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zFS V5 Migration and Performance



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Agenda "zFS V5 Migration and Performance"

- What are V5 Filesystems
- Differences between V4 and V5
- V5 Conversion Details
- Controls
- Utilities and programs
- V5 Exploitation Strategy
- V5 Performance Preliminary Data
- •Backup Information:
- New Salvager, and Quiesce updates





Terminology/Abbreviations

•File System = Aggregate

Because zFS has removed multi-file system aggregates and clones in z/OS 2.1, the term file system and aggregate can be considered synonymous.

This presentation uses the term file system where the publications might use the term aggregate and/or file system but they are equivalent now with z/OS 2.1.

• zFS file systems (aggregates) have a major and minor version stored inside them.

The **zfsadm aggrinfo –long** command will show you these two numbers today: example: version 1.4 will be shown if you issue this command on z/OS 13.

•V4 = Version 1.4, and V5 = Version 1.5

z/OS 2.1 introduces an optional version 1.5 aggregate (file system). This presentation simplifies the terminology to v4 file system (current version in the field) and v5 file system (new optional file system with z/OS 2.1).

• A v5 file system has the option to store directories in a new format (a tree) for fast lookup/insert/delete. The publications refer to directories stored in this new format as "extended (v5) directories". This presentation simplifies it to v5 directory and refers to the original directory format available today in the field as v4 directory.

V4 and V5 Filesystems Comparison



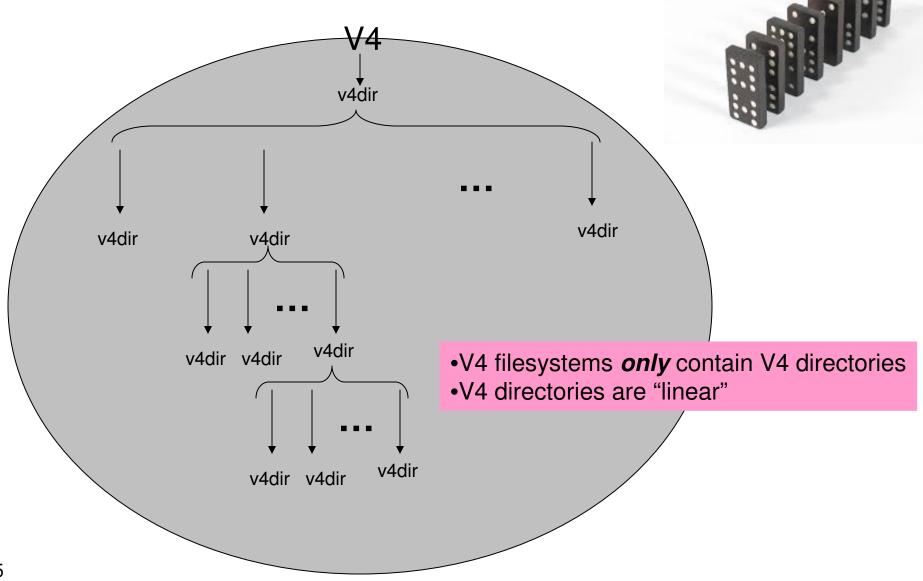
V4 filesystems (in z/OS V1R13 and prior):

- Has *linear* (v4) directory formats on disk
- V4 directories with thousands of names or more suffer significant performance degradation.
 - >50,000 names and IBM recommends that HFS contain the directory (but HFS is significantly worse for file IO)
- V4 filesystems are still fully supported and will be for a long time (possibly forever)

