Quick-install of the PowerHA Full System Flashcopy Manager 5.2

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Overview

What the heck is this document for?

- This is a quick-install guide for configuring the Full System Flashcopy Manager for the following storage products:

  - SVC family (FlashSystems, Storwize)

    - This document only covers volume-group FlashCopy.

    - Refer to prior versions for consistency-group based configurations.

  - DS8K family

  - 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 FSFC Manager Webpage:

  - **http://ibm.biz/FSFCManager**

Overview of Full System Flash Copy concepts

3 Partition returns to production duties

1 Write contents of memory to disk

2 Flashcopy the disks

6 Copy BRMS data back to the source

Source

4 IPL the target partition

Target

5 Backup the target partition to tape

Controller

7 Deactivate target LPAR

Flashcopy

LPARs
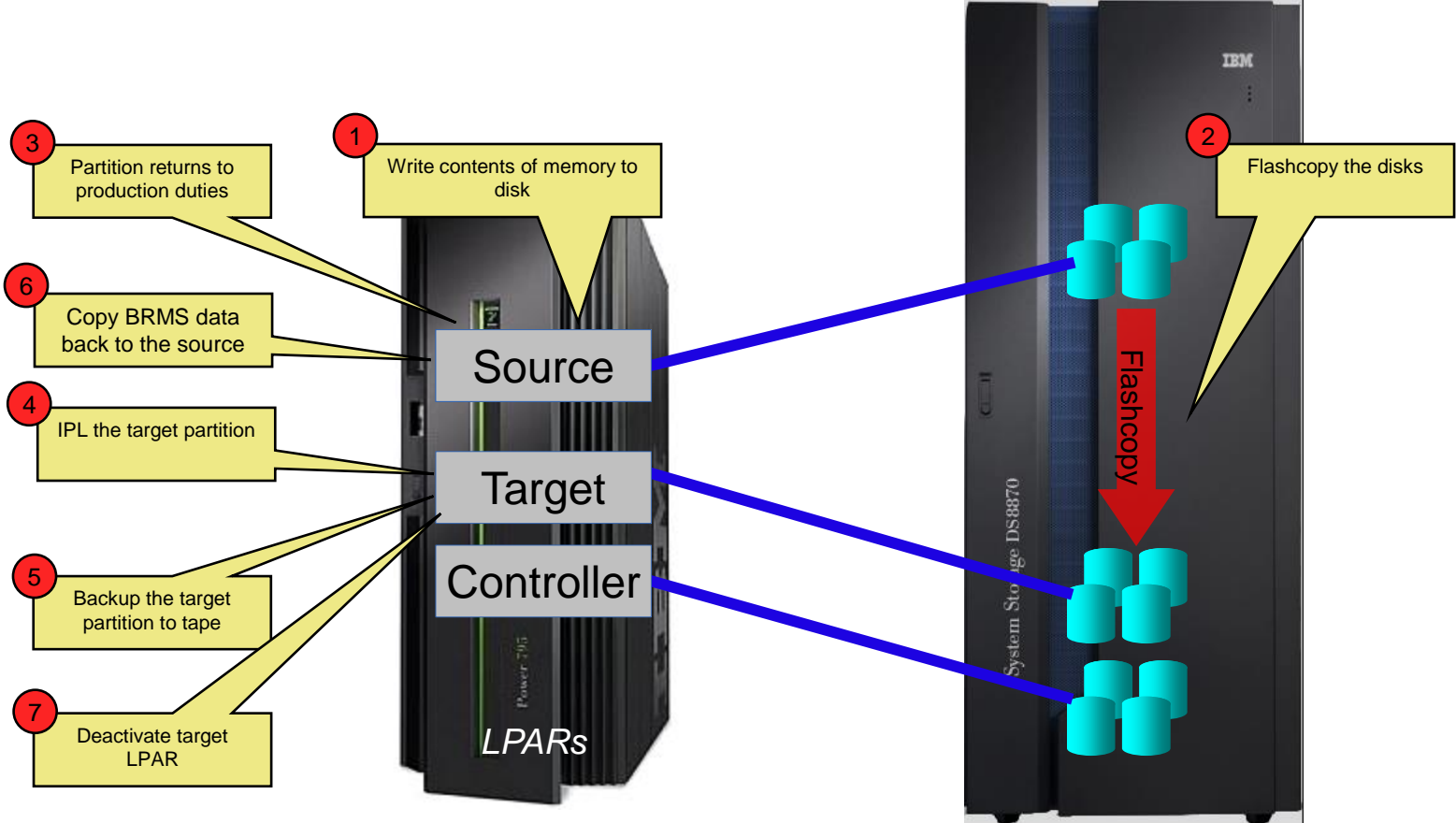
Flashcopy at DR site

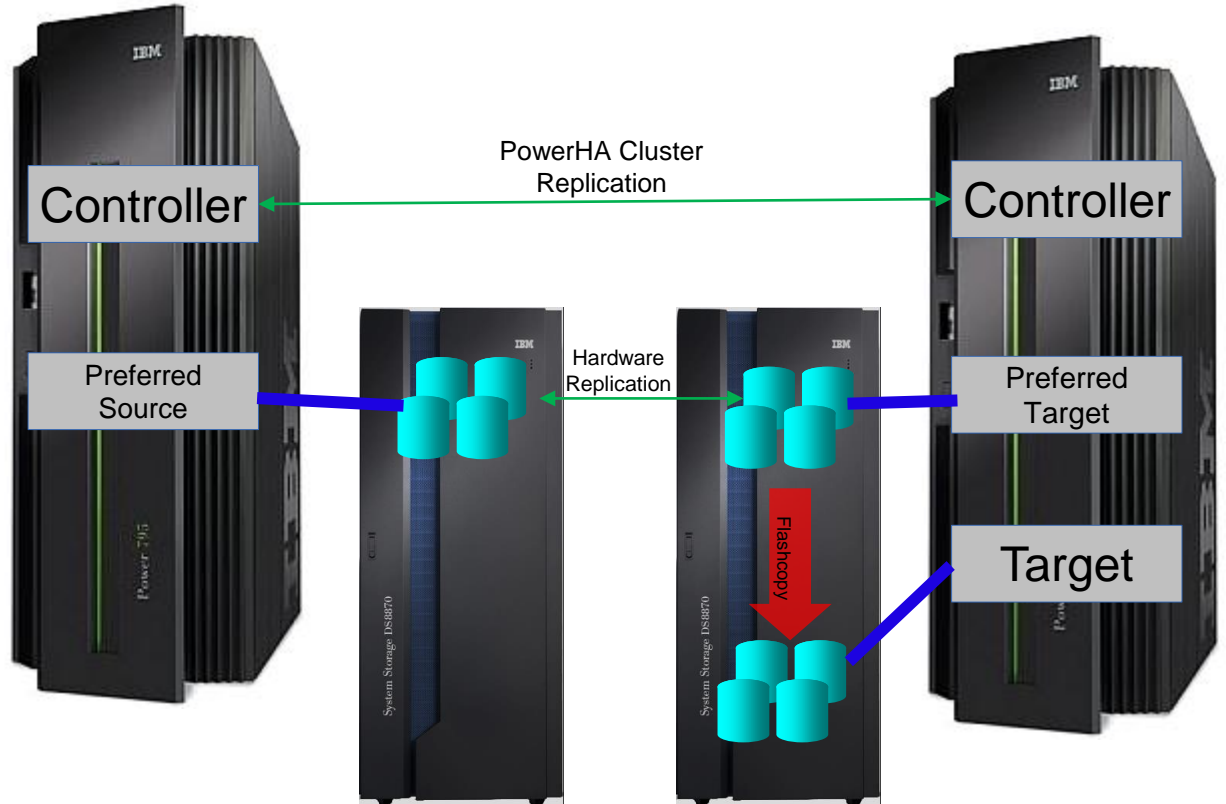It is possible to perform the flashcopy at the DR site.

