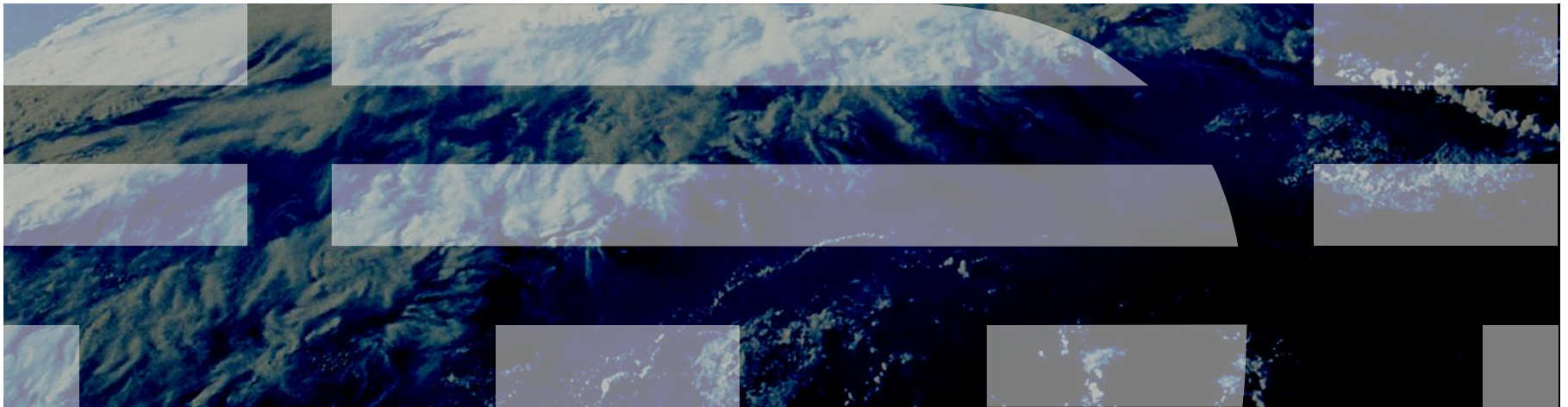


Quick-install of the PowerHA Full System Replication Manager

Version 4.5

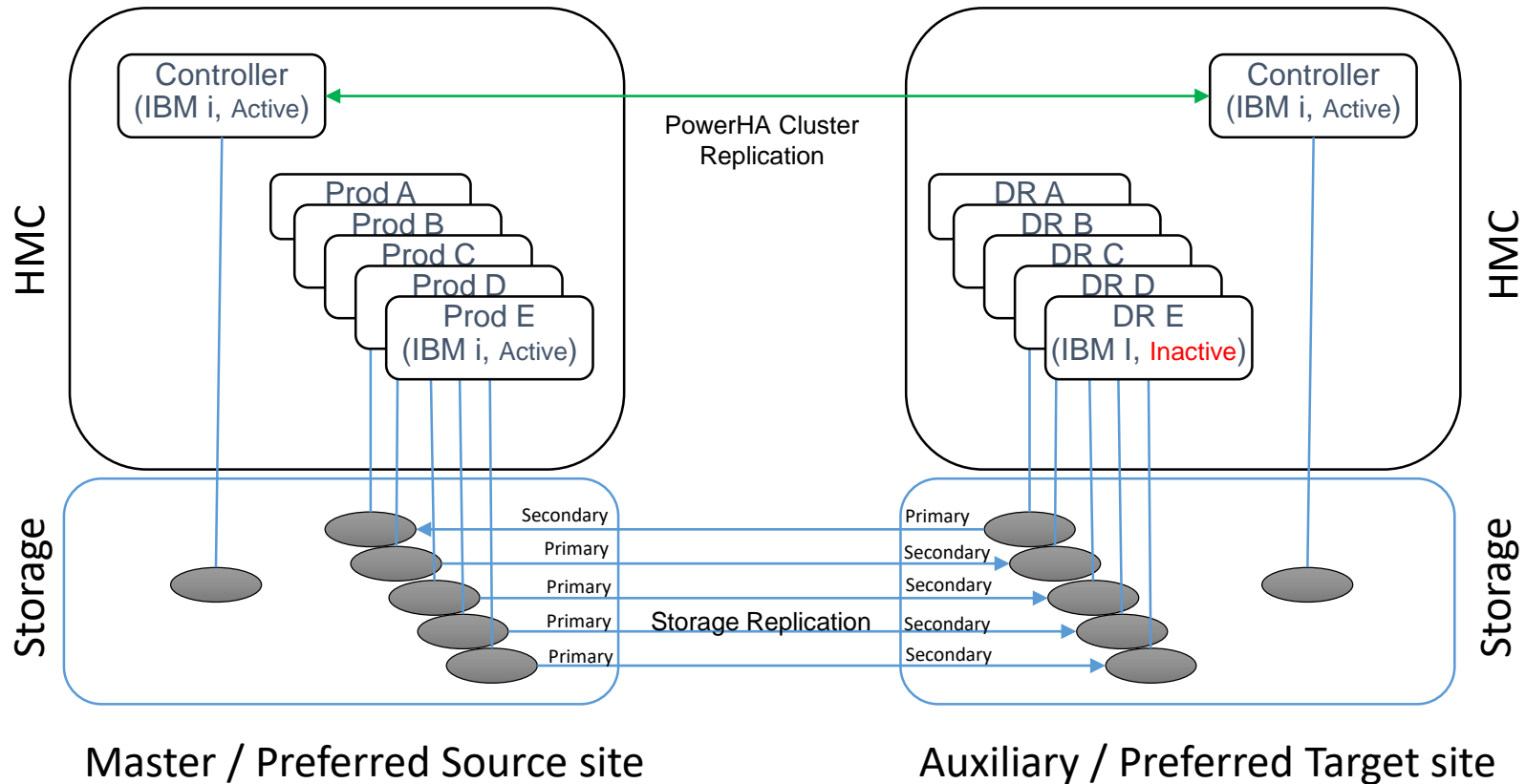
Christian Aasland
Monday, May 4, 2020



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 [LPP's](#) and [PTF's](#) on pages 5 and 6
 - ❑ PowerHA (Enterprise Edition) installed and licensed
 - ❑ We will help you set up the clusters
