

Power down command .  .  .  .  .  .           _____
```

❑ Prompting (F4) is available on the command

But … it is prompted on the local (controlling) LPAR, not where the command will run (on the source LPAR).

## Restoring toolkit, access codes, setup on each **Production** LPAR

❑ Place the toolkit savefile in QGPL (FTP, scp etc)

❑ Restore the toolkit library:
  ❑ RSTLIB SAVLIB(QZRDHASM) DEV(*SAVF) SAVF(QZRDHASM45)
    ❑ The '45' refers to the release and may change
  ❑ ADDLIBLE QZRDHASM

❑ The access code is based on serial number and will be provided by the Systems Lab Services consulting team. You should have two keys, one for each serial number
  ❑ ADDPRDACS SRLNBR(*CURRENT) ACSCDE('??')
  ❑ ADDPRDACS SRLNBR(Auxiliary serial #) ACSCDE('??')

❑ Run the setup program
  ❑ SETUPFSR NODEROLE(*PRD) PORT(*DFT)
    ❑ The default port is 55920 and must match what we entered into CRTCSEDTA on the controller

# Setting up **Production** LPAR resources: System Roles

❑ The Preferred Source (*PS) is where your production normally runs

❑ The Preferred Target (*PT) is where your production LPAR switches to for DR purposes

❑ Multiple LPAR (for example LPM etc) roles can be differentiated with *PS00-*PS99 etc.

❑ If the PT will have a different line description or IP address than the PS, create them on the PS

    ❑ FSR will only bring online the correct resources

❑ Use WRKSTRPRSC *SYS to indicate to the toolkit the roles of the LPARs

```
                 Serial      LPAR      Default
Opt    Usage     number      number    CSEDTA         Comment
 _     _____
 _     *PS       10001AP     11        *NONE          CTCIHA9J
 _     *PT       10001AP     4         *NONE          CTCIHA9P
```

# Setting up **Production** LPAR resources: IP Addresses

❑ The Preferred Source (*PS) is where your production normally runs

❑ The Preferred Target (*PT) is where your production LPAR switches to for DR purposes

❑ If the PT will have a different line description or IP address than the PS, create them on the PS

   ❑ FSR will only bring online the correct resources

❑ Use WRKSTRPRSC *CMN to indicate to the toolkit which lines to bring online

❑ *IPADDR and *LINE indicates FSR will populate the data from the current LPAR

❑ At IPL, FSR will find the resource at the specified location (CMNxx) and assign it to the specified line description.

❑ For aggregate lines, multiple resource location prompts are provided (up to 8)

```
Usage . . . . . . . .    *PS                      *PS, *PT, *FCxx, *CTLx
IP Interface  . . . .    9.5.167.13               IPv4 address
Line Description  . .    ETHLINE                  Name, *LINE, *NONE
Resource Location . .    U8233.E8B.10001AP-V11-C2-T1
                                                  Name, *LINE, blank
Resource Location . .    _____
                                                  Name, *LINE, blank
```

```
Opt  Usage  IP Interface   Line Desc   Hardware Resource Location     Port

 =   _____  _____
 _   *PS    9.5.167.13     ETHLINE     U8233.E8B.10001AP-V11-C2-T1     0
 _   *PT    9.5.167.13     ETHLINE     U8233.E8B.10001AP-V4-C2-T1      0
```

# Finding communication resource bus locations on the **Production**

❑ WRKHDWRSC *CMN, opt 7

❑ The "Port" is on the second page, but is usually 0 for VIOS managed virtual adapters

❑ The format of the location code for the *PT can be inferred

    ❑ V22 = LPAR number 22

    ❑ C2 = Virtual slot 2

```
Resource name  . . . . . . . . :    CMN03
Text . . . . . . . . . . . . :    Ethernet Port
Type-model . . . . . . . . . :    268C-002
Serial number  . . . . . . . :    00-00000
Part number  . . . . . . . :