The toolkit will manage the hardware replication so that the DR site can create a flashcopy for backup purposes.

This is supported for:

- DS8K GMIR
- SVC GMCV and MMIR

This is *not* supported for:

- PowerVS
- DS8K MMIR
- SVC GMIR

Controller

PowerHA Cluster Replication

Controller

Preferred Source

Hardware Replication

Preferred Target

Flashcopy

Target

Shared Flash Copy LPAR

The controlling LPAR can manage the host connections of the Backup LPAR to its disks. This allows one backup LPAR to sequentially service the backups of multiple production LPARs, reducing the footprint of the total solution.

Our toolkit's controlling LPAR can coordinate the flashcopy processes among multiple production LPARs. This includes when to perform the flashcopy and managing the locks of multiple processes when they share resources (LPARs, disks, etc).

For example, both flashcopies can occur at 2am.

Then the toolkit will attach the target LPAR to the first flashcopy disks and run it's backup. When that finishes, the toolkit will attach the target LPAR to the second flashcopy disks, IPL and run backups from that.

The number of production LPARs sharing a target LPAR is limited by how long the backups take.

Controller

Preferred Source

Preferred Source

Target

2am Flashcopy

2am Flashcopy

2am

8am

6
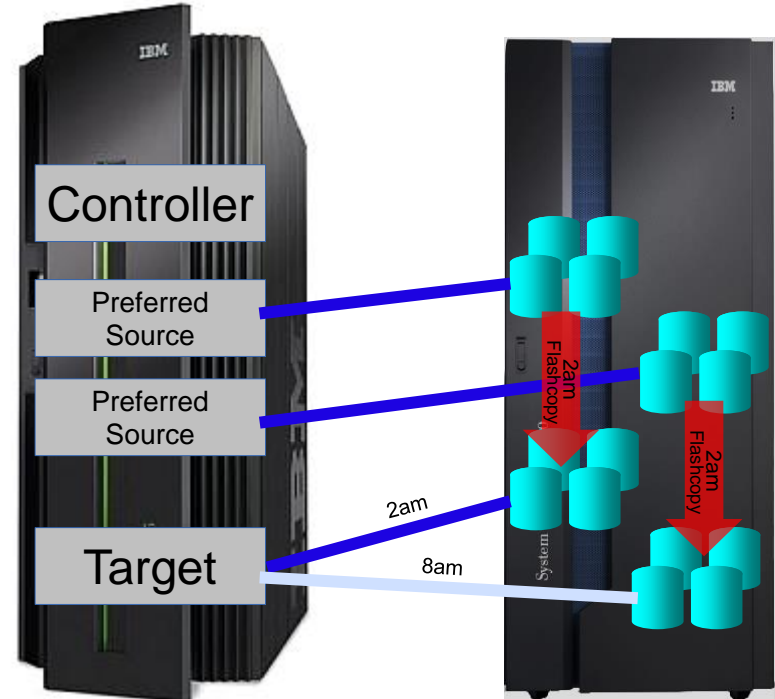
Multi-Flash

When one production LPAR hosts multiple applications which quiesce at different times, or an application that has both pre-batch and post-batch processing, our toolkit can manage concurrent flashcopy operations. In these scenarios each backup LPAR will typically backup only a portion of the data, i.e. the data associated with a specific application.

Note that a quiesce or memory flush affects the entire production LPAR, not just one application.

Controller

Preferred Source

Target 1

Target 2

2am Flashcopy

4am Flashcopy
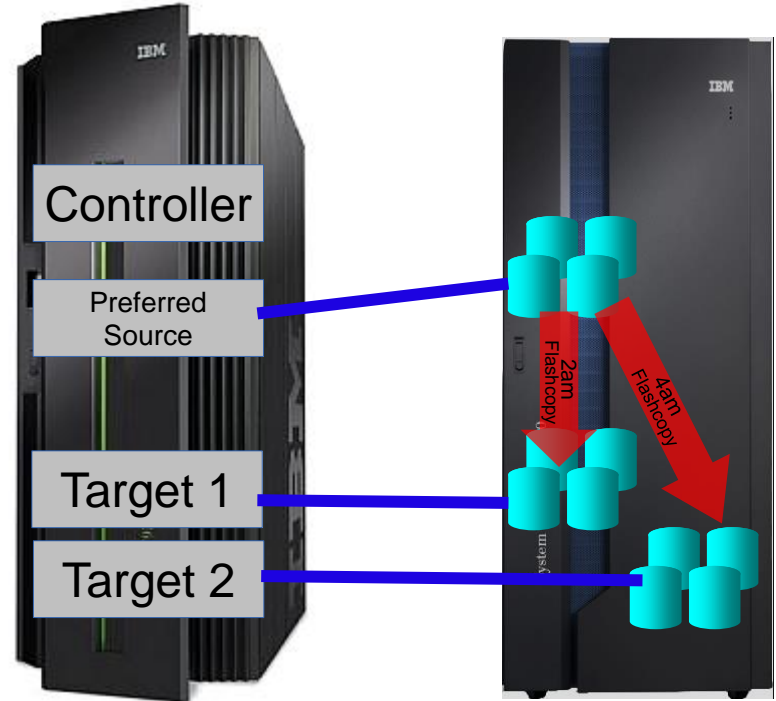
Firewall Access (on-prem)

Workstation access required for installation and configuration only

Ping, Telnet (23) → Source

Ping, Telnet (23)

Ping, ssh port 22

Ping, ssh port 22
Telnet 2300

Ping
Toolkit
(dft=55920)

BRMS Xfer port *DFT = 55066
Toolkit communications default = 55920

Controllers
PowerHA ports 5550, 5551 between controllers

Ping, ssh port 22
DSCLI = port 1751
SVC = port 7443

Ping, ssh port 22

Ping
Toolkit
(dft=55920)

