



Transaction Processing Facility

ESS Copy Services Support for TPF

Bill Lappan

Enterprise Storage Server (ESS) Copy Services Overview

- Outboard copy managed by ESS versus TPF managed copy
- FlashCopy® (*Local Copy*)
 - ▶ Within same physical ESS
 - ▶ Point-in-Time (PiT) copy
- Peer-to-Peer Remote Copy (PPRC) (*Remote Copy*)
 - ▶ ESS to ESS
 - ▶ Path definitions
 - 1 Primary (*source*) to 1-4 Secondary (*target*) LSS paths
 - 1-8 links per path
 - ▶ Initial Copy (track by track)
 - ▶ Synchronous (*SYNC*) or Extended Distance (*XD*)
 - SYNC - source and target updates synchronized
 - XD - source bit maps updated / target updates batched

TPF Copy Services Constructs

- Configuration Database
 - ▶ Defines the hardware configuration
 - ▶ Created from offline configuration file (tape or TPF file system)
 - ▶ Path Definitions (PPRC only)
 - ▶ Volume Definitions
 - Arbitrary Symbolic Config name for each device (source & target)
- Copy Relationship Database
 - ▶ Defines source-target pairs
 - ▶ Created online on TPF using ZXCFCG DEFINE and ZXCFCG ADD commands
 - Group - a collection of Sets
 - Set - a collection of Copy Relationships
 - Copy Relationship - a source-target pair defined by symbolic config name

Configuration Data Input: Sample Path and Volume Statements

PATH 0000FCA79 1024 04 0000FCA79 1023 03 2 0024 A8 03 00A4 85 03
ID

Primary

ESS Serial #

SSID LSS#

Secondary

ESS Serial #

SSID LSS#

Count

SAID Port# LSS#...

VOL DV102400 SR0001 7100 0000FCA79 1024 00 04
ID

Symbolic name

VSN

SDA

ESS Serial #

SSID

CCA (device ordinal)

LSS ordinal

Examples of Copy Relationship Definition Commands

```
zxcfg define group-tug_demo_group  
XCFG0001I 15.08.55 GROUP TUG_DEMO_GROUP DEFINED.
```

```
zxcfg define set-tug_demo_set ss-bss  
XCFG0003I 15.09.08 SET TUG_DEMO_SET DEFINED.
```

```
zxcfg define copyrel-040c021c from-dv10240c to-dv10221c  
XCFG0026I 15.02.56 COPY RELATIONSHIP 040C021C DEFINED
```

```
zxcfg add copyrel-040c021c set-tug_demo_set  
XCFG0008I 15.09.49 COPY RELATIONSHIP 040C021C ADDED TO SET TUG_DEMO_SET.
```

```
zxcfg add set-tug_demo_set group-tug_demo_group  
XCFG0005I 15.10.10 SET TUG_DEMO_SET ADDED TO GROUP TUG_DEMO_GROUP.
```

Copy Relationship Examples Contintued...

```
zxcfg display group-tug_demo_group
```

```
XCFG0018I 15.15.27 GROUP TUG_DEMO_GROUP  
SET TUG_DEMO_SET HAS 0001 COPY RELATIONSHIPS  
TUG_DEMO_GROUP HAS 0001 SETS ASSIGNED TO IT  
END OF DISPLAY+
```

```
zxcfg display set-tug_demo_set
```

```
XCFG0019I 15.15.38 SET TUG_DEMO_SET SSNAME BSS  
COPYREL 040C021C  
GROUP TUG_DEMO_GROUP  
TUG_DEMO_SET HAS 0001 COPY RELATIONSHIPS AND 0001 GROUPS ASSIGNED TO IT  
END OF DISPLAY+
```

```
zxcfg display copyrel-040c021c
```

```
XCFG0020I 15.17.29 COPY RELATIONSHIP 040C021C FROM DV10240C TO DV10221C  
SET ANY_SET_NAME_UP_TO_32_CHARS  
SET TUG_DEMO_SET  
040C021C IS ASSIGNED TO 0002 SETS  
END OF DISPLAY+
```

```
zxcfg display config-dv10240c
```

```
XCFG0021I 15.03.19 CONFIGURATION DATA FOR DV10240C.  
      SYMBOLIC VOLSER  SDA    SERIAL    SSID CCA LSS.  
CORE - DV10240C SR0001 710C 00000FCA79 1024 0C 04.  
FILE - DV10240C SR0001 710C 00000FCA79 1024 0C 04.
```

