z/OS 2.4 IBM Education Assistance (IEA)

Solution (Epic) Name: zFS High Availability Mount Option

Element(s)/Component(s): zFS

Agenda

- Trademarks
- Session Objectives
- Overview
- Usage & Invocation
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Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.
- Additional Trademarks:
  - None.

Session Objectives

- Describe benefits of High Availability (HA) mount option for zFS
- Describe what environment HA is useful for.
- Show how to enable and use HA
- Describe migration and coexistence considerations

Overview

- Users can indicate a zFS sysplex-aware R/W mounted file system should use the high-availability zFS sysplex protocols and interfaces which:
  - Guarantees that when a system experiences an outage in a sysplex, applications on other sysplex members do not receive errors.
    - Current z/OS Unix sysplex sharing (NORWSHARE) will present errors to applications that have open files when the owner goes down.
    - The current zFS sysplex sharing (RWSHARE) will also present errors to applications that have open files when the owner goes down.
    - And in both of the existing function cases, prior client operations might have been rolled back by the new owner causing loss of directory or file updates which confuse applications.
  - Guarantees that when a system experiences an outage in a sysplex, no prior directory or file update is lost.
  - No errors and no loss of data.
    - (Though resolving a dead system does take extra time to resolve orphaned calls to the dead owner).
- Some Target Users: Websphere Application Server (WAS) file systems and others.

Usage & Invocation - I

- New MOUNT parameter (HA | NOHA):
  - Explicitly indicates if high-availability should be used for a file system or not.
    - If not specified, the default comes from the IOEFSPRM options file.
- New IOEFSPRM parameter (HA = [ON | OFF])
  - The default high-availability setting for file systems mounts
    - Default is OFF, no high-availability. Not all file systems require HA support, example: autmove-unmount.
    - Is used if the user does not explicitly state HA or NOHA for their mount parameter.
  - zfsadm config –ha [ON | OFF] can be used to change the default dynamically.
- Can dynamically enable or disable the HA function of a file system.
  - zfsadm chaggr [–ha | -noha] *file_system_name*
    - This results in a same-mode re-mount of the file system using the new desired option.

Usage & Invocation - II

- zfsadm fsinfo will show if a file system is HA:

```
ZFSAGGR.BIGZFS.ZFSTEST.V5ENC          DCEIMGHQ RW,RS,GD,EN,CO,HA
ZFSAGGR.BIGZFS.ZFSTEST1.EXTATTR       DCEIMGHQ RW,RS,GD,NE,NC,HA

Legend: RW=Read-write,GD=AGGRGROW disabled,RS=Mounted RWSHARE,EN=Encrypted
     NC=Not compressed,HA=High availability,NE=Not encrypted,CO=Compressed
```

- Can select a listing of file systems that are HA:
  - ***zfsadm fsinfo –select HA***
- FSINFO is an API available to application programs, updates for HA include:
  - ***fr_selection*** **–** *New input bit (0x20000000) – allows application to select only HA file systems when listing file systems.*
  - ***fo_flags*** **–** *New output bit (0x20000) – indicates corresponding file system is HA mounted.*

Interactions & Dependencies

- HW Dependencies: None
- SW Dependencies: None
- Performance Impact:
  - Results in log file syncs for each directory update made by sysplex non-owners
    - Owners do not need to sync the log file for each directory update, but they would still be affected by clients forcing the owner to sync the log file.
  - Results in log file sync for any asynchronous write-behind for files performed by non-owners.
    - Clients still cache directory and file contents.
    - Clients still perform asynchronous read-ahead and write-behind for files with direct disk access.
  - Workloads heavy in directory updates from non-owners are impacted, heavy file activity is only slightly impacted.
    - Heavy directory update workloads are not common.
- No reason to use HA for RWSHARE file systems mounted with automove-no/automove-unmount
  - These file systems are not designed to be available to other systems, so no need for HA.

Migration & Coexistence Considerations

- No migration concerns
- 2.3 HA SPE being provided to allow z/OS 2.3 systems to support HA function.
- Systems need to be at the z/OS 2.4 level or 2.3 + HA SPE to use HA:
  - Systems that do not have the high-availability support are not allowed to be clients of an HA mounted file system (catchup mounts fail) and do not understand the HA MOUNT option.
    - → Those systems would end up as z/OS Unix Sysplex Sharing clients.
- No toleration PTF required.

Installation

- No changes to installation.

Session Summary

- Described HA and its benefits
- Described who might benefit from HA
- Provided usage considerations, including performance
- Presented how to enable or disable the function
- Discussed migration and coexistence considerations

Appendix

- z/OS File System Administration – Updated for HA function, including a section dedicated to using HA.
- z/OS File System Messages and Codes – Updated for HA function.