

*****DEPRECATED*****

This document has been deprecated and should no longer be used. Reference the [DFSMS Object Access Method Planning, Installation, and Storage Administration Guide for Object Support](#) and the [DFSMSdfp Diagnosis](#) publications for the latest information on OAM's Cloud as a Tier support.

***** DEPRECATED *****

| Externals (SPE OA55700) OAM Cloud as a Tier PTFs V2R3 and V2R4 Coexistence OA55701 (V2R2 and base V2R4) | |
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Note: Throughout this document, **blue text** indicates the additions or changes for this support shown in the context of the current text for existing support.

| Version | Date | Change Description | Revision Tag |
|---------|------------|--|---|
| 1.0 | 05/01/2020 | Initial version | None - this replaces earlier versions |
| 1.1 | 08/12/2020 | Added CDA error codes to Diagnostic Aids section | None |
| 1.2 | 02/04/2021 | Added additional diagnostic data, including OSREQ reason codes | Blue |
| 1.3 | 01/26/2022 | ***Deprecated*** | None – no updates were made to content. Only added the deprecation statement to the front of the document to indicate this document should no longer be used. |

Table of Contents

| | | |
|--------|---|-------------------------------------|
| 1 | Overview | 4 |
| 1.1 | Overview of the Support | 4 |
| 1.2 | Application Changes | 4 |
| 1.3 | Technical Overview | 4 |
| 2 | Platform Considerations | 7 |
| 2.1 | Installation Considerations | 7 |
| 2.2 | Migration Actions | 7 |
| 2.3 | Coexistence, Toleration and Fallback Considerations | 7 |
| 2.4 | Performance Considerations | 8 |
| 2.5 | Security/System Integrity Considerations | 8 |
| 3 | Functional Characteristics | 9 |
| 3.0 | Overview | 9 |
| 3.0.1 | New Cloud Level in OAM Storage Hierarchy | 17 |
| 3.0.2 | Specification of OAM Level/Sublevel | 17 |
| 3.0.3 | PARMLIB Statements | 18 |
| 3.0.4 | DB2 Databases | 24 |
| 3.0.5 | Operator Commands | 27 |
| 3.0.6 | Application Programming | 34 |
| 3.0.7 | OSMC Functions and Utilities | 36 |
| 3.0.8 | SMF 85 Record | 39 |
| 3.0.9 | OAM Cloud Processing | 62 |
| 3.0.10 | OAMplex/Sysplex Processing | 64 |
| 3.0.11 | IPCS Support | 65 |
| 3.0.12 | ISMF & NaviQuest | 65 |
| 3.1 | APIs, Callable Services, and Macros | 71 |
| 3.2 | Commands | 71 |
| 3.3 | System Library Updates (PARMLIB, PROCLIB, SAMPLIB, etc.) | 71 |
| 3.3.1 | CBRAPROC | 71 |
| 3.3.2 | CBRSAMPL | 71 |
| 3.3.3 | CBRSMCID (new) | 72 |
| 3.4 | Diagnostic Aids | 72 |
| 3.4.1 | General Information | 72 |
| 3.4.2 | OSREQ and OAM Macro Return and Reason Codes | 73 |
| 3.4.3 | Cloud error information | Error! Bookmark not defined. |
| 3.4.4 | Cloud Data Access Return Codes | 75 |
| 3.5 | Messages | 76 |
| 3.5.1 | CBR0016I (Changed) | 76 |
| 3.5.2 | CBR0052I (Changed) | 76 |
| 3.5.3 | CBR0080I (Changed) | 77 |
| 3.5.4 | CBR0081I (Changed) | 78 |
| 3.5.5 | CBR0082I (Changed) | 79 |
| 3.5.6 | CBR0085I (New) | 80 |
| 3.5.7 | CBR0302I (Changed) | 81 |
| 3.5.8 | CBR0303I (Changed) | 81 |
| 3.5.9 | CBR0304I (Changed) | 82 |
| 3.5.10 | CBR0305I (Changed) | 82 |
| 3.5.11 | CBR0306I (Changed) | 83 |
| 3.5.12 | CBR0307I (Changed) | 84 |
| 3.5.13 | CBR0309I (Changed – Explanation Only) | 85 |
| 3.5.14 | CBR0338I (Changed) | 86 |
| 3.5.15 | CBR0339I (Changed) | 87 |
| 3.5.16 | CBR0344I (Changed) | 88 |
| 3.5.17 | CBR0360I (New) | 89 |

(SPE) OAM Cloud as a Tier (OA55700)

| | | |
|--------|---|-----|
| 3.5.18 | CBR0361I (New) | 89 |
| 3.5.19 | CBR0362I (New) | 90 |
| 3.5.20 | CBR0363I (New) | 90 |
| 3.5.21 | CBR0443I (Changed / Explanation Only) | 91 |
| 3.5.22 | CBR1075I (Changed / Explanation Only) | 92 |
| 3.5.23 | CBR1090I (Changed)..... | 92 |
| 3.5.24 | CBR1091I (Changed)..... | 93 |
| 3.5.25 | CBR1092I (Changed)..... | 94 |
| 3.5.26 | CBR1093I (Changed)..... | 95 |
| 3.5.27 | CBR1100I (Changed)..... | 96 |
| 3.5.28 | CBR1130I (Changed)..... | 101 |
| 3.5.29 | CBR1290I (New) | 103 |
| 3.5.30 | CBR1295I (New) | 104 |
| 3.5.31 | CBR1705I (New) | 105 |
| 3.5.32 | CBR1795I (New) | 106 |
| 3.5.33 | CBR1810I (New) | 107 |
| 3.5.34 | CBR1811I (New) | 107 |
| 3.5.35 | CBR1812I (New) | 108 |
| 3.5.36 | CBR1813I (New) | 108 |
| 3.5.37 | CBR1990I (Changed)..... | 109 |
| 3.5.38 | CBR1991I (Changed)..... | 109 |
| 3.5.39 | CBR1992I (Changed)..... | 110 |
| 3.5.40 | CBR1993I (Changed)..... | 110 |
| 3.5.41 | CBR6000I (Changed)..... | 111 |
| 3.5.42 | CBR6001I (Changed)..... | 112 |
| 3.5.43 | CBR6505I (New) | 114 |
| 3.5.44 | CBR6520I (Changed)..... | 115 |
| 3.5.45 | CBR6521I (Changed)..... | 116 |
| 3.5.46 | CBR6522I (Changed)..... | 117 |
| 3.5.47 | CBR6523I (New) | 118 |
| 3.5.48 | CBR6524I (New) | 119 |
| 3.5.49 | CBR6530I (New) | 120 |
| 3.5.50 | CBR9014I (Changed / Explanation only) | 122 |
| 3.5.51 | CBR9015I (Changed / Explanation only) | 123 |
| 3.5.52 | CBR9103I (Changed)..... | 124 |
| 3.5.53 | CBR9106I (Changed)..... | 125 |
| 3.5.54 | CBR9225I (Changed)..... | 126 |
| 3.5.55 | CBR9370I (Changed)..... | 128 |
| 3.5.56 | CBR9842I (Changed / Explanation only) | 129 |
| 3.5.57 | CBR9890I (Changed / Explanation only) | 130 |

1 Overview

1.1 Overview of the Support

The following is an overview of the support provided:

1. Ability to store and manage **primary copies** of OAM objects on cloud storage with the same capabilities for access, transition, and backup as currently exist for primary object copies stored on a file system. Backups can continue to be stored to removable media (optical or tape).
2. **Ability to recall** an object stored in the cloud to the disk level of the storage hierarchy in any of the same ways that primary object copies on tape or optical can currently be recalled. Cloud objects can be recalled to both disk sublevels (DB2 or file system).
3. Ability to store detailed information about each cloud provider's API in the new Cloud Data Access (CDA) component of DFSMS. **OAM uses the CDA API for common services** to interface with the cloud.
4. Ability to define a user configurable mapping between OAM **object storage groups** and user-defined cloud **containers**. For new objects, each storage group is associated with a single container, but multiple storage groups can share a container. Once an object is stored, it will remain in the same container and continue to be accessible even if the container associated with its storage group is changed.
5. Ability to store an object with the same storage group name, collection name, and object name from **multiple unrelated OAM instances** in the same cloud container and ensure that each instance only accesses its own object.
6. File names for OAM objects stored in the cloud have a naming schema (through the use of forward slashes) that enables customers to create **pseudo hierarchical folders** for information lifecycle management (ILM) within the cloud.
7. The **Amazon (S3) interface is supported**. Testing was done using the IBM Cloud Object Store, IBM COS and Amazon's cloud; however, any cloud storage which supports the S3 interface is expected to work.

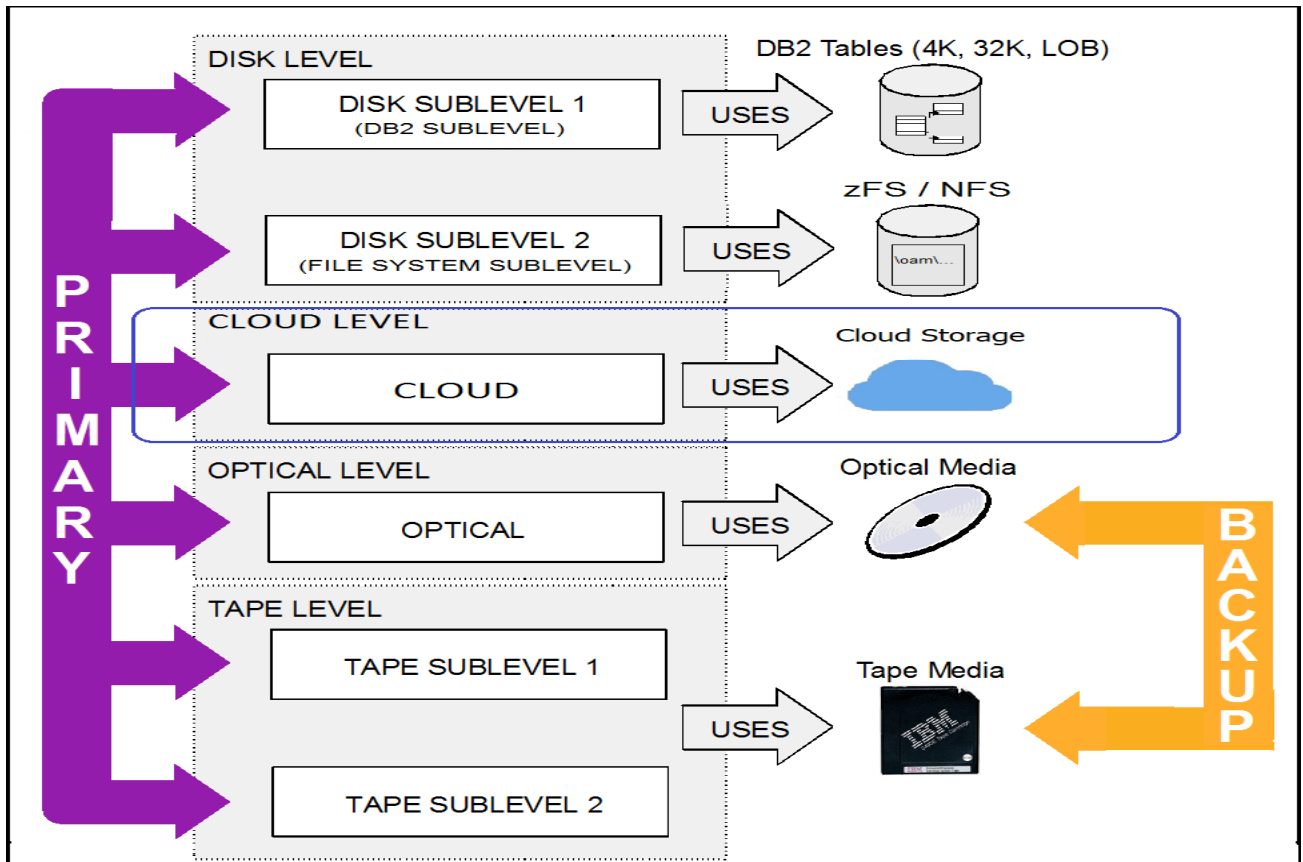
1.2 Application Changes

This support adds a new cloud tier to OAM's storage hierarchy. As with previous layers of the storage hierarchy, the ability to store and transition an object to a particular layer in the storage hierarchy is based on SMS policies. The ability to store or transition the primary copy of an object to the cloud will require no application changes. A new value for response time will be returned from an OSREQ QUERY when the primary copy of the object is stored in the cloud. Application which utilize the response time might need changes to recognize this new value.

1.3 Technical Overview

OAM is updated to support an additional level in the storage hierarchy called the cloud level. For this support only primary copies of objects can be stored in the cloud level. All functions available through the OSREQ API for the existing disk and tape levels will also be available for the new cloud level.

(SPE) OAM Cloud as a Tier (OA55700)



All **OSMC cycle processing** currently available for primary copies of objects in either of those levels are also supported for the new cloud level. Recall from cloud is supported to DB2 and to file system.

A new statement is supported in the **CBROAMxx member of SYS1.PARMLIB** to provide information about cloud processing for object storage groups and two existing statements in the same member are enhanced to allow configuration of automatic access to backup and recall processing for objects stored in the cloud level.

Operator command keywords and output from display and query commands are updated as appropriate to allow cloud-related values to be requested and displayed.

New processing tasks are added to the OAM address space to process requests for cloud level objects. These tasks interact with the new Cloud Data Access (CDA) services which provide the interface to cloud providers and manage the configuration and security setup necessary for reading, writing and deleting objects on cloud storage.

A **new DB2 table** is added to store information regarding cloud locations (provider and container names) and a column is added to the existing FSDELETE table to support deletion of objects stored in the cloud level.

New SMF type 85 subtypes are added and some existing subtypes additional fields or bit settings for cloud related information.

New messages are added, and some existing messages are updated for communicating information regarding cloud level object processing.

(SPE) OAM Cloud as a Tier (OA55700)

New reason codes are provided on OSREQ requests to convey cloud-specific conditions.

Minor changes to ISMF, SMS and NaviQuest are made to **support a value of 3 for OAM sublevel** if Initial Access Response Seconds (IARS) is 0. This value designates the cloud level.

2 Platform Considerations

2.1 Installation Considerations

To enable this function, the following must be done:

- acquire cloud storage (either internally or through a cloud provider)
- configure Cloud Data Access (CDA), including security features, to interface with the cloud storage (refer to the detailed setup steps for CDA)
- perform the migration actions described in [Migration Actions](#)
- add SETCLOUD statements to the CBROAMxx member of SYS1.PARMLIB to define the relationship between object storage groups and cloud containers
- use ISMF to create or alter one or more storage class definitions to set the OAM storage hierarchy tier to the new cloud level (IARS=0 and OAM Sublevel=3)
- optionally modify ACS routines to select a storage class that defines the OAM level as cloud
- optionally modify SETOPT and SETOSMC statements in the CBROAMxx member of SYS1.PARMLIB to configure automatic access to backup and recall processing for objects stored in the cloud level.

This function can be disabled by removing the statements that define the relationship between object storage groups and cloud containers and altering storage class definitions or ACS routines so that the cloud level will not be selected for newly stored objects.

2.2 Migration Actions

A job (CBRSMCID) must be run to define the new cloud identification table and add a column to the existing FSDELETE DB2 table in the OAM configuration.

Otherwise there are no migration actions specific to this line item, but as is the case with all new releases (and some PTFs), the DB2 database administrator must run the installation tailored BIND jobs as described in “Chapter 3. Migrating, Installing, and Customizing OAM” in the z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support publication.

2.3 Coexistence, Toleration and Fallback Considerations

This support is being delivered as an SPE (via PTFs) on z/OS V2R3 and z/OS V2R4 and will not be rolled back to any prior releases. When running in an OAMplex with one or more systems that have the support and one or more that do not, those that do not will have the following behavior for objects stored in the cloud level:

- OSREQ is unable to store objects to the cloud level.
- OSREQ is unable to retrieve the primary copy of an object from cloud storage; however, if the primary copy has been recalled to the disk level or if VIEW=BACKUP or VIEW=BACKUP2 is specified and the requested backup copy is available, OSREQ is able to retrieve it.
- OSREQ is unable to delete an object from cloud storage, even if it has been recalled to the disk level.
- OSMC is unable to make backup copies of an object with its primary copy in the cloud level, process transitions to or from the cloud level, delete an object from the cloud level, or do any type of recovery that requires reading the primary copy of an object from the cloud level.

(SPE) OAM Cloud as a Tier (OA55700)

Toleration support is available for V2R2 to recognize the new value (3) for the OAM sublevel field in the storage class structure indicating “cloud level” and to recognize the above situations and return a new return/reason code combination when the requested function cannot be performed. (Without toleration support, V2R2 will interpret sublevel 3 to be DB2 and perform processing accordingly.)

OAM's toleration support (OA55701 z/OS V2R2) or full support (OA55700 z/OS V2R3 and V2R4) must be applied to all systems in an OAMplex before assigning a storage class that uses the new cloud level of the storage hierarchy, using the new value (3) for OAM sublevel value in ISMF, or starting an OAM address space using a CBROAMxx PARMLIB member that contains one or more SETCLOUD statements. In addition, OA55715 from SMS also needs to be applied for toleration.

Note: For V2R4, in addition to full support being available (via PTFs), toleration support was also included in the base V2R4 support for OAM and for SMS. For SMS, their full support APAR OA55715, is the same as their toleration support.

2.4 Performance Considerations

The performance characteristics of the OAM code for processing objects written to the new cloud level are expected to be very similar to those for processing objects in other levels in the storage hierarchy. As is the case for other levels in the hierarchy, the time required to access the object data varies significantly depending on the location of the data and so overall processing time of a request that accesses data stored on the cloud level will likely be longer, perhaps significantly longer, than for the same type of request that accesses data stored on the disk level. The variance in response time is due to factors outside of OAM (i.e. how long it takes to access the storage where the object data resides).

2.5 Security/System Integrity Considerations

To exploit the new cloud level of the hierarchy, the following provides a high-level summary of the steps required. Refer to the Cloud Data Access (CDA) accompanying documentation for details on installation and setup:

1. Create an OAM RACF user id (similar to our file system support).
2. Associate the OAM started task with the OAM RACF user id (similar to our file system support).
3. The cloud access key/secret key for OAM will be created by the client's cloud administrator and will be entered into a new ISPF panel provided by CDA. The CDA provider name and OAM RACF user id will also be required information.
4. Based on the combination of CDA provider name and OAM RACF user id, CDA will request an ICSF encryption key be created associated with the key label 'GDK.<provider>.<OAM_racf_id>.A0000'. Note “GDK” is the 3-character prefix assigned to the CDA component.
5. CDA will then request ICSF to encrypt the access key/secret key using the CDA created key label above.
6. Upon return from ICSF, CDA will store the encrypted access key/secret key in the JSON CDA key file stored in a Unix file system under the key label.
7. The OAM RACF user id then needs to be granted access to the key associated with the key label in ICSF.

3 Functional Characteristics

3.0 Overview

The following table provides a brief description of the changes to the functional characteristics within the OAM component.

| Existing Environment | New Environment |
|---|--|
| GENERAL | |
| <p>The OAM storage hierarchy consists of:</p> <ul style="list-style-type: none">– a disk level with two sublevels (DSL1 is the DB2 sublevel; DSL2 is the file system sublevel)– a tape level with two tape sublevels (TSL1 is tape sublevel 1; TSL2 is tape sublevel 2)– an optical level (supported only in a classic OAM configuration) | <p>The OAM storage hierarchy is changed to add a cloud level. The OAM storage hierarchy will now consist of:</p> <ul style="list-style-type: none">– a disk level with two sublevels (DSL1 is the DB2 sublevel; DSL2 is the file system sublevel)– a tape level with two tape sublevels (TSL1 is tape sublevel 1; TSL2 is tape sublevel 2)– a cloud level– an optical level (supported only in a classic OAM configuration) |

(SPE) OAM Cloud as a Tier (OA55700)

| SMS / ISMF | |
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| <p>The OAM level is set in the SMS storage class definition using the Initial Access Response Seconds (IARS) value and the Sustained Data Rate (SDR) value as follows: IARS = 0: Disk level IARS > 0 and SDR < 3: Optical level IARS > 0 and SDR >= 3: Tape level</p> <p>The OAM Sublevel value in the SMS storage class definition is only used when the OAM level is Disk or Tape. Valid values are 1 or 2 which have the following meaning: When IARS = 0 - 1 means disk sublevel 1 (DB2) - 2 means disk sublevel 2 (File system) When IARS > 0 and SDR >= 3 - 1 means tape sublevel 1 - 2 means tape sublevel 2</p> | <p>The OAM level is set in the SMS storage class definition using the Initial Access Response Seconds (IARS) value, the Sustained Data Rate (SDR) value, and the OAM Sublevel value as follows: IARS = 0: Disk level or cloud level IARS > 0 and SDR < 3: Optical level IARS > 0 and SDR >= 3: Tape level</p> <p>The OAM Sublevel value in the SMS storage class definition is only used when IARS=0 or SDR>=3. Valid values are 1, 2 or 3 (with 3 only valid when IARS=0). The values have the following meaning: When IARS = 0 - 1 means disk sublevel 1 (DB2) - 2 means disk sublevel 2 (File system) - 3 means cloud level</p> <p>When IARS > 0 and SDR >= 3 - 1 means tape sublevel 1 - 2 means tape sublevel 2</p> <p>See “0 Specification of OAM Level/Sublevel” on page 17 for more information on OAM usage of the IARS, SDR, and OAM Sublevel fields.</p> |
| PARMLIB | |
| <p>Since the Cloud level is not currently supported in OAM, there is no mechanism in OAM to configure an object storage group for object storage in a cloud.</p> | <p>A new SETCLOUD statement in the CBROAMxx member of PARMLIB is added to specify information about cloud storage where objects may be stored for a given OAM primary object storage group. For details, see “3.0.3 ” on page 18.</p> |
| <p>The existing SETOPT statement in the CBROAMxx member of PARMLIB includes keywords for configuring ‘Automatic Access to Backup’ functionality in OAM for several “reasons”.</p> | <p>The existing SETOPT statement in the CBROAMxx member of PARMLIB configuration settings for ‘Automatic Access to Backup’ functionality in OAM will have a new “reason” added for cloud errors in addition to the existing “reasons”. For details, see “3.0.3.2 SETOPT Statement in CBROAMxx Member of PARMLIB” on page 21.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

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| <p>The existing SETOSMC statement in the CBROAMxx member of PARMLIB includes keywords for specifying the number of days an object recalled to the disk level (DB2 or File System) from the tape and/or optical level should remain in the disk level.</p> | <p>The existing SETOSMC statement in the CBROAMxx member of PARMLIB will have a new keyword added to specify the number of days an object recalled to the disk level from the cloud level should remain in the disk level. For details, see “3.0.3.3 ” on page 22.</p> |
| <p>OAM DATABASES / DB2</p> | |
| <p>N/A</p> | <p>A new DB2 table (CLOUDID) is added to hold information about cloud storage locations (e.g. cloud provider and container name). For details, see “3.0.4.1 ” on page 24.</p> |
| <p>The existing OAM DB2 Object Directory Location field (ODLOCFL) can contain one of the following values:</p> <ul style="list-style-type: none"> • ‘ ’ (blank) for optical (Classic configuration only) • ‘D’ for disk sublevel 1 (DB2) • ‘E’ for disk sublevel 2 (file system) • ‘R’ for recalled to disk sublevel 1 (DB2) • ‘2’ for recalled to disk sublevel 2 (file system) • ‘T’ for tape sublevel 1 • ‘U’ for tape sublevel 2 | <p>The existing OAM DB2 Object Directory Location field (ODLOCFL) will have a new possible value of ‘C’ and now can contain one of the following values:</p> <ul style="list-style-type: none"> • ‘ ’ (blank) for optical (Classic configuration only) • ‘C’ for cloud level • ‘D’ for disk sublevel 1 (DB2) • ‘E’ for disk sublevel 2 (file system) • ‘R’ for recalled to disk sublevel 1 (DB2) • ‘2’ for recalled to disk sublevel 2 (file system) • ‘T’ for tape sublevel 1 • ‘U’ for tape sublevel 2 <p>For details on the ODLOCFL column, see “3.0.4.2 ” on page 24.</p> |
| <p>The existing OAM DB2 Object Directory primary object location column ODLSLOC contains:</p> <ul style="list-style-type: none"> - the volume containing the primary copy of the object when it is in the tape or optical level of the storage hierarchy - blanks if the primary copy is on the disk level. | <p>The existing OAM DB2 Object Directory primary object location column ODLSLOC contains:</p> <ul style="list-style-type: none"> - the volume containing the primary copy of the object when it is in the tape or optical level of the storage hierarchy - the ID value of the row in the CLOUDID table defining the cloud provider and container where the primary copy is stored if it’s in the cloud level (in hexadecimal prefixed by a blank and the letter C) - blanks if the primary copy is on the disk level. <p>For details on this column, see “3.0.4.2 ” on page 2424.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

