Quick-install of the PowerHA Full System Replication Manager

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Overview

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:
  - FlashSystem (SVC, Storwize)
    - Policy-based replication (PCYGM) only!
    - Guides for prior releases will demonstrate consistency-group based replication
  - DS8K
  - IBM PowerVS (Cloud)
- Customers can have it, but it is designed to be performed by a Lab Services consultant
- It does not explain details or how to handle errors or special/complex situations
- Primary documentation is the FSR Manager Webpage:
  - **http://ibm.biz/FSRManager**

Overview of Replication

The toolkit will manage the hardware replication and LPAR resources so that the DR site can be used.

This is supported for:

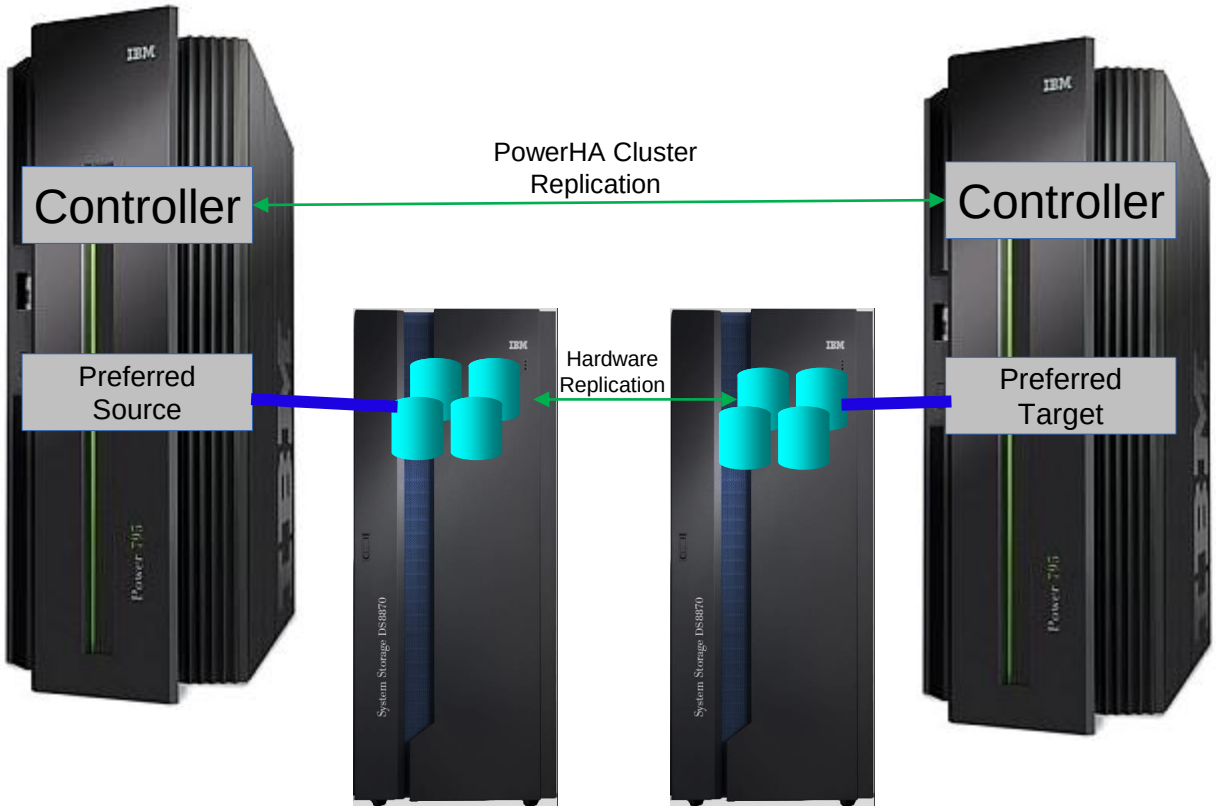
- DS8K GMIR and MMIR
- FlashSystem Policy-based Replication (GMIR, GMCV and MMIR)
- PowerVS

The following is not supported:

- PowerVC
- Non-IBM storage devices

It is an active-passive configuration; i.e. the replication source LPAR is active, while the replication target LPAR is inactive.

A **switch** requires an outage, and can be either scheduled or unscheduled. A **detach** will pause replication and IPL the target into restricted, as a means to test the configuration.