 - ❑ Place FSR Manager savefile QZRDHASM43 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
Group PTFs SF99776, SF99716	Group PTFs SF99876, SF99725	Group PTFs SF99666, SF99665
55770HAS PTF SI57302, SI62180, SI65314 5770999 PTF MF62565	5770999 PTF MF62566	



Source LPAR PTFs

7.2	7.3	7.4
5770999 PTF MF62565	5770999 PTF MF62566	

Storage Setup Selector

[Click here for SVC setup](#)

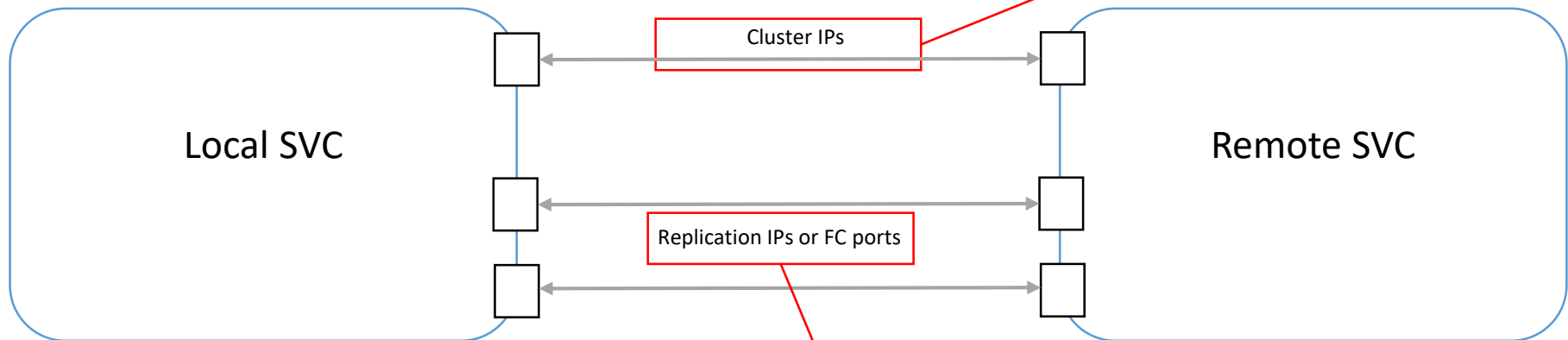
[Click here for DS8K setup](#)