Target
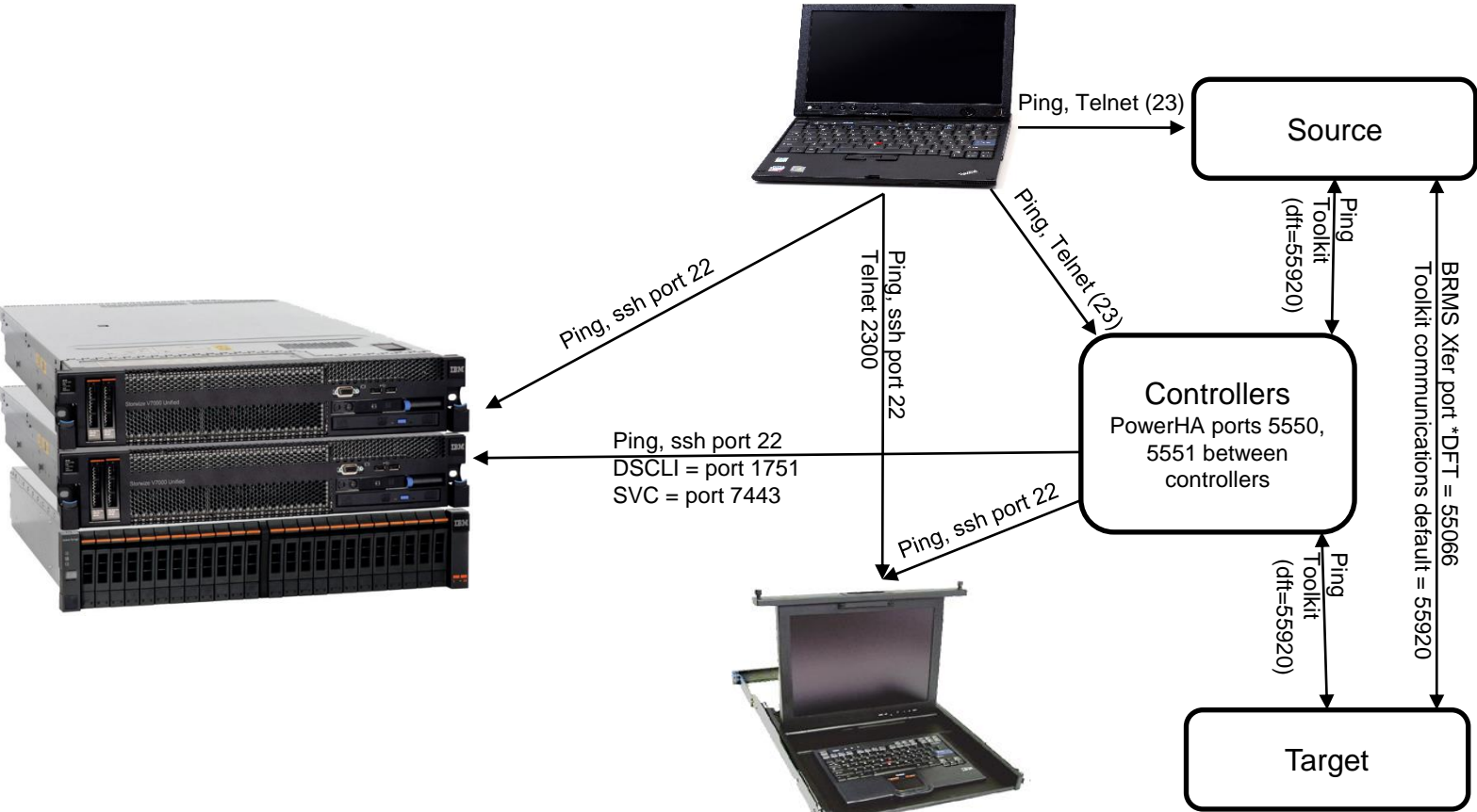
Firewall Access (PowerVS)

Source

Controllers
PowerHA ports
5550, 5551 between
controllers

Target

Flashcopy

Ping, Telnet (23)

Ping, Telnet (23)

Ping
Toolkit (dft=55920)

BRMS Xfer port *DFT = 55066
Toolkit communications default = 55920

Ping
Toolkit (dft=55920)

Ping
https (443)

Workstation access
required for installation
and configuration only

Public IBM PowerVS URLs:
iam.cloud.ibm.com
resource-
controller.cloud.ibm.com
us-east.power-iaas.cloud.ibm.com
etc.

FlashSystem setup prior to our engagement

- o Configure the storage unit for Primary, Secondary and Controlling LPAR(s).
  - o Firmware level 8.6.0.1 or newer
    - o Supports volume group flashcopy
  - o Create or select user profile
    - o Must be assigned to CopyOperator (or better) user group
    - o If changing host connections, must be Administrator
  - o Volumes
    - o Created for source LPARs
    - o Source and Target hosts created and zoned to the LPARs
  - o Licenses (Replication, Thin-provision, etc)
  - o If using replication:
    - o Partnerships
      - o We can remotely help you set this up (also ensures you have communication between the SVC's before we arrive)
    - o Start replication
      - o Policy-based GMIR replication should be completed before we're onsite so that won't have to wait for it to catch up

DS8K setup prior to our engagement

- o Create a user profile on the DS8K
    - o Can be other than QLPAR, make a member of the admin group
    - o Remember the password, set to not expire
        - o chpass –expire 0
- o Configure the storage unit for Primary, Secondary and Controlling LPAR.
    - o Recent firmware level
        - o Install DSCLI on the IBM i from the DS8K CD
        - o Bundle 87.10.91.0 or newer (required for creating GMIR D-Copy)
    - o Create fixed block volumes (requires ranks, arrays, extent pools, space efficient repositories, etc)
        - o For source and target LPARs
    - o Volume groups, ports and host connections
    - o Licenses (Replication, Space Efficient, etc)
    - o PPRC Paths
        - o We can remotely help you set this up (also ensures you have communication between the DS's before we arrive)
    - o Start replication
        - o Replication should be completed before we're onsite so that won't have to wait for it to catch up

Cloud setup prior to our engagement

- o Create the Cloud environment including
    - o One or two persistent controlling virtual server instances (IBM i)
        - o Access to the PowerVS APIs (i.e. iam.cloud.ibm.com etc)
    - o Production virtual server instances
        - o Network access (IP addresses etc)
        - o Storage with OS loaded and configured
        - o BRMS (optional)
    - o Flashcopy virtual server instances
        - o Network access (IP addresses etc)
        - o Backup device connectivity
    - o Serial numbers for all the instances
        - o DSPSYSVAL QSRLNBR
        - o Include potential LPM serial numbers, if known
- o Service ID
    - o Access to the resources (instances, storage, etc)
- o API Key (the API Key must be retained when created)

HMC Configuration

o   Create a user on the LPAR HMCs

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

   o   Password is required

   o   Hmcsuperadmin with AllSystemResources

o   Additional considerations (these are enabled by default):

   o   Enable remote command execution

   o   Enable ssh through the HMC's firewall

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

- o Place the toolkit savefile in QGPL (FTP, scp etc)
- o Restore the toolkit library:
  - o RSTLIB SAVLIB(QZRDHASM) DEV(*SAVF) SAVF(QZRDHASM52)
    - o The '52' refers to the release and may change
  - o ADDLIBLE QZRDHASM
- o Run the setup program
  - o SETUPFSFC NODEROLE(*SRC) ACSCODE('??')
    - o Press PF4 and specify the line description, TCPIP interface and subnet mask to create on the controller for the target to use
  - o The port number is used for toolkit communications from the controllers, *DFT is 55920
  - o The line description and IP interfaces will be created
  - o Will create user profile QLPAR without a password, initialize files etc.
- o If additional line descriptions and IP addresses are needed, for example for iSCSI VTL's, create those manually
- o If the target LPAR is on a different serial number:
  - o A license key for the target LPAR must be entered.
  - o Use ADDPRDACS on the Production LPAR to enter the serial number and license for the target LPAR.