Customer actions prior to our engagement

- Provide Technology Expert Labs 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 detailed on our website:
    - *http://ibm.biz/FSRManager*
    - Expand 'Pre-engagement Requirements'
  - PowerHA (Enterprise Edition) installed and licensed
    - We will help you set up the clusters
  - Place FSR Manager savefile QZRDHASM52 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)
  - API Keys (PowerVS)

Cloud setup prior to our engagement

- Create the Cloud environment including
  - One or two persistent controlling virtual server instances (IBM i)
    - Access to the PowerVS APIs (i.e. iam.cloud.ibm.com etc)
  - Preferred Source virtual server instances
    - Network access (IP addresses etc)
    - Storage with OS loaded and configured
    - BRMS (optional)
  - Preferred Target virtual server instances
    - Deploy it on image volumes and allow cloud-init to finish (no need to install additional software or volumes)
  - Serial numbers for all the instances
    - DSPSYSVAL QSRLNBR
    - Include potential LPM serial numbers, if known
  - API Key (the API Key must be retained when created)

FlashSystem setup prior to our engagement

- Configure the storage unit for Primary, Secondary and Controlling LPAR.
  - Firmware level 8.6.0.1 or newer
    - Note that some newer versions will not support consistency-group replication
  - Create or select user profile
    - Must be assigned to CopyOperator (or better) user group
  - Source LPAR volumes created
  - Source and Target hosts, including SAN zoning
  - 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)

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
- Additional considerations (these are enabled by default):
  - Enable remote command execution
  - Enable ssh through the HMC’s firewall

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.
- If multiple controllers are to be configured, issue these messages on all of them:
  - STRTCPSVR *INETD
  - CHGTCPSVR *INETD AUTOSTART(*YES)
  - CHGNETA ALWADDCLU(*ANY)
- On the Master controller
  - CRTCLU CLUSTER(FSFCFSR) START(*YES) DEVDMN(*GEN)
    - PF4, fill in Primary and Secondary Controlling node names and IP addresses

- On Auxiliary controller:
  - WRKCLU, validate cluster is started

Restoring toolkit library, setup on both **Controllers**

- Place the toolkit savefile in QGPL (FTP, scp etc)
- Restore the toolkit library:
  - RSTLIB SAVLIB(QZRDHASM) DEV(*SAVF) SAVF(QZRDHASM52)
    - The ‘52' refers to the release and may change
  - ADDLIBLE QZRDHASM
- Run the setup program
  - SETUPFSR NODEROLE(*CTL) PORT(*DFT) CTLCODE('??')
  - The port is used to receive communications from the production LPARs, *DFT is 55920
  - Will create user profile QLPAR without a password, initialize files etc.

```
      Set up IBM Pwr HA tools - FSR (SETUPFSR)

Type choices, press Enter.

Node role  . . . . . . . . . . . . > *CTL          *CTL, *PRD
FSFC communications port . . . .   *DFT          1-65535, *SAME, *DFT
Toolkit access code for *CTL . .   12345
```

Update the startup program on the **controllers**

- Modify the startup program (after IP has been started) on each controller to:
  - Start the subsystem if any process will be initiated from the production LPAR:
    - STRSBS QZRDHASM/QZRDFSR
  - Start the cluster if there are multiple nodes using the DDD:
    - STRCLUNOD CLUSTER(*) NODE(*ALL)
      - **This requires *IOSYSCFG so QSTRUPJD should specify a profile like QLPAR so after compiling the startup program issue this command:**
        - **CHGJOBD JOBD(QSTRUPJD) USER(QLPAR)**

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

- Not necessary for PowerVS Operations
- 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.
- The Java Secure Channel is an open-source implementation of ssh
- 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>
```

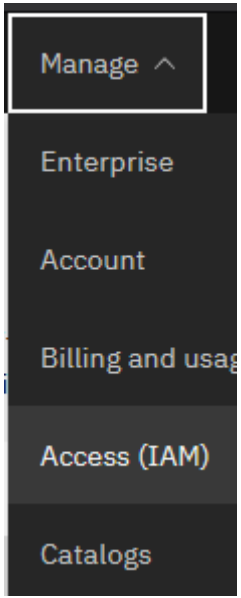
Create the credentials on either **controller**

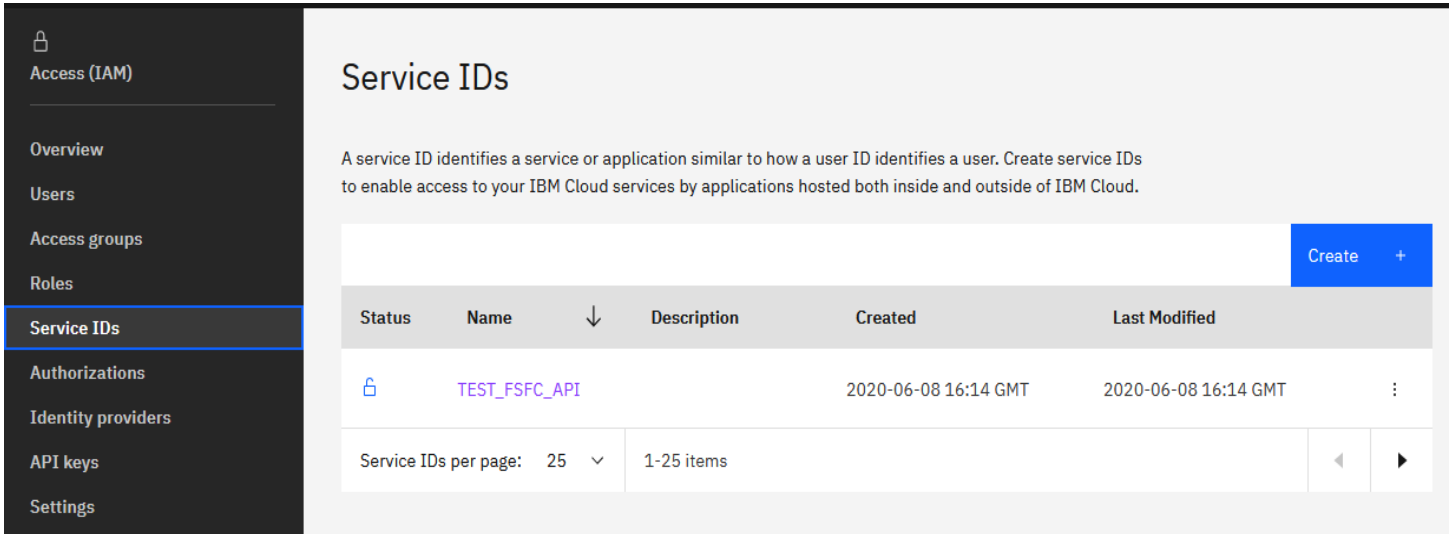
- FSFC uses userid/password to log into the HMCs, DS8Ks and SVCs. Use WRKCSECRDL or ADDCSECRDE to manage these credentials.
- The ‘Role’ should be *USER if the host is not a CSM server
- Enter the IP address, user ID, password and a description of the host for:
  - SVCs
  - DS8Ks
  - HMCs
- This information 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
- Use option 6 to validate the credentials