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

+ Create Partnership Actions Filter				
Name	Location	State	Type	IP Address
ctchav7ka	Local	-	-	-
ctchav7kb	Remote	✓ Fully Configured	IPv4	9.5.167.150
ctchav7kc	Remote	✓ Fully Configured	Fibre Channel	-



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:
 - ❑ *Isportip* 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:

- ❑ Indicate where you want to replicate to

Where are the auxiliary volumes located?

- ☐ On this system
- ☒ On another system

The screenshot shows the IBM Systems Lab Services console. At the top, a red box highlights the '+ Create Consistency Group' button. Below it, a table lists various consistency groups with columns for 'Mapping Name' and 'Status'. A red arrow points from the 'Create Consistency Group' button to the 'Copy Services' menu. The 'Copy Services' menu is open, showing options: FlashCopy, Consistency Groups, FlashCopy Mappings, Remote Copy (highlighted with a red box), and Partnerships.

Mapping Name	Status
Not in a Group	
AAKyle_Full_Incremental	Idle or
AAKyle_Thin	Idle or
asdfasdf	Empty
ctciha9m_ctciha9n_incr	Idle or
ctciha9m_ctciha9n_thin_provision	Stoppe
DEMO_FSCSM_DEMOSRC_DEMOTGT	Idle or
fc	Idle or
	Copyin
	Idle or

Creating the replication consistency group (RCCG)

- ❑ Select “yes” to add relationships

Do you want to add relationships to this group?

- ☒ Yes, add relationships to this group
- ☐ No, create an empty consistency group

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

Select the type of copy that you want to create:



- ❑ Pick the primary and secondary volumes



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**

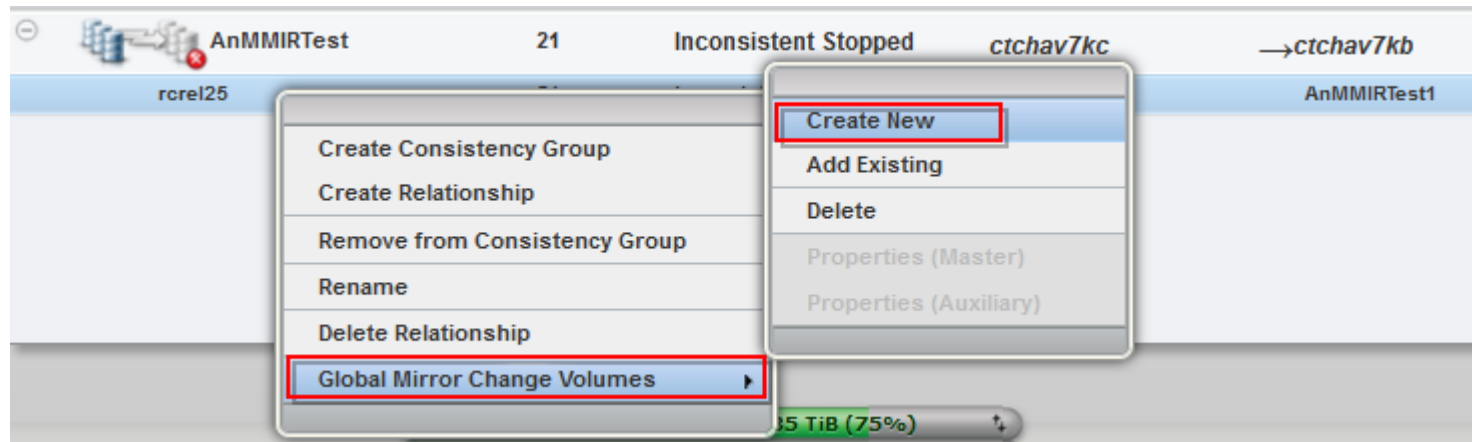
Select the master and auxiliary volumes for new remote copy relationships to add to the remote-copy consistency group.