Location :   U8205.E6B.06BD50P-V22-C2-T1
```

# Setting up **Production** LPAR resources: Storage (i.e. backup devices)

❑ Use WRKSTRPRSC *STG to indicate to the toolkit which tape devices to bring online

❑ During IPL, FSR will find the resource based on serial number (TAPxx or TAPMLBxx) and assign it to the device description and vary it on.

❑ The serial number can be for either the library or the tape drive.

  ❑ If there are multiple logical libraries then the tape drive serial number will let you select a drive in a specific library with a common serial number

❑ The device description is what your backup application uses

❑ The device type indicates whether FSR should vary on the tape drive or the media library

  ❑ If a tape drive serial number is specified with Type = *MLB then FSR will vary on the media library the tape drive is in

```
Usage . . . . . . . .    ___          *PS, *PT
Serial Number . . . .    _____    Character value
Device Description       _____    Name
Device Type . . . . .    _____         *MLB, *TAP
```

```
                   Storage Resource      Device          Device
Opt     Usage       Serial Number      Description        Type

_                 _____
_       *PS       78-78F1101           TS3400            *MLB
_       *PT       78-78F1039           TS3400            *MLB
```

# Setting up **Production** LPAR resources: Routes

❑ Use WRKSTRPRSC *RTE to indicate to the toolkit which routes to use

❑ If no routes are specified, no changes are made to the routes (CFGTCP opt 2)

❑ If any routes are specified, all existing routes will be removed

```
                        Add or change Routing Entry Resources
Enter details, press Enter.

    Usage . . . . . . . .      _____        *PS, *PT
    Destination . . . . .    _____   IPv4 address, *DFTROUTE
    Subnet Mask . . . . .    _____   nnn.nnn.nnn.nnn, *NONE
    Next Hop  . . . . . .    _____   IPv4 address
    Preferred Interface      _____   IPv4 address, *NONE
```

```
Opt  Usage  Destination   Subnet Mask    Next Hop       Preferred Interface
 _     ___    _____
 _    *PS    *DFTROUTE    *NONE          9.5.167.1       *NONE
 _    *PS    *DFTROUTE    *NONE          9.5.168.1       *NONE
 _    *PT    *DFTROUTE    *NONE          9.5.167.1       *NONE
 _    *PT    *DFTROUTE    *NONE          9.5.168.1       *NONE
```

# Setting up **Production** LPAR resources: BRMS Changes

```
Usage  . . . . . .  ____        *PS, *PT
Object . . . . . .  _____  Name
Object Type  . . .  _____  *DEVICE, *MEDPCY
Attribute  . . . .  _____  *LOC, *MEDCLS, *MOVPCY, *MARKDUP
                                *MARKHST, *MINVOL, *TEXT, *VOLSEC
New Value  . . . .  _____
```

```
Opt   Usage   Object Name   Object Type   Attribute   New Value

_     ____    _____
_     *PS     TS3400        *DEVICE       *LOC        ts3400prod
_     *PT     TS3400        *DEVICE       *LOC        TS3400hadr
```

# Setting up **Production** LPAR resources: Startup Program Changes

❑ While WRKSTRPRSC defines the resources, CFGSTRPRSC will effect the changes

❑ Place a call to QZRDHASM/CFGSTRPRSC early in QSTRUPPGM, before any resources need access to TCP