```
                              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
```

Create or identify a Cloud Service ID

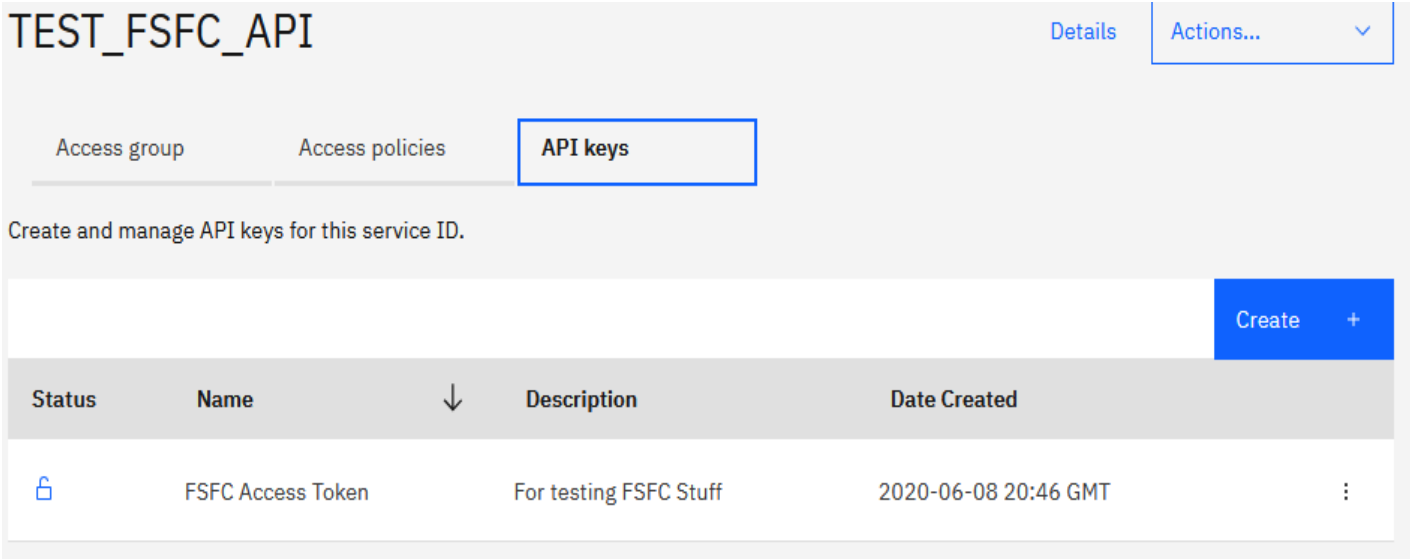
- FSR uses an API Key to authenticate cloud resource usage.
  - Only used for PowerVS operations
  - An API Key is associated with a Service ID. Use the Cloud IAM web GUI to create or identify a service ID.





Create Service ID API Key

- After identifying the Service ID identify or create an API Key
  - When the API Key is created it will be displayed or downloaded in a file.
    - You *must* record this API Key as there will not be an opportunity to retrieve it later. If you have a Service ID but no API Key then create a new key.
    - The name of the key does not matter. In these examples we are re-using a key created for FSFC operations.



Enter the API Key into WRKCSECRDL

- Use the command WRKCSECRDL TYPE(*CLOUD) to work with Cloud credentials.
  - Use option 1 to add a new set of credentials. Give the credentials a name which will later be used to refer to this cloud instance. DAL_KEY and WDC_KEY are good examples.
  - The API Key can be entered but not extracted. It is stored in an encrypted space.
  - The URNs and URLs will depend on the specific cloud implementation.
    - The team which set up your PowerVS cloud account may have this information
  - For Cloud Instance ID enter *SELECT and the API will provide a list based on the resources the API Key is authorized to.