- ❑ 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)

The diagram illustrates the process of selecting master and auxiliary volumes for a remote copy consistency group. It consists of two main boxes: 'Master' and 'Auxiliary'. The 'Master' box contains a dropdown menu. The 'Auxiliary' box contains a dropdown menu and an 'Add' button. An arrow points from the 'Master' box to the 'Auxiliary' box. Below the boxes, the text 'ctciha9m_ls10' and 'SteveTest15' are displayed, with a red 'X' icon to the right.

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.

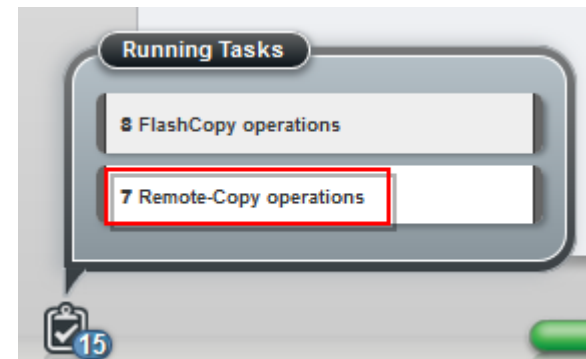
Start and monitor replication

- ❑ 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



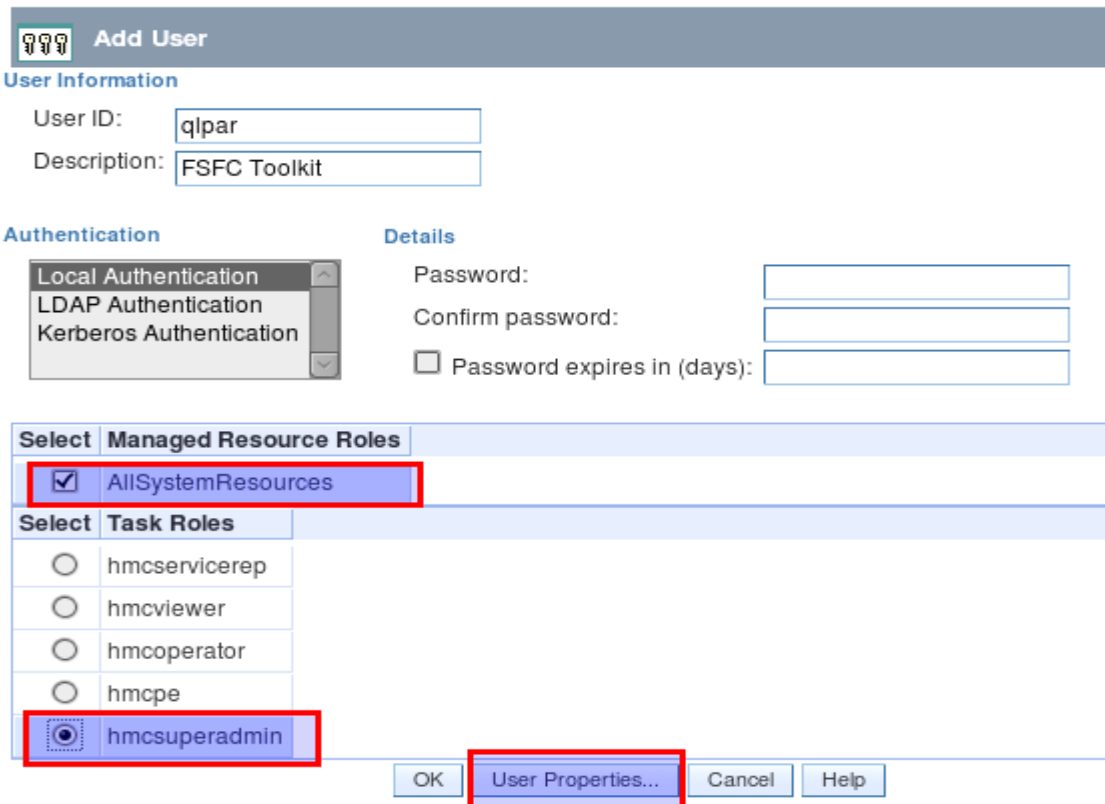
Name	Progress
System ctchav7kc, volume AnMMIRTest3 → System ctcha...	2%
System ctchav7kc, volume AnMMIRTest4 → System ctcha...	2%
System ctchav7kc, volume AnMMIRTest5 → System ctcha...	2%
System ctchav7kc, volume AnMMIRTest6 → System ctcha...	2%
System ctchav7kc, volume AnMMIRTest7 → System ctcha...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