```
DCL VAR(&IPLTYPE) TYPE(*CHAR) LEN(5) VALUE('?????')
/* PowerHA Tools for IBM i */
QZRDHASM/CFGSTRPRSC RTNVAR(&IPLTYPE)
MONMSG      MSGID(CPF0000)
IF          COND((%SST(&IPLTYPE 1 3) *EQ '*FC') *OR +
                 (%SST(&IPLTYPE 1 5) *EQ '*DTCH') *OR +
                 (%SST(&IPLTYPE 1 5) *EQ '?????')) +
            THEN(RETURN)
STRTCP
MONMSG      MSGID(CPF0000)
```

❑ CFGSTRPRSC will configure resources, but it will not start TCP

❑ After calling CFGSTRPRSC, call STRTCP after all the subsystems have been started (like right before :DONE)

❑ Since TCP is started from the startup program, don't start it during IPL

  ❑ CHGIPLA STRTCP(*NO)

❑ Other useful commands:

  ❑ RUNLPARCMD: Execute command based on where the LPAR is running

  ❑ RTVLPARINF: Retrieve *PS or *PT into a variable to control program flow

# Schedule Log Cleanup on all the LPARs

❑ CLEANLOGS will prune FSR Logs to save on space

    ❑ Tell it how many days of log entries to retain

    ❑ ADDJOBSCDE JOB(CLEANLOGS) FRQ(*WEEKLY) CMD(QZRDHASM/ CLEANLOGS RETAIN(120)) SCDDATE(*NONE) SCDDAY(*ALL) SCDTIME('10:00')

```
                    Clean ICSM Logs (CLNICSMLOG)

Type choices, press Enter.

Days of information to retain   . > 10          *NONE, days
```

# CHKCSE

❑ CHKCSE is a toolkit command used to check whether you can perform a scheduled switch. It performs more checks than SWCSE or WRKCSE, including verifying that the LUNs reported to the production LPAR are being replicated.

❑ Run the command interactively now to test it.

❑ Schedule CHKCSE to run periodically and monitor for escape messages. An escape message indicates a switch may fail.

```
          Check Copy Services Environ. (CHKCSE)

Type choices, press Enter.

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

# Test detach with WRKCSE

❑ WRKCSE is the main command for working with the storage. We have already created an environment, now we can do more things with it.

❑ Go into WRKCSE and take option 12 on the environment.

❑ Note the status – it should be "Consistent synchronized" or "Consistent copying" before doing a detach.

```
                  Work with SVC PPRC Environment

     Environment  . . . . . . . :    FSR4PMPMM
     MMIR Status  . . . . . . . :    Consistent synchronized
     Direction  . . . . . . . . :    Normal

 Select one of the following:

       2. Pause
       3. Resume

       5. Switch
       6. Start Replication after Switch

       8. Detach
       9. Reattach
      10. Display replication

 Selection
     __
```

# Test detach with WRKCSE

❑ Take option 10 (Display Replication) to view the relationships, then PF11 to view the progress

❑ The "Progress" column should be nearly caught up (~100%) or blank, and the "Freeze time" (if using GMCV) should be within the past few minutes.

❑ If the progress or freeze time is far behind, then a detach or scheduled switch will take a long time to complete.

```
                           Display Replication

Environment . . . :    FSR4PMPMM          Type . . . . . . . :    MMIR
Consistency group :    1 - ctciha4p_mp
Cycle period  . . :    *NONE
Primary . . . . . :    Master
State . . . . . . :    Consistent_synchronized

  Relationship       State / in sync?            Freeze time            Progress
  rcrel24            consistent_synchronized
  rcrel32            consistent_synchronized
  rcrel33            consistent_synchronized
  rcrel34            consistent_synchronized
```

# Test detach with WRKCSE

❑ A **Detach** will prepare the primary LPAR, pause replication, and IPL the secondary LPAR in manual restricted state.

    ❑ Detach for SVC is supported for MMIR and GMCV replication, not GMIR.

    ❑ Detach for DS8K is supported for GMIR, not MMIR

❑ Once detached, the replication status will be "Idle".

```
                       Work with SVC PPRC Environment

    Environment  . . . . . . . :    FSR4PMPMM
    MMIR Status  . . . . . . . :    Consistent synchronized
    Direction  . . . . . . . . :    Normal

Select one of the following:

      2. Pause
      3. Resume

      5. Switch
      6. Start Replication after Switch

      8. Detach
      9. Reattach
     10. Display replication

Selection
      8_



F1=Help    F3=Exit    F5=Refresh Status    F9=View log    F12=Cancel

Current SRC for ctcihamp is C20060F0.
```

# Test detach with WRKCSE

❑ A **Reattach** will deactivate the secondary LPAR and resume replication.