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| <p>The existing OAM DB2 Object Directory sector column ODSECLOC contains:</p> <ul style="list-style-type: none"> - the specific location on the volume (sector for optical volumes or block ID for tape volumes) where the primary copy of the object is stored when it is in the tape or optical level of the storage hierarchy - blanks if the primary copy is in the disk level. | <p>The existing OAM DB2 Object Directory sector field ODSECLOC contains:</p> <ul style="list-style-type: none"> - the specific location on the volume (sector for optical volumes or block ID for tape volumes) where the primary copy of the object is stored when it is in the tape or optical level of the storage hierarchy - the instance ID associated with the cloud file if the primary copy is in the cloud level - blanks if the primary copy is in the disk level. <p>For details on this column, see “3.0.4.2 “ on page 24.</p> |
| <p>The existing OAM Configuration Database contains configuration information for the optical and tape object destinations and a File System Delete (FSDELETE) table which maintains information about objects that have been deleted from OAM and need to be removed from the file system.</p> | <p>The FSDELETE table is referred to as the File <u>Storage</u> Delete table and will have one column added to identify from where in the cloud the file associated with the object must be deleted. It will maintain information about objects that have been deleted from OAM and need to be removed from either the file system or the cloud.</p> <p>For details on the FSDELETE table, see “3.0.4.3 ” on page 25.</p> |
| <p>OPERATOR COMMANDS</p> | |
| <p>The existing “F <i>oam,START,DIAGMSG,OSREQFS</i>” and “F <i>oam,STOP,DIAGMSG,OSREQFS</i>” commands start and stop, respectively, the temporary display of additional diagnostic messages for file system related errors originating from an OSREQ request. Each time OAM is started, 10 diagnostic messages for file system related errors are automatically enabled.</p> | <p>A new operand OSREQCLD is supported on operator commands “F <i>oam,START,DIAGMSG,OSREQCLD</i>” and “F <i>oam,STOP,DIAGMSG,OSREQCLD</i>” to allow the temporary display of diagnostic messages for cloud related errors originating from an OSREQ request. Each time OAM is started, 10 diagnostic messages for file system related errors and 10 for cloud related errors are automatically enabled.</p> <p>For details, see “3.0.5.1 ” on page 27.</p> |
| <p>The existing “F <i>oam,START,AB...</i>” and “F <i>oam,STOP,AB...</i>” operator commands are used to start and stop ‘Automatic Access to Backup’ functionality in OAM for a number of existing “reasons”.</p> | <p>The existing “F <i>oam,START,AB...</i>” and “F <i>oam,STOP,AB...</i>” operator commands to start and stop ‘Automatic Access to Backup’ functionality in OAM will have a new “reason” added for cloud errors in addition to the existing “reasons”.</p> <p>For details, see “3.0.5.2 ” on page 2828.</p> |
| <p>The existing “D SMS,OAM” and “F <i>oam,DISPLAY,OAM</i>” operator commands display the status of ‘Automatic Access to Backup’ functionality in OAM for a number of existing “reasons”.</p> | <p>The existing “D SMS,OAM” and “F <i>oam,DISPLAY,OAM</i>” operator commands to display the status of ‘Automatic Access to Backup’ functionality in OAM will now display a line for the new “reason” for cloud errors in addition to the lines for the existing “reasons”.</p> <p>For details, see “3.0.5.3 Displaying OAM Status” on page 3030.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

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| <p>The existing “F <i>oam</i>,DISPLAY,SETxxx...” operator command can request a display of parameters for the SETOPT, SETOAM, SETOSMC, SETDISK and SETTLIB statements.</p> | <p>The existing “F <i>oam</i>,DISPLAY,SETxxx...” operator command have new functionality added for “F <i>oam</i>, DISPLAY,SETCLOUD,...” to display new cloud related values specified on the SETCLOUD statement in addition to requesting a display of parameters for the SETOPT, SETOAM, SETOSMC, SETDISK and SETTLIB statements.</p> <p>For details, see “3.0.5.4 Displaying SETCLOUD, SETDISK, SETOAM, SETOPT, SETOSMC, and SETTLIB Parameters” on page 30.</p> |
| <p>The existing “F <i>oam</i>,DISPLAY,SETOPT,...” operator command displays values that span the DB2, file system, optical, and tape levels/sublevels and includes global values for ‘Automatic Access to Backup’</p> | <p>The existing “F <i>oam</i>,DISPLAY,SETOPT,...” operator command displays values that span the new cloud and existing DB2, file system, optical and tape levels/sublevels and will display the new reason for cloud errors in addition to existing reasons when displaying global values for ‘Automatic Access to Backup’</p> <p>For details, see “3.0.5.4 Displaying SETCLOUD, SETDISK, SETOAM, SETOPT, SETOSMC, and SETTLIB Parameters” on page 30.</p> |
| <p>The existing “F <i>oam</i>,DISPLAY,SETOSMC,...” operator command displays the values of settings for OSMC processing</p> | <p>The existing “F <i>oam</i>,DISPLAY,SETOSMC,...” operator command displays the values of settings for OSMC processing including the new settings for Recall processing for cloud level objects</p> <p>For details, see “3.0.5.4 Displaying SETCLOUD, SETDISK, SETOAM, SETOPT, SETOSMC, and SETTLIB Parameters” on page 30.</p> |
| <p>The existing “F <i>oam</i>,DISPLAY,OSMC,<i>taskname</i>” operator command displays work items on the OSMC service queues for “DISK1’ (DB2), “DISK2” (file system), optical (classic configuration only), and tape related processing.</p> | <p>The existing “F <i>oam</i>,DISPLAY,OSMC,<i>taskname</i>” operator command will now display work items on the new OSMC service queues for cloud processing in addition to existing OSMC service queues for “DISK1’ (DB2), “DISK2” (file system), optical, and tape related processing.</p> <p>For details, see “3.0.5.5 Displaying OSMC Task Status” on page 32.</p> |
| <p>The existing “F <i>oam</i>,DISPLAY,GROUP...” operator command displays storage group information as well as associated optical (classic configuration only), tape and file system related values.</p> | <p>The existing “F <i>oam</i>,DISPLAY,GROUP...” operator command will now display new values for cloud in addition to optical (classic configuration only), tape and file system related values.</p> <p>For details, see “3.0.5.6 Displaying Storage Group Status” on page 3232.</p> |
| <p>N/A</p> | <p>A new variation of the F <i>oam</i>,DISPLAY operator command will allow the operator to display information for rows in the new CLOUDID DB2 table. See “3.0.5.7 Displaying Cloud Information” on page 33 for details.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

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| <p>The existing “F <i>oam</i>,QUERY,...” operator command displays summary or detail information about active or waiting optical (classic configuration only), tape and file system requests.</p> | <p>The existing “F <i>oam</i>,QUERY...” operator command will now display new messages containing summary or detail information about active or waiting cloud requests in addition to optical (classic configuration only), tape and file system requests.</p> <p>For details, see “3.0.5.83.0.5.8 Querying Summary and Detail Information for Pending and Active Requests” on page 33.</p> |
| <p>The existing “F <i>oam</i>,UPDATE,SETOSMC,...” command is used to update values for a variety of OSMC processing options.</p> | <p>In addition to the existing support, F <i>oam</i>,UPDATE,SETOSMC will now support updating the number of days an object recalled from cloud should be kept at the disk level.</p> <p>For details, see “3.0.5.93.0.5.9 “ on page 33.</p> |
| <p>APPLICATION PROGRAMMING</p> | |
| <p>The existing OSREQ API can be used to store objects and perform subsequent operations on objects in the DB2 sublevel, file system sublevel, optical level (classic configuration only), and tape level of the OAM storage hierarchy.</p> | <p>The existing OSREQ API can be used to store objects and perform subsequent operations on objects in the new cloud level in addition to the existing DB2 sublevel, file system sublevel, optical level (classic configuration only), and tape level of the OAM storage hierarchy. New return/reason codes have been added and a new value for the retrieval response time returned by OSREQ QUERY has been added.</p> <p>For details, see “3.0.6 “ on page 3434.</p> |
| <p>There is a requirement that the application perform a DB2 “commit” within 24 hours of storing an object directly to the file system level.</p> | <p>The requirement that the application perform a DB2 “commit” within 24 hours is expanded to include cases where an object is stored directly to either the cloud level or directly to the file system sublevel.</p> <p>For details, see “3.0.6.4 ” on page 3535.</p> |
| <p>OSMC FUNCTIONS AND UTILITIES</p> | |
| <p>The existing OSMC storage management cycle processing transitions primary objects between any of the supported levels and sublevels in the OAM storage hierarchy – DB2, file system, tape, and optical (classic configuration only) as well as performing backup and expiration processing for primary objects stored anywhere in that hierarchy.</p> | <p>OSMC storage management cycle processing transitions primary objects between any of the supported levels and sublevels in the OAM storage hierarchy – DB2, file system, the new cloud level, tape, and optical (classic configuration only) as well as performing backup and expiration processing for primary objects stored anywhere in that hierarchy, including the new cloud level.</p> <p>For details, see “3.0.7.1 ” on page 3636.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

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| <p>The existing OSMC Volume Recovery utility includes the ability to restore a backup volume using the primary copy of objects which may reside in any of the supported levels and sublevels in the OAM storage hierarchy – DB2, file system, tape, and optical (classic configuration only). Additionally, the OSMC Volume Recovery utility preserves the pending action date for objects that have been recalled to the DB2 sublevel or file system sublevel.</p> | <p>The existing OSMC Volume Recovery utility includes the ability to restore a backup volume using the primary copy of objects which may reside in any of the supported levels and sublevels in the OAM storage hierarchy – DB2, file system, the new cloud level, tape, and optical (classic configuration only). Additionally, the OSMC Volume Recovery utility preserves the pending action date for objects that have been recalled to the DB2 sublevel or file system sublevel. For details, see “3.0.7.2 ” on page 37.</p> |
| <p>The existing OSMC Single Object Recovery utility can be used to restore a single primary object in any of the supported levels and sublevels in the OAM storage hierarchy – DB2, file system, tape, and optical (classic configuration only).</p> | <p>The OSMC Single Object Recovery utility can be used to restore a single primary object in any of the supported levels and sublevels in the OAM storage hierarchy – DB2, file system, the new cloud level, tape, and optical (classic configuration only). For details, see “3.0.7.3 ” on page 37.</p> |
| <p>The existing OSMC ‘Recall to Disk’ functionality is used to temporarily recall a primary object that resides in the optical level or tape level of the OAM storage hierarchy to the disk level (either the DB2 sublevel or the file system sublevel) of the OAM storage hierarchy following an OSREQ retrieve for the primary object.</p> | <p>The OSMC ‘Recall to Disk’ functionality can be used to temporarily recall a primary object that resides in the optical level (Classic configuration only), tape level, or the new cloud level of the OAM storage hierarchy to the disk level (either the DB2 sublevel or the file system sublevel) of the OAM storage hierarchy following an OSREQ retrieve for the primary object. For details, see “3.0.7.5 ” on page 3838.</p> |
| <p>The existing OSMC functionality to perform a backup “immediately” following an OSREQ store will create a backup for a primary object in any of the supported levels and sublevels in the OAM storage hierarchy – DB2, file system, tape, and optical (classic configuration only).</p> | <p>The existing OSMC functionality to perform a backup “immediately” following an OSREQ store will create a backup for a primary object that resides in any of the supported levels and sublevels in the OAM storage hierarchy – DB2, file system, the new cloud level, tape, and optical (classic configuration only). For details, see “3.0.7.6 ” on page 38.</p> |
| <p>SMF</p> | |
| <p>The existing OAM SMF records include a number of subtypes to provide information about the processing in the OSR, OSMC, and LCS components of OAM.</p> | <p>The existing OAM SMF records will include changes to several existing subtypes to include the new cloud level as well as new subtypes relative to the read, write, and delete cloud activity to provide information about the processing in the OSR, OSMC, and LCS components of OAM. For details, see “3.0.8 SMF” on page 39.</p> |
| <p>OAM ADDRESS SPACE REQUIREMENT</p> | |

(SPE) OAM Cloud as a Tier (OA55700)

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| <p>It is not necessary for the OAM address space to be running for storing and retrieving objects from the DB2 sublevel of the disk level in the OAM storage hierarchy. For all other levels and sublevels - file system, tape or optical (classic configuration only) - or if certain types of processing such as OSMC processing is needed, the OAM address space must be running.</p> | <p>The OAM address space must be running for storing, retrieving or deleting objects in the cloud level.</p> <p>With the new support, it is not necessary for the OAM address space to be running for storing and retrieving objects from the DB2 sublevel of the disk level in the OAM storage hierarchy. For all other levels and sublevels - file system, cloud, tape or optical (classic configuration only) - or if certain types of processing such as OSMC processing is needed, the OAM address space must be running.</p> <p>For details, see “3.0.9.1 ” on page 62.</p> |
| <p>FILE DELETION</p> | |
| <p>When an object is deleted from OAM, physical deletion of files from the file system is deferred and is performed periodically by a task running in the OAM address space.</p> | <p>When an object is deleted from OAM, physical deletion of files from the file system and from cloud storage is deferred and is performed periodically by a task running in the OAM address space.</p> <p>For details, see “3.0.9.3 Physical Deletion from Cloud” on page 63.</p> |
| <p>OAMPLEX / SYSPLEX</p> | |
| <p>In an OAMplex containing systems at different supported z/OS levels all types of processing of objects at any level or sublevel of the OAM storage hierarchy can be done from any system.</p> | <p>In an OAMplex containing a mixture of systems at a level that supports the cloud level and systems that don't, the systems that don't are unable to process object copies in the cloud level. For some functions, however, processing can be done using a backup copy of the object stored in the tape or optical levels.</p> <p>For details, see “3.0.10 ” on page 64.</p> |
| <p>IPCS</p> | |
| <p>The existing OAM “VERBEXIT OAMDATA...” IPCS command can be used to display OAM control block data.</p> | <p>The existing OAM “VERBEXIT OAMDATA...” IPCS command is updated to also display data related to the new cloud level including changes to existing control blocks as well as new control blocks and control block chains.</p> <p>For details, see “3.0.11 ” on page 65.</p> |

3.0.1 New Cloud Level in OAM Storage Hierarchy

This support provides a new cloud level in the OAM storage hierarchy. Currently the OAM storage hierarchy consists of:

- a disk level comprised of two sublevels
 - DB2 (OAM objects stored in DB2 tables) also known as disk sublevel 1
 - File system (OAM objects stored in files on a file system) also known as disk sublevel 2
- an optical level (OAM objects stored on optical media), and
- a tape level (OAM objects stored on tape media) comprised of two sublevels
 - tape sublevel 1
 - tape sublevel 2

This new support in OAM will add the cloud level to the storage hierarchy to enable primary copies of OAM objects to be stored in files on cloud storage.

3.0.2 Specification of OAM Level/Sublevel

OAM utilizes the SMS Storage Class construct to control where in the OAM storage hierarchy an object should be placed. The storage class is used during application-initiated invocations such as OSREQ STORE and OSREQ CHANGE as well as during OSMC class transition. The determination of where an object should be placed is based on the values for:

- Initial Access Response Seconds (IARS)
- Sustained Data Rate (SDR)
- OAM Sublevel (OSL).

Currently, when IARS=0 objects are directed to the "disk" level of the OAM storage hierarchy (DB2 if OSL=1 or file system if OSL=2), when IARS>0 and SDR>=3 objects are directed to the "tape" level of the OAM storage hierarchy (Tape sublevel 1 if OSL=1 or Tape sublevel 2 if OSL=2), and when IARS>0 and SDR<3 objects are directed to the "optical" level of the OAM storage hierarchy (which is only supported for a Classic configuration).

To support specification of the cloud level, the meaning of IARS=0 is expanded to include both the disk and cloud levels and a new value of 3 is supported for OSL when IARS=0 to indicate the cloud level.

ISMF and SMS are modified in conjunction with this support to allow 3 as a valid value for the existing OAM Sublevel field when IARS=0. The following shows the Storage Class Define ISMF panel with 3 added as a valid value for OAM Sublevel. (Note that 3 is only valid when Initial Access Response Seconds is 0.)

```

                                STORAGE CLASS DEFINE                                Page 1 of 2
Command ==>

SCDS Name . . . . . : WRK022.BASE.SCDS
Storage Class Name : SCCLD1
To DEFINE Storage Class, Specify:
  Description ==>
    ==>
  Performance Objectives
    Direct Millisecond Response . . . . . (1 to 999 or blank)
    Direct Bias . . . . . (R, W or blank)
    Sequential Millisecond Response . . . (1 to 999 or blank)
    Sequential Bias . . . . . (R, W or blank)
    Initial Access Response Seconds . . (0 to 9999 or blank)
    Sustained Data Rate (MB/sec) . . . (0 to 999 or blank)
    OAM Sublevel . . . . . (1, 2, 3 or blank)
    Availability . . . . . N (C, P ,S or N)
    Accessibility . . . . . N (C, P ,S or N)
    Backup . . . . . (Y, N or Blank)
    Versioning . . . . . (Y, N or Blank)
Use ENTER to Perform Verification; Use DOWN Command to View next Page;
Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.

```

3.0.3 PARMLIB Statements

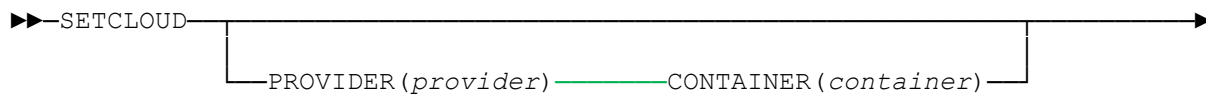
3.0.3.1 SETCLOUD Statement in CBROAMxx Member of PARMLIB

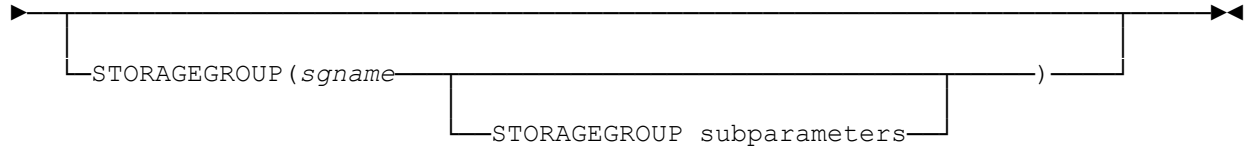
A new SETCLOUD statement is added to configure the new cloud level in the OAM storage hierarchy. For each object storage group in which a cloud level is defined, a SETCLOUD statement must be specified to provide the cloud provider name and container name. Global values can be set and are used for all storage groups which do not override the global values.

The cloud provider name and container name for the object storage group must be carefully selected as these are static values and cannot be changed. These values must remain available in the SETCLOUD statement so that OAM can successfully store and later retrieve objects from the cloud at any point in the future for as long as the object is stored in the cloud.

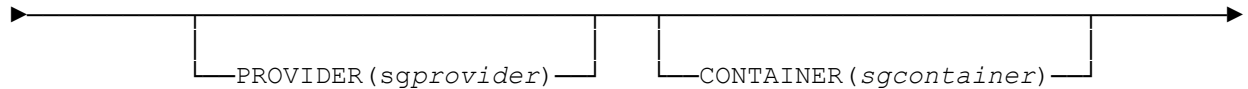
Note that the maximum length of a single SETCLOUD statement is 4096 characters. When specifying a large number of STORAGEEGROUPs with lengthy container names, it might be necessary to use several different SETCLOUD statements.

The syntax for the SETCLOUD statement is as follows:





STORAGEGROUP subparameters



SETCLOUD Keyword Definitions

PROVIDER(*provider*)

Specifies the global provider name to be used for all storage groups for which there is no provider specified. *provider* must be 1 to 20 characters in length and must match the name defined in a Cloud Data Access (CDA) cloud provider definition file. Valid characters in the provider name are upper case alphabetic, numeric, @, #, and \$. PROVIDER is required if CONTAINER is specified at the global level; otherwise it is optional. There is no default value.

CONTAINER(*container*)

Specifies the global container (or bucket) name to be used for all storage groups for which there is no container specified. The value for *container*.

- must be from 3 to 63 characters in length
- can only contain characters A-Z, a-z, 0-9, '.' (period), and '-' (hyphen)
- is case insensitive

Note: The cloud provider might have additional restrictions on the container name, but only the above are validated on the SETCLOUD statement. Refer to information from the cloud provider for the restrictions on the container (or bucket) name. If upper case letters are specified for this keyword for a provider that only allows lower case letters, Cloud Data Access will convert the upper case letters to lower case.

CONTAINER is required if PROVIDER is specified at the global level; otherwise it is optional. There is no default value.

STORAGEGROUP(*sgname*)

Specifies the name of an Object storage group which is in the active configuration, and which was previously defined using ISMF. This parameter on the SETCLOUD statement provides additional information beyond what was specified using ISMF for the Object storage group to which it pertains.

PROVIDER(*sgprovider*)

Specifies the desired cloud provider name. *sgprovider* must be from 1 to 20 characters in length and must match the name defined in a Cloud Data Access (CDA) cloud provider definition file. Valid characters in the provider name are upper case alphabetic, numeric, @, #, and \$.

There is no default value.

If this keyword is not specified for a given storage group, the provider for that storage group is set using the PROVIDER set at the global level. PROVIDER is required if CONTAINER is specified for this storage group and PROVIDER is not specified at the global level.

CONTAINER(*sgcontainer*)

Specifies the name of the container in which the objects for this storage group are stored. If this keyword is not specified for a given storage group, the container for that storage group is set using the value set at the global level. The value for *sgcontainer*:

- must be from 3 to 63 characters in length
- can only contain characters A-Z, a-z, 0-9, '.' (period), and '-' (hyphen)

Note: The cloud provider might have additional restrictions on the container name, but only the above are validated on the SETCLOUD statement. Refer to information from the cloud provider for the restrictions on the container (or bucket) name. If upper case letters are specified for this keyword for a provider that only allows lower case letters, Cloud Data Access will convert the upper case letters to lower case.

If this keyword is not specified for a given storage group, the container for that storage group is set using the CONTAINER set at the global level. CONTAINER is required if PROVIDER is specified for this storage group and CONTAINER is not specified at the global level.

3.0.3.2 SETOPT Statement in CBROAMxx Member of PARMLIB

The existing SETOPT statement in the CBROAMxx member of PARMLIB can be used to define options that span the various levels of the OAM storage hierarchy. These options can be specified globally and at the storage group level.

'Automatic Access to Backup' functionality can be configured using global options on the SETOPT statement.

As described in "3.0.5.2 " on page 28, changes are made to the 'Automatic Access to Backup' functionality to add a new reason for cloud related errors.

The SETOPT statement for global parameters are changed as illustrated below.

SETOPT Statement Syntax: OAM Global Level Parameters



The definition of this new reason for cloud related errors is as follows:

ABCLDERROR

Specifies that if an error occurs while OAM is retrieving an object from the cloud and the first or second backup copy exists, OAM retrieves the object data from the specified backup copy. This function allows access to backup copies of objects when the primary copy in the cloud is unavailable. Valid values for ABCLDERROR are:

BACKUP1

Specifies that when a primary copy of an object that is read by an application is not available for the specified reason, and BACKUP1 is specified for ABCLDERROR, an attempt is made to retrieve the object from the first backup copy of the object.

BACKUP2

When a primary copy of an object that is read by an application is not available for the specified reason, and BACKUP2 is specified for ABCLDERROR, an attempt is made to retrieve the object from the second backup copy of the object.

INACTIVE

When a primary copy of an object that is read by an application is not available for the specified reason, and INACTIVE is specified, then automatic access to backup is disabled for ABCLDERROR. No attempt is made to retrieve the object from either backup copy of the object and the retrieve will fail.

