IBM Education Assistance for z/OS V2R2

Item: CF Site Preference List Enhancements
Element/Component: XCF - Cross-System Coupling Facility

Agenda

- Trademarks

- Presentation Objectives

- Overview

- Usage & Invocation

- Migration & Coexistence Considerations

- Installation

- Presentation Summary

- Appendix

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Presentation Objectives

- Explain purpose of CF Site Preference List Enhancements

- Identify new/changed installation procedures for this item

- Define the functional content and benefit

- Explain any migration issues or concerns

- Explain how the function is invoked

- Indicate list of Publications and References

Overview

- Problem Statement / Need Addressed

    - Some coupling facility (CF) structures should be duplexed across sites for disaster recovery/availability purposes. Some should be duplexed within a site for performance. The CF STRUCTURE PREFLIST is insufficient information for XCF to achieve this during recovery and maintenance windows.

    - Example:
        - Structure should be duplexed across sites
        - PREFLIST(CF1SITE1,CF1SITE2,CF2SITE1,CF2SITE2)
        - Normally duplexed across sites in CF1SITE1 and CF1SITE2
        - When CF1SITE2 down, duplexed in CF1SITE1 and CF2SITE1 (within a SITE)
        - Could fix PREFLIST for this scenario, but then breaks for others

Overview

- Solution
  - Provide new CFRM policy keywords CROSSSITE, SAMESITE, and SAMESITEONLY. These new STRUCTURE keywords can be used with existing CF SITE keywords to influence CF structure allocation decisions made by XCF.

- Benefit / Value
  - During recovery or maintenance window the CF structure will be duplexed in the requested manner, maintaining performance and availability objectives

Overview - Continued

- SAMESITEONLY

    - ONLY duplex the structure if both coupling facilities are at the same SITE (as defined by the CFRM policy)
    - Use when system-managed CF structure duplexing performance across sites is unacceptable
    - General structure allocation will give slight preference to allocating in a site that has at least 2 coupling facilities available
    - ONLY coupling facilities at the same SITE as the allocated structure will be eligible for duplexing rebuild CF structure allocation

Overview - Continued

- SAMESITE

  - PREFER to duplex the structure in coupling facilities that are at the same SITE (as defined by the CFRM policy)
  - Use when system-managed CF structure duplexing performance across sites is acceptable, but not necessarily desired
  - When system will duplex structure, structure allocation will give slight preference to allocating in a site that has at least 2 coupling facilities available

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Overview - Continued

- CROSSSITE

    - PREFER to duplex the structure in coupling facilities that are at different sites (as defined by the CFRM policy)
    - Use when CF structure duplexing performance across sites is acceptable and important to avoid data loss in the event of a site failure
    - When system will duplex structure, structure allocation will give strong preference to allocating in a CF that can be used for cross-site duplexing

Overview - Continued

▪ ANYSITE

- – This is the default.
- – CF SITE specification is not used when determining CF importance and eligibility for duplexed CF structure allocation.

Overview - Continued

- General CF structure allocation changes

    - Better adherence to PREFLIST for duplexed structures

        - Consider that certain attributes are "composite" when duplexed
            - CFLEVEL (effective level is minimum of two)
            - Volatility (satisfied as long as one is non-volatile)
            - Failure isolation (satisfied by duplexed failure isolation)
            - Exclusion list (generally satisfied by duplexing)

        - Previously, XCF would override PREFLIST order to meet attribute requirements as if structure would NOT be duplexed
            - Has generated concern when duplex instances swapped

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Usage & Invocation

- CFRM policy example

```
STRUCTURE NAME(STR1) SIZE(10M)
    DUPLEX(ALLOWED)
    PREFLIST(CF1SITE1,CF2SITE1,CF1SITE2,CF2SITE2)
STRUCTURE NAME(STR2) SIZE(10M)
    DUPLEX(ALLOWED,SAMESITEONLY)
    PREFLIST(CF1SITE1,CF2SITE1,CF1SITE2,CF2SITE2)
STRUCTURE NAME(STR3) SIZE(10M)
    DUPLEX(ENABLED,SAMESITE)
    PREFLIST(CF1SITE1,CF2SITE1,CF1SITE2,CF2SITE2)
STRUCTURE NAME(STR4) SIZE(10M)
    DUPLEX(ENABLED,CROSSSITE)
    PREFLIST(CF1SITE1,CF2SITE1,CF1SITE2,CF2SITE2)
```

Usage & Invocation

- CFRM policy example requires CF SITE definitions

       CF NAME(CF1SITE1) **SITE(SITE1)**
         MFG(IBM) ...
       CF NAME(CF2SITE1) **SITE(SITE1)**
         MFG(IBM) ...
       CF NAME(CF1SITE2) **SITE(SITE2)**
         MFG(IBM) ...
       CF NAME(CF2SITE2) **SITE(SITE2)**
         MFG(IBM) ...