Add User

User Information

User ID:

Description:

Authentication

Local Authentication
LDAP Authentication
Kerberos Authentication

Details

Password:

Confirm password:

☐ Password expires in (days):

Select Managed Resource Roles

☒ AllSystemResources

Select Task Roles

☐ hmcserverrep

☐ hmcviewer

☐ hmcoperator

☐ hmcpe

☒ hmcsuperadmin

OK User Properties... Cancel Help

HMC Configuration

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

The image shows a screenshot of the HMC (Hardware Management Console) configuration interface. On the left, the 'Console Management' section is visible, with a sidebar menu containing 'Management', 'Users and Security', and 'Systems and Console Security'. The 'Systems and Console Security' option is highlighted. On the right, the 'Systems and Console Security' configuration page is shown, featuring two main sections: 'Security Authentication' and 'Remote Control'. Under 'Security Authentication', there are links for 'Manage Certificates', 'Manage LDAP', and 'Manage KDC'. Under 'Remote Control', there are three options: 'Enable Remote Command Execution', 'Enable Remote Operation', and 'Enable Remote Virtual Terminal'. Two large red arrows originate from the 'Systems and Console Security' menu item in the sidebar and point to the 'Enable Remote Command Execution' checkbox in the 'Remote Control' section. Below this, a dialog box titled 'Remote Command Execution' is shown, with the text 'Enable the following option to provide remote command execution through ssh.' and a checked checkbox labeled 'Enable remote command execution using the ssh facility'. The dialog box has 'OK' and 'Cancel' buttons at the bottom.

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 remc

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

The diagram illustrates the steps to configure network settings on the HMC console:

- Users and Roles** (ctchahmc Users and Security > Users and Roles)
 - Define and manage user accounts, roles and t
 - HMC Management**
 - Console Settings (selected)
 - Console Management
 - Templates and OS Images
 - Updates
- Console Settings** (Configure network settings, performance monitoring settin)
 - Launch Guided Setup Wizard
 - Network Settings**
 - View Network Topology
 - Test Network Connectivity
 - Change Network Settings (selected)
 - Performances Settings**
 - Change Performances Monitoring Settings
 - Other Settings**
 - Change Date and Time
 - Change Language and Locale
 - Create Welcome Text
- Customize Network Settings**
 - Identification | **LAN Adapters** | Name Services | Routing
 - Select your interface
 - LAN Adapters
 - Ethernet eth0 5C:F3:FC:BA:FD:F8 (192.168.128.1)
 - Ethernet eth1 5C:F3:FC:BA:FD:FA (9.5.168.169)
 - Ethernet eth2 34:40:B5:A5:0C:28 (0.0.0.0)
 - Ethernet eth3 34:40:B5:A5:0C:2A (0.0.0.0)
 - Details...
 - OK Cancel Help

Red arrows indicate the navigation path from the **Console Settings** menu to the **Change Network Settings** option, and then to the **Customize Network Settings** window.