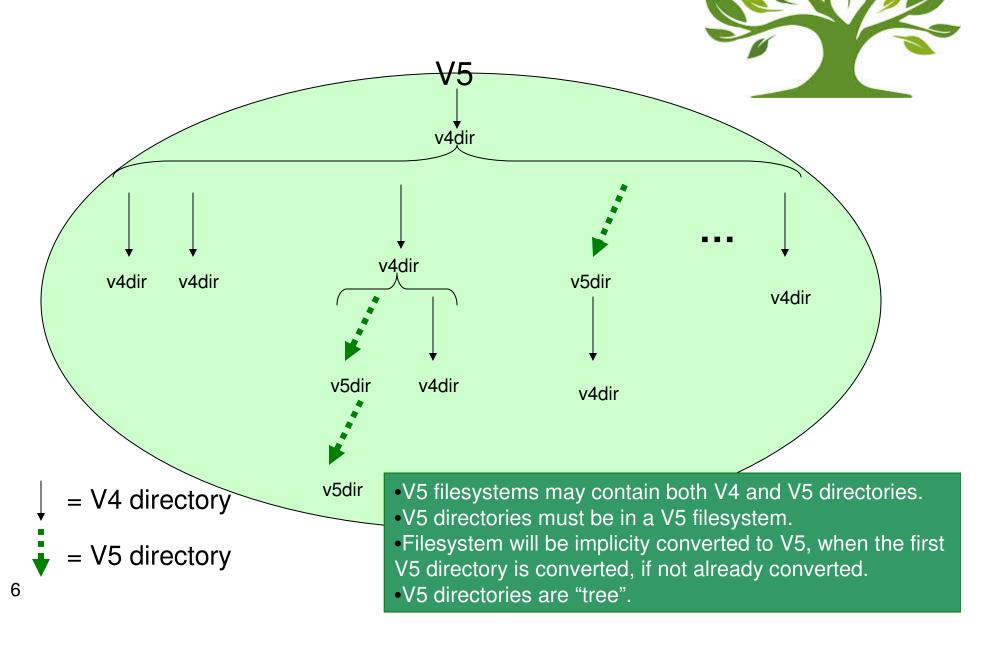
V5 filesystem (optional, in z/OS V2R1+ only):

- Provides new tree (v5) directory format: faster insert/search/delete
- Can contain both v4 (linear) and v5 (tree) directories
- Optional, not the default on z/OS V2R1
- Can only be mounted on z/OS V2R1
 - IBM recommends you do not start to use V5 filesystems until you are fully on z/OS V2R1 with no plans to go back to prior releases.

V4 and V5 Filesystems Comparison



V4 and V5 Filesystems Comparison





- More than 4 billion = limit of sub-directories in a directory
 - (v4 limit is 65,535)
- 16TB file system size limit (file size still limited to 4TB)
 - (v4 limit is 4TB)
- □ Can create a new v5 file system
 - zfsadm format, IOEAGFMT, IOEFSUTL
- New facilities to convert existing v4 file systems (and their directories) to v5:
 - Offline conversion facility (IOEFSUTL):
 - can convert v4 to v5 and also v5 to v4
 - Online conversion facilities (zfsadm convert, and IOEFSPRM CONVERTTOV5 option ...)
 - □ v4 to v5
- New query and APIs to determine directory version (4 or 5) (zfsadm fileinfo)



Version 5 File Systems - Disk Space Usage

- □ V5 file system pages use a prefix/postfix scheme to pack more names in a directory page than v4 if the names fit a common pattern at the beginning or end of the name.
 - Can result in 4X more names in a page over a v4 file system.
- □ V4 file systems can place a name in any directory page that can contain the name.
 - V5 directories must put the name in the page in the tree that is supposed to contain the name, thus leaving less flexibility in placement.
- □ Thus, there are cases where a v5 directory could use less space than a v4 directory and situations where it could use more.
- → IBM expects that the disk space used by v5 directories to be roughly equivalent to v4 directories on average.



v5 File Systems - Conversion Info

- Any **new** directories created in a v5 file system will be v5.
- A v5 filesystem can contain both v4 and v5 directories.
 - To support migration of an existing v4 filesystem to v5.
- Options for conversion of existing directories:
 - 1. Leave them all v4 (new dirs will be v5)
 - 2. Convert them as they are accessed
 - 3. Convert them at the time the filesystem is converted (use IOEFSUTL off-line utility)





v5 File Systems – More Details

V5 File Systems Can Only Be Processed on z/OS 2.1

- zFS will not allow creation of a v5 or conversion of a v4 to v5 if R13 or prior members exist in a sysplex.
- R13 and prior systems will fail MOUNTs of v5 file systems.
- Do not use v5 file systems until all systems at your site are z/OS 2.1 or later.
- IOEFSUTL converttov4 can convert a v5 file system back to v4 in most cases.



v5 File Systems – Conversion Details



- **Changing File System from v4 to v5:**
 - □ Fast operation, simply updates some global fields on disk.
 - After this conversion, any future directories created are v5
 - File system can be up to 16TB in size
 - •And allows the individual directories to be converted from v4 to v5.