Usage & Invocation

- Existing restriction on use of DUPLEX keyword (see message IXC745I)

    `THE PREFLIST MUST CONTAIN TWO OR MORE FACILITIES.`

    - The value of the DUPLEX keyword requires that two or more coupling facilities be specified in the preference list for the structure.

- New restrictions on use of DUPLEX keyword (see message IXC745I)

    `THE PREFLIST MUST CONTAIN TWO OR MORE FACILITIES WITH DIFFERENT SITE VALUES.`

    - The CROSSSITE keyword specified on the DUPLEX parameter requires that two or more coupling facilities be specified in the preference list for the structure with different SITE values.

    `THE PREFLIST MUST CONTAIN TWO OR MORE FACILITIES WITH THE SAME SITE VALUE.`

    - The SAMESITE or SAMESITEONLY keyword specified on the DUPLEX parameter requires that two or more coupling facilities be specified in the preference list for the structure with the same SITE value.

Usage & Invocation

- DISPLAY XCF,STR,STRNAME= message IXC360I has new keywords

```
IXC360I  14.11.06  DISPLAY XCF
STRNAME: DUPALLOWED01
 STATUS: ALLOCATED
 EVENT MANAGEMENT: MESSAGE-BASED
 TYPE: CACHE
 POLICY INFORMATION:
  POLICY SIZE    : 204 M
  POLICY INITSIZE: 104 M
  POLICY MINSIZE : 90 M
  FULLTHRESHOLD  : 80
  ALLOWAUTOALT   : NO
  REBUILD PERCENT: N/A
  DUPLEX         : ALLOWED SAMESITEONLY
  ALLOWREALLOCATE: YES
  PREFERENCE LIST: LF01     LF02     A       TESTCF   SUPERSES
  ENFORCEORDER   : NO
  EXCLUSION LIST IS EMPTY
```

- New fields in IXCYQUAA macro

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Usage & Invocation

- **Ensure coupling facilities available for SAMESITEONLY**

```
SETXCF START,RB,DUPLEX,STRNAME=DUPALLOWED01
IXC574I ALLOCATION FEASIBILITY INFORMATION FOR DUPLEXING REBUILD
OF STRUCTURE DUPALLOWED01
 CFNAME      STATUS/FAILURE REASON
 --------    ----------------------
 LF01        RESTRICTED BY SAMESITEONLY
 LF02        RESTRICTED BY SAMESITEONLY
 A           INSUFFICIENT CONNECTIVITY
                        INFO110: 00000000 00000000 00000000 00000000
 TESTCF      RESTRICTED BY REBUILD OTHER
 SUPERSES    RESTRICTED BY SAMESITEONLY
IXC367I THE SETXCF START REBUILD REQUEST FOR STRUCTURE
DUPALLOWED01 WAS REJECTED:
ALLOCATION OF REBUILD NEW STRUCTURE FOR DUPLEXING REBUILD NOT FEASIBLE
```

- **Messages IXC347I, IXC574I, and IXL015I may indicate RESTRICTED BY SAMESITEONLY**
  - New ConaRsnSameSiteOnly in IXLYCONA macro

Usage & Invocation

▪ **REALLOCATE considers DUPLEX preference**

```
STRNAME: DUPALLOWED01                                    INDEX: 45
   CFNAME      STATUS/FAILURE REASON
   --------    -------------------------------------------------------
   LF01        PREFERRED CF 1
                        INFO110: 00000001 AE000800 00000000 00000015
   LF02        PREFERRED CF ALREADY SELECTED
               PREFERRED CF HIGHER IN PREFLIST
                        INFO110: 00000001 AE000800 00000000 00000015
   TESTCF      PREFERRED CROSSSITE CF
               PREFERRED CF HIGHER IN PREFLIST
                        INFO110: 00000001 AE000800 00000000 00000015
   A           INSUFFICIENT CONNECTIVITY
                        INFO110: 00000000 00000000 00000000 00000000
   SUPERSES    INSUFFICIENT CONNECTIVITY
                        INFO110: 00000000 00000000 00000000 00000000
```

▪ Secondary CF tagged as "CF 2", "SAMESITEONLY CF", "SAMESITE CF", or "CROSSSITE CF". May not be same as 2nd choice for primary.