Note that generally for the SETOPT statements, some values that are specified on these statements can be updated by the "F *oam*,UPDATE,SETOPT..." operator command. The 'Automatic Access to Backup' related keywords are a notable exception since they are instead changed via the "F *oam*,START,AB" and "F *oam*,STOP,AB" operator commands described in "3.0.5.2 Starting and Stopping Automatic Access to Backup Copies of Objects" on page 28.

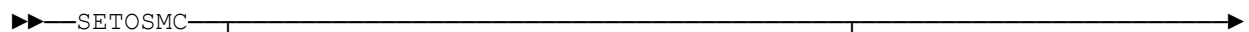
3.0.3.3 SETOSMC Statement in CBROAMxx Member of PARMLIB

The existing SETOSMC statement in the CBROAMxx member of PARMLIB can be used to define options for OSMC processing. These options can be specified globally and at the storage group level.

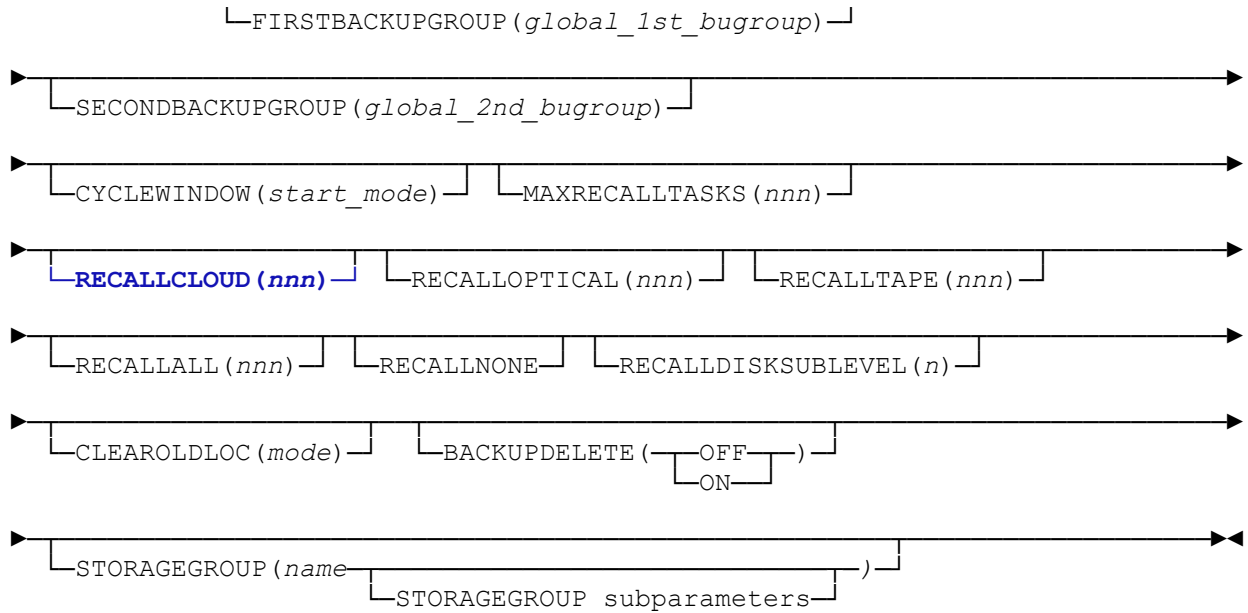
'Recall to Disk' functionality can be configured at the global or storage group level on the SETOSMC statement.

The setting on the SETOSMC statement can be changed later using the F *oam*,UPDATE command as described in "3.0.5.9 Using the UPDATE command to set SETOSMC values" on page 33.

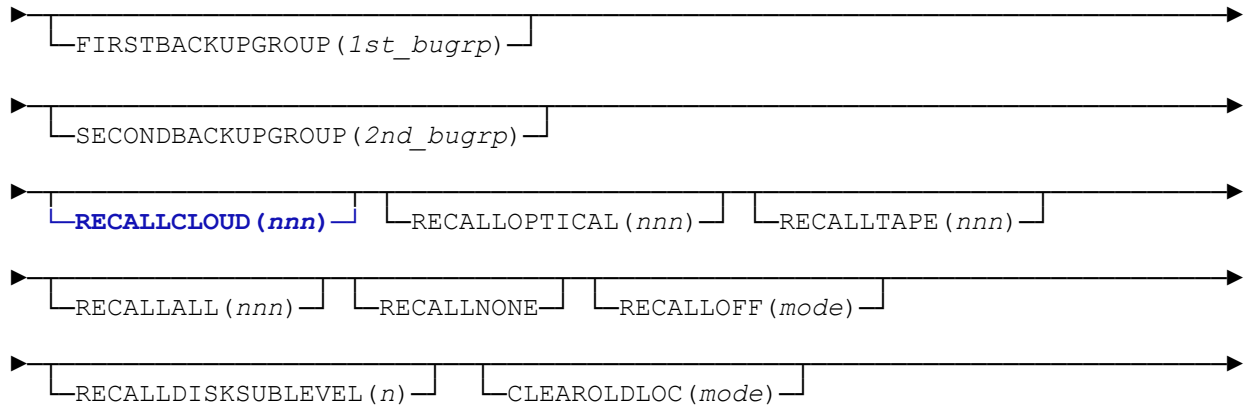
The SETOSMC statement is changed to add a new keyword RECALLCLOUD at both the global and storage group level as illustrated below.



(SPE) OAM Cloud as a Tier (OA55700)



STORAGEGROUP subparameters



The definition of the new keyword for cloud is as follows:

RECALLCLOUD(*nnn*)

Specifies that objects residing on the cloud level are recalled to disk for *nnn* days when retrieved. Valid values are 0–255. The default is 0. The object's pending action date in the object directory is set to today's date + the number of days specified in *nnn*. A value of 0 indicates that the RECALL is for the current day only. On the next OSMC cycle the object is restored to the cloud level. This applies to implicit recalls only. This keyword can be specified at the global level or at the storage group level.

The definitions of the following keywords are modified as follows to reflect the new support:

RECALLALL(*nnn*)

Specifies that objects residing on optical or tape devices **or in the cloud level** are recalled to disk for *nnn*

(SPE) OAM Cloud as a Tier (OA55700)

days when retrieved. Valid values are 0–255. The default is 0. The object's pending action date in the object directory is set to today's date + the number of days specified in *nnn*. A value of 0 indicates that the RECALL is for the current day only. On the next OSMC cycle the object is restored to **the location in the OAM storage hierarchy from which it was recalled**. This applies to implicit recalls only. This keyword can be specified at the global level or at the storage group level.

RECALLNONE

Specifies that objects residing on optical or tape devices **or in the cloud level** are not recalled to disk when retrieved. This applies to implicit recalls only. This keyword can be specified at the global level or at the storage group level.

RECALLOFF(*mode*)

Specifies whether objects residing on tape or optical devices **or in the cloud level** are to be recalled to **disk** when retrieved. This keyword can be specified at the storage group level only, and allows recall processing to be disabled at the storage group level regardless whether the RECALL parameter is specified on the OSREQ RETRIEVE request. This keyword applies to both implicit and explicit recalls. Valid values for *mode* are:

OFF Explicit and implicit recalls are enabled. This is the default.

ON Explicit and implicit recalls are disabled.

3.0.4 DB2 Databases

3.0.4.1 Object Storage Database – Cloud Location Table

A new table is added to the OAM Object Storage Database to contain information about cloud storage locations. This table CLOUDID will have the following columns:

- **ID** - SMALLINT GENERATED BY DEFAULT AS IDENTITY (START WITH 1, INCREMENT BY 1, NO CYCLE) - to be referenced in the object directory
- **PROVIDER** – CHAR(20) NOT NULL – identifies cloud storage provider (as defined in Cloud Data Access)
- **CONTAINER** – CHAR(63) NOT NULL – specifies container name.

The table will have a unique index on the combination of PROVIDER and CONTAINER. This is necessary to ensure that only one row is defined for each PROVIDER/CONTAINER combination. No index is defined for the ID column because DB2 recommend not using an index on very small tables which this is expected to be.

3.0.4.2 Object Storage Database – Object Directory Table

The Object Directory Table in the OAM Object Storage Database contains the meta-data about objects including locator information. Although the columns within the Object Directory Table are not changing, the *contents* for several of the columns are changing for the cloud support.

ODLOCFL

The object location flag (ODLOCFL) indicates where in the OAM storage hierarchy the primary copy of an

(SPE) OAM Cloud as a Tier (OA55700)

object currently resides. A new value is added to indicate when the primary copy of an object resides in the cloud level as indicated in the complete list below:

- ' ' (blank) for optical level
- **'C' for cloud level**
- 'D' for disk sublevel 1 (DB2)
- 'E' for disk sublevel 2 (file system)
- 'R' for recalled to disk sublevel 1 (DB2)
- '2' for recalled to disk sublevel 2 (file system)
- 'T' for tape sublevel 1
- 'U' for tape sublevel 2

ODLSLOC

The ODLSLOC field is a 6 character field that currently is blank if the primary copy of the object resides on either disk sublevel or contains the volser of the tape or optical disk where the primary copy resides.

OAM Cloud support will expand the use of this field to store the ID of the row in the CLOUDID table that contains the location (provider and container name) where the primary copy of the object resides when it is in the cloud level. The format is a blank followed by C followed by the hexadecimal representation of the ID in EBCDIC.

ODSECLOC

The ODSECLOC field is an integer field that currently specifies exactly where on the volume identified by ODLSLOC (sector for optical volumes or block ID for tape volumes) the primary copy of the object resides. It is 0 and not meaningful if the primary copy resides on either disk sublevel.

OAM Cloud support will expand the use of this field to specify the instance ID of the file associated with the primary copy of the object when it is stored in the cloud level. This instance ID is used in the same way as the one in the ODINSTID column is for file system objects.

3.0.4.3 OAM Configuration Database – File Storage Delete Table

The OAM Configuration Database contains configuration information related to the target destinations for objects including tape volumes, optical libraries, drives, slots, volumes, objects to be ultimately deleted by OAM from optical volumes, and a table named FSDELETE and referred to as the File System Delete Table used to identify objects to be ultimately physically deleted by OAM from the Unix file system hierarchy. Objects listed in the FSDELETE table are not represented in the OAM object directory because they are not current OAM objects. They have either been deleted from OAM through normal deletion activity (application initiated delete or OSMC expiration processing) or are objects that were written to the physical media during processing of a STORE that was never committed (e.g. due to rollback of the STORE by the application).

With cloud support, the FSDELETE table will maintain information about objects that have been deleted from OAM and need to be removed from either the file system or the cloud. The table will now be referred to as the File Storage Delete table. A new column CLOUDID is added. For objects being deleted from the cloud, it will contain the ID in the CLOUDID table that identifies the cloud provider and container where the object is stored (in hexadecimal and EBCDIC format). For file system objects the new column is blank.

| Column Description | Name | DB2 Type | DB2 Attribute | Value | Report Label |
|--------------------|------|----------|---------------|-------|--------------|
| Unique Identifier | ID | INTEGER | PRIMARY | | ID |

(SPE) OAM Cloud as a Tier (OA55700)

| | | | KEY GENERATED ALWAYS AS IDENTITY | | |
|--------------------|----------------|----------------|---|-----------|-----------------|
| Delete Time | DELTIME | INTEGER | NND | | DELETE_TIME |
| Delete Reason | DELREAS | CHAR(1) | NND | D O R | REASON |
| System Name | SYSNAME | CHAR(8) | NND | | SYS_NAME |
| Storage Group Name | SGNAME | CHAR(8) | NND | | SG_NAME |
| Collection Name | COLNAME | CHAR(44) | NND | | COLLECTION_NAME |
| Object Name | OBJNAME | CHAR(44) | NND | | OBJECT_NAME |
| Instance ID | INSTID | INTEGER | NND | | INSTANCE_ID |
| Cloud ID | CLOUDID | CHAR(4) | NND | | CLOUD_ID |

The following describes the columns in the File Storage Delete Table:

ID A unique identifier for each row in this table.

DELTIME The time after which the object, identified by the other columns in this table, can be removed

DELREAS The reason for the removal of the object:

D This is the normal deletion of an object as a result of an application delete request for a primary object in the file system or cloud

O This is the normal deletion of an object as a result of OSMC related transition or expiration processing for a primary object in the file system or cloud

R This a “rollback” of an application store request for an object that was written to the file system or cloud when the application has issued a “rollback” or when the store has not been committed by the application within the required amount of time

SYSNAME For file system objects, the name of the system from which the request to remove the object originated

SGNAME The name of the Object storage group in which the object to be removed resided

COLNAME The name of the collection to which the object to be removed belonged

OBJNAME The name of the object to be removed

INSTID The unique identifier for this instance of the named object to be removed

CLOUDID For objects being deleted from the cloud level, the ID (in EBCDIC representation of hexadecimal format) of the row in the CLOUDID table Identifying the provider and container where the file for the object is stored. For file system objects, this column is blank.

3.0.5 Operator Commands

3.0.5.1 Starting and Stopping Diagnostic Messages

The OAM processing for the cloud level is dependent upon other components including Cloud Data Access (CDA) services and its interaction with the specified cloud provider. When errors occur, these other components may return additional error information to OAM.

When the cloud level processing originated from within the OAM address space from the OSMC functions and utilities, this additional error information is provided in error messages and repeated error conditions will cause the OSMC functions and utilities to stop processing.

When the cloud level processing originated from an application program, the OSREQ return and reason code size limit the amount of error information that can be communicated back to the application program. Because application programs may not stop processing as a result of these error indications, by default each time OAM is started only 10 messages are issued by OAM with the additional error information in order to prevent an excessive and uncontrolled number of messages from being issued. There are some cases, however, when additional error information is available, and you may want to *temporarily* cause messages to be displayed in these cases to assist in diagnosing errors related to the cloud level. The OSREQ return and reason codes may identify cloud related conditions or LCS reason codes. Refer to **“Error! Reference source not found. REF_Ref506556873 \h * MERGEFORMAT Error! Reference source not found.”** on page **Error! Bookmark not defined. Error! Bookmark not defined.** which contains a chart that will be included in *z/OS DFSMSdfp Diagnosis* and contains a description of the additional error information that may be available.

The existing capability to start and stop the display of diagnostic messages containing additional error information for the file system sublevel is expanded to support control of the display of cloud error information as well.

The display of OAM status is updated to include information about whether diagnostic messages will be issued for cloud related errors originating from an OSREQ request. For more details, see “3.0.5.3 Displaying OAM Status” on page 30.

Starting Display of Diagnostic Messages

The following is the updated syntax for the operator command to start the temporary display of diagnostic messages for file system or cloud related errors originating from an OSREQ request.

Because of the potential for excessive and uncontrolled number of messages, it is recommended that this display of diagnostic messages is only started *temporarily* to obtain the additional error information and then *immediately stopped*.

► MODIFY *oam*, START, DIAGMSG, OSREQFS OSREQCLD , LIM=nnnn ◀

nnnn Specifies the approximate number of messages that OAM will issue when the display of diagnostic messages for the specified type of error has been started. The minimum is 1 and the maximum is 9999. The default value is 10. Note also that when OAM is started, by default, 10 diagnostic messages of each type will be enabled automatically.

The following message will be issued:

(SPE) OAM Cloud as a Tier (OA55700)

└, BACKUP2┘

A new *reason* is added however as described below.

CLDERROR If a cloud error occurs while OAM is retrieving object data from the cloud and the first or second backup copy exists, OAM retrieves the object from the backup copy. This function allows access to backup copies of objects that reside elsewhere in the OAM storage hierarchy when the primary copy on cloud is unavailable.

The following existing message will be issued:

CBR1090I OAM Access Backup processing started for *reason* using the {1st | 2nd} backup copy.

For more details on this message, see “3.5.23 CBR1090I (Changed)” on page 92.

A new *reason* for the cloud support is added as an insert for this CBR1090I message:

- CLOUD ERRORS

If access backup processing is already active for cloud related errors (CLDERROR), the following existing message will be issued using the same insert text as described for message CBR1090I:

CBR1092I OAM Access Backup processing already started for *reason* using the {1st | 2nd} backup copy.

For more details on this message, see “3.5.25 CBR1092I (Changed)” on page 94.

Stopping Automatic Access to Backup Copies of Objects

The following is the syntax for stopping ‘Automatic Access to Backup’ and the syntax itself remains unchanged for the addition of cloud support.

►└MODIFY┘OAM, └STOP┘, -AB-, -*reason*◄

└F┘ └P┘

The new *reason* of CLDERROR is added as described above.

When access backup is stopped successfully for cloud related errors (CLDERROR), the following existing message is issued using the same insert text as described for message CBR1090I:

CBR1091I OAM Access Backup processing stopped for *reason*.

For more details on this message, see “3.5.24 CBR1091I (Changed)” on page 93.

(SPE) OAM Cloud as a Tier (OA55700)

If access backup processing is already stopped for cloud related errors (CLDERROR), the following existing message will be issued using the same insert text as described for message CBR1090I:

CBR1093I OAM Access Backup processing already stopped for *reason*.

For more details on this message, see “3.5.26 CBR1093I (Changed)” on page 95.

3.0.5.3 Displaying OAM Status

The existing display OAM status operator commands (“F oam,DISPLAY,OAM” and “DISPLAY SMS,OAM”) provide output including information on optical and tape libraries and drives, installation exits, DB2, XCF, the CBROAMxx PARMLIB member, ‘Automatic Access to Backup’ configuration, and diagnostic message display.

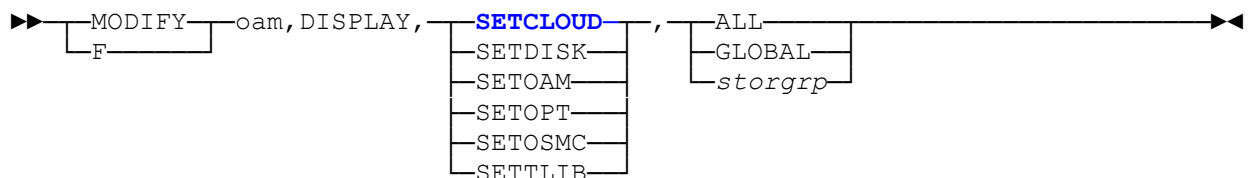
The output is expanded to include the status of Automatic Access to Backup for cloud related errors and to also include the status of diagnostic message display for cloud related errors as shown in the following example:

```
.  
. .  
. .  
Access Backup processing INACTIVE for LOST VOLUMES, using no backup  
copy.  
Access Backup processing INACTIVE for CLOUD ERRORS, using no backup  
copy.  
Access Backup processing INACTIVE for FILE SYSTEM ERRORS, using no  
backup copy.  
Diagnostic messages ACTIVE for OSREQCLD. Limit= 10.  
Diagnostic messages ACTIVE for OSREQFS. Limit= 10.  
. . .
```

For more details, see “3.5.27 CBR1100I (Changed)” on page 96.

3.0.5.4 Displaying SETCLOUD, SETDISK, SETOAM, SETOPT, SETOSMC, and SETTLIB Parameters

The existing operator command to display SETDISK, SETOAM, SETOPT, SETOSMC, and SETTLIB parameters is changed to add the ability to request a display of the new SETCLOUD statement parameters as shown in the following syntax.



Note that this command can be used to request *global* values or *storage group* specific values.

SETCLOUD

For SETCLOUD, the existing CBR1075I message is used to display the *storage group* values for cloud as in the following *example*:

```
CBR1075I GROUP22 value for PROVIDER is AMAZON
CBR1075I GROUP22 value for CONTAINR is mycont-03
```

For more details, see “3.5.22 CBR1075I (Changed / Explanation Only)” on page 92.

When a request for SETCLOUD specifies ALL, a set of CBR1075I messages will be issued for the *global* values and additional sets for the *storage group* values for each storage group.

SETDISK

For the cloud support, the SETDISK statement is unchanged therefore there are no changes to the DISPLAY command for SETDISK.

SETOAM

For the cloud support, the SETOAM statement is unchanged therefore there are no changes to the DISPLAY command for SETOAM.

SETOPT

For SETOPT, the existing CBR1075I message is used to display the *global* value for the new ‘Automatic Access to Backup’ cloud related ‘reason’ (ABCLDERR) as in the following *example*:

```
CBR1075I GLOBAL value for ABCLDERR is INACTIVE
```

For more details, see “3.5.22 CBR1075I (Changed / Explanation Only)” on page 92.

SETOSMC

For SETOSMC, the existing output is expanded to include an additional CBR1075I message to display the *global* and/or *storage group* values for new keyword RECALLC as in the following *examples*:

```
CBR1075I GLOBAL value for RECALLC is 30
CBR1075I GROUP17 value for RECALLC is 45
```

For more details, see “3.5.22 CBR1075I (Changed / Explanation Only)” on page 92.

SETTLIB

For the cloud support, the SETTLIB statement is unchanged therefore there are no changes to the DISPLAY command for SETTLIB.

3.0.5.5 Displaying OSMC Task Status

The existing “F OAM,DISPLAY,OSMC,TASK...” operator command displays work items on the OSMC service queues for Disk sublevel 1 (DB2), Disk sublevel 2 (file system), optical, and tape related processing.

For the cloud support, two new services are added to read from the cloud and to write to the cloud and these two new services are added to the output of the “F OAM,DISPLAY,OSMC,TASK...” operator command.

For the details of the changes to the output for these two new cloud related services, see “3.5.55 CBR9370I (Changed)” on page 128110.

Note that the inserts within this message have been re-lettered. The following new information is displayed in addition to the information that was displayed prior to this support:

cccccccc The number of internal work items that are queued on the work queue by the read cloud service

gggggggg The number of internal work items that are queued on the wait queue by the read cloud service

llllllll The number of internal work items that are completed by the read cloud service

qqqqqqqq The number of internal work items that are queued on the work queue by the write cloud service

vvvvvvvv The number of internal work items that are queued on the wait queue by the write cloud service

b2b2b2b2 The number of internal work items that are completed by the write cloud service

3.0.5.6 Displaying Storage Group Status

The existing “F OAM,DISPLAY,GROUP...” operator command displays storage group information as well as associated file system, optical and tape related values.

The output is changed to also display the following new values related to the cloud configuration for the storage group that have been specified on the SETCLOUD statement of the CBROAMxx member of PARMLIB:

- provider name
- container
- recall status for the cloud level

For more details, see “3.5.28 CBR1130I (Changed)” on page 101.

3.0.5.7 Displaying Cloud Information

A new operator command “F OAM,DISPLAY,CLOUD,ID,[*cloud-ids*]” (with *cloud-ids* being 1-14 cloud IDs separated by commas) displays the cloud provider name and container name for the specified entries in the CLOUDID table using new message CBR1290I.

For more details on the format of the display output, see “3.5.29 CBR1290I (New)” on page 103.

3.0.5.8 Querying Summary and Detail Information for Pending and Active Requests

The existing “F OAM,QUERY,*options*” operator command can be used to display summary or detail information about active or waiting requests and currently provides this information for file system, optical and tape requests. The output of this command is changed to provide new functionality for cloud to also display:

- A summary of active cloud requests
- A summary of waiting cloud requests
- Detailed information concerning active cloud requests
- Detailed information concerning waiting cloud requests

The output display for the summary of active cloud requests will use:

- New message CBR1795I – for more information see “3.5.32 CBR1795I (New)” on page 106.

The output display for the summary of waiting cloud requests will use:

- New message CBR1705I – for more information see “3.5.31 CBR1705I (New)” on page 105.

The output display for detailed information concerning active cloud requests will use:

- New message CBR1812I for reads from cloud – for more information see “3.5.35 CBR1812I (New)” on page 108.
- New message CBR1813I for write to cloud – for more information see “3.5.36 CBR1813I (New)” on page 108.
- Existing message CBR1742I to display the number of total active cloud requests.

The output display for detailed information concerning waiting cloud requests will use:

- New message CBR1810I for reads from cloud – for more information see “3.5.33 CBR1810I (New)” on page 107.
- New message CBR1811I for write to cloud – for more information see “3.5.34 CBR1811I (New)” on page 107.
- Existing message CBR1743I to display the number of total active cloud requests.

3.0.5.9 Using the UPDATE command to set SETOSMC values

The existing “F *oam*,UPDATE,SETOSMC,*scope*,*field*,*value*,*field*,*value*” operator command can be used to update the settings of many OSMC options. This command is changed to also support RECALLC for *field* with either ALL or a storage group name for *scope* and 0-255 for *value*. This updates the number of days that an object recalled from cloud to the disk level will remain on the disk level that was set with the RECALLCLOUD keyword on the SETOSMC statement in the CBROAMxx member of PARMLIB or on a previous F *oam*,UPDATE,SETOSMC command.