V5 File Systems — Conversion Details

Converting a v4 Directory to a v5 **Directory:**

- ☐ Stops user activity to the directory (if the file system is mounted)
- ☐ Creates a new hidden v5 directory (gets deleted if system crashes at next mount time)
- □ Copies names from original v4 directory to hidden v5
 - This could require disk space, and if file system space exhausted will dynamically grow file system if dynamic grow is allowed for the file system.
- ☐ If prior step successful, atomically swaps the hidden v5 with the v4 making the v4 hidden.
 - A crash after this point in time will delete original hidden v4 and the new v5 remains. A v4 to v5 conversion performance experience:
- □ Delete hidden v4 directory
- □ Resume user activity

- •3.500 names/sec on z9/FICON DASD
- •10,000 names/sec on zEC12/FICON DASD

 \rightarrow A conversion from v5 to v4 works the same way, just swap the terms v4 and v5.



v5 File Systems – Kernel Parameters

■ Kernel Conversion Parameters (IOEPRMxx)

- ☐ CHANGE_AGGRVERSION_ON_MOUNT = ON/OFF
 - Will set file system version to 5 at R/W mount time, fast operation.
- □ CONVERTTOV5=ON/OFF
 - Will set file system version to 5 (if not already) and convert root directory at R/W mount time (if not already in the new format)
 - Will convert each old-format v4 directory to the new format *upon* first access.
- □ FORMAT_AGGRVERSION = 4/5 controls whether zfsadm format, ioefsutl and ioeagfmt, by default create a version 4 or 5 file system.
 - This avoids the need to update existing programs and JCL to specify that you want a v5 file system.
 - Automount, ISHELL use this parameter.

v5 File Systems – MOUNT Parameters



■ MOUNT parameter

□ CONVERTTOV5 / NOCONVERTTOV5 — Overrides IOEPRMxx *CONVERTTOV5* setting for file system. If not specified then IOEPRMxx *CONVERTTOV5* option takes effect.

■ IOEAGFMT/zfsadm format – existing format programs

- □-version4 / -version5 New parameters specify the version of the file system to create.
- □ Default is to get value of **format_aggrversion** parameter from zFS kernel to determine file system version to create.
 <u>zFS kernel must be active</u>.

v5 File Systems – IOEFSUTL

- IOEFSUTL new batch program with 4 commands for <u>non-mounted</u> file systems:
 - 1. Format Can format/create new file system (v4 or v5).
 - 2. Converttov5 Converts a v4 file system and all its directories to v5.
 - 3. Converttov4 Can convert existing version 5 file systems back to version 4 format:
 - IFF no directory has more than 65,535 sub-directories
 - IFF file system is < 4TB in size.
 - 4. Salvage Can verify and repair both v4 and v5 file systems like ioeagslv does.
 - → IOEFSUTL is the IBM future direction for zFS batch programs, although ioeagfmt and ioeagslv will remain supported, new batch function will be placed in ioefsutl.





v5 File Systems – salvage program

- IOEAGSLV completely re-written to support both v4 and v5 file systems.
 - Scales to largest zFS file systems
 - Has new messages that provide more details on the progress and results of the verification and repair.
 - Designed to repair in one pass, though two recommended if a repair required.