```
                                Add Cloud Credential Entry (ADDCLDCRDE)

Add Cloud Credential Entry (ADDCLDCRDE)

 Type choices, press Enter.

 Key name . . . . . . . . . . . . > WDC_KEY       Character value
 IAM Identity Services URL  . . .   iam.cloud.ibm.com

 Resource controller URL  . . . .   resource-controller.cloud.ibm.com

 API Key  . . . . . . . . . . . .   Your API KEY goes here

 URN Endpoint . . . . . . . . . .   us-east.power-iaas.cloud.ibm.com or dal.power-iaas.cloud.ibm.com

 Cloud Instance ID  . . . . . . .   *SELECT

 Description  . . . . . . . . . .   WDC
```

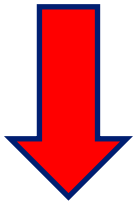
FlashSystem Environment Configuration

DS8K Environment Configuration

PowerVS Environment Configuration

Create the FlashSystem 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
  - Storage type is *PCYGM (Policy-based Global Mirror)
  - Enter *SYSTEM when prompted for ASP Copy Descriptions
- The environments are stored in the device data domain and is kept in sync with both controllers.
- NOTE: F6 to validate only works after we have created the CSE data (that's next).
- Enter the IP addresses for the local and remote FlashSystems
- Use *SELECT on the 'Volume Group ID' parameters
- Press enter and select the volume group ID



Click here to continue with CSE Data

```
                                    Change a GMIR Environment.
Environment  . . . . . :   FSR9M9O

Storage type . . . . . :   PCYGM

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


Preferred Source FlashSystem Information:
  IP address . . . . . .   1.2.3.4                 IPv4
  Volume Group ID  . . .   *SELECT                  ID, *SELECT

Preferred Target FlashSystem Information:
  IP address . . . . . .   1.2.4.4                 IPv4
  Volume Group ID  . . .   *SELECT                  ID, *SELECT




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

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 GMIR Environment
Type choices, press Enter.

Environment  . . . . . :   DEMO_FSR

Storage type . . . . . :   DS8K

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

CSM Replication  . . . . .   *NO                   *YES, *NO

Global Mirroring DS unit information:
  Source device  . . . . .   IBM.2107-75DYR51      Name
  Target device  . . . . .   IBM.2107-75LHH71      Name, *SAME
  Session number . . . . .   5                     Hexadecimal number
  Reverse session number     5                     Required if Symmetrical
```

Enter the DS information

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

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

DS unit SMC information:
  Source hmc1  . . . . . .   9.5.167.21              IPv4
  Source hmc2  . . . . . .   *NONE                   IPv4, *NONE
  Target hmc1  . . . . . .   9.5.168.160             IPv4
  Target hmc2  . . . . . .   *NONE                   IPv4, *NONE

Global Mirroring options:
  Symmetrical Mirroring      *YES                    *YES, *NO
  D-Copy Flash normal  . .   *YES                    *YES, *NO
  D-Copy Flash reversed      *NO                     *YES, *NO
  Override Master LSS  . .   *NO                     *YES, *NO
  CG interval  . . . . . .   0                       Seconds (0 - 65535)
  CG drain time  . . . . .   240                     30 to 1200

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

Enter the DS volumes

- Press Enter and fill in the source and target LUNs

```
                                  Add, Change or Delete Volumes

  Environment  . :   DEMO_FSR              Source device  :   IBM.2107-75DYR51
  Type . . . . . :   GMIR                  Target device  :   IBM.2107-75LHH71
  Volume sets  . :   4

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

           1E00-1E01       1E00-1E01        1E10-1E11         1E10-1E11
           1F00-1F01       1F00-1F01        1F10-1F11         1F10-1F11
```

- 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

Set up PowerVS Replication

- Setting up PowerVS Replication is covered in a separate document and details the following steps:
  - Deploy target VM on disposable volumes
    - Gather information
    - Shut down target VM
  - Start replication from source volumes
    - Creates target volumes
  - Create consistency set from volumes
  - Onboard consistency set
    - Makes replicated target volumes available
  - Attach replicated target volumes to target VM
  - Dispose of initial target deployment volumes

Create the Cloud environments on the **controller**

- An FSR Environment describes the storage to the toolkit. Use WRKCSE to manage the environments.
- The environments are stored in the device data domain and is kept in sync with both controllers.
  - Option 1 creates a new environment
    - Recommended name of the environment same as the preferred source VM name.
  - Enter GMIR when prompted for Copy Service Type
  - Enter CLOUD for Storage Type
  - Enter *SYSTEM for Primary ASP