In addition, processing is updated to set the RECALLC values (in addition to those already set) when *field* is RECALLA or RECALLN.

3.0.6 Application Programming

3.0.6.1 OSREQ Support of Cloud

The existing OSREQ application programming interface is used to:

- store objects via OSREQ STORE or OSREQ STOREBEG/STOREPRT/STOREEND
- change the management characteristics of objects via OSREQ CHANGE
- query information about objects via OSREQ QUERY
- retrieve objects via OSREQ RETRIEVE
- delete objects via OSREQ DELETE

The OSREQ application programming interface supports these operations for objects in the DB2 sublevel, the file system sublevel, the optical level, and the tape level of the OAM storage hierarchy and will now also support these operations for objects in the new cloud level. No changes are needed to the OSREQ syntax, however, to support these operations for the cloud level. Note that the object location in the OAM storage hierarchy, including whether the object resides in the cloud, is determined by the SMS storage class.

Note that the maximum object size supported for the cloud sublevel is 2000M as is the case for the DB2 sublevel, file system sublevel and tape level; the maximum object size supported for the optical level continues to be 256M.

3.0.6.2 OSREQ New Return/Reason Codes for Cloud Support

The following new OSREQ return and reason codes may be returned from the OSREQ API for cloud related errors:

| Return code | Reason code (bytes) | | | | Description |
|-------------|---------------------|---|-------|---|---|
| | 0 | 1 | 2 | 3 | |
| 12 (X'0C') | X'69' | x | y | z | Cloud Data Access detected failure. yz Cloud Data Access reason code. See Cloud Data Access documentation for information about the meaning of the reason code. |
| 12 (X'0C') | X'6A' | x | y | z | Web Toolkit detected failure. yz Web Toolkit reason code. See Web Toolkit documentation for information about the meaning of the reason code. |
| 12 (X'0C') | X'6B' | x | y | z | Cloud Provider detected failure. yz Cloud Provider reason code. See the cloud provider's documentation for information about the meaning of the reason code |
| 12 (X'0C') | X'80' | x | X'07' | z | ODLSLOC is inconsistent with ODLOCFL which indicates a cloud storage level. ODLSLOC must be in the format of ' C' followed by a 4 hexadecimal character cloud ID. |
| 12 (X'0C') | X'BF' | x | y | z | Error related to coexistence |
| 12 (X'0C') | X'BF' | x | X'01' | z | OSREQ STORE to the requested storage hierarchy level/sublevel is not supported at this maintenance or release level |

3.0.6.3 OSREQ QUERY Results for Cloud Objects

The OSREQ QUERY function is used to query information about objects stored in OAM. Information about an object is returned in a query element mapped by macro CBRIQEL. The following describes the query output for objects in the cloud sublevel:

- The primary order retrieval key (QELQPROK) will contain binary zeroes for objects stored in the cloud level
- The estimated retrieval response time (QELQERRT) will contain a new value of 90000 (milliseconds) for objects that reside in the cloud level.

Note that the actual cloud level retrieval response time can vary significantly and is dependent upon several factors including the size of the object, the cloud configuration, what type of storage the object resides on in the cloud, etc. The estimated retrieval response time therefore is intended to only provide a comparative response time relative to the other OAM storage hierarchy targets for objects.

The set of values for estimated retrieval response time will now be as follows:

| <u>Location</u> | <u>milliseconds</u> |
|--|---------------------|
| DB2 sublevel | 300 |
| File system sublevel | 9000 |
| Optical volume within optical library | 12000 |
| Tape volume within tape library | 60000 |
| Cloud level | 90000 |
| Optical volume outside optical library | 120000 |
| Tape volume outside tape library | 240000 |

3.0.6.4 OSREQ Requirement for DB2 “Commit” after Storing Objects

As is the case for objects stored directly to the file system sublevel, objects stored directly to the cloud level (as determined by the SMS storage class) from an application program have a requirement that the DB2 “commit” following the store must be performed by the application within 24 hours of storing the object. The actual mechanism for performing the “commit” varies depending on the application operating environment (i.e. MVS, IMS, CICS, etc.). Note that the DB2 publication library recommends that the “commit” be performed as soon as practical for a unit of work after reaching a point of consistency. Further database guidance suggests that a practical maximum period of time before performing a “commit” is approximately 10 minutes, so it is not expected that the requirement for a “commit” within 24 hours will affect OSREQ applications.

Failure to perform a DB2 “commit” within 24 hours of storing an object to the cloud level **will ultimately result in loss of object data stored in the cloud**. An application store of an object to the cloud level includes OSREQ STORE as well as the OSREQ store sequence functions STOREBEG/STOREPRT/STOREEND.

Applications that cannot ensure that the DB2 “commit” will occur within 24 hours should not store directly to the cloud level; as an alternative these applications could instead store to the DB2 sublevel and later use the OSMC storage management cycle processing to transition the object from the DB2 sublevel to the cloud level.

3.0.7 OSMC Functions and Utilities

3.0.7.1 OSMC Storage Management Cycle Processing

The OSMC storage management cycle processing is responsible for managing an object through its life cycle including:

- *transitioning* objects including potentially changing the assigned SMS storage class and SMS management class as specified in the SMS ACS routines and moving the primary copy of the object to the desired location in the OAM storage hierarchy as specified in the SMS storage class
- creating *backup* copies of the primary object as specified in the SMS management class
- *expiration* of the object as specified in the SMS management class data including deletion of the object data (primary and backup copies) as well as deletion of the meta-data about the object maintained in the DB2 object directory

These aspects of the storage management cycle processing relative to the new cloud support are described in more detail below.

TRANSITIONING

With the addition of the cloud support, functionality is added to OSMC storage management cycle processing such that objects can be transitioned:

- *from* any location in the OAM storage hierarchy (including the new cloud level)
- *to* any location in the OAM storage hierarchy (including the new cloud level)

These valid transitions (including cases where the object simply remains in its existing location such as a transition from the DB2 sublevel to the DB2 sublevel) are shown in the following table.

| | | Transition from... | | | | | |
|--|----------------------|--------------------|----------------------|----------------|-----------------|-----------------|-------------|
| | | DB2 Sublevel | File system Sublevel | Optical Level* | Tape Sublevel 1 | Tape Sublevel 2 | Cloud Level |
| | DB2 Sublevel | X | X | X | X | X | X |
| | File system Sublevel | X | X | X | X | X | X |
| | Optical Level* | X | X | X | X | X | X |
| | Tape Sublevel 1 | X | X | X | X | X | X |
| | Tape Sublevel 2 | X | X | X | X | X | X |
| | Cloud Level | X | X | X | X | X | X |

* Note, however, that the optical level is only supported in a Classic OAM configuration and objects greater than 256M in size cannot be transitioned to the optical level.

When an object is transitioned *to* the cloud level from a different location in the OAM storage hierarchy, the object will be read from its current location and new functionality in OSMC storage management processing will write the object to the cloud level. Note that when objects are transitioned from the optical level or the tape level to the disk level (either the DB2 sublevel or the file system sublevel) of the OAM storage hierarchy, the CLEAROLDLOC specification on the SETOSMC statement in the CBROAMxx member of PARMLIB determines whether the old location in the DB2 object directory is preserved (i.e. in case the object is transitioned back to its former location). When objects are transitioned from the optical level or the tape level

(SPE) OAM Cloud as a Tier (OA55700)

to the cloud level, the old location information is never preserved regardless of the CLEAROLDLOC specification. This is the same behavior that occurs when transitioning from tape to optical or optical to tape.

When objects are transitioned *from* the cloud level to a different location in the OAM storage hierarchy, new functionality in OSMC storage management processing will read the object from the cloud and will then write the object to the new location in the OAM storage hierarchy. In addition, the object is logically deleted from the cloud level by placing a deletion entry in the File Storage Delete Table. The actual physical deletion occurs in a *deferred* manner when OAM internally periodically processes the entries in the File Storage Delete Table and completes the physical deletion from the cloud.

CREATING BACKUP COPIES

The OSMC storage management cycle processing will create up to two backup copies of primary objects that reside in the DB2 sublevel, file system sublevel, optical level, or tape level of the OAM storage hierarchy.

The functionality in the OSMC storage management cycle processing is changed to also create up to two backup copies of primary objects that reside in the cloud level in addition to the existing processing.

For a primary object that resides in the cloud level and requires backup processing, OSMC storage management cycle processing will read the object from the cloud level and then write the object to one or two configured backup destinations each of which could be optical (Classic OAM configuration only) or tape.

EXPIRATION AND DELETION

The OSMC storage management cycle expiration processing is responsible for deletion of the meta-data for an object from the DB2 object directory as well as the deletion of the object data itself.

The OSMC storage management cycle expiration processing is changed to include the deletion of object data from the cloud level. Removal of the meta-data from the DB2 object directory will accomplish the logical deletion of the object from the cloud level. The physical deletion of object data from the cloud level is *deferred* and is accomplished by placing an entry in the File Storage Delete Table. The File Storage Delete Table will be processed internally periodically by OAM to complete the physical deletion from the cloud.

3.0.7.2 OSMC Volume Recovery Utility

The OSMC Volume Recovery utility is used to recover an entire primary volume (optical or tape) or an entire backup volume (optical or tape).

In the case of recovery for a primary volume, the OSMC Volume Recovery utility reads a backup copy of each object on the volume to be recovered and writes the objects to a new primary volume. This functionality is unchanged.

In the case of recovery for a backup volume, the OSMC Volume Recovery utility reads the primary copy of each object on the volume to be recovered and writes a new backup copy of the objects to a new backup volume. Currently, the primary copy can be read from the DB2 sublevel, file system sublevel, optical level (Classic configuration only) or tape level in the OAM storage hierarchy. The OSMC Volume Recovery utility is enhanced to support reading of the primary copy of objects from the cloud level in addition to the levels/sublevels already supported.

3.0.7.3 OSMC Single Object Recovery Utility

The OSMC Single Object Recovery utility is used to recover a single primary object in the DB2 sublevel, file system sublevel, optical level (Classic OAM configuration only), or tape level of the OAM storage hierarchy. It

(SPE) OAM Cloud as a Tier (OA55700)

does this by reading a backup copy of the object from either the optical level (Classic OAM configuration only) or tape level and storing a new primary copy in the desired level.

The OSMC Single Object Recovery utility is enhanced to allow recovery of the primary copy of a single object which is stored in the cloud level in addition to the levels/sublevels already supported.

With the new functionality, for recovery of a single primary object that resides in the DB2 sublevel, file system sublevel, optical level (Classic OAM configuration only), tape level, or new cloud level of the OAM storage hierarchy, the OSMC Single Object Recovery utility will read the backup copy of the object from an optical backup (Classic OAM configuration only) or tape backup and write a new primary copy of that object to the level/sublevel where the primary copy being recovered resided.

3.0.7.4 OSMC Move Volume Utility

The OSMC Move Volume utility is used to move data from an optical or tape source volume to one or more target volumes. This capability is specific to the optical and tape levels and therefore no changes are needed to the Move Volume utility for cloud level support.

3.0.7.5 OSMC Recall to Disk Functionality

The OSMC 'Recall to Disk' functionality is used to temporarily recall a primary object that resides in the optical level or tape level of the OAM storage hierarchy to the disk level (either the DB2 sublevel or the file system sublevel) of the OAM storage hierarchy following an OSREQ retrieve for the primary object. The "recall" (as well as the duration) can be requested using the RECALL keyword on the OSREQ application programming interface. Configuration of this 'Recall to Disk' functionality is performed using the SETOSMC statement which remains unchanged.

The OSMC 'Recall to Disk' functionality is enhanced to allow a primary copy of an object in the cloud level to be recalled to the disk level (either the DB2 sublevel or the file system sublevel).

With the new support, when a primary object is configured to be recalled to one of the disk sublevels, the OSMC 'Recall to Disk' functionality will read the object from its location in the optical (Classic configuration only), tape or cloud level of the OAM storage hierarchy and will write the object to the designated disk sublevel (DB2 or file system).

3.0.7.6 OSMC Immediate Backup Functionality

The OSMC Immediate Backup functionality is used to perform a backup "immediately" following an OSREQ store of a primary object instead of waiting until the OSMC storage management cycle has been initiated for the storage group containing the object. This "immediate" backup functionality is specified in the SMS Management Class (see BACKUP FREQUENCY) and will perform a backup for primary objects that reside in the DB2 sublevel, file system sublevel, optical level (Classic OAM configuration only), or tape level of the OAM storage hierarchy.

The OSMC Immediate Backup functionality is changed to also perform a backup for primary objects that reside in the new cloud level in addition to primary objects that reside in the already supported levels/sublevels.

3.0.8 SMF 85 Record

OAM issues SMF records with type 85 and many subtypes to provide information about the processing within the OSR, OSMC, and LCS components of OAM.

The cloud support will introduce changes to include relevant information about the cloud level in several of the existing OSR and OSMC subtypes and includes the addition of several new LCS subtypes to provide information about the cloud read, write, and delete related activities.

3.0.8.1 OAM SMF Record Subtypes

The following table identifies the changes to the sizes of the existing SMF record subtypes in OSR and OSMC as well as the addition of new LCS subtypes for cloud related processing.

| Record Subtype | Record Size | Description |
|----------------|-------------|-------------------------------------|
| 1 | 380 | OSREQ Access |
| 2 | 380 | OSREQ Store |
| 3 | 380 | OSREQ Retrieve |
| 4 | 380 | OSREQ Query |
| 5 | 380 | OSREQ Change |
| 6 | 380 | OSREQ Delete |
| 7 | 380 | OSREQ Unaccess |
| 8 | 380 | OSREQ STOREBEG |
| 9 | 380 | OSREQ STOREPRT |
| 10 | 380 | OSREQ STOREEND |
| 32 | 796 | OSMC Storage Group Processing |
| 33 | 796 | OSMC DASD Space Management |
| 34 | 796 | OSMC Volume Recovery Utility |
| 35 | 796 | OSMC Move Volume Utility |
| 36 | 300 | OSMC Single Object Recovery Utility |
| 37 | 184 | OSMC Library Space Management |
| 38 | 290 | OSMC Single Object Recall Utility |
| 39 | 298 | OSMC Immediate Backup |
| 40 | 428 | OSMC Tape Recycle |
| 64 | 256 | LCS Optical Drive Vary Online |
| 65 | 256 | LCS Optical Drive Vary Offline |
| 66 | 256 | LCS Optical Library Vary Online |
| 67 | 256 | LCS Optical Library Vary Offline |
| 68 | 284 | LCS Optical Cartridge Entry |
| 69 | 284 | LCS Optical Cartridge Eject |
| 70 | 284 | LCS Optical Cartridge Label |
| 71 | 284 | LCS Optical Volume Audit |
| 72 | 284 | LCS Optical Volume Mount |

(SPE) OAM Cloud as a Tier (OA55700)

| | | |
|------------|-----------------------------------|--|
| 73 | 284 | LCS Optical Volume Demount |
| 74 | variable (min =416, max = 32 664) | LCS Optical Write Request |
| 75 | 416 | LCS Optical Read Request |
| 76 | 416 | LCS Optical Logical Delete Request |
| 77 | variable (min =416, max = 32 664) | LCS Optical Physical Delete Request |
| 78 | variable (min =416, max = 32 664) | LCS Object Tape Write Request |
| 79 | 416 | LCS Object Tape Read Request |
| 87 | 228 | LCS Object Tape Volume Demount (OAM usage) |
| 88 | 416 | LCS Object Tape Logical Delete Request |
| 90 | 324 | LCS File System Write Request |
| 91 | 324 | LCS File System Read Request |
| 92 | 324 | LCS File System Physical Delete Request |
| 93 | 324 | LCS File System Physical Delete Request (Uncommitted Application Store Cleanup) |
| 100 | 300 | LCS Cloud Write Request |
| 101 | 300 | LCS Cloud Read Request |
| 102 | 300 | LCS Cloud Physical Delete Request |
| 103 | 300 | LCS Cloud Physical Delete Request (Uncommitted Application Store Cleanup) |

3.0.8.2 OSREQ Activity (Subtypes 1-10)

For OSR, the cloud support will set new bits in the existing records for subtypes 1-10. For subtypes 2 (STORE), 3 (RETRIEVE), 6 (DELETE), and 10 (STOREEND) the flags (ST2FLGS, ST3FLGS, ST6FLGS, and ST10FLGS respectively) will be set to indicate that the action was taken on a copy of the object in the cloud level as shown in the following table. Though the cloud level does not have sublevels, the sublevel bits will be set to indicate sublevel 1. Two new fields are added to show the cloud location (via the cloud ID) and the cloud instance ID for cloud level objects.

| OFFSETS | NAME | LENGTH | FORMAT | DESCRIPTION |
|---------|---------|--------|--------|---|
| 0 0 | ST1COLN | 44 | EBCDIC | Collection name. Valid for subtypes 2, 3, 4, 5, 6, 8, 9, and 10. |
| 44 2C | ST1OBJN | 44 | EBCDIC | Object name. Valid for subtypes 2, 3, 4, 5, 6, 8, 9, and 10. |
| 88 58 | ST1SGN | 8 | EBCDIC | Storage group name. Valid for subtypes 2, 3, 4, 5, 6, 8, 9, and 10. |
| 96 60 | ST1SCN | 8 | EBCDIC | Storage class name. Valid for subtypes 2, 4, 5, 8, 9, and 10. |
| 104 68 | ST1MCN | 8 | EBCDIC | Management class name. Valid for subtypes 2, 4, 5, 8, 9, and 10. |
| 112 70 | ST1OFF | 4 | binary | Offset for both partial object retrieve (subtype 3), and object store part (subtype 9). Zero for all others. |
| 116 74 | ST1LEN | 4 | binary | Length. Valid for subtypes 2, 3, 4, 6, 8, 9, and 10. |
| | | | | SUBTYPE MEANING 1 Unused, contains binary zero. 2 Length of object stored. 3 Number of bytes retrieved. |

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| | | | | <p>4 Number of QEL elements returned to the application program.</p> <p>5 Unused, contains binary zero.</p> <p>6 Length of object deleted.</p> <p>7 Unused, contains binary zero.</p> <p>8 Total object length in bytes.</p> <p>9 Length in bytes of the part of the object to be stored.</p> <p>10 Total object length in bytes to complete storage of the object.</p> |
| 120 78 | ST1TTOK | 16 | binary | OSREQ tracking token supplied with TTOKEN keyword on the OSREQ macro. Note: Any application programs that want to use the new TTOKEN keyword interface need to be recompiled with the new OSREQ macro. |
| 136 88 | ST1TOK | 8 | binary | OSREQ token. |
| 144 90 | ST1VSN | 6 | EBCDIC | <p>Volume serial number. Valid for subtypes 2, 3, and 6.</p> <p>For an OSREQ STORE request (subtype 2), this field contains the volume serial number of the tape or optical volume to which the primary copy of the object was stored. Only valid if bit 1 or 2 is on in field ST2FLGS.</p> <p>For an OSREQ RETRIEVE request (subtype 3), this field contains the volume serial number of the tape or optical volume from which the copy of the object was retrieved. Either the first or the second backup copy is retrieved as determined by the VIEW=BACKUP BACKUP2 option indicated on the RETRIEVE request. Valid if bit 1, 2, 3, 4, 5, or 6 is on in field ST3FLGS.</p> <p>For an OSREQ DELETE request (subtype 6), this field contains the volume serial number of the tape or optical volume from which the primary copy of the object was deleted. Valid if bit 1 or 2 is on in field ST6FLGS.</p> |
| 150 96 | ST1VMT | 2 | EBCDIC | <p>Volume media type. Valid for subtype 2, 3, and 6. If a volume serial number is contained in the previous field (ST1VSN), this field contains the media type of the volume whose volume serial number is in field ST1VSN as follows:</p> <p>VALUE MEANING</p> <p>00 IBM 9247 12-inch 2000-MB optical disk media.</p> <p>01 IBM 3995 5.25-inch 650-MB rewritable optical disk media.</p> <p>02 IBM 3480 Cartridge System Tape.</p> <p>03 IBM 3995 5.25-inch 650-MB WORM optical disk media.</p> <p>04 IBM 3480 Enhanced Capacity Cartridge System Tape.</p> <p>05 IBM High Performance Cartridge Tape.</p> <p>06 IBM Extended High Performance Cartridge Tape.</p> <p>07 IBM Enterprise Tape Cartridge.</p> <p>08 IBM Enterprise WORM Tape Cartridge.</p> <p>09 IBM Enterprise Economy Tape Cartridge.</p> <p>10 IBM Enterprise Economy WORM Tape Cartridge.</p> <p>11 IBM 3995 5.25-inch 1300-MB rewritable optical disk media.</p> <p>12 IBM Enterprise Extended Tape Cartridge.</p> <p>13 IBM 3995 5.25-inch 1300-MB WORM optical disk media.</p> <p>14 IBM Enterprise Extended WORM Tape Cartridge.</p> <p>15 IBM 3995 5.25-inch 1300-MB CCW optical disk media.</p> <p>16 IBM Enterprise 3592 Advanced Tape Cartridge.</p> <p>17 IBM Enterprise 3592 Advanced WORM Tape</p> |

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| | | | | <p>Cartridge.</p> <p>18 IBM Enterprise 3592 Advanced Short Tape Cartridge.</p> <p>21 IBM 3995 5.25-inch 2600-MB rewritable optical disk media.</p> <p>23 IBM 3995 5.25-inch 2600-MB WORM optical disk media.</p> <p>25 IBM 3995 5.25-inch 2600-MB CCW optical disk media.</p> <p>31 IBM 3995 5.25-inch 5.2-GB rewritable optical disk media.</p> <p>33 IBM 3995 5.25-inch 5.2-GB WORM optical disk media.</p> <p>35 IBM 3995 5.25-inch 5.2-GB CCW optical disk media.</p> <p>Note: CCW = continuous composite WORM media. WORM = write-once-read-many.</p> |
| 152 98 | ST1RC | 4 | binary | OSREQ return code. Value in register 15 following the OSREQ macro invocation. |
| 156 9C | ST1RS | 4 | binary | OSREQ reason code. Value in register 0 following the OSREQ macro invocation. |
| 160 A0 | ST1FLGS | 4 | binary | <p>Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 1, the following bit definitions apply:</p> <p>BIT MEANING</p> <p>0 When on, the IADDRESS parameter was specified on the OSREQ request.</p> <p>1-31 Reserved.</p> |
| 160 A0 | ST2FLGS | 4 | binary | <p>Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 2, the following bit definitions apply:</p> <p>BIT MEANING</p> <p>0 When on, the object is stored to disk.</p> <p>1 When on, the object is stored to optical.</p> <p>2 When on, the object is stored to tape.</p> <p>3 When on, the object is stored to cloud.</p> <p>4 Unused.</p> <p>5 When on, the OSREQ STORE request resulted in the mounting of a shelf-resident removable media volume (tape or optical) by an operator. This bit is only valid if bit 1 or 2 is on.</p> <p>6 When on, the OSREQ STORE request resulted in the mounting of a library-resident removable media volume (tape or optical) inside an automated storage library. This bit is only valid if bit 1 or 2 is on.</p> <p>7 When on, the OSREQ STORE request was satisfied using an already mounted removable media volume (tape or optical). This bit is only valid if bit 1 or 2 is on.</p> <p>8 When on, an immediate backup copy is scheduled for this object.</p> <p>9 When on, the object is stored to LOB storage structure.</p> <p>10 When on, the object is stored on a-sublevel 1. When bit 0 is on, the object is stored in DB2. When bit 2 is on, the object is stored to a sublevel 1 volume.</p> <p>11 When on, the object is stored on a-sublevel 2. When bit 0 is on, the object is stored in a file system. When bit 2 is on, the object is stored to a sublevel 2 volume.</p> <p>12 Unused.</p> <p>13 When on, the OSREQ STORE request included a DELHOLD=HOLD parameter. A deletion-hold was in effect</p> |