 zfsadm convert – new z/OS UNIX shell command, operates on mounted file systems:

zfsadm convert -aggrversion filesysname

Only changes the v4 filesystem to v5 (no directories)

zfsadm convert -path pathname

- Convert a specific directory to v5
- If filesystem not already changed to v5, it will change to v5
- Makes sure local application do not have directory open, but cannot check NFS/SMB remote applications, so be careful.
- Issuer must be owner with write access, and be UID 0 or have READ authority to SUPERUSER.FILESYS.PFSCTL



v5 File Systems – zfsadm fileinfo

- zfsadm fileinfo displays detailed file information:
 - zfsadm fileinfo -path <pathname> [{-globalonly | -localonly | -both}]

```
path: /home/suimghg/lfsmounts/PLEX.ZFS.FS2/DCEIMGHQ.ftestLD.p6/.
        global data
  * * *
                        ***
  fid
                           7,174515
                                          anode
                                                                  130931,2028
                           33546240
                                          format.
  length
                                                                  BLOCKED
                           21664
                                                                  755
  1K blocks
                                          permissions
                           0,10
                                          access acl
                                                                  33,72
  uid, gid
                                          file model acl
  dir model acl
                           33,72
                                                                  32,72
  user audit
                          F,F,F
                                          auditor audit
                                                                  N,N,N
  set sticky, uid, gid
                           0,0,0
                                          seclabel
                                                                  none
  object type
                                          object linkcount
                                                                  39686
                           DTR
  object genvalue
                           0 \times 00000000
                                          dir version
  dir name count
                           39686
                                          dir data version
                                                                  160308
                                          dir conversion
  dir tree status
                           VALID
                                                                  na
  file format bits
                                          file charset id
                           na, na, na
                                                                  na
  file cver
                                          charspec major, minor
                           na
                                                                  na
  direct blocks
                           0x000D91FE
                                          0x000D91FF
                                                         0x000D9200
                                                                        0x000D9201
                           0x000D9202
                                          0x000D9203
                                                         0x000D9204
                                                                        0x000D9205
  indirect blocks
                                          0 \times 00052199
                           0 \times 000 D9206
  mtime
                                        atime
               May 28 17:09:45 2013
                                                     May 28 17:09:19 2013
  ctime
               May 28 17:09:45 2013
                                        create time May 28 15:14:48 2013
  reftime
               none
```

v5 File Systems - Exploitation Strategy

- 1. Delay converting remaining HFS to zFS file systems until z/OS 2.1:
 - Unless you have an immediate need to convert an HFS to zFS (typically due to file IO performance issues with HFS):
 - Wait until your site is at z/OS 2.1 and later before migrating the file system to zFS
 - So you can use v5 format for improved directory performance and avoid a conversion from v4 to v5 format.
- 2. Do not use v5 until fully ready to commit to z/OS 2.1 for all systems.
 - Going back to v4 via IOEFSUTL could be lengthy and manual, wait until it is safe before using v5.
 - There is no IOEPRMxx CONVERTTOV4 option.
- 3. **Set IOEPRMxx format_aggrversion=5:**
 - Future file systems get created as version 5
 - And avoids having to change JCL and other programs.



v5 File Systems - Exploitation Strategy...Cont'd

- 4. Set IOEPRMxx change_aggrversion_on_mount=ON
 - Safe since it is a fast operation and ensures future directories are v5 format.
- 5. Determine if IOEPRMxx CONVERTTOV5 can be globally enabled
 - This depends on how many directories are accessed at IPL time, the number of names in each and the known zFS conversion performance results and the expected amount of delay to the system IPL.
 - User has to decide if they can tolerate the expected one-time IPL delay
 - And if they can, simply specify CONVERTTOV5=ON in IOEFSPRM.
- 6. And if cannot globally enable, then:
 - Determine highest usage file systems via RMF, or F
 ZFS,QUERY,FILESETS and commands shown previously.
 - Also look at file systems with large directories, especially if they are high usage and then use the CONVERTTOV5 MOUNT parameter selectively.

Version 5 File Systems- Performance Preliminaries



z/OS 2.1 Improves zFS Directory Performance:

New v5 file system directory trees make directory name lookup, insertion, & removal fast for larger directories.

- Directory searches scale well as names are added to the dir
- Directory searches can be performed in parallel (most of the time) with directory updates to the same directory.

For **both** v4 and v5 file systems:

- z/OS UNIX and zFS teams improved readdir+ performance for large directories.
 - → (used by Is –I and NFS server for example)
- zFS greatly improved sysplex client directory operation performance ... by reducing communications between clients and servers for readdir operations.