Preparation for Running a Copy

- Create Configuration Database and Copy Relationship Database
- ZXCFCG CONFIG RECEIVE
 - ▶ Reads offline Configuration File from tape or file system (FTP)
 - ▶ Validates data
 - ▶ Copies data to configuration database path and volume files
- ZXCFCG CONFIG LOAD
 - ▶ Loads configuration data and copy relationships into memory.
 - ▶ Configuration data and copy relationship databases can be modified after load without affecting active copies.
- Copy Control Area tables in memory are keypointed and restored across an IPL
- Processor Resource Ownship Table (PROT) controls Loosely Coupled ownship of copy services utility (XCPY).

Running a Local Copy (FlashCopy)

- ZXCPY LOCAL START GROUP-*groupname*
 - ▶ Flashcopy will establish PiT copy and withdraw when completed.
 - ▶ No path set-up since copy is within same physical ESS
 - ▶ ZXCPY LOCAL STATUS GROUP-*groupname*
 - Displays copy state and percentage completed
 - ALL option shows all devices that are lagging by >10% from average
 - SDA-xxxx shows detailed status of an individual device

ZXCPY LOCAL START GROUP-FC1024TO1024

XCPY0001I 08.55.16 LOCAL COPY STARTED FOR GROUP FC1024TO1024.

ZXCPY LOCAL STATUS GROUP-FC1024TO1024

XCPY0062I 08.55.40 STATUS FOR GROUP FC1024TO1024:

FLASHCOPY STARTED AT 08:55:15.

PERCENT OF INITIAL COPY COMPLETE = 29.4.

END OF DISPLAY.+

ZXCPY LOCAL STATUS GROUP-FC1024TO1024 ALL

XCPY0062I 08.59.23 STATUS FOR GROUP FC1024TO1024:

FLASHCOPY STARTED AT 08:55:15.

PERCENT OF INITIAL COPY COMPLETE = 57.7.

VOLUME DV102401, VOLSER SR0002, SDA 7101 IS ONLY .0 PERCENT COMPLETE.

VOLUME DV102403, VOLSER SR0004, SDA 7103 IS ONLY 32.0 PERCENT COMPLETE.

END OF DISPLAY.

ZXCPY LOCAL STATUS GROUP-FC1024TO1024 SDA-7103

XCPY0008I 09.00.13 STATUS FOR SDA 7103: FLASHCOPY ACTIVE.

CSMP0097I 09.00.13 CPU-B SS-BSS SSU-HPN IS-01

XCPY0007I 09.00.13 TRACKS REMAINING FOR SDA 7103: 20,017.

XCPY0002I 09.01.36 LOCAL COPY COMPLETED FOR GROUP FC1024TO1024.

Running a Remote Copy (PPRC)

- ZXCPY REMOTE **PATH START** GROUP-*groupname*
 - ▶ Establishes all LSS-LSS paths for the group
- ZXCPY REMOTE **SESSION START XD** GROUP-*groupname*
 - ▶ Starts PPRC copies in XD or SYNC mode as specified
- ZXCPY REMOTE SESSION **GOTOSYNC** GROUP-*groupname*
 - ▶ Transitions from XD to SYNC mode
- ZXCPY REMOTE SESSION **FREEZE** GROUP-*groupname*
 - ▶ Freeze and create consistency group
 - ▶ Paths are stopped and copy is suspended at source only
 - Freeze differs from Suspend for performance
 - Suspend leaves paths up and suspends source and target
 - Source bit maps continue to be updated
- ZXCPY REMOTE SESSION **RESUME XD** GROUP-*groupname*
 - ▶ Must restart paths after freeze before resume or stop can be issued
 - ▶ Resume copies in XD or SYNC mode as specified

ZXCPY REMOTE PATH START GROUP-BLD1024TO1022

XCPY0016I 09.23.26 REMOTE PATH STARTED FOR GROUP BLD1024TO1022.

ZXCPY REMOTE SESSION START GROUP-BLD1024TO1022 XD

XCPY0011I 09.23.45 REMOTE COPY STARTED FOR GROUP BLD1024TO1022.

ZXCPY REMOTE SESSION STATUS GROUP-BLD1024TO1022

XCPY0062I 09.29.09 STATUS FOR GROUP BLD1024TO1022:
XD COPY STARTED AT 09:23:45.