Enter the FlashCopy information on the **<u>Production</u>** LPARs

o The Toolkit needs some information to determine whether it is running on the Source or Target LPAR.

o Use WRKSTRPRSC *SYS to enter that information.

o There must be *PSxx and *FCxx entries:

```
                    Work with System Information Entries

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


              Serial     LPAR    Default
 Opt   Usage  number     number  CSEDTA      Comment


       *FC    21AE977    53      *NONE       Target LPAR
       *PS    21AE977    52      *NONE       Source LPAR
```

Enter the controller information on the **Production** LPARs

o If using multiple controllers, set up the toolkit so STRFSFLASH can be issued on the production LPAR and connect to the first available controller.

o Use WRKSTRPRSC *CMN and enter the controller information:

```
                    Work with Communications Startup Resources

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

 Opt  Usage  IP Interface      Line Desc   Hardware Resource Location      Port
  _    _____  _____
  _    *CTL1  1.2.3.4           N/A         PRIMARY CONTROLLER              *DFT
  _    *CTL2  1.2.3.5           N/A         SECONDARY CONTROLLER            *DFT
```

o STRFSFLASH CTLR(*AUTO) will use this information to connect to the first available controller.

o STRFSFLASH can still be run from the controller with CTLR(*LOCAL)

o The IP used by the Flashcopy LPAR should NOT be in this list. That information will be entered in WRKCSEDTA.

Modifying the Startup Program on **Production** LPARs

o Modify startup program on each node to allow the toolkit to recognize when it is a FlashCopy target.

o 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 3) *EQ '?????') *OR +
                (%SST(&IPLTYPE 1 5) *EQ '*TGTF') *OR +
                (%SST(&IPLTYPE 1 5) *EQ '*DTCH')) +
           THEN(RETURN)
STRTCP
MONMSG     MSGID(CPF0000)
```

o Change the IPL attributes to not start TCP automatically

   o CHGIPLA STRTCP(*NO)

Creating the cluster on the **controllers**

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

o   If multiple controllers are to be configured, issue these messages on all of them:

   o   STRTCPSVR *INETD

   o   CHGTCPSVR *INETD AUTOSTART(*YES)

   o   CHGNETA ALWADDCLU(*ANY)

o   On the Master controller

   o   CRTCLU CLUSTER(FSFC) START(*YES) DEVDMN(*GEN)

      o   PF4, fill in Primary and Secondary Controlling node names and IP addresses

o   On Auxiliary controller:

   o   WRKCLU, validate cluster is started

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

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

o Restore the toolkit library:

  o RSTLIB SAVLIB(QZRDHASM) DEV(*SAVF) SAVF(QZRDHASM52)

   o The '52' refers to the release and may change

  o ADDLIBLE QZRDHASM

o Run the setup program

  o SETUPFSFC NODEROLE(*CTL) PORT(*DFT) ACSCODE('??')

  o The port is used to receive communications from the production LPARs, *DFT is 55920

  o Will create user profile QLPAR without a password, initialize files etc.

```
     Set up IBM Pwr HA tools - FSFC (SETUPFSFC)


Type choices, press Enter.


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

Update the startup program on the **controllers**

o Modify the startup program (after IP has been started) on each controller to:

  o Start the cluster if there are multiple nodes using the DDD:

    o QSYS/STRCLUNOD CLUSTER(*) NODE(*ALL)

    o This requires *IOSYSCFG so QSTRUPJD should specify a profile like QLPAR so after compiling the startup program issue this command:

      o CHGJOBD JOBD(QSTRUPJD) USER(QLPAR)

  o Start the subsystem if any process will be initiated from the production LPAR:

    o QSYS/STRSBS QZRDHASM/QZRDFSR

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

o Not necessary for PowerVS Operations

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

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

   o Use the latest version, ensure the file /QIBM/Qzrdhasm/ssh/jsch.jar links to what you downloaded.

o The Java Secure Channel is an open-source implementation of ssh

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

o 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
    - PowerVS credentials are stored in WRKCSECRDL *CLOUD (covered a few pages later)
- 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

o   FSFC uses an API Key to authenticate cloud resource usage.

    o   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

o   After identifying the Service ID identify or create an API Key

  o   When the API Key is created it will be displayed or downloaded in a file.

    o   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.

Enter the API Key into WRKCSECRDL

o   Use the command WRKCSECRDL TYPE(*CLOUD) to work with Cloud credentials.

   o   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.

   o   The API Key can be entered but not extracted. It is stored in an encrypted space.

   o   The URNs and URLs will depend on the specific cloud implementation.

      o   The team which set up your PowerVS cloud account may have this information

   o   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 . . . . . . . . . . . . > fsfckey      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  . . . . . . . . . .   What does the smell of Purple sound like?

```

Storage Selector

SVC Environment Configuration

DS8K Environment Configuration

Cloud Environment Configuration

Create the SVC environments on the **controller**

o An FSFC Environment describes the storage to the toolkit. Use WRKCSE to manage the environments.

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

- o Option 1 creates a new environment
- o Specify copy service type FLASH
- o Specify Storage type VGFC
- o Enter *SYSTEM when prompted for ASP Copy Descriptions
- o After entering the FlashSystem IP Address enter *SELECT on the ID parameters to retrieve lists from the FlashSystem
- o Use F6 to validate the information

o NOTE: An environment cannot be used for both FlashCopy Backups and Safe Guarded Copy (they use different Target Volume Pool ID's and host connections). Separate environments will need to be created.

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


  Environment name . . . . . . . . . . :   TEST
  Storage Type . . . . . . . . . . . . :   VGFC


Primary ASP  . . . . . . . . . . . . :   *SYSTEM


FlashSystem IP Address . . . . . . :   9.5.167.155
FlashCopy volume group ID  . . . . :   15
Target Volume Pool ID  . . . . . . :   3
Safeguarded Copy . . . . . . . . . :   *NO

  Comment:
    Text . . . . . . . . . . . . . . .   Something meaningful to humans


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

Finish the SVC environments on the **controller**

o A Volume-group FlashCopy creates new target volumes and the toolkit needs to know which **Flashcopy** host to attach them to.

- o After creating the environment, use option 16 to enter host information
- o Use Option 1 and F6 to get a list of hosts defined on the FlashSystem
- o Do not enter any volumes
- o Use F8 to validate the hosts.

o For Safe Guarded Copy environments, the hosts are used for recoveries. The recovery volumes will be attached to the host.
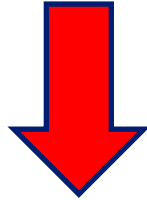
```
                    Work with Host Mappings

   Environment  . :   FSFC9M                  Device . . . . :
   Type . . . . . :   FLASH

 Type options, press Enter.
  1=Add    2=Change    4=Delete    6=Change host volume list

                                    Volume
   Opt      Host name                Count

            ctciha9p_1                  0




 F1=Help   F3=Exit   F6=Import host   F8=Validate   F12=Cancel
```

[Click here to continue with CSE Data](#)

Create the DS environments on the <u>controller</u>

- An FSFC Environment describes the storage to the toolkit. Use WRKCSE to manage the environments.
  - Option 1 creates a new environment
- The environments are stored in the device data domain and is kept in sync with both controllers.
- Enter the requested information then PAGE DOWN

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

Environment name . . . . . . . . . :   TEST
Storage Type . . . . . . . . . . . :   DS8K

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

FlashCopy DS unit information:
  Device . . . . . . . . . . . . . .   IBM.1234-1234565       Name



                                  More . . .
```

Enter the DS information

o   Enter the flashcopy details

o   Enter the DS unit details

o   If the IP address isn't in WRKCSECRDL yet, pressing enter will take you there to add it.