Sample Performance Workload Descriptions:



- Performance results (on subsequent slides) were obtained using 3 workloads created by IBM:
 - All workloads involved many tasks processing 2,000 objects in each directory, for multiple directories, on multiple file systems
 - □ And adding "base names" solely to fill up the directories
 - ptestDL2 This workload did repeated lookup (name searches) by the tasks.
 - ptestDL The tasks did repeated lookup and readdir functions.
 - ptestDU The tasks performed directory create/update/remove/readdir/search.
- □ Definitions used:
 - External Throughput (E) Number of operations per unit of time.
 - □ higher the number →lower the average operation response time.
 - Internal Throughput (I) Number of operations per unit of processor time.
 - □ higher the number → less CPU time each operation took.
- Tests were run varying the sizes of the involved directories to test scaleability.

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Version 5 File Systems – Performance Results ptestDL2

■ ptestDL2 (Directory Search) Results on zEC12 / FICON connected DASD

	Monoplex Results			Sysplex Client Results		
Directory Sizes	R13 Operations / Second	z/OS 2.1 V4 Ratio over R13	z/OS 2.1 V5 Ratio over R13	R13 Operations / Second I per processor	z/OS 2.1 V4 Ratio over R13	z/OS 2.1 V5 Ratio over R13
O Base Names (2,000 names per directory)	E=307703 I=307703	EΔ 1.005 IΔ 1.005	E∆ 1.197 I∆ 1.197	E=232427 I=55067/proc	EΔ 0.996 IΔ 0.980	E∆ 1.416 I∆ 1.378
18k Base Names (20,000 names per directory)	E=80840 I=80840	EΔ 0.964 IΔ 0.964	E∆ 4.536 I∆ 4.536	E=44532 I=10536/proc	EΔ 0.933 IΔ 0.933	E∆ 7.271 I∆ 7.098
48k Base Names (50,000 names per directory)	E=34598 I=34598	EΔ 0.964 IΔ 0.964	E∆ 10.026 I∆ 10.026	E=18308 I=4333/proc	EΔ 0.918 IΔ 0.918	E∆ 16.668 I∆ 16.297

- V5 file system search performance scales almost linearly with directory size
- V5 Sysplex client performance improves 40% even for small directories, 16X for directories with 50,000 names.
- vnode_cache_size=400000, meta_cache_size=100M, metaback_cache_size=2G
- V5 file system monoplex performance improves 20% for small directories, 10X for directories with 50,000 names.

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Version 5 File Systems - Performance Results ptestDL

■ ptestDL (Dir. Search+Readdir) Results on zEC12 / FICON connected DASD

	Monoplex Results			Sysplex Client Results		
Directory Sizes	R13 Operations / Second	z/OS 2.1 V4 Ratio over R13	z/OS 2.1 V5 Ratio over R13	R13 Operations / Second I per processor	z/OS 2.1 V4 Ratio over R13	z/OS 2.1 V5 Ratio over R13
O Base Names (2,000 names per directory)	E=297285 I=297345	EΔ 1.002 IΔ 1.002	E∆ 1.167 I∆ 1.167	E=216433 I=50474/proc	EΔ 1.064 IΔ 1.078	E∆ 1.454 I∆ 1.452
18k Base Names (20,000 names per directory)	E=33908 I=33918	E∆ 2.032 I∆ 2.032	E∆ 5.978 I∆ 5.977	E=2620 I=638/proc	E∆ 12.834 I∆ 8.840	E∆ 77.549 I∆ 51.830
48k Base Names (50,000 names per directory)	E=12717 I=12720	E∆ 2.258 I∆ 2.258	E∆ 9.160 I∆ 9.160	E=384 I=97/proc	E∆ 35.490 I∆ 22.237	E∆ 276.67 I∆ 174.81

- Since readdir is in the mix, its response time is dependent on directory size
- ■V5 monoplex performance: improves 17% for small, 9X for larger directories.
- V5 sysplex client performance improves 45% for small, 277X for larger directories
- Sysplex clients do server communication for attributes of base files
 - ■→This is why ETR differs from ITR, we improved performance for client to server communications for both v4 and v5 file systems, hence the large improvement.