    ❑ If both LPARs are deactivated, the toolkit will ask which direction to resume replication in.

❑ After a Reattach, it is recommended to change the secondary HMC LPAR properties to IPL in B-Normal (the toolkit leaves it in B-Manual)

❑ The replication status will go to "Inconsistent copying".

```
                    Work with SVC PPRC Environment

   Environment  .  .  .  .  .  .  .  :     FSR4PMPMM
   MMIR Status  .  .  .  .  .  .  .  :     Idling
   Direction  .  .  .  .  .  .  .  .  :

Select one of the following:

     2.  Pause
     3.  Resume

     5.  Switch
     6.  Start Replication after Switch

     8.  Detach
     9.  Reattach
    10.  Display replication
                                                                          Bo

Selection
     9_

F1=Help    F3=Exit    F5=Refresh Status    F9=View log    F12=Cancel

Waiting for partition ctcihamp on managed system CTCMOBILE to power down.
```

# Perform a scheduled switch with WRKCSE

❑ A **Scheduled Switch** will shut down the primary LPAR, reverse replication, and then IPL the secondary LPAR.

   ❑ This requires an outage of the LPAR!

❑ A scheduled switch requires the primary LPAR to be active and reachable at its IP address.

❑ WRKCSE option 5 will prompt on SWCSE and it will be performed interactively. Press enter.

❑ On the primary LPAR, an inquiry message will be posted to QSYSOPR

```
                    Switch Copy Services Environ. (SWCSE)

 Type choices, press Enter.


 Environment name . . . . . . . . . > FSR4PMPMM      Name
 Switch type  . . . . . . . . . .   *SCHEDULED      *SCHEDULED, *UNSCHEDULED
 Type . . . . . . . . . . . . . .   *               *, *GMIR, *MMIR
 Auto replicate . . . . . . . . .   *DFT            *DFT, *YES, *NO
```

```
                    Additional Message Information

 Message ID . . . . . . :     IAS0029      Severity . . . . . . . :    60
 Message type . . . . . :     Inquiry
 Date sent  . . . . . . :     12/03/15     Time sent  . . . . . . :    07:53:14

 Message . . . . :     Perform full system switch? (G C)
 Cause . . . . . : A scheduled SWCSE command was issued by job  on node . If
  you reply Go to this message, the system will be powered down. Possible
  choices for replying to the message are:
  G -- Go       = Perform full system switch.
  C -- Cancel   = Do not perform full system switch.
```

# Perform unscheduled switch back with SWCSE

❑ An **Unscheduled Switch** will reverse replication, and then IPL the secondary LPAR.

    ❑ This requires an outage of the LPAR!

❑ An unscheduled switch requires that the primary LPAR be powered down. In the event of a disaster, you will be performing an unscheduled switch.

❑ SWCSE can be submitted to batch.

❑ When SWCSE is called interactively, you will be presented with this message:

```
                    Unscheduled SWCSE Warning

You have issued an unscheduled MMIR switch for *SYSTEM.

This process assumes that the current production node is not
accessible and eliminates any normal switchover release actions for
external storage disk volumes that are accessible on the production
node.  If the production node is active, cancel this switchover by
pressing F12.

Press F10 to continue the unscheduled MMIR switchover.
```

# How to reset after failure

❑ Failures can happen, you need to know how to set things back to normal.