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| | | | | <p>for this object when it was initially stored.</p> <p>14 When on, the object was stored as a retention-protected object.</p> <p>15 When on, the object was stored as a deletion-protected object.</p> <p>16 When on, the object was stored as a event-based-retention object.</p> <p>17 Reserved.</p> <p>18 When on, a 64-bit virtual storage address was provided for the object data buffer</p> |
| 160 A0 | ST3FLGS | 4 | binary | <p>Processing flags. The meaning is dependent on the record subtype. Unless specified below all bits are zero and reserved. For subtype 3, the following bit definitions apply:</p> <p>BIT MEANING</p> <p>0 When on, the primary copy of the object was retrieved from disk.</p> <p>1 When on, the primary copy of the object was retrieved from optical.</p> <p>2 When on, the primary copy of the object was retrieved from tape.</p> <p>3 When on, either the first or the second backup copy of the object was retrieved from optical as a result of VIEW=BACKUP or VIEW=BACKUP2 being specified on the OSREQ macro. See bit 10 to indicate which backup copy was retrieved.</p> <p>4 When on, either the first or the second backup copy of the object was retrieved from tape as a result of VIEW=BACKUP or VIEW=BACKUP2 being specified on the OSREQ macro. See bit 10 to indicate which backup copy was retrieved.</p> <p>5 When on, either the first or the second backup copy of the object was retrieved from optical as a result of the primary copy of the object being unavailable and the automatic access to backup being active. See bit 10 for indication which backup copy was retrieved.</p> <p>6 When on, either the first or the second backup copy of the object was retrieved from tape as a result of the primary copy of the object being unavailable and the automatic access to backup being active. See bit 10 for indication which backup copy was retrieved.</p> <p>7 When on, the OSREQ RETRIEVE request resulted in the mounting of a shelf-resident removable media volume (tape or optical) by an operator. This bit is only valid if bit 1, 2, 3, 5, or 6 is on.</p> <p>8 When on, the OSREQ RETRIEVE request resulted in the mounting of a library-resident removable media volume (tape or optical) inside an automated storage library. This bit is only valid if bit 1, 2, 3, 5, or 6 is on.</p> <p>9 When on, the OSREQ RETRIEVE request was satisfied using an already mounted removable media volume (tape or optical). This bit is only valid of bit 1, 2, 3, 5, or 6 is on.</p> <p>10 When on, the second backup copy of the object was retrieved.</p> <p>11 When on, a recall is scheduled for this object.</p> <p>12 When on, a recall was explicitly specified on the OSREQ RETRIEVE request.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

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| | | | | <p>13 When on, the primary copy of the object was retrieved from a LOB table.</p> <p>14 When on, the object is retrieved from a-sublevel 1. When bit 0 is on, the object is retrieved from DB2. When bit 2 is on, the object is retrieved from a sublevel 1 volume.</p> <p>15 When on, the object is retrieved from a-sublevel 2. When bit 0 is on, the object is retrieved from a file system. When bit 2 is on, the object is retrieved from a sublevel 2 volume.</p> <p>16 Reserved.</p> <p>17 When on, a 64-bit virtual storage address was provided for the object data buffer</p> <p>18 When on, the primary copy of the object was retrieved from cloud.</p> |
| 160 A0 | ST4FLGS | 4 | binary | <p>Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 4, the following bit definitions apply:</p> <p>BIT MEANING</p> <p>0 When on, the QUERY BACKUP OPTION has been disabled by specifying QB=N in the IEFSSNxx PARMLIB member. When off, the QUERY BACKUP OPTION is enabled, either by default or by specifying QB=Y in the IEFSSNxx PARMLIB member.</p> <p>1-31 Reserved.</p> |
| 160 A0 | ST5FLGS | 4 | binary | <p>Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 5, the following bit definitions apply:</p> <p>BIT MEANING</p> <p>0 When on, management class is specified on the OSREQ CHANGE macro.</p> <p>1 When on, storage class is specified on the OSREQ CHANGE macro.</p> <p>2 When on, retention period is specified on the OSREQ CHANGE macro.</p> <p>3 When on, special retention period value of -1 is specified on the OSREQ CHANGE macro.</p> <p>4 When on, special retention period value of -2 is specified on the OSREQ CHANGE macro.</p> <p>5 When on, special retention period value of X'7FFFFFFF' is specified on the OSREQ CHANGE macro.</p> <p>6 When on, event expiration (EVENTEXP) is specified on the OSREQ CHANGE macro.</p> <p>7 When on, activate deletion hold (DELHOLD=HOLD) is specified on the OSREQ CHANGE macro.</p> <p>8 When on, release deletion hold (DELHOLD=NOHOLD) is specified on the OSREQ CHANGE macro.</p> |
| 160 A0 | ST6FLGS | 4 | binary | <p>Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 6, the following bit definitions apply:</p> <p>BIT MEANING</p> <p>0 When on, the primary copy of the object is deleted from disk.</p> <p>1 When on, the primary copy of the object is deleted from optical.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

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| | | | | <p>2 When on, the primary copy of the object is deleted from tape.</p> <p>3 When on, the first backup copy of the object is deleted from optical.</p> <p>4 When on, the first backup copy of the object is deleted from tape.</p> <p>5 When on, the second backup copy of the object is deleted from optical.</p> <p>6 When on, the second backup copy of the object is deleted from tape.</p> <p>7 When on, the primary copy of the object is deleted from LOB table.</p> <p>8 When on, the primary copy of the object is deleted from sublevel 1. When bit 0 is on, the object is deleted from DB2. When bit 2 is on, the object is deleted from a sublevel 1 volume.</p> <p>9 When on, the primary copy of object is deleted from sublevel 2. When bit 0 is on, the object is deleted from a file system. When bit 2 is on, the object is deleted from a sublevel 2 volume.</p> <p>10 Reserved.</p> <p>11 When on, the primary copy of the object is deleted from cloud.</p> |
| 160 A0 | ST7FLGS | 4 | binary | Processing flags. For subtype 7, all bits contain zero. |
| 160 A0 | ST8FLGS | 4 | binary | Processing flags. For subtype 8, all bits contain zero. |
| 160 A0 | ST9FLGS | 4 | binary | Processing flags. For subtype 9, all bits contain zero. |
| 160 A0 | ST10FLGS | 4 | binary | <p>Processing flags. The meaning is dependent on the record subtype. Unless specified below, all bits are zero and reserved. For subtype 10, the following bit definitions apply:</p> <p>BIT MEANING</p> <p>0 When on, the object is stored to disk.</p> <p>1 Unused.</p> <p>2 When on, the object is stored to tape.</p> <p>3 When on, the object is stored to cloud.</p> <p>4 Unused.</p> <p>5 When on, the OSREQ STORE request resulted in the mounting of a shelf-resident tape volume by an operator. This bit is only valid if bit 2 is on.</p> <p>6 When on, the OSREQ STORE request resulted in the mounting of a library-resident tape volume inside an automated storage library. This bit is only valid if bit 2 is on.</p> <p>7 When on, the OSREQ STORE request was satisfied using an already mounted tape volume. This bit is only valid if bit 2 is on.</p> <p>8 When on, an immediate backup copy is scheduled for this object.</p> <p>9 When on, the object is stored to LOB storage structure.</p> <p>10 When on, the object is stored on a-sublevel 1. When bit 0 is on, the object is stored in DB2. When bit 2 is on, the object is stored to a sublevel 1 volume.</p> <p>11 When on, the object is stored on a-sublevel 2. When bit 0 is on, the object is stored in a file system. When bit 2 is on, the object is stored to a sublevel 2 volume.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

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| | | | | <p>12 When on, the CANCEL=YES keyword was specified indicating the store sequence was successfully cancelled.</p> <p>13 When on, the OSREQ STORE request included a DELHOLD=HOLD parameter. A deletion-hold was in effect for this object when it was initially stored.</p> <p>14 When on, the object was stored as a retention-protected object.</p> <p>15 When on, the object was stored as a deletion-protected object.</p> <p>16 When on, the object was stored as a event-based-retention object.</p> |
| 164 A4 | ST1STOK | 16 | binary | OSREQ STOKEN. Valid for subtypes 8, 9, and 10. |
| 180 B4 | ST1RC2 | 4 | binary | OSREQ Return Code 2. Valid for subtypes 2, 3, and 10. |
| 184 B8 | ST1STOUT | 4 | binary | STIMEOUT value specified on the STOREBEG request. Specifies the maximum interval in seconds between STOREBEG, STOREPRT, and STOREEND request that OAM should wait before OAM will assume that there will be no more activity for this store sequence. Valid for subtype 8. |
| 188 BC | ST1OLRD | 10 | EBCDIC | Old Last Reference Date. Value contained in OLDREFDT prior to the OSREQ CHANGE or RETRIEVE request. Valid for subtypes 3 and 5. |
| 198 C6 | ST1NLRD | 10 | EBCDIC | New Last Reference Date. Value contained in ODLREFDT after the OSREQ CHANGE or RETRIEVE request has completed. Valid for subtypes 3 and 5. |
| 208 D0 | ST1INST | 4 | binary | Instance ID. Valid for subtypes 2,3,6, and 10. |
| 212 D4 | ST1CLDID | 2 | binary | <p>ID of entry in CLOUDID table defining the provider and container name where the primary copy of the object is stored. Valid for:</p> <ul style="list-style-type: none"> - Subtype 2 when ST2FLGS bit 3 is on - Subtype 3 when ST3FLGS bit 18 is on - Subtype 6 when ST6FLGS bit 11 is on - Subtype 10 when ST10FLGS bit 3 is on. |
| 214 D6 | * | 2 | | Unused |
| 216 D8 | ST1CINST | 4 | binary | <p>Cloud instance ID. Valid for:</p> <ul style="list-style-type: none"> - Subtype 2 when ST2FLGS bit 3 is on - Subtype 3 when ST3FLGS bit 18 is on - Subtype 6 when ST6FLGS bit 11 is on - Subtype 10 when ST10FLGS bit 3 is on. |

3.0.8.3 OSMC Storage Management Activity (Subtypes 32-35)

For the OSMC subtypes 32 (Storage Group Processing), 33 (DASD Space Management), 34 (Volume Recovery Utility), and 35 (Move Volume Utility), existing statistics are provided for:

- Primary objects on DASD (i.e. disk sublevel 1)
- Primary objects on file system (i.e. disk sublevel 2)
- Primary objects on optical
- Primary objects on tape (i.e. tape sublevel 1)
- Primary objects on tape sublevel 2
- Backup copy 1 objects on optical
- Backup copy 1 objects on tape
- Backup copy 2 objects on optical
- Backup copy 2 objects on tape

For the cloud support, *new* statistics are added for:

- Primary objects on cloud

| OFFSETS | NAME | LENGTH | FORMAT | DESCRIPTION |
|---------|----------|--------|--------|---|
| 0 0 | ST32SGN | 8 | EBCDIC | Object or Object Backup storage group name. |
| 8 8 | ST32VSN0 | 6 | EBCDIC | Volume serial number of a tape or optical volume. Valid for subtypes 34 and 35. This field contains blanks for all other subtypes. If the RECYCLE or DELETE option was specified, this field lists the volume serial number for the volume being recycled or deleted, and field ST32VSN1 lists the volume serial number for the opposite side of the optical volume. |
| 14 E | ST32VSN1 | 6 | EBCDIC | Volume serial number of the opposite side of the optical volume. Valid for subtypes 34 and 35. If the volume serial number contained in field ST32VSN0 is the volume serial number of a tape volume, this field contains blanks. This field contains blanks for all other subtypes. If the RECYCLE or DELETE option was specified, this field lists the volume serial number of the opposite side of the optical platter. |
| 20 14 | ST32OMT | 2 | EBCDIC | Media type of the volume identified in field ST32VSN0. Valid for subtypes 34 and 35. This field contains blanks for all other subtypes. VALUE MEANING 00 IBM 9247 12-inch 2000-MB optical disk media. 01 IBM 3995 5.25-inch 650-MB rewritable optical disk media. 02 IBM 3480 Cartridge System Tape. 03 IBM 3995 5.25-inch 650-MB WORM optical disk media. 04 IBM 3480 Enhanced Capacity Cartridge System Tape. 05 IBM High Performance Cartridge Tape. 06 IBM Extended High Performance Cartridge Tape. 07 IBM Enterprise Tape Cartridge. 08 IBM Enterprise WORM Tape Cartridge. |

(SPE) OAM Cloud as a Tier (OA55700)

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| | | | | <p>09 IBM Enterprise Economy Tape Cartridge. 10 IBM Enterprise Economy WORM Tape Cartridge. 11 IBM 3995 5.25-inch 1300-MB rewritable optical disk media. 12 IBM Enterprise Extended Tape Cartridge. 13 IBM 3995 5.25-inch 1300-MB WORM optical disk media. 14 IBM Enterprise Extended WORM Tape Cartridge. 15 IBM 3995 5.25-inch 1300-MB CCW optical disk media. 16 IBM Enterprise 3592 Advanced Tape Cartridge. 17 IBM Enterprise 3592 Advanced WORM Tape Cartridge. 18 IBM Enterprise 3592 Advanced Short Tape Cartridge. 21 IBM 3995 5.25-inch 2600-MB rewritable optical disk media. 23 IBM 3995 5.25-inch 2600-MB WORM optical disk media. 25 IBM 3995 5.25-inch 2600-MB CCW optical disk media. 31 IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. 33 IBM 3995 5.25-inch 5.2-GB WORM optical disk media. 35 IBM 3995 5.25-inch 5.2-GB CCW optical disk media.</p> <p>Note: CCW = continuous composite WORM media. WORM = write-once-read-many.</p> |
| 22 16 | * | 2 | binary | Reserved. |
| 24 18 | ST32PDWO | 4 | binary | Number of primary objects written to disk sublevel 1 (DB2). |
| 28 1C | ST32PDWK | 4 | binary | Number of kilobytes of primary object data written to disk sublevel 1 (DB2). X'FFFFFFFF' indicates the counter has overflowed. |
| 32 20 | ST32PDRO | 4 | binary | Number of primary objects read from disk sublevel 1 (DB2). |
| 36 24 | ST32PDRK | 4 | binary | Number of kilobytes of primary object data read from disk sublevel 1 (DB2). X'FFFFFFFF' indicates the counter has overflowed. |
| 40 28 | ST32PDDO | 4 | binary | Number of primary objects deleted from disk sublevel 1 (DB2). |
| 44 2C | ST32PDDK | 4 | binary | Number of kilobytes of primary object data deleted from disk sublevel 1 (DB2). X'FFFFFFFF' indicates the counter has overflowed. |
| 48 30 | ST32POWO | 4 | binary | Number of primary objects written to optical. |
| 52 34 | ST32POWK | 4 | binary | Number of kilobytes of primary object data written to optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 56 38 | ST32PORO | 4 | binary | Number of primary objects read from optical. |
| 60 3C | ST32PORK | 4 | binary | Number of kilobytes of primary object data read from optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 64 40 | ST32PODO | 4 | binary | Number of primary objects deleted from optical. |
| 68 44 | ST32PODK | 4 | binary | Number of kilobytes of primary object data deleted from optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 72 48 | ST32PTWO | 4 | binary | Number of primary objects written to tape. |
| 76 4C | ST32PTWK | 4 | binary | Number of kilobytes of primary object data written to tape. X'FFFFFFFF' indicates the counter has overflowed. |

(SPE) OAM Cloud as a Tier (OA55700)

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| 80 50 | ST32PTRO | 4 | binary | Number of primary objects read from tape. |
| 84 54 | ST32PTRK | 4 | binary | Number of kilobytes of primary object data read from tape. X'FFFFFFFF' indicates the counter has overflowed. |
| 88 58 | ST32PTDO | 4 | binary | Number of primary objects deleted from tape. |
| 92 5C | ST32PTDK | 4 | binary | Number of kilobytes of primary object data deleted from tape. X'FFFFFFFF' indicates the counter has overflowed. |
| 96 60 | ST32BOWO | 4 | binary | Number of backup objects written to optical. |
| 100 64 | ST32BOWK | 4 | binary | Number of kilobytes of backup object data written to optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 104 68 | ST32BORO | 4 | binary | Number of backup objects read from optical. |
| 108 6C | ST32BORK | 4 | binary | Number of kilobytes of backup object data read from optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 112 70 | ST32BODO | 4 | binary | Number of backup objects deleted from optical. |
| 116 74 | ST32BODK | 4 | binary | Number of kilobytes of backup object data deleted from optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 120 78 | ST32BTWO | 4 | binary | Number of backup objects written to tape. |
| 124 7C | ST32BTWK | 4 | binary | Number of kilobytes of backup object data written to tape. X'FFFFFFFF' indicates the counter has overflowed. |
| 128 80 | ST32BTRO | 4 | binary | Number of backup objects read from tape. |
| 132 84 | ST32BTRK | 4 | binary | Number of kilobytes of backup object data read from tape. X'FFFFFFFF' indicates the counter has overflowed. |
| 136 88 | ST32BTDO | 4 | binary | Number of backup objects deleted from tape. |
| 140 8C | ST32BTDK | 4 | binary | Number of kilobytes of backup object data deleted from tape. X'FFFFFFFF' indicates the counter has overflowed. |
| 144 90 | ST32B2OWO | 4 | binary | Number of BACKUP2 objects written to optical. |
| 148 94 | ST32B2OWK | 4 | binary | Number of kilobytes of BACKUP2 objects written to optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 152 98 | ST32B2ORO | 4 | binary | Number of BACKUP2 objects read from optical. |
| 156 9C | ST32B2ORK | 4 | binary | Number of kilobytes of BACKUP2 objects read from optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 160 A0 | ST32B2ODO | 4 | binary | Number of BACKUP2 objects deleted from optical. |
| 164 A4 | ST32B2ODK | 4 | binary | Number of kilobytes of BACKUP2 objects deleted from optical. X'FFFFFFFF' indicates the counter has overflowed. |
| 168 A8 | ST32B2TWO | 4 | binary | Number of BACKUP2 objects written to tape. |
| 172 AC | ST32B2TWK | 4 | binary | Number of kilobytes of BACKUP2 objects written to tape. X'FFFFFFFF' indicates the counter has overflowed. |
| 176 B0 | ST32B2TRO | 4 | binary | Number of BACKUP2 objects read from tape. |
| 180 B4 | ST32B2TRK | 4 | binary | Number of kilobytes of BACKUP2 objects read from tape. X'FFFFFFFF' indicates the counter has overflowed. |
| 184 B8 | ST32B2TDO | 4 | binary | Number of BACKUP2 objects logically deleted from tape. |
| 188 BC | ST32B2TDK | 4 | binary | Number of kilobytes of BACKUP2 objects logically deleted from tape. X'FFFFFFFF' indicates the counter has overflowed. |
| 192 C0 | ST32DTUP | 4 | binary | Number of rows updated in the object directory table. |
| 196 C4 | ST32DTDE | 4 | binary | Number of rows deleted from the object directory table. |
| 200 C8 | ST324KIN | 4 | binary | Number of rows inserted into the 4 KB object storage table. |
| 204 CC | ST324KDE | 4 | binary | Number of rows deleted from the 4 KB object storage table. |
| 208 D0 | ST3232KI | 4 | binary | Number of rows inserted into the 32 KB object storage table. |

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| 212 D4 | ST3232KD | 4 | binary | Number of rows deleted from the 32 KB object storage table. |
| 216 D8 | ST32NCE | 4 | binary | Number of optical cartridges expired. Valid only for Subtype 32. |
| 220 DC | ST32FLGS | 4 | binary | <p>Processing flags.</p> <p>BIT MEANING</p> <p>0 When on, the MOVEVOL was invoked automatically under software control as a result of RECYCLE.</p> <p>1 When on, this process was invoked by a MODIFY OAM,START command issued from an MVS console.</p> <p>2 When on, this process was invoked using an ISMF line operator.</p> <p>3 When on, volume recovery was invoked with the BACKUP1 keyword or defaulted to BACKUP1.</p> <p>4 When on, volume recovery was invoked with the BACKUP2 keyword.</p> <p>5 When on, the DELETE option was specified for the RECOVER or MOVEVOL utility.</p> <p>6 When on, the RECYCLE option was specified for the MOVEVOL utility.</p> <p>7 When on, the Object storage group was processed.</p> <p>8 When on, the Object Backup storage group was processed.</p> <p>9 When on, the storage group cycle ended because the CYCLE END TIME was exceeded.</p> <p>10 When on, automatic backup deletion was enabled during the storage group cycle.</p> <p>11–31 Reserved.</p> |
| 224 E0 | ST32NTE | 4 | binary | Number of tape volumes expired. Valid only for subtype 32. |
| 228 E4 | ST32RCLD | 4 | binary | Number of recalled objects processed this storage group cycle. Valid only for subtype 32. |
| 232 E8 | ST32RCLK | 4 | binary | Number of kilobytes of recalled objects processed this storage group cycle. Valid only for subtype 32. X'FFFFFFFF' indicates the counter has overflowed. |
| 236 EC | ST32LOBI | 4 | binary | Number of rows inserted into the LOB storage structure. |
| 240 F0 | ST32LOBD | 4 | binary | Number of rows deleted from the LOB storage structure. |
| 244 F4 | ST32PUWO | 4 | binary | Number of primary objects written to tape sublevel 2. |
| 248 F8 | ST32PUWK | 4 | binary | Number of kilobytes of primary objects written to tape sublevel 2. X'FFFFFFFF' indicates the counter has overflowed. |
| 252 FC | ST32PURO | 4 | binary | Number of primary objects read from tape sublevel 2. |
| 256 100 | ST32PURK | 4 | binary | Number of kilobytes of primary objects read from tape sublevel 2. X'FFFFFFFF' indicates the counter has overflowed. |
| 260 104 | ST32PUDO | 4 | binary | Number of primary objects deleted from tape sublevel 2. |
| 264 108 | ST32PUDK | 4 | binary | Number of kilobytes of primary objects deleted from tape sublevel 2. X'FFFFFFFF' indicates the counter has overflowed. |
| 268 10C | ST32PEWO | 4 | binary | Number of primary objects written to disk sublevel 2 (file system). |
| 272 110 | ST32PERO | 4 | binary | Number of primary objects read from disk sublevel 2 (file system). |
| 276 114 | ST32PEDO | 4 | binary | Number of primary objects deleted from disk sublevel 2 (file system). |

(SPE) OAM Cloud as a Tier (OA55700)

| | | | | |
|---------|-----------|---|--------|--|
| 280 118 | ST32PDWB | 8 | binary | Number of bytes of primary object data written to disk sublevel 1 (DB2). |
| 288 120 | ST32PDRB | 8 | binary | Number of bytes of primary object data read from disk sublevel 1 (DB2). |
| 296 128 | ST32PDDB | 8 | binary | Number of bytes of primary object data deleted from disk sublevel 1 (DB2). |
| 304 130 | ST32POWB | 8 | binary | Number of bytes of primary object data written to optical. |
| 312 138 | ST32PORB | 8 | binary | Number of bytes of primary object data read from optical. |
| 320 140 | ST32PODB | 8 | binary | Number of bytes of primary object data deleted from optical. |
| 328 148 | ST32PTWB | 8 | binary | Number of bytes of primary object data written to tape. |
| 336 150 | ST32PTRB | 8 | binary | Number of bytes of primary object data read from tape. |
| 344 158 | ST32PTDB | 8 | binary | Number of bytes of primary object data deleted from tape. |
| 352 160 | ST32BOWB | 8 | binary | Number of bytes of backup object data written to optical. |
| 360 168 | ST32BORB | 8 | binary | Number of bytes of backup object data read from optical. |
| 368 170 | ST32BODB | 8 | binary | Number of bytes of backup object data deleted from optical. |
| 376 178 | ST32BTWB | 8 | binary | Number of bytes of backup object data written to tape. |
| 384 180 | ST32BTRB | 8 | binary | Number of bytes of backup object data read from tape. |
| 392 188 | ST32BTDB | 8 | binary | Number of bytes of backup object data deleted from tape. |
| 400 190 | ST32B2OWB | 8 | binary | Number of bytes of BACKUP2 object data written to optical. |
| 408 198 | ST32B2ORB | 8 | binary | Number of bytes of BACKUP2 object data read from optical. |
| 416 1A0 | ST32B2ODB | 8 | binary | Number of bytes of BACKUP2 object data deleted from optical. |
| 424 1A8 | ST32B2TWB | 8 | binary | Number of bytes of BACKUP2 object data written to tape. |
| 432 1B0 | ST32B2TRB | 8 | binary | Number of bytes of BACKUP2 object data read from tape. |
| 440 1B8 | ST32B2TDB | 8 | binary | Number of bytes of BACKUP2 object data deleted from tape. |
| 448 1C0 | ST32RCLB | 8 | binary | Number of bytes of recalled objects processed this storage group cycle. Valid only for subtype 32. |
| 456 1C8 | ST32PUWB | 8 | binary | Number of bytes of primary object data written to tape sublevel 2. |
| 464 1D0 | ST32PURB | 8 | binary | Number of bytes of primary object data read from tape sublevel 2. |
| 472 1D8 | ST32PUDB | 8 | binary | Number of bytes of primary object data deleted from tape sublevel 2. |
| 480 1E0 | ST32PEWB | 8 | binary | Number of kilobytes of primary objects written to disk sublevel 2 (file system). |
| 488 1E8 | ST32PERB | 8 | binary | Number of kilobytes of primary objects read from disk sublevel 2 (file system). |
| 496 1F0 | ST32PEDB | 8 | binary | Number of kilobytes of objects deleted from disk sublevel 2 (file system). |
| 504 1F8 | ST32BOAO | 4 | binary | Number of unneeded backup 1 copies deleted from optical. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32BODO field. |
| 508 1FC | ST32B2OAO | 4 | binary | Number of unneeded backup 2 copies deleted from optical. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32B2ODO field. |
| 512 200 | ST32BTAO | 4 | binary | Number of unneeded backup 1 copies deleted from tape. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32BTDO field. |