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

FlashCopy IASP Manager options:
  Full FlashCopy . . . . . . . . . .   *NO                    *YES, *NO
  Resync FlashCopy . . . . . . . . .   *NO                    *YES, *NO
  Multi incremental resync . . . . .   *YES                   *YES, *NO
  Space Efficient FlashCopy  . . . .   *NO                    *YES, *NO
  Target PPRC  . . . . . . . . . . .   *NO                    *YES, *NO
  GMIR D-Copy target flash . . . . .   *NO                     *YES, *NO

DS unit SMC information:
  Flash hmc1 . . . . . . . . . . . .                          IPv4
  Flash hmc2 . . . . . . . . . . . .                          IPv4
  Port . . . . . . . . . . . . . . .   1751                  1750, 1751

Comment:
  Text . . . . . . . . . . . . . . .

Press Enter to add DS8K credentials for 1.2.3.4, press F12 to cancel.
```

Enter the DS information

o   Enter the volume details

```
Add, Change or Delete Volumes

   Environment  . :   TEST                    Source device  :   IBM.123
   Type . . . . . :   FLASH                   Target device  :   IBM.123
   Volume sets  . :   0

Type Volume options; 1=Add, 2=Change, 4=Delete, press Enter.
              Source           Flash
   Opt       Volumes          Volumes
    1        0100             0200
```

Enter the DS information – host connections

o From WRKCSE, use option 16 to manage the target LPAR host connections

o Note the use of F4 to prompt for hosts, and F6 to import LUNs

```
                              Work with Host Connections

   Environment  . :    FSFC137              Device . . . . :   XBM.2107-75XA511
   Type . . . . . :    FLASH

 Type options, press Enter.
   1=Add    2=Change   4=Delete    6=Work with Volumes


                                   Number
   Opt      Host name            Volumes

            CTCCSM1                    1






                                                    Click here to continue with CSE Data





                                                           Bottom
   F1=Help    F3=Exit    F4=Prompt    F12=Cancel
```
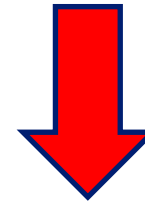
Enter the Cloud information – VSI Information

○ From WRKCSE, use option 1 to create a new Cloud environment.

○ Enter the API Key name you created in WRKCSECRDL

○ On the VSI parameters press F4 to retrieve a list of the instances associated with the API Key

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


Environment name . . . . . :   CLOUD
Storage Type . . . . . . . :   CLOUD


Primary ASP  . . . . . . . .   *SYSTEM                    *SYSTEM

Cloud Flash Copy Information:
  API Key name . . . . . . .   us-east
  Source VSI ID  . . . . . .   47094614-322c-4c90-9006-f833b2676613
  Source VSI name  . . . . :   prod
  Target VSI ID  . . . . . .   1786c35b-715a-475d-8f40-2c947b864c37
  Target VSI name  . . . . :   fc

Comment:
  Text . . . . . . . . . . .



                                                          Bottom
 F1=Help   F3=Exit   F4=Prompt   F12=Cancel
```

Create Copy Services Environment (CSE) Data on either **Controller**

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

o   This data is also stored in CRG's. The toolkit will create the CRG. It will always remain inactive when viewed in WRKCLU opt 9.

o   CRTCSEDTA, CHGCSEDTA, DLTCSEDTA and DSPCSEDTA can be used to work with this information.

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

o   WRKCSEDTA displays all the data created.

```
                      Work with CSE Data

Type options, press Enter.
  1=Create   2=Change   3=Copy   4=Delete   5=Display


                      CRG
Opt     CSE Data      type        Text

        FSR9M2        FSR          FSR from 9M to 9O
        HA8FSR2       FSR          DS8K FSR from HA8FSR1 to HA8FSR2
        FSFC9J9K      FSFC
        FSFC9M9N      FSFC       GMCV Flash
        FSFC9M9P1     FSFC
        FSR9J2        FSR
        FSFC9M9P2     FSFC
        FSFC9F9G      FSFC
                                                          More...
Parameters or command:
===>
```

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

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o Use CRTCSEDTA or WRKCSEDTA opt 1 to enter the flashcopy operational details

o The command will prompt for details depending on what you enter

```
                        Create Full System FlashCopy CSE Data

  Supply all required values, press Enter.


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


  Environment  . . . . . . . . .     TEST                Name
  HyperSwap environment  . . . .     *NONE               *NONE, Name
  Primary controlling node . . .     NODE1               Name
  Secondary controlling node . .     node2               Name
  Communications port  . . . . .     55920


  Physical-Virtual Isolation
    FlashCopy  . . . . . . . . .     *NO                 *YES, *NO

Source LPAR IP address . . . .     1.2.3.4             IPv4 address
Source host alias  . . . . . .     SOURCE              Name
Target host alias  . . . . . .     TARGET              Name
                                                              More...

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

Memory flush method on either **Controller**

o   Start with *FRCWRT. We'll change it to *QUIESCE later.

```
                      Change Full System FlashCopy CSE Data

 Supply all required values, press Enter.

 Method to flush memory . . . .    *FRCWRT           *QUIESCE, *FRCWRT, *IPL,
                                                       *RAGGED, *NONE


Target LPAR Information:
  HMC Primary IP . . . . . . .    1.2.3.4            IPv4 address, *CLOUDENV
  HMC Secondary IP . . . . . .                       IPv4 address
  HMC managed system . . . . .    MngSys
  HMC LPAR name  . . . . . . .    TargetLparName
  HMC Profile name . . . . . .    default_profile
  Shutdown target before
    FlashCopy  . . . . . . . .    *YES               *YES, *NO
  Restart target after
    FlashCopy  . . . . . . . .    *YES               *YES, *NO, *INQ, *FRCINQ,
                                                       *PAUSE, *COPIED
                                                                    More...
 F1=Help   F3=Exit   F4=Prompt   F6=Query HMC   F12=Cancel
```

HMC LPAR inforomation on either **Controller**

- If the source or target LPARs participate in LPM or LUN switches, specify *SEARCH on the HMC Managed System Name parameter.

- If this is a PowerVS Cloud environment specify *CLOUDENV on the Primary HMC IP parameter and leave the rest blank.

- Note that you can prompt on the system, LPAR and Profile names using F6

  - F6 to prompt will not work with *SEARCH (which is used if the LPAR will be LPM'd)

- Do not specify BRMS integration (yet)

```
Target LPAR Information:
  Primary HMC IP . . . . . . .    1.2.3.4            IPv4 address, *CLOUDENV
  Secondary HMC IP . . . . . .                       IPv4 address
  HMC managed system . . . . .    *SEARCH
  HMC LPAR name  . . . . . . .    lparName
  HMC Profile name . . . . . .    lparProfile
  Shutdown target before
    FlashCopy  . . . . . . . .    *YES               *YES, *NO
  Restart target after
    FlashCopy  . . . . . . . .    *YES               *YES, *NO, *INQ, *FRCINQ,
                                                      *PAUSE, *COPIED

  Use BRMS integration . . . . .  *NO                *YES, *NO

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

Communications information on either **Controller**

o If it is available, enter:

    o Target LPAR IO Card location code, line description and IP interfaces (include iSCSI interfaces)

        o Use *LPAR- to have toolkit resolve type-model-serial-id on the target, i.e. *LPAR-C2-T1

    o Routing details

```
                         Change Full System FlashCopy CSE Data

 Supply all required values, press Enter.

 Target Comm Interfaces:

   IO card location code  . . .   *LPAR-C2-T1
                                                 *NONE, identifier
   Line description . . . . . .   FSFCLINE        line name, *VIRTUALIP
   IP interface . . . . . . . .   9.5.34.90       IPv4 address

        + for more values  . . .

 Target LPAR Default Route:
   Binding interface  . . . . .   *NOCHANGE       IPv4 address
   Next hop . . . . . . . . . .                   IPv4 address
```

Backup device information on either **<u>Controller</u>**

- o If the Flash Copy (target) LPAR is going to use a VTL via iSCSI it needs to know the new initiators for the target LPAR to use.