❑ This usually involves the following manual steps:

  ❑ Determine the current state of the master and auxiliary LPARs (i.e. which should be active or inactive)

  ❑ Determine the desired of LPARs and replication direction

  ❑ Deactivating LPARs if needed, using the HMC web interface

  ❑ Manually changing the replication direction if needed, using the SVC web interface

  ❑ Activating an LPAR if needed, using the HMC web interface

❑ Tell the toolkit the correct current state of the replication

  ❑ On the controller, CHGCSEDTA and modify these fields:

    ❑ Status to *READY

    ❑ Direction to *NORMAL or *REVERSED

    ❑ Request type to 0

```
PPRC status  . . . . . . . . .   *READY
PPRC direction . . . . . . . .   *NORMAL

  Request type . . . . . . . . .      0
```

# Where can I find the logs for troubleshooting?

❑ Controller logs are in the following place:

  ❑ /QIBM/Qzrdhasm/qzrdhasm.log

  ❑ /QIBM/Qzrdhasm/qzrdhasm.log.bak

  ❑ /QIBM/Qzrdhasm/java.logs/*

  ❑ /QIBM/Qzrdhasm/joblogs/*

❑ DMPINF ENV(*ALL) EXTDLOGS(*YES) will grab all these files and put them in a zip file.

```
              Dump ICSM Information (DMPINF)

Type choices, press Enter.

Environment name . . . . . . . . > *ALL          Name, *ALL
Type . . . . . . . . . . . . . . > *ALL          *ALL, *FLASH, *GMIR, *LUN...
Extended logging . . . . . . . . > *YES          *YES, *NO
Job name . . . . . . . . . . . .   *NONE         Name, *CURRENT, *NONE, *LAST
  User . . . . . . . . . . . . .                 Name
  Number . . . . . . . . . . . .                 000000-999999
Days of logs to keep . . . . . .   90            days, *NONE, *NOMAX
```

```
> DMPINF ENV(*ALL) EXTDLOGS(*YES)
  Spooled file copied to /tmp/Qzrdhasm/CLU_DSPCLUINF.txt_tmp.
  Spooled file copied to /tmp/Qzrdhasm/CRG_QHADSPCRG.txt_tmp.
  ICSM informaton dumped to: /tmp/qzrdhasm_CTCIHA9L_151201_1002.zip
```

❑ On the primary LPAR:

  ❑ /QIBM/Qzrdhasm/qzrdhasm.log

  ❑ /QIBM/Qzrdhasm/joblogs/*

  ❑ WRKJOB QZRDIAEXT2 and view the joblog

  ❑ WRKJOB QSTRUPJD and view the joblog

# Saving and Restoring WRKCSE, WRKCSEDTA and WRKCSECRDL

- ❑ WRKCSE, WRKCSEDTA and WRKCSECRDL information is stored on the controller in PowerHA device data domains (DDD)

- ❑ The DDD's are not saved/restored with the usual commands SAVCFG, SAVOBJ etc or even GO SAVE opt 21

- ❑ The Toolkit includes two commands to save and restore the DDD:

  - ❑ SAVDDD

    - ❑ Saves all the DDD information to an existing IFS directory

      - ❑ Use mkdir to create the directory first

  - ❑ RSTDDD

    - ❑ Restores all the DDD information from an existing IFS directory

- ❑ Recommendation is to run SAVDDD prior to an upgrade or backup of the controlling LPAR

# Contacting support if you have problems

Support for the FSR Toolkit is to customers who meet the following criteria:

- Current System i Software Maintenance Agreement

- Current FSR Toolkit Software Maintenance Agreement

For non-urgent issues or questions contact the consultant who installed the Toolkit. To reach a Toolkit developer for non-urgent issues and questions, or to report a bug, send an email to iessspt@us.ibm.com

For immediate 24x7 assistance, reach out to IBM Support:

US: http://www.ibm.com/planetwide/us/

Worldwide: http://www.ibm.com/planetwide/

To assist IBM personnel in correctly routing your problem, request support for the iSeries

Systems Lab Services "Copy Services Toolkit – Full System Replication" using component identifier 5798CST00.