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Version 5 File Systems – Performance Results ptestDU

ptestDU (Dir. Reading and Writing) Results on zEC12 / FICON connected

Sysplex Client Results

	Monopiex results			Oyopick Oliciti Hoodito		
Directory Sizes	R13 Operations / Second	z/OS 2.1 V4 Ratio over R13	z/OS 2.1 V5 Ratio over R13	R13 Operations / Second I per processor	z/OS 2.1 V4 Ratio over R13	z/OS 2.1 V5 Ratio over R13
0 Base Names (2,000 names per directory)	E=109584 I=119372	EΔ 1.055 IΔ 1.022	E∆ 1.167 I∆ 1.167	E=65384 I=11076/proc	E∆ 1.053 I∆ 1.059	E∆ 1.249 I∆ 1.226
18k Base Names (20,000 names per directory)	E=31688 I=31943	EΔ 1.566 IΔ 1.483	E∆ 3.313 I∆ 3.586	E=7441 I=1675/proc	E∆ 3.528 I∆ 2.780	E∆ 8.940 I∆ 6.822
48k Base Names (50,000 names per directory)	E=12667 I=12682	EΔ 1.741 IΔ 1.751	E∆ 6.158 I∆ 7.069	E=830 I=205/proc	E∆ 17.472 I∆ 12.568	E∆ 65.110 I∆ 47.891

- ■V5 monoplex performance: improves 17% for small, 7X for larger directories.
- V5 sysplex client performance improves 25% for small, 65X for larger directories
- Results from last two rows in table hurt by small meta cache size:

Monoplex Results

- ■→Due to zFS storage constraints, it was not possible to run with larger cache
- ■→ IBM working on solution.

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Judging v5 Benefits for Your Site



- Typical Customer Usage Pattern:
 - 1. Directory search (lookup) most common operation, or at least one of the most frequent. (ptestDL2)
 - File Open/Read/Write/Close the next most common operations (ptestDU)
 - →Note: z/OS 2.1 file IO performance is equivalent to z/OS 13 file IO performance.
 - Directory update operations generally a much lower percentage of calls to zFS.
 - → F ZFS,QUERY,KNPFS will show you your workload characteristics in terms of what operations are most common for you.

NA.

Judging v5 Benefits for Your Site...Cont'd

The Bigger the Directory...

- As shown in the prior slides, directory performance is improved even for smaller directories (2,000 names). Directories over 10,000 names will likely see non-trivial reduction in directory operation time inside zFS!
- The F ZFS,QUERY,FILESETS can be used to identify your most active file systems.
- And the Is -slk will show your directory size on disk in kilobytes.
 - → Any directory over 160K in size is going to get a benefit with v5

Note: Above commands can be used to help determine v4→v5 conversion candidates.



Benefits for your site: Quick Summary



- Summary:
 - If zFS (or HFS) is heavily used in your installation,
 AND you have:
 - High usage zFS or HFS file systems, or file systems with active larger directories AND/OR
 - You are using zFS sysplex RWSHARE support and access data on a non-owner.
 - Then zFS V5 File System and the z/OS 2.1 enhancements are going to help your environment.

Backup Information

- New Salvager
- Quiesce Updates

New Salvager - Summary

- Completely rewritten in z/OS 2.1:
 - Scales to largest file systems, avoiding abends present with the previous salvager.
 - Runs much faster
 - Note: Large file systems may still take a long time to verify and repair
 - Uses official z/OS messages for all communications to the user
 - The inputs to the program are mostly the same
 - Can specify a dataset that contains parameters much like the zFS kernel and/or use parmlib search.
 - But the output messages are completely different as shown in following slides.
- Supports both V4 and V5 File Systems.
- Invoked via:
 - IOEAGSLV for compatibility with existing programs.
 - IOEFSUTL salvage preferred method of invocation for the future.
- Can Verify and Repair in One Pass
 - If corrupt, will mark file system damaged, and if not repaired, a subsequent MOUNT would show message number IOEZ00783E.
 - However IBM recommends that if corruptions are found:
 - Perform a second repair pass to prove file system is truly corrected.
 - If not corrected then report the problem to IBM.
 - Should always be certain a file system is truly fixed before using it.