```
                                        Add an Environment

Enter Copy Services and ASP information

Environment name . . . . :   TEST
Copy Service Type  . . . :   GMIR
Storage Type . . . . . . :   CLOUD

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

Create the Cloud environments on the **controller**

- Select the API Key names and virtual server instance ID's for the preferred source and target
  - Use F4 to Prompt

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

Environment  . . . . . :   TEST

Storage type . . . . . :   CLOUD

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

Cloud Replication Information:
  Source API Key name  . .   WDC_CLOUD
  Source VSI ID  . . . . .    0d458e15-2d8f-4bf4-9eb9-5c245891b4d5
  Source VSI name  . . . :   SRCDEMO
  Source Consistency Set     srcdemo
  Target API Key name  . .   DAL_CLOUD
  Target VSI ID  . . . . .   a1933b1d-e70c-4d2a-8245-508beb9bec07
  Target VSI name  . . . :   TRGDEMO
  Target Consistency Set :   rccg-9138-44d82
```

Create 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 Data

Supply all required values, press Enter.

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

Environment name . . . . . .   TEST
Production node name . . . .   __________
FSR communications port  . .   55920
Primary controlling node . .   __________   Name
Secondary controlling node     __________   Name
```

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.
- For PowerVS, specify *CLOUDENV for Primary HMC IP
- Use F6 to prompt the HMC for the Managed System, LPAR and Profile names

```
                                    Create CSE Data

Supply all required values, press Enter.

Preferred source details:
  IP address . . . . . .   _______________
  Primary HMC IP . . . . .   _______________
                                    IPv4 address, *CLOUDENV
  Secondary HMC IP . . . . .   _______________
  HMC managed system . . . .   ____________________________________
  HMC LPAR name  . . . . . .   ____________________________________
  HMC Profile name . . . . .   ____________________________________

Preferred target details:
  IP address . . . . . .   _______________
  Primary HMC IP . . . . .   _______________
  Secondary HMC IP . . . . .   _______________
  HMC managed system . . . .   ____________________________________
  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)
- Specify `/* *NONE */` for no command, user will have to shut down the LPAR manually.
  This provides an additional safeguard in case a switch is accidentally started.
- 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).

```
                                        Create CSE Data

Supply all required values, press Enter.

Power down command . . . . .   PWRDWNSYS *CNTRLD DELAY(30) RESTART(*NO)



Auto start cluster . . . . .   *YES         *YES, *NO
Message Queue  . . . . . . .   *SYSOPR      name, *SYSOPR
  Library  . . . . . . . . .     __________ library name

Text . . . . . . . . . . . .
```

Restoring toolkit library, setup on **Production** LPARs

- Place the toolkit savefile in QGPL (FTP, scp etc)
- Restore the toolkit library:
  - RSTLIB SAVLIB(QZRDHASM) DEV(*SAVF) SAVF(QZRDHASM52)
    - The ‘52' refers to the release and may change
  - ADDLIBLE QZRDHASM
- Run the setup program
  - SETUPFSR NODEROLE(*PRD) PORT(*DFT) PSCODE('??') PTSRLNBR(??) PTCODE('??')
    - The default port is 55920 and must match what we entered into CRTCSEDTA on the controller
- The access code is based on serial number and will be provided by the IBM Technology Expert Labs consulting team. You should have multiple access codes, one for each serial number

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

```
                                Work with System Information Entries

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

             Serial     LPAR    Default
Opt   Usage  number     number  CSEDTA       Comment

      *PS    787F800    *ANY    *NONE        WDC06
      *PT    VSHJKLR    *ANY    *NONE        DAL12
```

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                    *PSxx, *PTxx, *FCxx, *CTLx,
                                             *SGxx
IP Interface  . . . .   9.5.167.13         IPv4 address
Line Description  . .   ETHLINE            Name, *IPADDR, *VIRTUALIP
Resource Location . .   U9009.22A.787F800-V28-C6
                                           Name, *LINE, blank
Port  . . . . . .   0                      *LOC, *DFT, 0-65535
```