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

LAN Adapter Details

Basic Settings | IPv6 Settings | **Firewall Settings**

LAN interface address: 5C:F3:FC:BA:FD:FA Ethernet

Available Applications

Select	Application Name	Ports
<input checked="" type="radio"/>	Secure Shell	22:tcp
<input type="radio"/>	Secure Remote Web Access	443:tcp 9960:tcp
<input type="radio"/>	Secure ASM Access	9443:tcp
<input type="radio"/>	Open Pegasus	5989:tcp

Allowed Hosts

Select	Application Name	Ports	Allowed Hosts
<input type="radio"/>	SLP	427:udp	0.0.0.0/0.0.0.0
<input type="radio"/>	SLP	427:udp	::::
<input type="radio"/>	RSCT Peer Domains	12347:udp udp:12348	0.0.0.0/0.0.0.0
<input type="radio"/>	RSCT Peer Domains	12347:udp udp:12348	::::
<input type="radio"/>	Cluster Ready Hardware Server	8899:tcp	0.0.0.0/0.0.0.0
<input type="radio"/>	Cluster Ready Hardware Server	8899:tcp	::::
<input type="radio"/>	Secure Remote Web Access	443:tcp tcp:9960	0.0.0.0/0.0.0.0
<input type="radio"/>	Secure Remote Web Access	443:tcp tcp:9960	::::
<input type="radio"/>	Secure Shell	22:tcp	0.0.0.0/0.0.0.0
<input type="radio"/>	Secure Shell	22:tcp	::::

Buttons: Allow Incoming, Allow Incoming by IP Address, Allow remote Secure Shell access, Remove, OK, Cancel, Help

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
 - ❑ ADDLIB QZRDHASM
- ❑ The access code is based on serial number will be provided by the Systems Lab Services consulting team
 - ❑ ADDPRDACS SRLNBR(*CURRENT) ACSCDE(yyyy)
- ❑ 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(FSR) NODE(Master or Auxiliary controller nodes)
 - ❑ **This requires *IOSYSCFG so QSTRUPJD should specify a profile like QLPAR**
 - ❑ **CHGJOB JOB(QSTRUPJD) USER(QLPAR)**

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

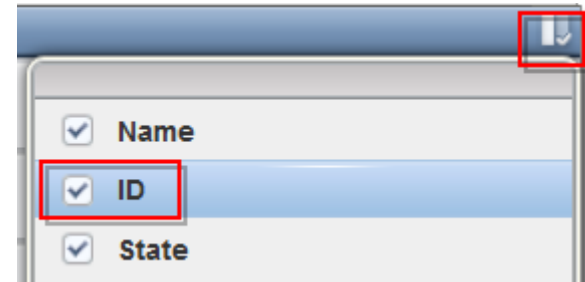
- ❑ An FSR Environment describes the storage to the toolkit. Use WRKCSE to manage the environments.
 - ❑ Option 1 creates a new environment
 - ❑ Enter *NONE when prompted for ASP Copy Descriptions
- ❑ The environments are stored in the device data domain and is kept in sync with both controllers.
- ❑ 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
Metro Mirroring Power HA, ASP information:
Device name . . . . . : *SYSTEM
Source Copy Description . . . . . : *NONE
Target Copy Description . . . . . : *NONE
Production node . . . . . :
Preferred Source SVC Information:
IP address . . . . . : 0.0.0.0
Remote copy consistency group Id : 0
Name, *SYSTEM
Name, *NONE
Name, *NONE
Name
IPv4
Id
More...