New Salvager – Sample Verification

IOEZ00559I zFS IOEFSUTL: Initializing z/OS zFS Version 02.01.00 Service Level s15. Created on Tue Feb 5 09:15:55 EST 2013. Address space asid x1C IOEZ00178I CFCIMGNJ.PARMLIB(IOEFSPRM) is the configuration dataset currently in use **IOEZ00707I Log file size 107 8K blocks, verified correct** IOEZ00729I Verification of aggregate SUIMGNJ.HIGHRISK.TEST started IOEZ00705I Formatted v5 aggregate size 10800 8K blocks, dataset size 10800 8K blocks **IOEZ00707I Log file size 107 8K blocks, verified correct IOEZ00709I Bitmap size 2 8K blocks, verified correct** IOEZ00782I Salvage has verified 17 of 175 pages in the anode table. IOEZ00782I Salvage has verified 34 of 175 pages in the anode table. IOEZ00782I Salvage has verified 153 of 1530 directories in the directory tree. IOEZ00782I Salvage has verified 306 of 1530 directories in the directory tree. IOEZ007221 Primary file system size 465 8K blocks, verified correct IOEZ00739I Salvage processed 1573 directory pages, 4128 anodes, 3 indirect blocks and 175 anode table pages. IOEZ00730I Verification of aggregate SUIMGNJ.HIGHRISK.TEST completed, no errors found

- Note that the new program has progress indicators to show its still running
- Shows how many objects were processed.

New Salvager – Sample Repair Case where File System was Corrupt

```
IOEZ00729I Verification of aggregate SUIMGNJ.HIGHRISK.TEST1 started
IOEZ00705I Formatted v5 aggregate size 41040 8K blocks, dataset size 41040 8K blocks
IOEZ00707I Log file size 107 8K blocks, verified correct
IOEZ00709I Bitmap size 6 8K blocks, verified correct
IOEZ00703E Corruption: Anode Table (T3); direct block index=6 physPage=8
IOEZ00704E Expected: Anode Table (T3): physPage=8 not alllocated to another object
IOEZ00703E Corruption: Anode Table (T2): allocated=12032 visible=12032
IOEZ00704E Expected: Anode Table (T2): calculated allocated=12024 visible=12024
IOEZ00723E Primary file system on aggregate SUIMGNJ.HIGHRISK.TEST1 is corrupted
IOEZ00703E Corruption: Bitmap (B18): bits array in Bitmap physPage 00000001 logPage/offset/value=<0 2319
000000FF>
IOEZ00703E Corruption: Bitmap (B18): represented physPage 1386
IOEZ00704E Expected: Bitmap (B18): bits array in Bitmap physPage 00000001 logage/offset/value=<0 2319
0000000>
IOEZ00739I Salvage processed 16916 directory pages, 47972 anodes, 5 indirect blocks and 1500 anode table
pages.
IOEZ00733I Verification of aggregate SUIMGNJ.HIGHRISK.TEST1 completed and the aggregate is in error
IOEZ00735I Salvage found 16 minor errors of aggregate SUIMGNJ.HIGHRISK.TEST1
IOEZ00753I Salvage is repairing anode table pages.
IOEZ00755I Salvage is repairing the ZLC list.
IOEZ00756I Salvage is repairing file, directory, and ACL objects.
IOEZ00757I Salvage is repairing bitmap pages.
IOEZ00758I Salvage repaired 1 anode table pages, 0 partially free pages, 0 zlc pages, 0 indirect blocks.
IOEZ00787I Repair of aggregate SUIMGNJ.HIGHRISK.TEST1 completed
```

- Message 703E/704E generally intended for IBM support.
- Messages 733I/758I/787I intended for user, shows if file system is corrupted and how many errors were repaired and if repair was successful.
- You should run the program one more time and verify it indicates the file system is no longer corrupted if you see these.