PERCENT OF INITIAL COPY COMPLETE = 34.7.

12 DEVICES: 4 COMPLETE.

END OF DISPLAY.

ZXCPY REMOTE SESSION STATUS GROUP-BLD1024TO1022 all

XCPY0062I 09.29.12 STATUS FOR GROUP BLD1024TO1022:
XD COPY STARTED AT 09:23:45.

PERCENT OF INITIAL COPY COMPLETE = 34.7.

VOLUME DV102404, VOLSER SR0005, SDA 7104 IS ONLY 16.6 PERCENT COMPLETE.

VOLUME DV102405, VOLSER SR0006, SDA 7105 IS ONLY .0 PERCENT COMPLETE.

VOLUME DV102406, VOLSER SR0007, SDA 7106 IS ONLY .0 PERCENT COMPLETE.

VOLUME DV102407, VOLSER SR0008, SDA 7107 IS ONLY .0 PERCENT COMPLETE.

VOLUME DV102408, VOLSER WR0001, SDA 7108 IS ONLY .0 PERCENT COMPLETE.

VOLUME DV102409, VOLSER WR0002, SDA 7109 IS ONLY .0 PERCENT COMPLETE.

VOLUME DV10240A, VOLSER WR0003, SDA 710A IS ONLY .0 PERCENT COMPLETE.

VOLUME DV10240B, VOLSER WR0004, SDA 710B IS ONLY .0 PERCENT COMPLETE.

END OF DISPLAY.

ZXCPY REMOTE SESSION STATUS GROUP-BLD1024TO1022 sda-7104

XCPY0008I 09.29.24 STATUS FOR SDA 7104: COPY PENDING (INIT OR RESYNCH).+

CSMP0097I 09.29.24 CPU-B SS-BSS SSU-HPN IS-01

XCPY0007I 09.29.24 TRACKS REMAINING FOR SDA 7104: 32,132.

CSMP0097I 09.29.24 CPU-B SS-BSS SSU-HPN IS-01

XCPY0065I 09.29.24 PATH STATUS FOR SDA 7104:

SECONDARY CU: 00000FCA79, SSID: 1022, LSS: 02.

SAID: 0024, LINK: A802, STATUS: PATH ESTABLISHED.

SAID: 00A4, LINK: 8502, STATUS: PATH ESTABLISHED.

END OF PATH DISPLAY.+

XCPY0008I 09.29.24 STATUS FOR SDA 7084: COPY PENDING (INIT OR RESYNCH).+

CSMP0097I 09.29.24 CPU-B SS-BSS SSU-HPN IS-01

XCPY0007I 09.29.24 TRACKS REMAINING FOR SDA 7084: 0.

CSMP0097I 09.29.24 CPU-B SS-BSS SSU-HPN IS-01

XCPY0065I 09.29.24 PATH STATUS FOR SDA 7084:

NO SECONDARY CONTROL UNITS CONNECTED.

XCPY0052I 09.40.15 INITIAL COPY COMPLETE FOR GROUP BLD1024TO1022.

ZXCPY REMOTE SESSION GOTOSYNC GROUP-BLD1024TO1022

XCPY0050I 09.48.57 GOTOSYNC REQUESTED FOR GROUP BLD1024TO1022.

XCPY0053I 09.49.05 DEVICES FOR GROUP BLD1024TO1022 NOW IN FULL DUPLEX.

ZXCPY REMOTE SESSION FREEZE GROUP-BLD1024TO1022

XCPY0012I 09.50.10 REMOTE COPY COMPLETED FOR GROUP BLD1024TO1022.

ZXCPY REMOTE SESSION STATUS GROUP-BLD1024TO1022

XCPY0062I 09.50.59 STATUS FOR GROUP BLD1024TO1022:

CONSISTENCY GROUP CREATED AT 09:50:10.

FREEZE TOOK 1.665 SECONDS.

END OF DISPLAY.

ZXCPY REMOTE SESSION STATUS GROUP-BLD1024TO1022 sda-7100

CSMP0097I 09.51.40 CPU-B SS-BSS SSU-HPN IS-01

XCPY0008I 09.51.40 STATUS FOR SDA 7100: COPY SUSPENDED DUE TO FREEZE.