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

     *PS    9.5.167.13       ETHLINE     U9009.22A.787F800-V28-C6        0
     *PT    9.5.168.174      ETHLINE     U9009.22A.787F820-V34-C4        0
```

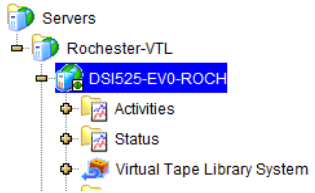
Finding communication resource bus locations on the **Production**

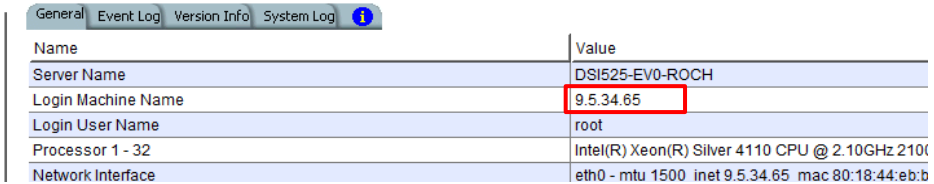
- WRKHDWRSC *CMN, opt 7
- The “Port” is on the second page, but is usually 0 for VIOS managed virtual adapters
- The format of the location code for the *PT can be inferred
  - V22 = LPAR number 22
  - C2 = Virtual slot 2 or Adapter number
- Can also use *LPAR to have toolkit resolve type, model, serial and virtual bus
  - *LPAR-C2-T1

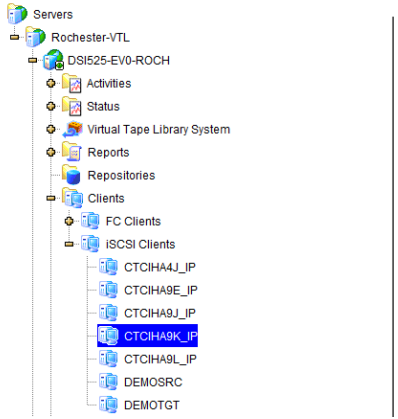
```
Resource name  . . . . . :   CMN11
Text . . . . . :   Ethernet Port
Type-model . . . . . :   2BD4-001
Serial number  . . . . . :   00-00000
Part number  . . . . . :

Location :   U9009.22A.787F800-V28-C6
```

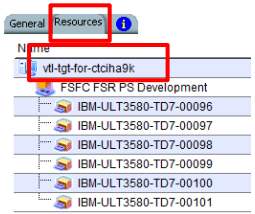
Finding iSCSI Resources on the **VTL**

- The iSCSI details can be found in the VTL Console

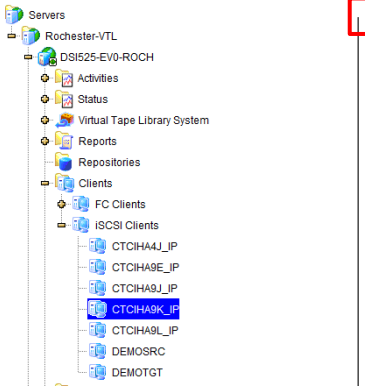


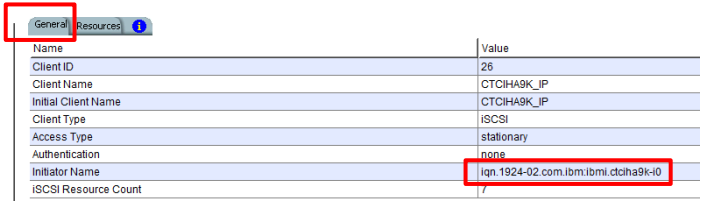






Client ION:





Entering iSCSI Resources on the **Production** LPAR

- Enter them into WRKSTRPRSC *ISCSI

```
                                  Add or Change iSCSI Resources
 Enter details, press Enter.

   Usage . . . . . .   *PS                    *PSxx, *PTxx, *FCxx, *CTLx,
                                                *SGxx
   IP Interface  . . .   9.5.34.65            IPv4 address
   Port  . . . . . .     3260                 0-65535
   Target Device IQN . .   DSI525-EV0
                                              IQN
   Client Device IQN . .   iqn.1924-02.com.ibm:ibmi.demotest
                                              IQN
```

```
                                  Work with iSCSI Resources

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

Opt   Usage   IP Interface      Target Device

      *PS     9.5.34.65         DSI525-EV0
      *PT     9.5.35.66         FalconStor Thingy
```

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                    *PSxx, *PTxx, *FCxx, *CTLx,
                                             *SGxx
Device Description      VTL_PS_DEV         Name
Serial Number . . . .   YTC634303828       Character value, *DEVD
Device Type . . . . .   *MLB               *MLB, *TAP, *DEV
```

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

        *PS       VTL_PS_DEV       *MLB      YTC634303828
        *PT       VTL_PS_DEV       *MLB      YTC634832773
```

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

```
Usage . . . . . .   *PS                 *PSxx, *PTxx, *FCxx, *CTLx,
                                          *SGxx
Destination . . . . .   *DFTROUTE       IPv4 address, *DFTROUTE
Subnet Mask . . . . .   *NONE           nnn.nnn.nnn.nnn, *NONE, *HOST
Next Hop  . . . . . .   9.5.167.1       IPv4 address
Preferred Interface     *NONE           IPv4 address, *NONE
```

```
 Preferred
Opt  Usage  Destination      Subnet Mask      Next Hop         Interface