▪ Affects messages IXC347I and IXC574I

Usage & Invocation

- New reasons to choose one CF over another

```
IXL015I REBUILD NEW STRUCTURE ALLOCATION INFORMATION FOR
STRUCTURE DUPALLOWED01, CONNECTOR NAME IXCLO02D0001,
CONNECTIVITY=DEFAULT
 CFNAME      ALLOCATION STATUS/FAILURE REASON
 --------    ---------------------------------------
 LF01        RESTRICTED BY REBUILD OTHER
 A           INSUFFICIENT CONNECTIVITY 00000000
 SUPERSES    INSUFFICIENT CONNECTIVITY 00000000
 TESTCF      STRUCTURE ALLOCATED AE000800
 LF02        PREFERRED CF ALREADY SELECTED AC000800
             CROSSSITE DUPLEXING PREFERENCE MET BY PREFERRED CF
```

- Affects messages IXC347I, IXC574I, and IXL015I

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Usage & Invocation

- EXAMPLE: A particular duplex structure should be duplexed across sites with the primary instance in a particular site for locality relative to a workload and the secondary instance in the other site unless there is no alternative to duplexing it within the same site.

  - Previous structure definition
    ENFORCEORDER(NO)
    DUPLEX(ENABLED)
    PREFLIST(CF1SITE1,**CF1SITE2,CF2SITE1**,CF2SITE2)

  - **Reconsider PREFLIST** in new structure definition
    ENFORCEORDER(NO)
    DUPLEX(ENABLED,**CROSSSITE**)
    PREFLIST(CF1SITE1,**CF2SITE1,CF1SITE2,**CF2SITE2)

Usage & Invocation

- Health check XCF_CF_STR_PREFLIST for duplexed structures
  - Most preferred CF depends on DUPLEX SITE preference
    - ANYSITE (specified or defaulted)
      - Primary in 1st CF in PREFLIST
      - Secondary in 2nd CF in PREFLIST
    - SAMESITE or SAMESITEONLY
      - Primary in 1st CF with SITE specified
      - Secondary in next CF with same SITE
    - CROSSSITE
      - Primary in 1st CF with SITE specified
      - Secondary in next CF with other SITE
  - New message IXCH0226I when DUPLEX SITE preference used
  - New message IXCH0227I if DUPLEX SITE preference not met
  - Messages IXCH0202I and IXCH0206E affected

Usage & Invocation

- Additional diagnostics

  - Extra hex data in message IXC574I and IXC347I INFO110
    - See message IXC574I documentation on how to decipher data

  - LOGREC entry when duplexing determined not feasible

    ```
    COMPONENT INFORMATION:
        COMPONENT ID:              5752SCXCF
        COMPONENT RELEASE LEVEL:  7A0
        DESCRIPTION OF FUNCTION:  SCXCF - ALLOCATION FEASIBILITY

    PRIMARY SYMPTOM STRING:
        PIDS/5752SCXCF RIDS/IXCLOALF RIDS/IXCI2PVT#L PRCS/00000C75
    ...
    ```

    - May be useful to IBM if debugging is needed

Migration & Coexistence Considerations

- No migration actions

- No toleration/coexistence APARs/PTFs

- Do NOT exploit until ALL systems in sysplex are at z/OS V2R2
    - In general, ANY system in the sysplex may perform CF structure allocation. Downlevel systems will only use PREFLIST.
    - Downlevel systems will not DISPLAY new policy options
    - Downlevel XCF_CF_STR_PREFLIST health check will not consider new policy options

Installation

- Consider using CROSSSITE, SAMESITE, or SAMESITEONLY for each duplexed CF structure definition

- Activate CFRM policy using new keywords

  - Run IXCMIAPU with updated policies
  - Use SETXCF START,POL command to start updated policy
    - Note that changes will NOT be "PENDING"

  - Use DISPLAY XCF,REALLOCATE,TEST to check for changes
  - Use SETXCF START,REALLOCATE to reconfigure structures

Presentation Summary

- As appropriate, add CROSSSITE, SAMESITE, SAMESITEONLY to DUPLEX keyword in CFRM policy definition for IXCMIAPU (for example, DUPLEX(ENABLED,CROSSSITE))

- During recovery or maintenance window the CF structure will be duplexed in the requested manner, maintaining performance and availability objectives

Appendix

- IXCMIAPU information and new CFRM policy keywords
  - *MVS Setting Up a Sysplex* (SA23-1399-02)

- Updates to IXC347I, IXC360I, IXC547I, IXL015I, etc.
  - *MVS System Messages Vol. 10* (IXC-IZP) (SA38-0677-03)

- Updates to XCF_CF_STR_PREFLIST
  - *IBM Health Checker for z/OS Users Guide* (SC23-6843-03)

- Understanding Preference and exclusion lists
  - *MVS Setting Up a Sysplex* (SA23-1399-02)