(SPE) OAM Cloud as a Tier (OA55700)

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|--|-----------------|-----------|---------------|---|
| 516 204 | ST32B2TAO | 4 | binary | Number of unneeded backup 2 copies deleted from tape. Valid for subtype 32 only. Note: These backup copies are also included in the count in the ST32B2TDO field. |
| 520 208 | ST32BOAB | 8 | binary | Number of bytes of unneeded backup 1 copies deleted from optical. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32BODB field. |
| 528 210 | ST32B2OAB | 8 | binary | Number of bytes of unneeded backup 2 copies deleted from optical. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32B2ODB field. |
| 536 218 | ST32BTAB | 8 | binary | Number of bytes of unneeded backup 1 copies deleted from tape. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32BTDB field. |
| 544 220 | ST32B2TAB | 8 | binary | Number of bytes of unneeded backup 2 copies deleted from tape. Valid for subtype 32 only. Note: These bytes are also included in the count in the ST32B2TDB field. |
| 552 228 | ST32PCWB | 8 | binary | Number of bytes of primary object data written to cloud. |
| 560 230 | ST32PCRB | 8 | binary | Number of bytes of primary object data read from cloud. |
| 568 238 | ST32PCDB | 8 | binary | Number of bytes of primary object data deleted from cloud. |
| 576 240 | * | 48 | binary | Reserved |
| 624 270 | ST32PCWO | 4 | binary | Number of primary objects written to cloud. |
| 628 274 | ST32PCRO | 4 | binary | Number of primary objects read from cloud. |
| 632 278 | ST32PCDO | 4 | binary | Number of primary objects deleted from cloud. |
| Note: For subtypes 32-35, the total value in fields that refer to 'number of kilobytes' or 'number of bytes' will be rounded up. | | | | |

3.0.8.4 OSMC Single Object Recovery Utility (Subtype 36)

For the OSMC subtype 36 (Single Object Recovery), the storage hierarchy level from which the backup copy of the object was read and to which the new primary copy was written is not explicitly shown but can be determined from the values or lack of values in various fields. With cloud support, a non-zero value in new field ST36TCLID indicates that the object was recovered to the cloud level and shows the cloud location (via the cloud ID) of the recovered object.

| OFFSETS | NAME | LENGTH | FORMAT | DESCRIPTION |
|---------|----------|--------|--------|---|
| 0 0 | ST36COLN | 44 | EBCDIC | Collection name. |
| 44 2C | ST36CNID | 4 | binary | Collection ID. |
| 48 30 | ST36OBJN | 44 | EBCDIC | Object name. |
| 92 5C | ST36SGN | 8 | EBCDIC | OBJECT storage group name. |
| 100 64 | ST36OLEN | 4 | binary | Object length. |
| 104 68 | ST36BVSN | 6 | EBCDIC | Volume serial number of the optical or tape volume from which the backup copy of the object was read. The backup copy can be either the first or the second backup copy as determined by options specified on the F OAM,START,OBJRECV command. The options are: BACKUP1 BACKUP2. |
| 110 6E | ST36BMT | 2 | EBCDIC | Media type of volume from which the backup copy of the object was read. VALUE MEANING 00 IBM 9247 12-inch 2000-MB optical disk media. 01 IBM 3995 5.25-inch 650-MB rewritable optical disk media. 02 IBM 3480 Cartridge System Tape. 03 IBM 3995 5.25-inch 650-MB WORM optical disk media. 04 IBM 3480 Enhanced Capacity Cartridge System Tape. 05 IBM High Performance Cartridge Tape. 06 IBM Extended High Performance Cartridge Tape. 07 IBM Enterprise Tape Cartridge. 08 IBM Enterprise WORM Tape Cartridge. 09 IBM Enterprise Economy Tape Cartridge. 10 IBM Enterprise Economy WORM Tape Cartridge. 11 IBM 3995 5.25-inch 1300-MB rewritable optical disk media. 12 IBM Enterprise Extended Tape Cartridge. 13 IBM 3995 5.25-inch 1300-MB WORM optical disk media. 14 IBM Enterprise Extended WORM Tape Cartridge. 15 IBM 3995 5.25-inch 1300-MB CCW optical disk media. 16 IBM Enterprise 3592 Advanced Tape Cartridge. 17 IBM Enterprise 3592 Advanced WORM Tape Cartridge. 18 IBM Enterprise 3592 Advanced Short Tape Cartridge. 21 IBM 3995 5.25-inch 2600-MB rewritable optical disk media. 23 IBM 3995 5.25-inch 2600-MB WORM optical disk media. 25 IBM 3995 5.25-inch 2600-MB CCW optical disk media. 31 IBM 3995 5.25-inch 5.2-GB rewritable optical disk |

(SPE) OAM Cloud as a Tier (OA55700)

| | | | | |
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| | | | | <p>media.</p> <p>33 IBM 3995 5.25-inch 5.2-GB WORM optical disk media.</p> <p>35 IBM 3995 5.25-inch 5.2-GB CCW optical disk media.</p> <p>Note: CCW = continuous composite WORM media. WORM = write-once-read-many.</p> |
| 112 70 | ST36BTKN | 4 | binary | Volume location token associated with the backup copy of the object on the volume specified in the ST36BVSN field. |
| 116 78 | ST36TVSN | 6 | EBCDIC | Volume serial number of the target optical or tape volume to which the new primary copy of the object was written. This field contains blanks if the new location is not in the optical or tape level of the storage hierarchy . |
| 122 7E | ST36TMT | 2 | EBCDIC | <p>Media type of target optical or tape volume to which the new primary copy of the object was written. This field contains blanks if the new primary copy of the object is not in the optical or tape level of the storage hierarchy:</p> <p>VALUE MEANING</p> <p>00 IBM 9247 12-inch 2000-MB optical disk media.</p> <p>01 IBM 3995 5.25-inch 650-MB rewritable optical disk media.</p> <p>02 IBM 3480 Cartridge System Tape.</p> <p>03 IBM 3995 5.25-inch 650-MB WORM optical disk media.</p> <p>04 IBM 3480 Enhanced Capacity Cartridge System Tape.</p> <p>05 IBM High Performance Cartridge Tape.</p> <p>06 IBM Extended High Performance Cartridge Tape.</p> <p>07 IBM Enterprise Tape Cartridge.</p> <p>08 IBM Enterprise WORM Tape Cartridge.</p> <p>09 IBM Enterprise Economy Tape Cartridge.</p> <p>10 IBM Enterprise Economy WORM Tape Cartridge.</p> <p>11 IBM 3995 5.25-inch 1300-MB rewritable optical disk media.</p> <p>12 IBM Enterprise Extended Tape Cartridge.</p> <p>13 IBM 3995 5.25-inch 1300-MB WORM optical disk media.</p> <p>14 IBM Enterprise Extended WORM Tape Cartridge.</p> <p>15 IBM 3995 5.25-inch 1300-MB CCW optical disk media.</p> <p>16 IBM Enterprise 3592 Advanced Tape Cartridge.</p> <p>17 IBM Enterprise 3592 Advanced WORM Tape Cartridge.</p> <p>18 IBM Enterprise 3592 Advanced Short Tape Cartridge.</p> <p>21 IBM 3995 5.25-inch 2600-MB rewritable optical disk media.</p> <p>23 IBM 3995 5.25-inch 2600-MB WORM optical disk media.</p> <p>25 IBM 3995 5.25-inch 2600-MB CCW optical disk media.</p> <p>31 IBM 3995 5.25-inch 5.2-GB rewritable optical disk media.</p> <p>33 IBM 3995 5.25-inch 5.2-GB WORM optical disk media.</p> <p>35 IBM 3995 5.25-inch 5.2-GB CCW optical disk media.</p> <p>Note: CCW = continuous composite WORM media. WORM = write-once-read-many.</p> |
| 124 80 | ST36OVSN | 6 | EBCDIC | Volume serial number of the original optical or tape volume on |

(SPE) OAM Cloud as a Tier (OA55700)

| | | | | |
|--------|----------|---|--------|--|
| | | | | <p>which the primary copy of the object resided prior to the start of the single object recovery utility. This field contains blanks if the original location was not in the optical or tape level of the storage hierarchy.</p> |
| 130 82 | ST36OMT | 2 | EBCDIC | <p>Media type of the original optical or tape volume on which the primary copy of the object resided prior to the start of the single object recovery utility. This field contains blanks if the primary copy of the object is not in the optical or tape level of the storage hierarchy:</p> <p>VALUE MEANING</p> <p>00 IBM 9247 12-inch 2000-MB optical disk media. 01 IBM 3995 5.25-inch 650-MB rewritable optical disk media. 02 IBM 3480 Cartridge System Tape. 03 IBM 3995 5.25-inch 650-MB WORM optical disk media. 04 IBM 3480 Enhanced Capacity Cartridge System Tape. 05 IBM High Performance Cartridge Tape. 06 IBM Extended High Performance Cartridge Tape. 07 IBM Enterprise Tape Cartridge. 08 IBM Enterprise WORM Tape Cartridge. 09 IBM Enterprise Economy Tape Cartridge. 10 IBM Enterprise Economy WORM Tape Cartridge. 11 IBM 3995 5.25-inch 1300-MB rewritable optical disk media. 12 IBM Enterprise Extended Tape Cartridge. 13 IBM 3995 5.25-inch 1300-MB WORM optical disk media. 14 IBM Enterprise Extended WORM Tape Cartridge. 15 IBM 3995 5.25-inch 1300-MB CCW optical disk media. 16 IBM Enterprise 3592 Advanced Tape Cartridge. 17 IBM Enterprise 3592 Advanced WORM Tape Cartridge. 18 IBM Enterprise 3592 Advanced Short Tape Cartridge. 21 IBM 3995 5.25-inch 2600-MB rewritable optical disk media. 23 IBM 3995 5.25-inch 2600-MB WORM optical disk media. 25 IBM 3995 5.25-inch 2600-MB CCW optical disk media. 31 IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. 33 IBM 3995 5.25-inch 5.2-GB WORM optical disk media. 35 IBM 3995 5.25-inch 5.2-GB CCW optical disk media.</p> <p>Note: CCW = continuous composite WORM media. WORM = write-once-read-many.</p> |
| 132 84 | ST36FLGS | 4 | binary | <p>Processing flags.</p> <p>BIT MEANING</p> <p>0 When on, object recovery was invoked with the BACKUP1 keyword or defaulted to BACKUP1. 1 When on, object recovery was invoked with the BACKUP2 keyword. 2–31 Reserved.</p> |

(SPE) OAM Cloud as a Tier (OA55700)

| | | | | |
|--------|-----------|---|--------|--|
| 136 88 | ST36DSL | 2 | EBCDIC | Disk sublevel associated with the recovered object. This field is only valid when the ST36TVSN field contains blanks and the ST36TCLID field is 0. VALUE MEANING 01 Recovered object on disk sublevel 1 (DB2). 02 Recovered object on disk sublevel 2 (file system). |
| 138 8A | ST36TCLID | 2 | binary | ID of entry in CLOUDID table defining the provider and container name to which the new primary copy of the object was written. This field contains 0 if the new location is not in the cloud level of the storage hierarchy. |

3.0.8.5 OSMC Recall to Disk Sublevel (Subtype 38)

For the OSMC subtype 38 (Immediate Recall), an object could be recalled from the cloud level to the DB2 sublevel or to the file system sublevel. In this case there will be no volume serial number, media type or volume location token for the recalled object. The descriptions of those fields are updates to indicate this. A new field is added to show the cloud location (via the cloud ID) of the primary copy of the recalled object.

| OFFSETS | NAME | LENGTH | FORMAT | DESCRIPTION |
|---------|----------|--------|--------|--|
| 0 0 | ST38COLN | 44 | EBCDIC | Collection name. |
| 44 2C | ST38CNID | 4 | binary | Collection ID. |
| 48 30 | ST38OBJN | 44 | EBCDIC | Object name. |
| 92 5C | ST38SGN | 8 | EBCDIC | Object storage group name. |
| 100 64 | ST38OLEN | 4 | binary | Object length. |
| 104 68 | ST38VSN | 6 | EBCDIC | Volume serial number of the optical or tape volume from which the copy of the object was read. This field contains blanks if the object was recalled from the cloud level. |
| 110 6E | ST38MT | 2 | EBCDIC | Media type of volume from which the copy of the object was read. This field contains blanks if the object was recalled from the cloud level. VALUE MEANING 00 IBM 9247 12-inch 2000-MB optical disk media. 01 IBM 3995 5.25-inch 650-MB rewritable optical disk media. 02 IBM 3480 Cartridge System Tape. 03 IBM 3995 5.25-inch 650-MB WORM optical disk media. 04 IBM 3480 Enhanced Capacity Cartridge System Tape. 05 IBM High Performance Cartridge Tape. 06 IBM Extended High Performance Cartridge Tape. 07 IBM Enterprise Tape Cartridge. 08 IBM Enterprise WORM Tape Cartridge. 09 IBM Enterprise Economy Tape Cartridge. 10 IBM Enterprise Economy WORM Tape Cartridge. 11 IBM 3995 5.25-inch 1300-MB rewritable optical disk media. 12 IBM Enterprise Extended Tape Cartridge. 13 IBM 3995 5.25-inch 1300-MB WORM optical disk media. 14 IBM Enterprise Extended WORM Tape Cartridge. 15 IBM 3995 5.25-inch 1300-MB CCW optical disk media. 16 IBM Enterprise 3592 Advanced Tape Cartridge. 17 IBM Enterprise 3592 Advanced WORM Tape Cartridge. 18 IBM Enterprise 3592 Advanced Short Tape Cartridge. 21 IBM 3995 5.25-inch 2600-MB rewritable optical disk media. 23 IBM 3995 5.25-inch 2600-MB WORM optical disk media. 25 IBM 3995 5.25-inch 2600-MB CCW optical disk media. 31 IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. 33 IBM 3995 5.25-inch 5.2-GB WORM optical disk media. |

(SPE) OAM Cloud as a Tier (OA55700)

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| | | | | 35 IBM 3995 5.25-inch 5.2-GB CCW optical disk |
| 112 70 | ST38TKN | 4 | binary | Volume location token associated with the copy of the object on the volume specified in the ST38VSN field. This field contains 0 if the object was recalled from the cloud level. |
| 116 74 | ST38RCLD | 4 | binary | Number of days specified for object recall. |
| 120 78 | ST38VT | 1 | EBCDIC | Volume type: Value MEANING G Volume is a grouped volume belonging to an OBJECT storage group. B Volume is a backup volume belonging to an OBJECT BACKUP storage group. |
| 121 79 | ST38BT | 1 | EBCDIC | Backup type: Value MEANING 1 Volume belonging to a backup one OBJECT BACKUP storage group. 2 Volume belonging to a backup two OBJECT BACKUP storage group. |
| 122 7A | ST38DSL | 2 | EBCDIC | Disk sublevel associated with the recalled object. VALUE MEANING 01 Recalled object on disk sublevel 1 (DB2). 02 Recalled object on disk sublevel 2 (file system). |
| 124 7C | ST38FLGS | 4 | binary | Processing flags: Bit MEANING 0 When on, Object Recall was successful. 1–31 Reserved. |
| 128 80 | ST38CLDID | 2 | binary | ID of entry in CLOUDID table defining the provider and container name where the primary copy of the recalled object is stored. This field contains 0 if the object was not recalled from the cloud level of the storage hierarchy. |

3.0.8.6 OSMC Immediate Backup Copy (Subtype 39)

For the OSMC subtype 39 (Immediate Backup), the primary object could reside on the cloud level so this record will have new bits in an existing field to indicate these new possibilities. A new field is added to show the cloud location (via the cloud ID) from which the primary copy of the object was read.

| OFFSETS | NAME | LENGTH | FORMAT | DESCRIPTION |
|---------|----------|--------|--------|--|
| 0 0 | ST39COLN | 44 | EBCDIC | Collection name. |
| 44 2C | ST39CNID | 4 | binary | Collection ID. |
| 48 30 | ST39OBJN | 44 | EBCDIC | Object name. |
| 92 5C | ST39SGN | 8 | EBCDIC | OBJECT storage group name. |
| 100 64 | ST39MCN | 8 | EBCDIC | Management Class name. |
| 108 6C | ST39OLEN | 4 | binary | Object length. |
| 112 70 | ST39SVSN | 6 | EBCDIC | Source Volume serial number of the optical or tape volume on which the primary object was read. Only valid if the bit 1 or 2 is ON in field ST39FLGS. |
| 118 76 | ST39SMT | 2 | EBCDIC | Source volume Media type. Only valid if the bit 1 or 2 is ON in field ST39FLGS. Value MEANING 00 IBM 9247 12-inch 2000-MB optical disk media. 01 IBM 3995 5.25-inch 650-MB rewritable optical disk media. 02 IBM 3480 Cartridge System Tape. 03 IBM 3995 5.25-inch 650-MB WORM optical disk media. 04 IBM 3480 Enhanced Capacity Cartridge System Tape. 05 IBM High Performance Cartridge Tape. 06 IBM Extended High Performance Cartridge Tape. 07 IBM Enterprise Tape Cartridge. 08 IBM Enterprise WORM Tape Cartridge. 09 IBM Enterprise Economy Tape Cartridge. 10 IBM Enterprise Economy WORM Tape Cartridge. 11 IBM 3995 5.25-inch 1300-MB rewritable optical disk media. 12 IBM Enterprise Extended Tape Cartridge. 13 IBM 3995 5.25-inch 1300-MB WORM optical disk media. 14 IBM Enterprise Extended WORM Tape Cartridge. 15 IBM 3995 5.25-inch 1300-MB CCW optical disk media. 16 IBM Enterprise 3592 Advanced Tape Cartridge. 17 IBM Enterprise 3592 Advanced WORM Tape Cartridge. 18 IBM Enterprise 3592 Advanced Short Tape Cartridge. 21 IBM 3995 5.25-inch 2600-MB rewritable optical disk media. 23 IBM 3995 5.25-inch 2600-MB WORM optical disk media. 25 IBM 3995 5.25-inch 2600-MB CCW optical disk media. 31 IBM 3995 5.25-inch 5.2-GB rewritable optical disk media. 33 IBM 3995 5.25-inch 5.2-GB WORM optical disk |

(SPE) OAM Cloud as a Tier (OA55700)

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|--------|-----------|---|--------|--|
| | | | | media. 35 IBM 3995 5.25-inch 5.2-GB CCW optical disk |
| 120 78 | ST39TVSN | 6 | EBCDIC | Target Volume serial number of the optical or tape volume on which the backup copy of the object was written. |
| 126 7E | ST39TMT | 2 | EBCDIC | Target Volume Media type: Refer to ST39SMT for the values. |
| 128 80 | ST39BTKN | 4 | binary | Volume location token on the ST39TVSN. |
| 132 84 | ST39FLGS | 4 | binary | Processing flags: Bit MEANING 0 When on, the primary copy is stored to disk. 1 When on, the primary copy is stored to optical. 2 When on, the primary copy is stored to tape. 3 When on, the primary copy is stored to cloud. 4 Reserved. 5 When on, the backup copy is stored to optical. 6 When on, the backup copy is stored to tape. 7 Reserved. 8 When on, write to backup was successful. 9 Reserved. 10 When on, the primary copy is stored on sublevel 1. When bit 0 is on, the primary copy is stored in DB2. When bit 2 is on, the primary copy is stored to a sublevel 1 volume. 11 When on, the primary copy is stored on sublevel 2. When bit 0 is on, the primary copy is stored in a file system. When bit 2 is on, the primary copy is stored to a sublevel 2 volume. |
| 136 88 | ST39SCLID | 2 | binary | ID of entry in CLOUDID table defining the provider and container name from which the primary copy of the object was read. Only valid if bit 3 is ON in field ST39FLGS. |

3.0.8.7 LCS Cloud Write, Read, Delete (Subtypes 100,101,102,103)

For the cloud support, 4 new OAM SMF record subtypes are introduced:

- 100 LCS Cloud Write Request
- 101 LCS Cloud Read Request
- 102 LCS Cloud Physical Delete Request
- 103 LCS Cloud Physical Delete Request (Uncommitted Application Store Cleanup)

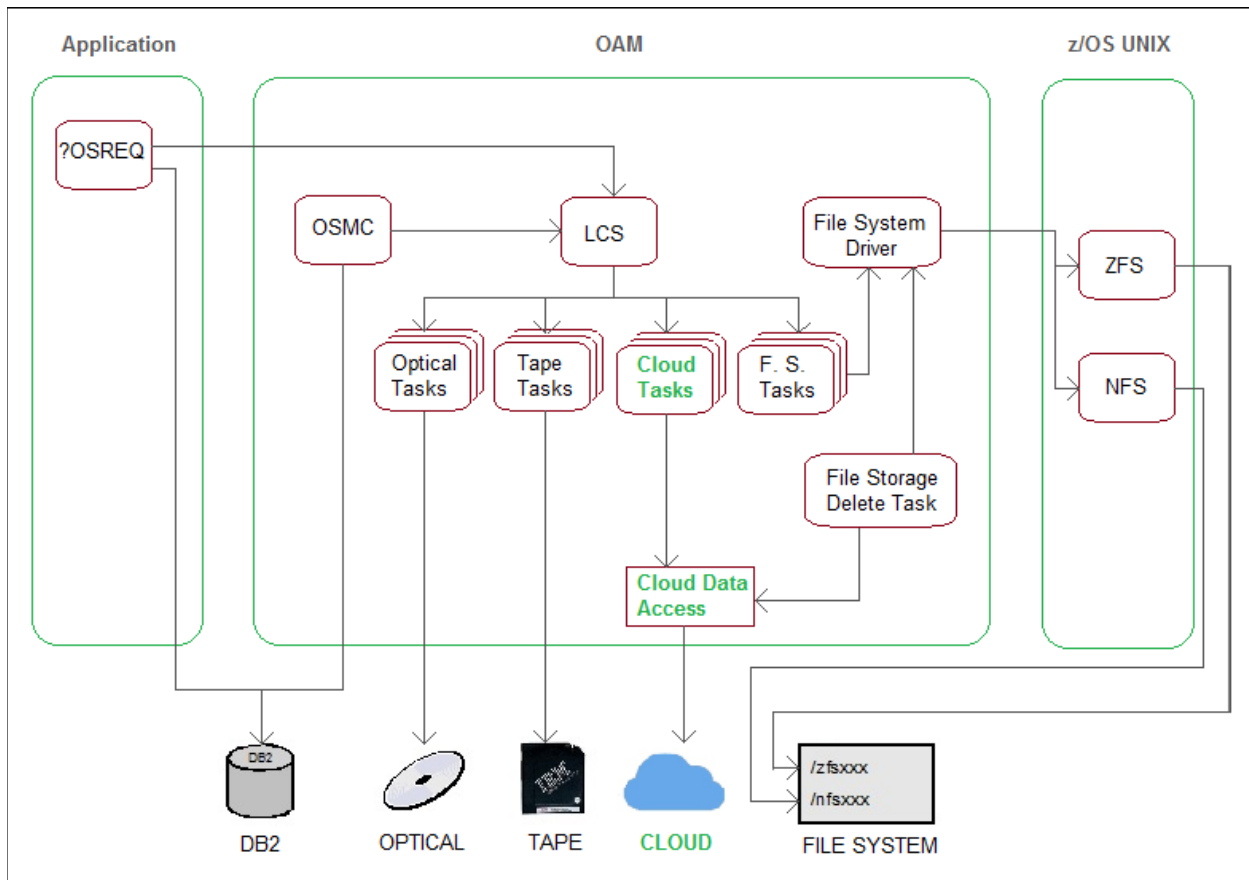
| OFFSETS | NAME | LENGTH | FORMAT | DESCRIPTION |
|---------|-----------|--------|--------|--|
| 0 0 | ST100CID | 2 | binary | ID of entry in CLOUDID table that defines the Provider and Container where the object is stored in the cloud level. |
| 2 2 | * | 2 | | Unused |
| 4 4 | ST100SGN | 8 | EBCDIC | Object storage group name. |
| 12 C | ST100COLN | 44 | EBCDIC | Collection name. |
| 56 38 | ST100OBJN | 44 | EBCDIC | Object name. |
| 100 64 | ST100INST | 4 | binary | Instance ID. |
| 104 68 | ST100FLGS | 4 | binary | Processing Flags. BIT MEANING 0 When on, request originated within OAM address space. 1 When on, request originated outside OAM address space. 2-31 Reserved |
| 108 6C | ST100OLEN | 4 | binary | Object length. Only valid for subtypes 100 and 101. |
| 112 70 | ST100OFF | 4 | binary | Object offset. Valid for a subtype 101 partial object read. |
| 116 74 | ST100LIQT | 4 | binary | LCS input-work-queue time. The amount of time in milliseconds that this request has spent on the LCS input-work-queue waiting for processing. Only valid for subtypes 100 and 101. |
| 120 78 | ST100LDQT | 4 | binary | LCS dispatcher-queue time. The amount of time in milliseconds that this request has spent on the LCS dispatcher-queue waiting for processing. Only valid for subtypes 100 and 101. |
| 124 7C | ST100LEQT | 4 | binary | LCS execution-queue time. The amount of time in milliseconds that this request has spent on the LCS execution-queue processing. Only valid for subtypes 100 and 101. |
| 128 80 | ST100LCLT | 4 | binary | LCS Cloud Data Access time. The amount of time in milliseconds that this request has spent in Cloud Data Access processing. |
| 132 84 | ST100RC | 4 | binary | LCS return code. Only valid for subtypes 100 and 101. |
| 136 88 | ST100RS | 4 | binary | LCS reason code. Only valid for subtypes 100 and 101. |

3.0.9 OAM Cloud Processing

3.0.9.1 OAM Address Space Requirement

The cloud support is implemented as part of the Library Control System (LCS) component of OAM, therefore the OAM address space must be started to enable the store, retrieve, or delete of objects in the cloud level.