- o Any existing source initiators are removed when the LPAR/VM UUID changes, i.e. when:

  - o Flash Copied

  - o Replicated and switched

  - o Restored on new hardware

- o The IQN information is not saved (not even *SAVCFG)

- o The new initiators for the target to use.

- o Add the existing tape device description name and the serial number

```
                          Change Full System FlashCopy CSE Data

 Supply all required values, press Enter.

 Target LPAR iSCSI Information:
   VTL IP address . . . . . . .   19.5.34.65         *NONE, IP address
   VTL port number  . . . . . .   *DFT               *DFT, 0-65535
   VTL IQN  . . . . . . . . . .   vtl-tgt-for-fclparname

   Initiator IQN  . . . . . . .   iqn.1924-02.com.ibm:ibmi.fclparname-i0


 Target LPAR Device Setup:
   Backup device description      VTL_PS_DEV         *NONE, device name
   Device serial number . . . .   YTC634303828
       + for more values  . . .
```
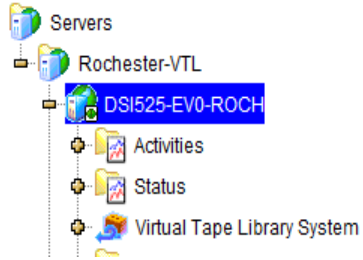
Finding the iSCSI information
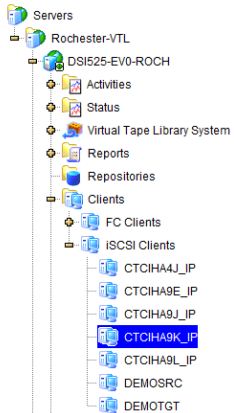
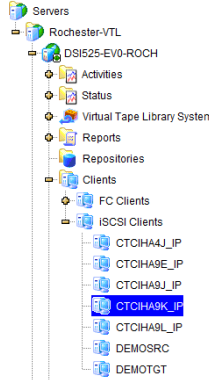o   Where to find the IQN's in the VTL Console

VTL IP:

VTL IQN:

Initiator IQN:

Entering backup information on either **Controller**

o   No backup command (yet)

o   "Wait for ENDFSFLASH" set to *YES

o   Target keylock position set to *MANUAL if not a Cloud environment

    o   Cloud environments must use the system value QIPLTYPE

```
                           Change Full System FlashCopy CSE Data

   Supply all required values, press Enter.

   Target LPAR backup command #1    *NONE


        + for more values  . . .

   Wait for ENDFSFLASH  . . . . .   *YES              *YES, *NO
   FlashCopy Exit program . . . .   *NONE             *NONE, program name
     Library  . . . . . . . . . .                     library name
   Hold scheduled jobs  . . . . .   *YES              *YES, *NO
   Target keylock position  . . .   *MANUAL           *PANEL, *AUTO, *MANUAL
   Stop target after backups  . .   *NO               *YES, *NO, *RMV
   Source lock wait time out  . .   3600              300 - 108000 (seconds)
   Target lock wait time out  . .   86400             300 - 108000 (seconds)

   Auto start cluster . . . . . .   *YES              *YES, *NO
   Message Queue  . . . . . . . .   *SYSOPR           name, *SYSOPR
     Library  . . . . . . . . . .                     library name
                                                                More...
   F1=Help   F3=Exit   F4=Prompt   F6=Query HMC   F12=Cancel
```

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

o The command SAVDDD will put all the DDD and CRG information into an IFS directly.

    o SAVDDD *GEN

        o Will save to /QIBM/QZRDHASM/QZ_DDDBKU_<timestamp>

o BRMS *LINK will save /QIBM/QZRDHASM

    o Consider the following two control group exits prior to *LINK:

        o RMVDIR DIR('/QIBM/QZRDHASM/QZ_DDDBKU_*') SUBTREE(*ALL)

        o SAVDDD

o In the event of a restore:

    o Restore the directory from the backups

    o Issue RSTDDD, specifying the directory

o Add the restore command to the end of the recovery report. It should be done after re-establishing the cluster and DDD.

Test the configuration on either **Controller**

o   Use CHKFSFLASH to verify communications configurations first

o   Resolve issues until it is successful

```
CHKFSFLASH CSEDTA(FSFC9M9P1)
Acquired lock on LPAR CTCIHA9M.
Validating flashcopy consistency group 8
Validating flashcopy mappings
Consistency group 8 validated.
Successfully performed local verifications.
Performing Full System FlashCopy verifications on CTCIHA9M.
Released lock on LPAR CTCIHA9M.
Log file used : /QIBM/Qzrdhasm/fsfc/FSFC9M9P1/ctl.log.
CHKFSFLASH validation for FSFC9M9P1 completed successfully.
```

Before you test the Flash Copy

- On the production LPAR, do QCTL and QSYSWRK have prestart or autostart jobs?
  - DSPSBSD SBSD(QSYS/QCTL) options 3 and 10
  - DSPSBSD SBSD(QSYS/QSYSWRK) options 3 and 10
  - If YES then you'll need to use the exit program QZRDIAFFEX
    - Remove them at *QUIESCE and add them back at *POSTFLASH (include MONMSG CPF0000)
      - RMVAJE SBSD(QSYS/QCTL) JOB(jobname)
      - RMVPJE
      - ADDAJE SBSD(QSYS/QCTL) JOB(jobname) JOBD(job description)
      - ADDPJE
    - Add them to the BRMS Recovery report (we'll do this later when we edit QO1AUSRRCY)
    - Update the CSE Data to call the exit program
- If this is a Cloud environment, ensure the target will IPL in manual mode the first time:
  - CHGSYSVAL QIPLTYPE VALUE('1')
- Did you update the Source startup program?