CSMP0097I 09.51.40 CPU-B SS-BSS SSU-HPN IS-01

XCPY0065I 09.51.40 PATH STATUS FOR SDA 7100:

SECONDARY CU: 00000FCA79, SSID: 1022, LSS: 02.

NO PATH ENTRIES.

NO SECONDARY CONTROL UNITS CONNECTED.

ZXCPY REMOTE PATH START GROUP-BLD1024TO1022

XCPY0016I 09.52.01 REMOTE PATH STARTED FOR GROUP BLD1024TO1022.

ZXCPY REMOTE SESSION STATUS GROUP-BLD1024TO1022 sda-7100

CSMP0097I 09.52.05 CPU-B SS-BSS SSU-HPN IS-01

XCPY0008I 09.52.05 STATUS FOR SDA 7100: COPY SUSPENDED DUE TO FREEZE.

CSMP0097I 09.52.05 CPU-B SS-BSS SSU-HPN IS-01

XCPY0065I 09.52.05 PATH STATUS FOR SDA 7100:

SECONDARY CU: 00000FCA79, SSID: 1022, LSS: 02.

SAID: 0024, LINK: A802, STATUS: PATH ESTABLISHED.

SAID: 00A4, LINK: 8502, STATUS: PATH ESTABLISHED.

END OF PATH DISPLAY.+

CSMP0097I 09.52.05 CPU-B SS-BSS SSU-HPN IS-01

XCPY0008I 09.52.05 STATUS FOR SDA 7080: FULL DUPLEX MODE.

CSMP0097I 09.52.05 CPU-B SS-BSS SSU-HPN IS-01

XCPY0065I 09.52.05 PATH STATUS FOR SDA 7080:

NO SECONDARY CONTROL UNITS CONNECTED.

zxcfg ?

XCFG0020I 11.50.57 ZXCFCG HELP DISPLAY

ZXCFCG DEFine Group-groupname

ZXCFCG DEFine Set-setname SSname-ssname

ZXCFCG DEFine Copyrel-crelname From-source To-target

ZXCFCG UNDefine Group-groupname

ZXCFCG UNDefine Set-setname

ZXCFCG UNDefine Copyrel-crelname

ZXCFCG ADD Set-setname Group-groupname

ZXCFCG ADD Copyrel-crelname Set-setname

ZXCFCG DElete Set-setname Group-groupname

ZXCFCG DElete Copyrel-crelname Set-setname

—
ZXCFCG DISplay Group-groupname

ZXCFCG DISplay Group-* (displays all groups)

ZXCFCG DISplay Set-setname

ZXCFCG DISplay Set-* (displays all sets)

ZXCFCG DISplay Copyrel-crelname

ZXCFCG DISplay CONfig-configname

ZXCFCG CONfig Load

ZXCFCG CONfig Receive TApe

END OF DISPLAY.

zxcpy ?

XCPY0020I 11.50.57 ZXCPY HELP DISPLAY

ZXCPY Local START Group-groupname

ZXCPY Local STOp Group-groupname

ZXCPY Local STATus Group-groupname

ZXCPY Local STATus Group-groupname ALL

ZXCPY Local STATus Group-groupname SDA-sdaname

ZXCPY Local RESEt Group-groupname

ZXCPY REMote Path START Group-groupname

ZXCPY REMote Path STOp Group-groupname

ZXCPY REMote SEssion START Group-groupname XD

ZXCPY REMote SEssion START Group-groupname SYnc

ZXCPY REMote SEssion STOp Group-groupname

ZXCPY REMote SEssion SUSpend Group-groupname

ZXCPY REMote SEssion RESUme Group-groupname XD

ZXCPY REMote SEssion RESUme Group-groupname SYnc

ZXCPY REMote SEssion STATus Group-groupname

ZXCPY REMote SEssion STATus Group-groupname ALL

ZXCPY REMote SEssion STATus Group-groupname SDA-sdaname

ZXCPY REMote SEssion GOTOSync Group-groupname

ZXCPY REMote SEssion Freeze Group-groupname

ZXCPY REMote RESEt Group-groupname

END OF DISPLAY.

Question and Answer

Legal information

Any references to future plans are for planning purposes only. IBM reserves the right to change those plans at its discretion. Any reliance on such a disclosure is solely at your own risk. IBM makes no commitment to provide additional information in the future.

IBM and FlashCopy are trademarks of the IBM Corporation in the United States, other countries, or both.

Other company, product, or service names may be trademarks or service marks of others.