Quiesce Updates - Summary

- Problem: D OMVS,F does not show quiesced status for zFS file systems:
 - zFS was handling file system quiesce operations independent of z/OS Unix
 - z/OS Unix displays did not properly show file system quiesce status.
- IBM has corrected problem in z/OS 2.1:
 - NORWSHARE file system quiesce now handled by z/OS Unix
 - Guarantees z/OS Unix display command correct.
 - RWSHARE file system quiesce still handled by zFS
 - But zFS notifies z/OS Unix of the quiesce, and z/OS Unix shows it in a "PFS Exception" string in its display commands.
 - zFS has also updated its zfsadm aggrinfo –long command to show more information about the quiesced file system.

USSZFS.PLEX01.ZFS (R/W COMP QUIESCED): 2134143 K free out of total 2160000 version 1.4 auditfid D6C5F9F6 F7F70010 0000 266767 free 8k blocks; 7 free 1K fragments 21616 K log file; 56 K filesystem table 312 K bitmap file Quiesced by job TOTTEN26 on system NP5 on Wed Feb 6 13:31:07.687179 2013



Quiesce Updates – z/OS UNIX Display Examples

NORWSHARE Examples:

D OMVS,F,N=USSZFS.PLEX01.ZFS

```
PXO045I 15.14.39 DISPLAY OMVS 252
OMVS 0011 ACTIVE OMVS=(ST,R1,X9)
TYPENAME DEVICE ------STATUS------ MODE MOUNTED LATCHES
ZFS 425 QUIESCED RDWR 01/30/2013 L=245
NAME=USSZFS.PLEX01.ZFS 15.13.24 Q=245
PATH=/u/totten/testdir
MOUNT PARM= norwshare
OWNER=NP5 AUTOMOVE=Y CLIENT=N
QSYSTEM=NP5 QJOBNAME=TOTTEN26 QPID= 50595795
```

df -Pkv /u/totten/testdir

1024-blocks Available Mounted on Filesystem Used Capacity **USSZFS.PLEX01.ZFS** 0% ZFS. Read/Write, Device:401, ACLS=Y norwshare File System Owner: NP5 Automove=Y Client=N **Quiesce Owner: NP5 Quiesce Jobname: TOTTEN26** Quiesce PID: 50595795 Filetag: T=off codeset=0 Aggregate Name: USSZFS.PLEX01.ZFS



Quiesce Updates – z/OS Unix Display Examples

RWSHARE Examples:

D OMVS,F,N=USSZFS.PLEX01.ZFS

```
BPXO045I 15.07.53 DISPLAY OMVS 248
OMVS 0011 ACTIVE OMVS=(ST,R1,X9)
TYPENAME DEVICE -----STATUS------ MODE MOUNTED LATCHES
ZFS 423 ACTIVE RDWR 01/30/2013 L=245
NAME=USSZFS.PLEX01.ZFS 15.05.59 Q=0
PATH=/u/totten/testdir
MOUNT PARM= rwshare
OWNER=NP5 AUTOMOVE=Y CLIENT=N
PFS INFO:
PFS EXCP: QUIESCED
```

df -Pkv /petzfs1

Filesystem 1024-blocks Used Available Capacity Mounted on OMVSSPT.PETZFS1.ZFS 2492640 973353 1519287 40% /petzfs1 ZFS, Read/Write, Device:8793, ACLS=Y

File System Owner : Z1 Automove=U Client=N

Filetag: T=off codeset=0

Aggregate Name: OMVSSPT.PETZFS1.ZFS

PFS EXCP: QUIESCED



References

- ■SA23-2283-00 z/OS V2R1.0 Using REXX and z/OS UNIX System Services
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- ■SA23-2285-00 z/OS V2R1.0 UNIX System Services File System Interface Reference
- ■SA23-2284-00 z/OS V2R1.0 UNIX System Services Messages and Codes
- ■GA32-0884-00 z/OS V2R1.0 UNIX System Services Planning
- ■SA23-2282-00 z/OS V2R1.0 UNIX System Services Programming Tools
- ■SA23-2281-00 z/OS V2R1.0 UNIX System Services Programming: Assembler Callable Services Reference
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