Test the configuration on either **Controller**

o Did you read the previous slide?

o Use STRFSFLASH to perform a flashcopy

o The target will IPL into manual mode

o Sign on to the target LPAR console

o Continue to IPL the LPAR to restricted state.

o When you've got a command line, verify the userspace QZRDHASM/QZRDIAFSFC exists

    o CHKOBJ OBJ(QZRDHASM/QZRDIAFSFC) OBJTYPE(*USRSPC)

o Continue the IPL

    o STRSBS QCTL

o Get the information needed for the communications interface

    o DSPHDWRSC *CMN

    o Get the location code

o Get the information needed for the tape devices

    o DSPHDWRSC *STG

    o Get the serial number

o On the target, execute command QZRDHASM/ENDFSFLASH to finish the process

o On the production LPAR change, if a cloud environment: CHGSYSVAL QIPLTYPE VALUE('0')

Update the communication information on either **Controller**

o Using CHGCSEDTA, update:

    o Communications interface location code

        o *LPAR will results type, model, serial and virtual bus on the target

        o Cxx = slot number xx

    o Line description

    o IP Address

```
Change Full System FlashCopy CSE Data

Supply all required values, press Enter.

Target Comm Interfaces:

  Identifier Type  . . . . .   *LOC            *SRLN, *LOC, *NONE
  IO card identifier . . . .   *LPAR-C2-T1

  Line Description . . . . .   FSFCLINE        line name, *VIRTUALIP
  IO card IP interface . . .   9.5.167.93      IPv4 address

     + for more values  . .

Target LPAR default route:
  Binding interface  . . . .   *NOCHANGE       IPv4 address
  Next hop . . . . . . . . .                   IPv4 address
```

Update the backup devices on either **Controller**

o Using CHGCSEDTA, update:

  o Device descriptions that the backups will use

  o Serial numbers of the devices

    o If using logical libraries, use the tape drive serial numbers

```
Change Full System FlashCopy CSE Data

Supply all required values, press Enter.

Target LPAR Device Setup:

  Backup device description    TS3400PROD        *NONE, device name
  Device serial number . . .   78-78F1101

      + for more values  . .
```

Update the BRMS information on either **Controller**: BRMS

IBM Technology Expert Labs

o   Using CHGCSEDTA, update:

o   BRMS Integration = *YES

o   Change the defaults if necessary

o   Custom SYSBAS Timestamp is recommended if incremental backups are performed on the FlashCopy LPAR

o   BRMS Advanced Feature is required to use Custom SYSBAS Timestamp

```
Use BRMS integration . . . . .    *YES              *YES, *NO
BRMS information:
 BRMS transfer method . . . .   *ALL              *ALL, *CHGONLY
 BRMS transfer port . . . . .   *DFT              *DFT, 1024-65535
 Encrypt BRMS transfer  . . .   *NO               *YES, *NO
 Custom SYSBAS timestamp  . .   *NONE             *NONE, *BOTH, *QSYS, *IFS
 Control group error behavior   *NOTIFY           *NOTIFY, *IGNORE
 Control groups prior to xfer   1                 1-254
 Base media class . . . . . .   *NONE             class, *NONE
 Base media class suffix  . .   *NONE             suffix, *NONE
 Restricted media class(es)     *NONE             *NONE, class
    + for more values  . . .
```

Update the configuration on either **<u>Controller</u>**: BRMS

o Specify a BRMS command

    o If SBMJOB(*YES) then specify a job description that ensures it will run (i.e. if QBATCH isn't started don't send it to QBATCH)

        o JOBD(QLPARJOBD) sends it to job queue QSYSNOMAX which sends to QSYSWRK

        o The command is called from QSTRUPJD which usually runs under QPGMR.

```
Target LPAR backup command      STRBKUBRM CTLGRP(BACKUPS) SBMJOB(*YES or *CTLSBS)
```

o 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). Select a default control group (like *BKUGRP) then change it to the desired control group after pressing enter.

o At 7.5 BRMS changed the functional usage to be more restrictive. As a result, QPGMR does not have the authority to run BRMS commands. Therefore, one of the following must be done:

    o On the source LPAR, issue SETUSRBRM USER(QPGMR) USAGE(*ADMIN)

    o Change the 'Target LPAR backup command' to:

        SBMJOB CMD(STRBKUBRM CTLGRP(BACKUPS) SBMJOB(*YES or *CTLSBS)) JOB(BRMBACKUP) JOBQ(QSYS/QSYSNOMAX) USER(QLPAR)

Update the configuration on either **Controller**: Keylock

o Using CHGCSEDTA, update:

   o Target keylock position = *AUTO

o Note: This parameter is not available in Cloud environments

```
 Change Full System FlashCopy CSE Data

 Supply all required values, press Enter.

 Wait for ENDFSFLASH  . . . .   *YES              *YES, *NO
 FlashCopy Exit program . . .   *NONE
   Library  . . . . . . . . .    *LIBL            *LIBL, library
 Hold scheduled jobs  . . . .   *YES              *YES, *NO
 Target keylock position  . .   *AUTO             *PANEL, *AUTO, *MANUAL
 Stop target after backups      *NO               *YES, *NO, *RMV

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

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

BRMS Changes on the **Source** LPAR

o   Change the system policy to allow backups in batch:

   o   WRKPCYBRM *SYS, Option 1, Page down

```
V7R3M0                    Change System Policy                    CTCIHA9L

 Type choices, press Enter.


   End all subsystems options
     Controlled end delay time  . . . . . . 1200         1-99999 seconds,*IMMED
     Abnormal end delay time  . . . . . . . *NOLIMIT     10-999 minutes,*NOLIMIT
     End servers wait time  . . . . . . . .    0         0-9999 seconds
   Controlling subsystem:
     Allow backups in batch . . . . . . . . *YES         *NO, *YES
     Restricted state time limit  . . . . . *NOMAX       5-9999 minutes, *NOMAX
   Allow alternate input media. . . . . . . *YES         *NO, *YES
   Volume prefix  . . . . . . . . . . . . .              Prefix
   Enable Full System FlashCopy . . . . . . *YES         *NO, *YES
   BRMS submitted jobs:
     Job description. . . . . . . . . . . . *USRPRF      Name, *USRPRF
       Library. . . . . . . . . . . . . . .              Name, *LIBL, *CURLIB
     Job queue. . . . . . . . . . . . . . . *JOBD        Name, *JOBD
       Library. . . . . . . . . . . . . . .              Name, *LIBL, *CURLIB
   BRMS flight recorder size  . . . . . . . 050          001-999 megabytes
```

Specify an Output Queue

o   Change the system policy to specify output for joblogs from the backups:

   o   WRKPCYBRM *SYS, Option 1, Page down

   o   If no output queue is specified the toolkit will create and use QUSRBRM/QZOUTQ

   o   Use ENDFSFLASH *TAGJOBLOG on the target in a job to bring back its joblog to the source LPAR

```
V7R4M0                    Change System Policy                CTCHADV1

 Type choices, press Enter.

  Media policy . . . . . . . . . . . . . . ULTRIUM3     Name, F4 for list
  Devices  . . . . . . . . . . . . . . . . TAPMLB01     Name, F4 for list



  Home location for media  . . . . . . . . LOST         Name, F4 for list
  Media class  . . . . . . . . . . . . . . ULTRIUM3     Name, F4 for list
  Sign off interactive users . . . . . . . *NO          *YES, *NO
  Sign off limit . . . . . . . . . . . . . 30           0-999 minutes
  Output queue . . . . . . . . . . . . . . *PRTF        Name, *PRTF
    Library  . . . . . . . . . . . . . . .              Name, *LIBL
  Day start time . . . . . . . . . . . . . 0:00:00      Time
  Media monitor  . . . . . . . . . . . . . *YES         *YES, *NO
  Shared inventory delay . . . . . . . . . 60           30-9999 seconds
  Auto enroll media  . . . . . . . . . . . *NO          *NO, *YES
  Default usage. . . . . . . . . . . . . . *YES         *NO, *YES
                                                        More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel
```

BRMS Changes on the **<u>Source</u>** LPAR

o   Modify the control group to call the toolkit exit program

   o   WRKCTLGBRM, Opt 8, page down to Backup item exit program

   o   Set the exit program to QZRDHASM/QZBRMSEXIT format BKUI0100

      o   IBM i OS releases prior to V7R5M0 must use format BKUI0100

```
   Change Backup Control Group Attributes

Group  . . . . . . . . . . . . . . . . : TESTEXIT

Type information, press Enter.