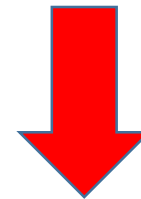
F1=Help F3=Exit F6=Validate SVC F12=Cancel
```

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

A screenshot of a table titled 'Consistency Groups'. The table has two columns: 'Name' and 'ID'. The 'ID' column is highlighted with a red rectangular box. The table contains four rows of data.

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.

Opt      Source      Target
         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.

```

Java Shell Display
CTCHADEV_IASP  F301 Online   Normal   Normal   2107-A04  FB 520P  P1      Standard iSeries    65.7    70.6    1378
22208 V33      137822208 managed PG0   RG0
CTCHADEV_IASP  F302 Online   Normal   Normal   2107-A04  FB 520P  P1      Standard iSeries    65.7    70.6    1378
22208 V33      137822208 managed PG0   RG0
CTCHADEV_IASP  F303 Online   Normal   Normal   2107-A04  FB 520P  P1      Standard iSeries    65.7    70.6    1378
22208 V33      137822208 managed PG0   RG0
CTCHADEV_IASP  F304 Online   Normal   Normal   2107-A04  FB 520P  P1      Standard iSeries    65.7    70.6    1378
22208 V33      137822208 managed PG0   RG0
CTCHADEV_IASP  F305 Online   Normal   Normal   2107-A04  FB 520P  P1      Standard iSeries    65.7    70.6    1378
22208 V33      137822208 managed PG0   RG0
CTCHADEV_IASP  F306 Online   Normal   Normal   2107-A04  FB 520P  P1      Standard iSeries    65.7    70.6    1378
22208 V33      137822208 managed PG0   RG0
CTCHADEV_IASP  F307 Online   Normal   Normal   2107-A04  FB 520P  P1      Standard iSeries    65.7    70.6    1378
22208 V33      137822208 managed PG0   RG0
CTCHADEV_IASP  F308 Online   Normal   Normal   2107-A04  FB 520P  P1      Standard iSeries    65.7    70.6    1378
22208 V33      137822208 managed PG0   RG0
Java program completed
=>

```



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 CRG Name must match the environment name**
 - ☐ The toolkit will create the CRG. It will always remain inactive
- ☐ WRKCS EDTA, CRTCS EDTA, CHGCS EDTA and DSPCS EDTA 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 . . . . . : _____

F1=Help   F3=Exit   F4=Prompt   F6=Query HMC   F12=Cancel   _   More...
  
```

Power Down Command on the Controller

- ☐ The “Power down command” must be entered and it will be called on the production LPAR.
- ☐ Use PWRDWN SYS 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
 - ❑ ADDLIB 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 CRTCEDTA 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

Opt	Usage	Serial number	LPAR number	Default CSEDTA	Comment
—	<u> </u>				
—	*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
  
```

Opt	Usage	Storage Resource Serial Number	Device Description	Device 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, *DFTRROUTE
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	*DFTRROUTE	*NONE	9.5.167.1	*NONE
—	*PS	*DFTRROUTE	*NONE	9.5.168.1	*NONE
—	*PT	*DFTRROUTE	*NONE	9.5.167.1	*NONE
—	*PT	*DFTRROUTE	*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('?????')
```

```
/* BEGIN POWERHA TOOLS FOR IBM i - FSFC */
QZRDHASM/CFGSTRPRSC RTNVAR(&IPLTYPE)
MONMSG      MSGID(CPF0000)
IF          COND((%SST(&IPLTYPE 1 3) *EQ '*FC') *OR +
                (%SST(&IPLTYPE 1 5) *EQ '*DTCH')) +
            THEN(RETURN)
STRTCP
MONMSG      MSGID(CPF0000)
/* END POWERHA TOOLS FOR IBM I - FSFC */
```

- ❑ 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) SCDDTIME('10:00')

```
                                Clean ICSM Logs (CLNICSMLLOG)
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

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) EXTDLGOS(*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) EXTDLGOS(*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.