As shown in the following diagram, new cloud processing tasks have been added to LCS and these new tasks interact with the to access cloud storage. In addition, the File System Delete Task is renamed to File Storage Delete Task and enhanced to support processing of physical deletes from the cloud as well as a file system.



Note that cloud related tasks will only be active when OAM has been configured to incorporate the cloud level in one or more object storage groups. For more information, see “3.0.3.1 SETCLOUD Statement in CBROAMxx Member of PARMLIB” on page 18.

3.0.9.2 Cloud File Names

Objects stored to the cloud will be stored as files in the container specified on the SETCLOUD statement in PARMLIB for the storage group. The file names are intended to provide a pseudo-directory structure in order to make it easy to, for example, easily identify all files associated with a particular storage group. The format of the file name is:

DFSMSOAM/*group-name/collection-name/object-name.instance-ID*

where:

| | |
|------------------------|--|
| DFSMSOAM | defines the file as an OAM object file |
| <i>group-name</i> | is the object storage group name associated with the object/file |
| <i>collection-name</i> | is the collection name associated with the object/file |
| <i>object-name</i> | is the name of the object* |
| <i>instance-ID</i> | is the unique instance ID for the object |

* **Note:** If any characters in the object name are not supported by the selected cloud provider, unsupported characters will be replaced by a supported character in the object-name portion of the file name.

3.0.9.3 Physical Deletion from Cloud

Physical deletion of object data from the cloud is handled in the same way as physical deletion of object data from a file system.

Because any unit of work may result in a “commit” or “rollback” and, particularly in the case of application initiated delete activity via OSREQ when the ultimate disposition of the unit of work is outside of direct knowledge by OAM, OAM will defer the *physical* deletion of object data from the cloud to ensure data consistency between the DB2 object directory meta-data and the actual object data file in the cloud. This also applies when an object is deleted from the cloud as a result of the storage management cycle processing when the object data is transitioned to another location in the OAM storage hierarchy.

Similarly, when an application stores object data to the cloud via OSREQ, the ultimate disposition of the unit of work (i.e. “commit” or “rollback”) is outside of direct knowledge by OAM therefore there are cases when no “commit” is performed by the application within a reasonable period of time and the object data in the cloud therefore must be physically deleted as a “cleanup” activity. This need for “cleanup” is recorded in the OAM DB2 File Storage Delete Table (FSDT). To avoid this “cleanup” processing for valid object data, it is essential that an application DB2 “commit” occurs in a timely manner as described in “3.0.6.4 OSREQ Requirement for DB2 “Commit” after Storing Objects” on page 35.

The deletion of object data may result in changes to the object meta-data in the object directory such as an update to the object location or the deletion of the object directory entry. This accomplishes the logical portion of the deletion, however the need for a corresponding physical deletion is recorded in the FSDT. Periodically while the OAM address space is running OAM will internally process this FSDT and physically delete objects from the cloud for the cases of normal object deletion or “cleanup” of the uncommitted storage of object data, however in all cases this physical deletion will be deferred - in some cases more than 24 hours. It is therefore essential that all cloud interfaces used by OAM are available whenever the OAM address space is active.

3.0.10 OAMplex/Sysplex Processing

3.0.10.1 Operation with pre-Cloud Support release levels

To support our OAMplex customers, coexistence support is provided at the V2R2 release level and is also provided in the base V2R4 support. Full support is provided with PTFs on V2R3 and V2R4.

Downlevel systems have no awareness of the cloud level or infrastructure to support it. An OAM Sublevel value of 3 in the SMS Storage Class definitions (used to indicate that an object should be stored in the cloud level) is not recognized on downlevel systems. In other words, the same Storage Class that results in a given object being written to the cloud level on a release with Cloud support will result in a failure when attempting to store an object on a downlevel system.

Primary objects that already reside in the cloud level will not be accessible from the downlevel systems. Therefore, the following outlines the expected behavior of downlevel systems relative to objects that reside in the cloud:

The following table summarizes the expected behavior on a downlevel system as it relates to cloud objects once the Coexistence PTFs have been applied.

| Operation involving copies of objects stored on Cloud (ODLOCFL='C') | Behavior on downlevel system |
|--|---|
| OSREQ STORE | Fails (Reason=BFxx0100) |
| OSREQ RETRIEVE | View=Primary: Fails (Reason=80xx0100) View=Backup Backup2: Succeeds <i>Note: the OSREQ TSO COMPARE function retrieves the primary or a backup copy of an object and compares the data. If the primary copy is requested and is on the Cloud level the retrieve will fail as noted above. Retrieve of a backup copy (which is on tape or optical) will succeed even if the primary copy of the object is the cloud level</i> |
| OSREQ QUERY | Successful but Estimated Retrieval Time = -1 |
| OSREQ CHANGE | Fails (Reason=80xx0100) if primary copy of object in Cloud level |
| OSREQ DELETE | Fails (Reason=80xx0100) if primary copy of object in Cloud level |
| OSMC Storage Group Cycle (Includes Backups, Transitions, Expiration) | Objects with primary copy in Cloud level or which require reading/writing a copy to the Cloud level are skipped w/ CBR9225I; objects not requiring any interaction with the Cloud level are processed. |
| OSMC DASD Space Manager | Cloud objects skipped w/ CBR9225I, objects with valid locations are processed. |
| OSMC Move Volume Utility | MOVEVOL of backup and primary volumes is successful. |
| OSMC Object Recovery | Fails w/ CBR9842I |
| OSMC Volume Recovery | Volume Recovery of primary volumes (volser in ODLSLOC column of object directory) is processed as follows: -- If a backup copy of an object does not exist on tape or optical (i.e. ODBKLOC and ODBK2LOC are both blank) then the object is skipped. Message CBR9864I is issued showing the total count of such objects. -- If a backup copy of an object does exist on tape or optical (i.e. ODBKLOC and/or ODBK2LOC are non-blank) then the object is copied |

(SPE) OAM Cloud as a Tier (OA55700)

| | |
|-----------------------|--|
| | <p>to the recovered volume from tape or optical.</p> <p>Volume Recovery of backup volumes (volser in ODBKLOC or ODBK2LOC) are processed as follows:</p> <ul style="list-style-type: none">-- If the primary copy of an object is on the cloud level then the object is skipped w/ CBR9225I-- If the primary copy of an object is on the disk, tape or optical level then the object is copied to the recovered volume. |
| Object Recall to Disk | <p>Fails (Reason=80xx0100) if primary copy of object in Cloud level <i>(Note1: direct OSREQ RETRIEVE of Cloud objects will fail and therefore no RECALL will be scheduled.</i></p> <p>Note2: A successful OSREQ RETRIEVE w/ VIEW=BACKUP BACKUP2 of an object with the primary copy on Cloud could result in RECALL being scheduled, but the RECALL will fail w/ CBR9890I.)</p> |

3.0.11 IPCS Support

Existing OAM control block models and processors are updated to reflect the incorporation of cloud support. The following control block models are updated:

Control Task Control Block (CTCB), OSR Request Work Area (IRWA), Master Control Block (MCB), OAM Parameter List (OPL), OAM Vector Table (OVT), Process Control Block (PCB), Volume Set Control Block (VSCB), and Work to Do (WTD).

New OAM control block model and processor are created for the new Cloud Control Block (CLCB).

VERBX OAMDATA will now include formatting of the new CLCB control block. This control block can also be formatted explicitly with the following new command:

```
VERBX OAMDATA 'CLCB'  
or an individual CLCB can be formatted by using an address:  
VERBX OAMDATA 'CLCB(0B39F770)'
```

3.0.12 ISMF & NaviQuest

ISMF Changes.

The Storage Class application is modified to support this line item in the following areas:

- Storage Class Define/Alter.
- Storage Class Display.
- Storage Class List.

Storage Class Define/Alter.

The Storage Class define/alter panel page 1, DGTDCSC1, will allow 1 new value in OAM Sublevel field.

| |
|-----------------------------|
| Panel Utilities Scroll Help |
|-----------------------------|

(SPE) OAM Cloud as a Tier (OA55700)

```
-----  
DGTD CSC1                STORAGE CLASS DEFINE/ALTER                Page 1 of 2  
Command ==>  
  
SCDS Name . . . . . : USER8.MYSCDS  
Storage Class Name   : SC1  
To ALTER Storage Class, Specify:  
  Description ==>  
    ==>  
Performance Objectives  
  Direct Millisecond Response . . . . . (1 to 999 or blank)  
  Direct Bias . . . . . (R, W or blank)  
  Sequential Millisecond Response . . . . . (1 to 999 or blank)  
  Sequential Bias . . . . . (R, W or blank)  
  Initial Access Response Seconds . . . 0 (0 to 9999 or blank)  
  Sustained Data Rate (MB/sec) . . . . . (0 to 999 or blank)  
  OAM Sublevel . . . . . 3 (1, 2, 3 or blank)  
  Availability . . . . . N (C, P ,S or N)  
  Accessibility . . . . . N (C, P ,S or N)  
  Backup . . . . . (Y, N or Blank)  
  Versioning . . . . . (Y, N or Blank)  
Use ENTER to Perform Verification; Use DOWN Command to View next Page;  
Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
```

Field description:

OAM Sublevel – Use the OAM SUBLEVEL field to specify the desired sublevel of an OAM disk, **cloud level** or tape hierarchy level to use for object storage. The OAM SUBLEVEL is only applicable when the INITIAL ACCESS RESPONSE SECONDS value is equal to 0, or when the INITIAL ACCESS RESPONSE SECONDS value is greater than 0 and the SUSTAINED DATA RATE value is greater than or equal to 3.

- Length: 1 character.
- Type: Input.
- Required: No.
- Valid values:
 - For disk **and cloud**, when IARS = 0 then OSL value of
 - 1 equates to OAM Disk Sublevel 1,
 - 2 equates to OAM Disk Sublevel 2,
 - **3 equates to OAM Cloud Level**,
 - blank defaults to OAM Disk Sublevel 1.
 - For tape, when IARS > 0 and SDR >= 3 then OSL value of
 - 1 equates to OAM Tape Sublevel 1,
 - 2 equates to OAM Tape Sublevel 2,
 - blank defaults to OAM Tape Sublevel 1.
- Default: blank

Storage Class Display.

The storage class display panel page 1, DGTICSC1, will show the new value for OAM Sublevel field:

```
Panel  Utilities  Scroll  Help
-----
DGTICSC1          STORAGE CLASS DISPLAY          Page 1 of 2
Command ===>

CDS Name . . . . . : USER8.MYSCDS
Storage Class Name : SC1

Description :

Performance Objectives
  Direct Millisecond Response . . . . :
  Direct Bias . . . . . :
  Sequential Millisecond Response . . :
  Sequential Bias . . . . . :
  Initial Access Response Seconds . : 0
  Sustained Data Rate (MB/sec) . . . :
  OAM Sublevel . . . . . : 3
Availability . . . . . : NOPREF
Accessibility . . . . . : NOPREF
  Backup . . . . . :
  Versioning . . . . . :
Use DOWN Command to View the next Page;
Use HELP Command for Help; Use END Command to Exit.
```

Storage Class List.

The Storage Class List panel, DGTLP21, will show the new value in column 21. Sample of the list panel:

```
Panel List Utilities Scroll Help
-----
DGTLP21                               STORAGE CLASS LIST
Command ==>                               Scroll ==> PAGE
                                           Entries 1-2 of 2
                                           Data Columns 21-23 of 23

CDS Name : USER8.MYSCDS

Enter Line Operators below:

      LINE      STORCLAS OAM      CF LOCK      DISC
      OPERATOR  NAME      SUBLVL  SET NAME  SPHERE
      --- (1) --- -- (2) --- - (21) - -- (22) -- - (23) -
                SC1      3      - - - - - NO
                SC2      -      - - - - - NO
      - - - - - - - - - - - - - - - BOTTOM OF DATA - - - - -
```

Column description:

OAM SUBLVL – column 21, The value in the OAM SUBLEVEL data column indicates the sublevel of an OAM disk, **cloud level** or tape hierarchy level to use for object storage. The OAM SUBLEVEL is only applicable when the INITIAL ACCESS RESPONSE SECONDS value is equal to 0, or when the INITIAL ACCESS RESPONSE SECONDS value is greater than 0 and the SUSTAINED DATA RATE value is greater than or equal to 3.

- Length: 1 character.
- Type: Output.
- Valid values:

For disk **and cloud**, when IARS = 0:

- 1 - OAM Disk Sublevel 1,
- 2 - OAM Disk Sublevel 2,
- 3 - OAM Cloud Level.**

For tape, when IARS > 0 and SDR >= 3:

- 1 - OAM Tape Sublevel 1,
- 2 - OAM Tape Sublevel 2.

- value was not specified;
- ? - the value cannot be displayed because of a data conversion error.

(SPE) OAM Cloud as a Tier (OA55700)

Message and Message Help.

- One message is modified.
- DGTSC08:
DGTSC088 - INVALID OAM SUBLEVEL, issued when an invalid value is specified in the OAM Sublevel field in the Storage Class DEFINE/ALTER panel.
- The following is the message help panel that goes with the above message:

```
DGTMSC88 -----ISMF MESSAGE-----HELP
COMMAND ===>

MESSAGE NUMBER:  DGTDC088

SHORT MESSAGE:   INVALID OAM SUBLEVEL

LONG MESSAGE:    OAM Sublevel must be 1, 2, 3 or blank

EXPLANATION:
  You have entered an invalid OAM Sublevel value.

SUGGESTED ACTION:
  Correct and re-enter the OAM Sublevel value.  The OAM Sublevel
  value must be 1, 2, 3 or left blank.

Use ENTER to continue with ISMF HELP, Use END to return to ISMF.
```

The following message help panel is modified too:

(SPE) OAM Cloud as a Tier (OA55700)

```
DGTMSC87 -----ISMF MESSAGE-----HELP
COMMAND ===>

MESSAGE NUMBER:  DGTSC087

SHORT MESSAGE:   INVALID COMBINATION

LONG MESSAGE:    Sustained Data Rate, Initial Access Response
                  Seconds and/or OAM Sublevel invalid

EXPLANATION:
The OAM Sublevel is valid when specifying a Storage Class related
to Object Tape (IARS > 0 and SDR >= 3), Disk or Cloud level (IARS = 0).
You have specified an OAM Sublevel value of 1, 2 or 3, but the Initial
Access Response Seconds value and/or the Sustained Data Rate value are
not valid. If IARS = 0 (for Disk or Cloud), then valid values for the OSL
are 1 (Disk Sublevel 1), 2 (Disk Sublevel 2), 3 (Cloud Level) or blank.
If IARS > 0 and SDR >= 3 (for Tape), then valid values for the OSL are
1 (Tape Sublevel 1), 2 (Tape Sublevel 2) or blank. Otherwise the OSL
value must be blank.

SUGGESTED ACTION:
Correct and re-enter the Sustained Data Rate, the Initial Access
Response Seconds and/or the OAM Sublevel field.

Use ENTER to continue with ISMF HELP, Use END to return to ISMF.
```

Help Panels.

The following help panels are modified:

1. DGTHSC3D - OAM Sublevel field description (define/alter).
2. DGTHSC3E - OAM Sublevel field description (display).
3. DGTHSC3F - OAM Sublevel column description (list).

3.0.12.1 NaviQuest Changes.

NaviQuest changes include updates to the following parts:

1. ACBJBAS1 – sample JCL for Define/Alter/Display Storage Class.
2. ACQBAS2 - REXX exec for Define/Alter Storage Class.
3. ACQBAC2 - REXX exec for Generate SMS report from DCOLLECT (batch).
4. ACBQFLR2 - REXX exec for Generate SMS report from DCOLLECT (online).

3.1 APIs, Callable Services, and Macros

There are no changes to APIs with this support..

3.2 Commands

There are no new commands for this support. Additional keywords are supported on some commands and additional output is generated for some commands. See “3.0.5 Operator Commands” on page 27 for details.

3.3 System Library Updates (PARMLIB, PROCLIB, SAMPLIB, etc.)

3.3.1 CBRAPROC

Member CBRAPROC in SAMPLIB provides sample JCL to create an OAM address space JCL procedure. The executable statements are unchanged, but the prolog is updated to mention the new SETCLOUD statement in the CBROAMxx member.

3.3.2 CBRSAMPL

Member CBRSAMPL in SAMPLIB provides sample JCL for DB2 definitions for the OAM configuration database. It is updated to add the CLOUDID column to the existing FSDELETE table definition statements and to add statements to define the new CLOUDID table:

...

```
CREATE TABLESPACE OCCLDTSP
  IN CBROAM
  USING STOGROUP CBROAM
  BUFFERPOOL BP0
  CLOSE NO;
```

...

```
CREATE TABLE FSDELETE
  (ID          INTEGER PRIMARY KEY GENERATED ALWAYS AS IDENTITY
    (START WITH 1, INCREMENT BY 1, CACHE 50, CYCLE),
  DELTIME     INTEGER      NOT NULL WITH DEFAULT,
  DELREAS     CHAR(1)      NOT NULL WITH DEFAULT,
  SYSNAME     CHAR(8)      NOT NULL WITH DEFAULT,
  SGNAME      CHAR(8)      NOT NULL WITH DEFAULT,
  COLNAME     CHAR(44)     NOT NULL WITH DEFAULT,
  OBJNAME     CHAR(44)     NOT NULL WITH DEFAULT,
  INSTID      INTEGER      NOT NULL WITH DEFAULT,
  CLOUDID     CHAR(4)      NOT NULL WITH DEFAULT)
  IN CBROAM.OCFSDTSP;
```

(SPE) OAM Cloud as a Tier (OA55700)

```
CREATE TABLE CLOUDID
  (ID          SMALLINT GENERATED BY DEFAULT AS IDENTITY
    (START WITH 1, INCREMENT BY 1, NO CYCLE),
   PROVIDER    CHAR(20)   NOT NULL WITH DEFAULT,
   CONTAINER   CHAR(63)   NOT NULL WITH DEFAULT)
IN CBROAM.OCCLDTSP;
```

...

```
CREATE UNIQUE INDEX CLDTINDX
ON CLOUDID
  (PROVIDER, CONTAINER ASC)
USING STOGROUP CBROAM
BUFFERPOOL BP0
CLUSTER
CLOSE NO;
```

...

```
LABEL ON FSDELETE
  (ID          IS 'ID',
   DELTIME    IS 'DELETE_TIME',
   DELREAS    IS 'REASON',
   SYSNAME    IS 'SYS_NAME',
   SGNAME     IS 'SG_NAME',
   OBJNAME    IS 'OBJECT_NAME',
   COLNAME    IS 'COLLECTION_NAME',
   INSTID     IS 'INSTANCE_ID',
   CLOUDID    IS 'CLOUD_ID');
```

```
LABEL ON CLOUDID
  (ID          IS 'ID',
   PROVIDER    IS 'PROVIDER_NAME',
   CONTAINER   IS 'CONTAINER_NAME');
```

...

3.3.3 CBRSMCID (new)

Member CBRSMCID in SAMPLIB provides sample JCL to migrate from base V2R3 to V2R3 with cloud support or from base V2R4 to V2R4 with cloud support.. It includes the new statements for the CLOUDID table in 3.3.2 CBR SAMPL on page 71 **Error! Bookmark not defined.** and statements to add the CLOUDID column to the FSDELETE table.

3.4 Diagnostic Aids

3.4.1 General Information

To aid in diagnosing cloud request errors, OAM has added new OSREQ and OAM macro reason codes. These new codes will also percolate Cloud Data Access (CDA) and z/OS Web Enablement Toolkit reason codes. The new codes may be returned on OSREQ function calls as well as displayed in the system log through new message CBR6530I.

(SPE) OAM Cloud as a Tier (OA55700)

CBR6530I will be issued (if the diagnostic message threshold has not been reached) whenever an error has occurred while processing a cloud object request. This message provides additional diagnostic information that has been percolated from the service in the stack that encountered the error. These services include OAM, z/OS Web Enablement Toolkit, Cloud Data Access (CDA), and the cloud storage provider.

Note: CBR6530I may not be issued if the threshold for diagnostic messages has been met. In this case, please refer to section 3.0.5.1 on Starting and Stopping Diagnostic Messages.

CBR6530I provides the following diagnostic information:

1. OAM cloud function failure (write, read, delete), Collection name, Object name, Cloud ID and OAM reason code.
2. For a LE Preinitialization failure, the failing PIFI function name and *PIFI-return-code* are displayed.
3. For a CDA service failure, the return code *CDA-return-code* provided by CDA is displayed. Additionally, if the CDA return code denotes that the error was a web toolkit failure or a bad response from the cloud provider, a second status area will be displayed after the CDA return code area.
4. For a web toolkit failure, the return code *toolkit-return-code*, the reason code *toolkit-reason-code*, the service ID *toolkit-service-ID*, and one or more lines (up to 70 characters each) of diagnostic messages *toolkit-diagnostic-message* will be shown.
5. If a bad HTTP response code is received from the cloud provider, the cloud provider status code *cloud-provider-status-code* and one or more lines (up to 70 characters each) of cloud provider status messages *cloud-provider-status-message* will be shown.