Backup item exit program . . . . . . . . QZBRMSEXIT  Name, *NONE, *BKUPCY
   Exit program library  . . . . . . . . QZRDHASM    Name
   Exit program format . . . . . . . . . *BOTH       BKUI0100, BKUI0200, *BOTH
```

o   Note this information: https://www.ibm.com/support/pages/node/6371290

BRMS Changes on the **<u>Source</u>** LPAR - Subsystems

o If processing subsystems, subsystems should NOT be set to start

    o WRKCTLGBRM, Opt 9

```
                        Subsystems to Process

Use . . . . . . . . . . :   *BKU
Control group . . . . :   SAVSYSALL


Type choices, press Enter.
                                End
  Seq      Subsystem       Library     Option      Delay       Restart

   10      *ALL            *ALL        *CNTRLD     30          *NO
```

BRMS Changes on the **Source** LPAR - Attributes

o Do not run STRMNTBRM or manage servers after control group

   o WRKCTLGBRM, Opt 8, page down all the way

   o Editable on V7R4M0, use OpsNav or API's on prior releases

```
Additional Backup Policy Properties

Client backup policy . . . . . . . . . : SAVSYSALL

Type information, press Enter.

Allow activity overrides . . . . . . . . *YES        *NO, *YES
Allow retention overrides  . . . . . . . *YES        *NO, *YES
Additional management:
  TCP/IP servers . . . . . . . . . . . . *NO         *NO, *END, *RESTART, *BOTH
  Lotus servers  . . . . . . . . . . . . *NO         *NO, *END, *RESTART, *BOTH
  Integrated Windows servers . . . . . . *NO         *NO, *VARYOFF, *VARYON ...
  Guest partitions . . . . . . . . . . . *NO         *NO, *VARYOFF, *VARYON ...
Unmount user-defined file systems  . . . *NO         *NO, *YES
Run maintenance after backup . . . . . . *NO         *NO, *YES
```

Modify BRMS recovery report user-added steps

o Insert custom message into the recovery reports to change system settings to start IP etc.

    o STRSEU SRCFILE(QUSRBRM/QO1AUSRRCY) SRCMBR(STEP014)

    o Insert the following text:

```
If restoring configuration settings from a FSFC backup, run the following commands:
CHGSYSVAL SYSVAL(QSTRUPPGM) VALUE('QSTRUP    QSYS      ')
CHGLINETH LIND(ETHLINE) ONLINE(*YES)
CHGTCPIFC INTNETADR('1.2.3.4') AUTOSTART(*YES)
DLTUSRSPC USRSPC(QZRDHASM/QZRDIAFSFC)
CHGIPLA STRTCP(*YES)    ← skip this if also using FSR
RSTJOBSCDE ACTION(*DISPLAY | *RESTORE)
```

o Modify the recovery report creation to include the user info

    o Add the parameter USRRCYINF(*ADD)

    o If STRMNTBRM is used to generate the reports

        o Modify the STRMNTBRM call with PRTRCYRPT(*NONE)

        o Add STRRCYBRM USRRCYINF(*ADD) to the job scheduler, to run 15 minutes (or so) after STRMNTBRM

    o Consider using the Flashcopy Exit Program

        o WRKMBRPDM QZRDHASM/QCLSRC member QZRDIAFFEX

            o Copy the source files to utility libraries

            o Compile a blank program for the controller, and one that calls STRMNTBRM and STRRCYBRM at exit *FINISH on the source

Create an exit program to run BRMS Maintenance and generate reports

o   On the source:

  o   Copy the source from QZRDHASM/QCLSRC member QZRDIAFFEX to your tools library.

  o   WRKMBRPDM to edit it. At the *FINISH section add this code:

```
IF COND(%SST(&EXTRAS 1 8) *EQ '*SUCCESS') THEN(DO)
  STRMNTBRM PRTRCYRPT(*NONE)
  STRRCYBRM  USRRCYINF(*ADD)
ENDDO
```

  o   Compile the program

o   On the Controller create an empty version of that program:

```
CRTCLPGM PGM(QGPL/QZRDIAFFEX) SRCFILE(QZRDHASM/QCLSRC) SRCMBR(QZRDIAFFEX)
```

o   Use WRKCSEDTA opt 2 and set the exit program name

Test the configuration on either **Controller**

o   Use CHKFSFLASH to verify communications configurations first

o   Resolve issues until it is successful

```
CHKFSFLASH CSEDTA(FSFC9M9P1)
Acquired lock on LPAR CTCIHA9M.
Validating flashcopy consistency group 8
Validating flashcopy mappings
Consistency group 8 validated.
Successfully performed local verifications.
Performing Full System FlashCopy verifications on CTCIHA9M.
Released lock on LPAR CTCIHA9M.
Log file used : /QIBM/Qzrdhasm/fsfc/FSFC9M9P1/ctl.log.
CHKFSFLASH validation for FSFC9M9P1 completed successfully.
```

Test the configuration on either **Controller**

o   Use STRFSFLASH to perform a flashcopy

o   Flashcopy target LPAR IPL etc will occur

o   If this is a SAVSYS backup then the HMC SRC will be A900 3C70 while in Batch Restricted State

o   After backups, BRMS will be transferred to the source LPAR

   o   If not, check /tmp/qzrdiash.log on the target

o   On the source LPAR, verify backups are complete

   o   DSPLOGBRM

   o   WRKMEDIBRM

   o   BRMS Recovery reports

      o   Look for the customer recovery steps after RSTCFG.

      o   This is usually step 14 – if not, find the correct step and move the text in member QUSRBRM/QO1AUSRRCY STEP014 to the correct member.

Schedule Log Cleanup on all **Controlling** LPARs

- o CLEANLOGS will prune toolkit logs to save on space
    - o Tell it how many days of log entries to retain
    - o 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
```

How to reset after failure

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

o   To abandon the backups:

  o   On the target: QZRDHASM/ENDFSFLASH *FAILBKU

  o   On the source: QZRDHASM/ENDFSFLASH *RSTFCNUSG

o   PowerVS Volumes-clones can be displayed, canceled and deleted with these commands:

  o   DSPCLDCLNL

  o   CNLCLDCLN

  o   DLTCLDCLN

  o   WRKCLDVOL

o   The toolkit webpage contains additional recovery steps

Where can I find the logs for troubleshooting?

- Logs are in the following place:
  - /QIBM/Qzrdhasm/qzrdhasm.log
  - /QIBM/Qzrdhasm/fsfc/<CSE Data name>/*
  - /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.
  - Specify the failing job information on Job Name:

```
                    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
```

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 (i.e. license key requests) and questions, or to report a defect, 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.