     *PS    *DFTROUTE        *NONE            9.5.167.1        *NONE
     *PT    *DFTROUTE        *NONE            9.5.168.1        *NONE
```

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

- Add changes which should occur to BRMS depending on where it IPLs.
- The syntax is:
  - “For the BRMS object of this type, change the specified attribute to this value”
- For example:
  - “When starting as *PS then change the *DEVICE object TS3400 to use attribute *LOC TS3400PROD
- Additional items can be added by request

```
Usage  . . . . . .   *PS          *PSxx, *PTxx, *FCxx, *SGxx
Object . . . . . .   TS3400       Name
Object Type  . . .   *DEVICE      *DEVICE, *MEDPCY, *CTLGATTR
Attribute  . . . .   *LOC         *LOC, *MEDCLS, *MOVPCY, *MARKDUP
                                  *MARKHST, *MINVOL, *TEXT, *VOLSEC
                                  *DEVICE, *MEDPCYFUL, *MEDPCYINC

New Value  . . . .   TS3400PROD
```

Opt	Usage	Object Name	Object Type	Attribute	New Value
	*PS	TS3400	*DEVICE	*LOC	TS3400PROD
	*PT	TS3400	*DEVICE	*LOC	TS3400DR

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

CHKCSE

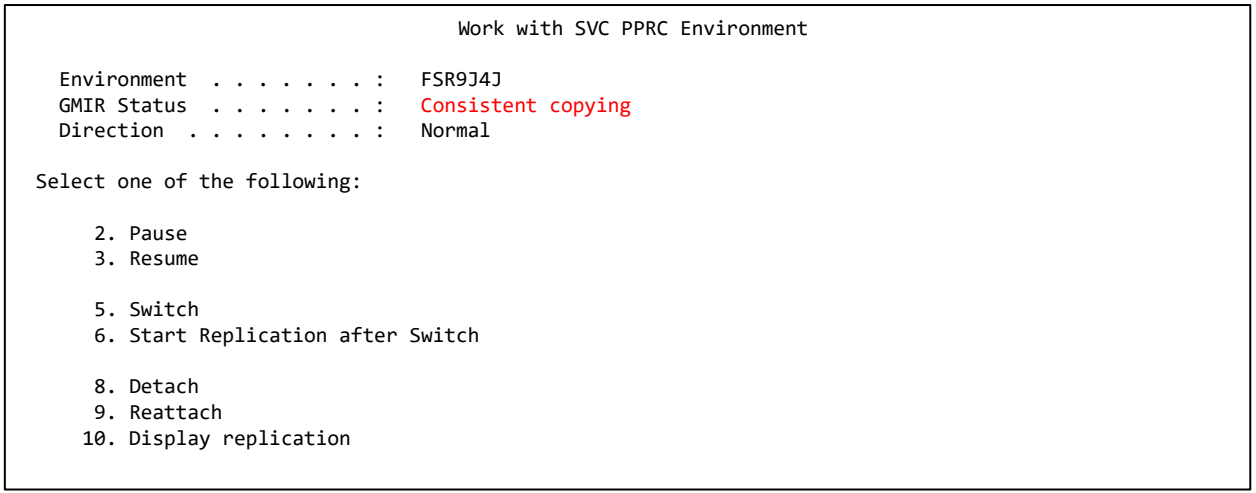
- CHKCSE is a toolkit command used to check whether you can perform a scheduled switch. It performs more checks than SWCSE or WRKCSE, including verifying that the LUNs reported to the production LPAR are being replicated.
- Run the command interactively now to test it.
- Schedule CHKCSE to run periodically and monitor for escape messages. An escape message indicates a switch may fail.

```
                                Check Copy Services Environ. (CHKCSE)

Type choices, press Enter.

Environment name . . . . . .                F4 to prompt
```

```
> CHKCSE ENV(FSR_TEST)
  Partition TEST is configured for a manual IPL.
  CHKCSE completed successfully.  FSR_TEST is ready for the SWCSE command.
```

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.
- A ‘detach’ is a test switch without an outage to the production LPAR.
  - It will pause replication and IPL the target into restricted state.
- 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.



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 . . . :   FSR9J4J           Type  . . . . . :   GMIR
Consistency group :   ctciha9j_4j
Cycle period  . . :   300
Primary . . . . . :   Master
State . . . . . . :   Consistent_copying

  Relationship    State / in sync?            Freeze time          Progress
  rcrel28         consistent_copying          2023/04/18 09:58:57    99
  rcrel29         consistent_copying          2023/04/18 09:58:57    99
  rcrel30         consistent_copying          2023/04/18 09:58:57    99
  rcrel31         consistent_copying          2023/04/18 09:58:57    99
```

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 SVC using PCYGM requires additional manual steps.

    To ensure the user understands these steps are required, the menu option for Detach is not displayed unless the following environment variable exists in the job issuing the detach: QZ_ALLOW_PCYGM_DETACH

    When target LPAR has a command line (before the controlling subsystem has started) issue the following commands:

    ```
    CHGIPLA STRRSTD(*YES)
    CHGSYSVAL QSTRUPPGM VALUE(*NONE)
    CRTDTAARA DTAARA(QZRDHASM/QDETACHED) TYPE(*CHAR)
    ```
  - Detach for DS8K is supported for GMIR, not MMIR
  - Detach for PowerVS is supported.
- Once detached, the replication status will be “Idle”.

Test re-attach 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”.
- The longer the replication is paused, the longer it will take to reach a “Consistent” state.

```
                                    Work with SVC PPRC Environment

  Environment  . . . . . :   FSR9J4J
  GMIR Status  . . . . . :   Inconsistent copying
  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
                                                                  Bottom
Selection
     9
```

Perform a scheduled switch with WRKCSE

- A **Scheduled Switch** will shut down the primary LPAR, IPL the secondary LPAR, and then reverse replication.
  - 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
- Auto replicate *DFT will restart replication after a scheduled switch.

```
                                    Switch Copy Services Environ. (SWCSE)

Type choices, press Enter.

Environment name . . . . . > TEST          F4 to prompt
Switch type  . . . . . .   *SCHEDULED    *SCHEDULED, *UNSCHEDULED
Type . . . . . .           *             *, *GMIR, *MMIR
Auto replicate . . . . . .   *DFT         *DFT, *YES, *NO
```

```
Message ID . . . . . :   IAS0029       Severity . . . . . :   40
Message type . . . . . :   Inquiry
Date sent  . . . . . :   04/18/23      Time sent  . . . . . :   10:46:22

Message . . . . :   Perform full system switch? (G C)
Cause . . . . . : A scheduled SWCSE command was issued by job 2 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 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.
- Auto replicate *DFT will **not** restart replication after an unscheduled switch.
- When SWCSE is called, you will be presented with this message on the controlling LPAR:

```
 Unscheduled SWCSE Warning

You have issued an unscheduled GMIR 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 GMIR switchover.
```

Restart replication after a switch

- If a switch did not restart replication you can do so from WRKCSE option 12 then option 6.
- A panel confirming the direction of replication is presented.
  - Use F8 to reverse replication, and F10 to start replication.

```
 Work with SVC PPRC Environment

  Environment  . . . . . :   TEST
  GMIR Status ..............................................................
  Direction   :                Confirm Start of Replication                :
              :                                                            :
Select one of :  Warning; this option may be hazardous to the health       :
              :  data of your production data. It is possible to start     :
     2. Pause :  replication in either direction. BEFORE CONTINUING,       :
     3. Resum :  CONFIRM THE NEW NODE ROLES BELOW.                         :
              :                                                            :
     5. Switc :                                                            :
     6. Start :  Press F10 to continue, F8 to reverse, F12 to cancel.      :
              :                                                            :
     8. Detac :    Source LPAR/VM :   *PT prod                            :
     9. Reatt :    Target LPAR/VM :   *PS dr                              :
    10. Displ :                                                            :
              :                                                    Bottom  :
Selection     :  F1=Help        F3=Exit   F8=Reverse the Direction         :
     6        :  F10=Continue   F12=Cancel                                 :
              :                                                            :
F1=Help   F3= :............................................................:
```

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

```
PPRC status  . . . . . .   *READY         *READY, *INCOMPLETE, number
PPRC direction . . . . . .   *NORMAL        *NORMAL, *REVERSED
```

Save the Copy Services Environment (CSE) Data on both **Controllers**

- 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 a new IFS directory based on the current timestamp
  - RSTDDD
    - Restores all the DDD information from an existing IFS directory
- Recommendation is to run SAVDDD prior to an upgrade and immediately before IFS backups on the controlling LPAR

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           F4 to prompt
Type . . . . . .               *ALL           *ALL, *FLASH, *GMIR, *LUN...
Extended logging . . . . . .   *YES           *YES, *NO
Job name . . . . . .           *NONE          Name, *CURRENT, *NONE, *LAST
  User . . . . . .                            Name
  Number . . . . . .                          000000-999999
```

- On the primary LPAR:
  - /QIBM/Qzrdhasm/qzrdhasm.log
  - /QIBM/Qzrdhasm/joblogs/*
  - WRKJOB QZRDIAEXT2 and view the joblog
  - WRKJOB QSTRUPJD and view the joblog

Schedule Log Cleanup on all LPARs

- CLEANLOGS will prune toolkit 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('22:30')`

```
                    Clean Toolkit Logs (CLEANLOGS)

                      Type choices, press Enter.

   Days of information to retain  .                *NONE, days

                                    Additional Parameters

FSFC environment . . . . . .   *NONE          Name, *NONE, *ALL
```

Contacting support if you have problems

- Support for the FSFC Toolkit is to customers who meet the following criteria:
  - Current System i Software Maintenance Agreement
  - Current FSFC 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
- Lab Services “Copy Services Toolkit – Full System Flashcopy” using component
- identifier 5798CST00.