3.4.2 OSREQ and OAM Macro Return and Reason Codes

The following OSREQ reason codes are added for return code 12 (X'0C'):

- 69 – yy zz Cloud Data Access detected failure. Look up the Cloud Data Access reason code. yy zz is the CDA reason code.
- 6A – yy zz Web Toolkit detected failure. Look up the Web Toolkit reason code. yy zz is the Web Toolkit reason code.
- 6B – yy zz Cloud Provider detected failure. Look up the Cloud Provider reason code. yy zz is the Cloud Provider Reason Code

The following OAM macro reason codes are added for return code 8 (X'08'):

- X'05A0' CBRCLD.BUFLEN INVALID OR MISSING
- X'05A1' CBRCLD.BUFLEN IS LESS THAN CBRCLD.LENGTH
- X'05A2' CBRCLD.BUFTOKEN AND CBRCLD.BUFFADDR BOTH MISSING
- X'05A3' CBRCLD.BUFTOKEN AND CBRCLD.BUFFADDR BOTH PRESENT
- X'05A4' CBRCLD.COLNAME IS INVALID OR MISSING
- X'05A5' CBRCLD.CLOUDID IS MISSING ON A DELETE
- X'05A6' CBRCLD.CLOUDID IS MISSING ON A READ
- X'05A7' CBRCLD.CLOUDID IS PRESENT ON A WRITE
- X'05A8' CBRCLD.CLINSTID IS MISSING ON A DELETE
- X'05A9' CBRCLD.CLINSTID IS MISSING ON A READ
- X'05AA' CBRCLD.CLINSTID IS PRESENT ON A WRITE
- X'05AB' CBRCLD.OBJNAME IS INVALID OR MISSING
- X'05AC' CBRCLD.OSREQ IS INVALID OR MISSING
- X'05AD' CBRCLD.PARM BLOCK ADDRESS IS ZERO
- X'05AE' CBRCLD.PARM BLOCK EYECATCHER IS INVALID

(SPE) OAM Cloud as a Tier (OA55700)

X'05AF' CBRCLD CLOUD REQUEST IS UNKNOWN
X'05B0' CBRCLD.GROUP IS INVALID OR MISSING
X'05B1' CBRCLD.SYSNAME IS INVALID OR MISSING
X'05B2' CBRCLD.WTDPTR IS PRESENT ON A DELETE
X'05B3' CBRCLD.WTDPTR IS MISSING ON A READ
X'05B4' CBRCLD.WTDPTR IS MISSING ON A WRITE
X'05B5' CBRCLD.CONNTOKN IS MISSING

...

X'0713' No storage groups are cloud enabled
X'0714' No cloud ID specified for cloud read or delete
X'0715' Invalid cloud id for cloud read

...

X'0B30' Cloud streaming send exit failure from CDA
X'0B31' Cloud streaming receive exit failure from CDA
X'0B32' Cloud ID row not found in DB2
X'0B33' Internal error from CDA
X'0B34' Error from the web tool kit
X'0B35' Error from the cloud provider

The following OAM macro reason codes are added for return code 12 (X'0C'):

X'0B83' Read of an object from the cloud failed. Access Backup is active for cloud errors; for OSREQ requests a read may be attempted for the backup copy of the object.

X'0B84' LCS cloud tasks not operational

X'0B85' PROVIDER or CONTAINER not defined for the object storage group

The following OAM macro reason codes are added for return code 16 (X'10'):

X'0C04' Abend caused by bad CBRCLDP parameter list

...

X'0D90' File system/Cloud driver unable to MVS LOAD LE CELQPIPI/CEEPIPI
X'0D91' File system/Cloud driver unable to start LE CELQPIPI/CEEPIPI
X'0D92' File system/Cloud driver unable to end LE CELQPIPI/CEEPIPI
X'0D93' File system/Cloud driver unable to invoke LE CELQPIPI/CEEPIPI

...

X'0DB0' Cloud ID CAF error from DB2
X'0DB1' Cloud ID SQL error from DB2
X'0DB2' Cloud processing internal logic error

The following OAM macro reason codes are updated:

X'0712' Missing instance id on a file system or cloud read or delete request

X'0B82' Object to be deleted from file system or cloud could not be added to file storage delete table

3.4.3 Cloud error information

OAM interacts with the cloud provider through Cloud Data Access (CDA) services when reading, writing, or

deleting objects in the cloud level. CDA returns information about various errors to OAM including errors detected during processing within CDA itself (such as a configuration error), errors that occur while attempting to contact the cloud provider, or errors reported by the cloud provider.

3.4.4 Cloud Data Access Return Codes

| | |
|-----|---|
| 0 | Success |
| 100 | Unable to read the keyfile |
| 101 | Unable to write the keyfile |
| 102 | Unable to parse the keyfile |
| 103 | Keyfile was likely modified manually in an incorrect manner |
| 104 | Keyfile does not contain the user-specified cloud provider |
| 105 | Keyfile has no matching resource match for the given cloud provider |
| 106 | Keyfile could not be updated due to severe error |
| 107 | Keyfile resource could not be deleted due to severe error |
| 108 | Keyfile resource could not be added due to severe error |
| 109 | No credentials found for a given cloud resource |
| 110 | The provider specification file could not be opened |
| 111 | The provider specification file could not be parsed |
| 112 | The requested feature is not supported |
| 113 | The provided buffer is too small for the requested data |
| 114 | Invalid authorization parameters |
| 115 | Unable to open local file |
| 116 | Error applying the authorization calculations |
| 117 | The GDKKEYAD service was unable to generate a symmetric key |
| 118 | Keyfile doesn't have any entries specified for the current user |
| 119 | Decrypted key resulted in invalid data |
| 120 | Invalid return code provided for text translation |
| 121 | No associated text for specified return code |
| 122 | ICSF error occurred |
| 123 | httpMethod is not HTTPS |
| 799 | Unexpected error |
| 800 | Connection to the cloud provider could not be established |
| 801 | Web toolkit returned a bad return code |
| 850 | XML parser returned a bad return code |
| 900 | Requested object/resource could not be found (HTTP 404) |
| 901 | Denied access (HTTP 403) |
| 902 | The requested cloud provider operation is not supported |
| 903 | Response is not what was expected |
| 904 | Request failed (bad HTTP response code) |

3.5 Messages

3.5.1 CBR0016I (Changed)

CBR0016I Successful processing of the {OAMXCF | SETOPT | SETOAM | SETOSMC | ONLYIF | SETDISK | SETTLIB | SETCLOUD} statements in CBROAMxx member of PARMLIB. Initialization continues.

Explanation: OAM did not encounter any errors when processing the statements of the indicated type in the CBROAMxx member of PARMLIB, where the xx characters are identified by either of the following:

- The OAM=xx keyword in the PARM field of the JCL EXEC statement in the OAM cataloged procedure
- The OAM=xx keyword on the START OAM command

The CBROAMxx member of PARMLIB is parsed twice during OAM initialization, at different points during OAM initialization: once for OAMXCF statements, and a second time for SETOPT, SETOAM, SETOSMC, SETDISK, SETTLIB and SETCLOUD statements. ONLYIF statements are processed both times CBROAM is parsed, however only one CBR0016I message will be issued for successfully processing the ONLYIF statements. This message indicates which PARMLIB member was used during this particular initialization of OAM. It is for documentation purposes only.

System action: OAM initialization continues.

Operator response: None.

System programmer response: None.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.2 CBR0052I (Changed)

CBR0052I Error calling the MVS parameter parsing service for a {SETOAM | SETOPT | OAMXCF | SETOSMC | ONLYIF | SETDISK | SETTLIB | SETCLOUD} statement, return code = return-code. Initialization terminated.

Explanation: The MVS parameter parsing service (IEEMB887) returned with a non-zero return code return-code after an attempt to process a member in PARMLIB. This is an internal service; formal publications and documentation on this service are not available. The return code return-code is for diagnostic purposes only.

System action: OAM initialization stops.

Operator response: Notify the system programmer.

System programmer response: If the problem recurs and if the program is not in error, search problem reporting databases for a fix to the problem. If no fix exists, contact the IBM Support Center.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.3 CBR0080I (Changed)

CBR0080I {IDENTIFY | ATTACH | INITIALIZE} error establishing the {Operator Command Task | Library Control Task | Drive Control Task | OAM Storage Management Component Task | OAM XCF Control Task | Buffer Manager Task | File [Storage Delete Task](#)}. Initialization terminated.

Explanation: During the initialization phase of processing, the control task attempted to establish one of the major subtasks. The major subtasks are:

- Operator command task
- Library control task
- Drive control task
- OAM Storage Management Component task
- OAM XCF control task
- Buffer manager task
- File [Storage Delete Task](#)

The control task was unable to establish the subtask as a result of the IDENTIFY or ATTACH of the subtask failing or the subtask not initializing successfully.

System action: OAM initialization stops.

Operator response: Notify the system programmer.

System programmer response: Either the IDENTIFY or ATTACH failed or the subtask initialization failed. If the ATTACH failed, this message will be preceded by message CBR7000I which contains the return code from the ATTACH macro. If the subtask initialization failed, this message will be preceded by messages which further describe that failure. Refer to preceding messages.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.4 CBR0081I (Changed)

CBR0081I Error re-establishing the {Operator Command Task | Library Control Task | Drive Control Task | OAM Storage Management Component Task | OAM XCF Control Task | Buffer Manager Task | File [Storage](#) Delete Task}. OAM processing terminates.

Explanation: During OAM processing, a major subtask ended abnormally. The major subtasks are:

- Operator command task
- Library control task
- Drive control task
- OAM Storage Management Component task
- OAM XCF control task
- Buffer manager task
- File [Storage](#) Delete Task

The control task attempted to re-establish the failing subtask. This attempt failed as a result of the ATTACH of the subtask failing or the subtask not initializing successfully.

System action: OAM starts to shut down.

Operator response: Notify the system programmer.

System programmer response: Either the ATTACH failed or the subtask initialization failed. If the ATTACH failed, this message will be preceded by message CBR7000I which contains the return code from the ATTACH macro. If the subtask initialization failed, this message will be preceded by messages which further describe that failure. Refer to preceding messages.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.5 CBR0082I (Changed)

CBR0082I Error detaching the {Operator Command Task | Library Control Task | Drive Control Task | OAM Storage Management Component Task | OAM XCF Control Task | Buffer Manager Task | File Storage Delete Task}.

Explanation: The control task attempted to detach one of the major subtasks. The major subtasks are:

- Operator command task
- Library control task
- Drive control task
- OAM Storage Management Component task.
- OAM XCF control task.
- Buffer manager task
- File **Storage** Delete Task

The control task was unable to detach the subtask.

System action: OAM processing continues.

Operator response: Notify the system programmer.

System programmer response: This message will be preceded by message CBR7001I which contains the return code from the DETACH macro. Refer to the documentation for message CBR7001I.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.6 CBR0085I (New)

CBR0085I Error dubbing the *oam* address space. Return value = *BPX-return-value*, Return code = *BPX-return-code*, Reason code = *BPX-reason-code*.

Explanation: An error occurred when the *oam* address space attempted to change the z/OS Unix System Services default dub setting. *BPX-return-value*, *BPX-return-code*, and *BPX-reason code* are hexadecimal values indicating the cause of the error. If all three values are zero, z/OS Unix System Services is not available. For all other combinations of values, the meaning of those values is described in *z/OS UNIX System Services Messages and Codes*.

System action: OAM processing continues with processing of objects in the cloud tier disabled.

Operator response: Notify the system programmer.

System programmer response: Correct the problem that resulted in the error and restart the *oam* address space.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.7 CBR0302I (Changed)

CBR0302I Keyword *keyword-name* invalid in a {SETOAM | SETOPT | OAMXCF | SETOSMC | ONLYIF | SETDISK | SETTLIB | **SETCLOUD**} statement.

Explanation: An unrecognized keyword was specified on a SETOAM, SETOPT, OAMXCF, SETOSMC, ONLYIF, SETDISK, SETTLIB or SETCLOUD statement in the CBROAMxx member of PARMLIB. This error is caused by one of the following:

- *keyword-name* is not a valid keyword for the indicated statement.
- The ending parenthesis is missing in the preceding storagegroup level statement
- There is a blank between *keyword-name* and the left parenthesis that should immediately follow it.
- A keyword that is storage group specific has been specified at the global level.
- A keyword that is global (only) was specified at the storage group level.

System action: OAM continues processing the statements in the CBROAMxx member of PARMLIB, but OAM initialization terminates after all statements are processed.

System programmer response: Correct the specification of the keyword on the indicated statement in the CBROAMxx member of PARMLIB, then restart OAM.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.8 CBR0303I (Changed)

CBR0303I Data for keyword *keyword-name* in a {SETOAM | SETOPT | OAMXCF | SETOSMC | ONLYIF | SETDISK | SETTLIB | **SETCLOUD**} statement is invalid - *data*.

Explanation:

OAM is processing an ONLYIF, OAMXCF, SETOAM, SETOPT, SETOSMC, SETDISK, SETTLIB, or SETCLOUD statement in the CBROAMxx member of PARMLIB. A valid keyword was specified on the statement but the data supplied with the keyword is invalid. This error is caused by one of the following reasons:

- data has invalid syntax (for example, it should be numeric, but alphabetic characters were entered)
- data has invalid range (for example, it should be between numbers 1 and 100, and 1000 has been entered)
- data is not followed by a right parenthesis

System action: OAM continues processing the statements in the CBROAMxx member of PARMLIB, but OAM initialization terminates after all statements are processed.

System programmer response: Correct the invalid data supplied on the statement in the CBROAMxx member of PARMLIB, then restart OAM.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.9 CBR0304I (Changed)

CBR0304I Extra data for keyword *keyword-name* in a {SETOAM | SETOPT | OAMXCF | SETOSMC | ONLYIF | SETDISK | SETTLIB | **SETCLOUD**} statement has been found – data.

Explanation: OAM is processing a SETOAM, SETOPT, OAMXCF, SETOSMC, ONLYIF, SETDISK, SETTLIB or SETCLOUD statement in the CBROAMxx member of PARMLIB. The data supplied for *keyword-name* has an embedded blank.

System action: OAM continues processing the statements in the CBROAMxx member of PARMLIB, but OAM initialization terminates after all statements are processed.

System programmer response: Remove all embedded blanks from the value specified for keyword *keyword-name* on the indicated statement in the CBROAMxx member of PARMLIB, then restart OAM.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.10 CBR0305I (Changed)

CBR0305I STORAGEGROUP *storage-group-name* missing ending parenthesis in a {SETOAM | SETOPT | SETOSMC | SETDISK | **SETCLOUD**} statement.

Explanation: OAM is processing a SETOAM, SETOPT, SETOSMC, SETDISK or SETCLOUD statement in the CBROAMxx member of PARMLIB. The STORAGEGROUP keyword was specified on the statement but the value for *storage-group-name* does not end with a right parenthesis.

System action: OAM continues processing the statements in the CBROAMxx member of PARMLIB, but OAM initialization terminates after all statements are processed.

System programmer response: Correct the SETOAM, SETOPT, SETOSMC, SETDISK or SETCLOUD statement in the CBROAMxx member of PARMLIB by adding an ending right parenthesis that follows all of the keywords that are associated with the STORAGEGROUP keyword.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.11 CBR0306I (Changed)

CBR0306I Data for keyword *keyword-name* is missing in a {SETOAM | SETOPT | OAMXCF | SETOSMC | ONLYIF | SETDISK | SETTLIB | SETCLOUD} statement.

Explanation: OAM is processing a SETOAM, SETOPT, SETOSMC, OAMXCF, ONLYIF, SETDISK, SETTLIB or SETCLOUD statement in the CBROAMxx member of PARMLIB. The keyword *keyword-name* was specified on the indicated statement, but no data was supplied with the keyword. This error is caused by one of the following conditions:

- There is no data between the left and right parentheses that follow the keyword *keyword-name*.
- The left parenthesis that follows keyword *keyword-name* is the last character in the CBROAMxx member of PARMLIB.

System action: OAM continues processing the statements in the CBROAMxx member of PARMLIB, but OAM initialization terminates after all statements are processed.

System programmer response: Correct the SETOAM, SETOPT, SETOSMC, ONLYIF, OAMXCF, SETDISK, SETTLIB, or SETCLOUD statement in the CBROAMxx member of PARMLIB by adding the appropriate data that follows the keyword *keyword-name*.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.12 CBR0307I (Changed)

CBR0307I STORAGEGROUP *storage-group-name* specified in a {SETOAM | SETOPT | SETOSMC | SETDISK | **SETCLOUD**} statement not found.

Explanation: This message is issued for one of the following conditions:

- OAM is processing a SETOAM, SETOPT, SETOSMC, **SETDISK** or **SETCLOUD** statement in the CBROAMxx member of PARMLIB. The *storage group name storage-group-name* specified with the **STORAGEGROUP** keyword on the indicated statement is not the name of an OBJECT or OBJECT BACKUP storage group that is defined in the active SMS configuration.
- The storage group name that is specified in a F OAM,DISPLAY,SETOAM | SETOPT | SETOSMC | SETDISK | **SETCLOUD** *storage-group-name* operator command is not the name of an OBJECT or OBJECT BACKUP storage group that is defined in the active SMS configuration.
- The storage group name that is specified in a F OAM,UPDATE,SETOAM | SETOPT | SETOSMC *storage-group-name* operator command is not the name of an OBJECT or OBJECT BACKUP storage group that is defined in the active SMS configuration.

System action: If OAM is processing statements in the CBROAMxx member of PARMLIB, it continues processing all the statements in the CBROAMxx member of PARMLIB, but OAM initialization terminates after all such statements are processed.

If this message was issued as a result of an invalid storage group name that is specified in an operator command, processing of the operator command stops.

System programmer response: Verify that the storage group name that is specified with the STORAGEGROUP keyword on the SETOAM, SETOPT, SETOSMC, **SETDISK** or **SETCLOUD** statement in the CBROAMxx member of PARMLIB or in the F OAM,DISPLAY or F OAM,UPDATE is spelled correctly. If the storage group name is spelled correctly, use the Interactive Storage Management Facility (ISMF) storage group application to verify that the storage group is part of the active SMS configuration and that it is enabled to the current system and, in a multiple OAM configuration, enabled to the current OAM instance.

If the storage group name is spelled correctly and the storage group is not the name of an object or object backup storage group in the active SMS configuration, then activate an SMS configuration that contains a definition of this storage group that it enabled to the desired system and OAM instance, and restart the OAM address space.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.13 CBR0309I (Changed – Explanation Only)

CBR0309I PARMLIB member *member* is empty.

Explanation: OAM is processing the *member* member of PARMLIB because the OAM=xx keyword was specified on the PARM field of the JCL EXEC statement in the cataloged procedure that is used to start the OAM address space.

One of the following conditions is encountered:

- There are no SETOAM, SETOPT, OAMXCF, SETOSMC, SETDISK, [SETTLIB](#) or [SETCLOUD statements](#) in the *member* member of PARMLIB.
- All of the SETOAM, SETOPT, OAMXCF, SETOSMC, SETDISK, [SETTLIB](#) and [SETCLOUD statements](#) are being ignored due to ONLYIF statements indicating that the [statements](#) should not be processed on this system.

System action: OAM initialization continues. Since no SETOAM [statements](#) were included in *member*, OAM will not store any OAM objects to tape. Refer to the explanation for message CBR0310I.

Because there were no SETOPT [statements](#) included in *member*, OAM will use default values for general options and when processing objects stored on optical media. Refer to the explanation for message CBR0320I.

Because no SETOSMC [statements](#) were included, backup processing will be limited to a single backup copy. Refer to the explanation for message CBR0331I. If more than one OBJECT BACKUP storage group exists in the active configuration, message CBR0230D is issued to determine the default backup storage group that is to be used for the first backup copy of objects.

Because no SETDISK [statements](#) were included, the file system sublevel of the disk level in the OAM storage hierarchy will not be enabled for any storage group. Refer to the explanation for message CBR0347I.

[Because no SETCLOUD statements were included, the cloud level in the OAM storage hierarchy will not be enabled for any storage group. Refer to the explanation for message CBR0360I.](#)

Because no SETTLIB [statements](#) were included, OAM will use default values for tape library options. Refer to the explanation for message CBR0355I.

Because no OAMXCF [statements](#) were included, this instance of OAM will not be in an OAMplex. Refer to the explanation for message CBR0327I.

System programmer response: If a file system sublevel is required, then add the appropriate SETDISK statements to the *member* member of PARMLIB. [If a cloud level is required, then add the appropriate SETCLOUD statements to the *member* member of PARMLIB.](#) If object tape processing is required, then add the appropriate SETOAM [statements](#) to the *member* member of PARMLIB. Add SETOPT [statements](#) to the *member* member of PARMLIB to set up various preferences for optical volume processing and general options. Add SETOSMC [statements](#) to the *member* member of PARMLIB to establish the environment to use multiple OBJECT BACKUP storage groups or to create second backup copies. Add OAMXCF statements to the *member* member of PARMLIB if this instance of OAM is to be part of an OAMplex. If using the ONLYIF statement in the *member* member of PARMLIB, then ensure it is specified to allow desired [statements](#) to be processed on this system.

See *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support* for information on these [statements](#). You must restart OAM so that it recognizes any changes made to the

(SPE) OAM Cloud as a Tier (OA55700)

member member of PARMLIB.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.14 CBR0338I (Changed)

CBR0338I Recall keyword specified in a SETOSMC statement is ignored because MAXRECALLTASKS is equal to zero.

Explanation: OAM is processing the SETOSMC commands in the CBROAMxx member of PARMLIB. At least one SETOSMC command was encountered with the RECALLALL, **RECALLCLOUD**, RECALLOPT or RECALLTAPE keyword, implying that the installation desires for immediate recall to disk to be enabled, however, since MAXRECALLTASKS was set (or defaulted) to zero, immediate recall to disk is disabled.

System action: OAM continues processing all the SETOSMC commands in the CBROAMxx member of PARMLIB. Recall processing is disabled for all object storage groups.

Operator response: Inform your system programmer.

System programmer response: Conflicting information was encountered in the CBROAMxx PARMLIB member. The RECALLALL, **RECALLCLOUD**, RECALLOPT or RECALLTAPE keywords specified in a SETOSMC statement indicate that RECALL processing should be enabled, however setting MAXRECALLTASKS to zero disables explicit and implicit RECALL processing for all storage groups. If recall processing is desired then set MAXRECALLTASKS to a non-zero value. See *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support* for more information on the SETOSMC keyword values.

Programmer response: None.

Module: None.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.15 CBR0339I (Changed)

CBR0339I Recall keyword specified in a SETOSMC statement is superseded by a SETOSMC statement for storage group *sg_name* with RECALLOFF(ON) specified.

Explanation: OAM is processing the SETOSMC commands in the CBROAMxx member of PARMLIB. At least one SETOSMC command was encountered with the RECALLALL, **RECALLCLOUD**, RECALLOPT or RECALLTAPE keyword, implying that the installation desires for immediate recall to disk to be enabled for object storage group *sg_name*, however, since RECALLOFF(ON) was specified at the storage group level, immediate recall to disk is disabled for object storage group *sg_name*.

System action: OAM continues processing all the SETOSMC commands in the CBROAMxx member of PARMLIB. Recall processing is disabled at the *sg_name* level specified.

Operator response: Inform your system programmer.

System programmer response: Conflicting information was encountered in the CBROAMxx PARMLIB member. The RECALLALL, **RECALLCLOUD**, RECALLOPT or RECALLTAPE keywords specified in a SETOSMC statement indicate that RECALL processing should be enabled, however setting RECALLOFF to ON disables RECALL processing for the specified object storage group. If recall processing is desired for the storage group *sg_name* then set RECALLOFF to OFF. See *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support* for more information on the SETOSMC keyword values.

Programmer response: None.

Module: None.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.16 CBR0344I (Changed)

CBR0344I Keyword *keyword-name* invalid when specified with storage group *group-name* in a {SETOAM | SETOPT | SETOSMC | SETDISK | SETCLOUD} statement.

Explanation: This message is issued for one of the following conditions:

- OAM is processing the SETOAM, SETOPT, SETOSMC, **SETDISK and SETCLOUD** commands in the CBROAMxx member of PARMLIB. Keyword *keyword-name* and STORAGEEGROUP *group-name* were both specified on a SETOAM, SETOPT, SETOSMC, **SETDISK or SETCLOUD** command. However, keyword *keyword-name* is only valid when associated with an object storage group. It cannot be associated with an object backup, scratch or tape storage group.
- The *group-name* specified in the scope parameter in an F OAM,UPDATE, {SETOAM, | SETOPT, | SETOSMC, | **SETCLOUD**,} scope,keyword-name operator command is not the name of an object storage group defined in the active SMS configuration. The *keyword-name* must be associated with an object storage group and cannot be associated with an object backup, scratch or tape storage group.

System action: If this message was issued during OAM initialization, OAM continues processing all the SETOAM, SETOPT, SETOSMC, **SETDISK and SETCLOUD** commands in the CBROAMxx member of PARMLIB, but OAM initialization will terminate after all the commands it is currently parsing in the CBROAMxx member of PARMLIB are processed. If this message was issued as a result of an operator command, the operator command stops.

System programmer response: Correct the SETOAM, SETOPT , SETOSMC, **SETDISK or SETCLOUD** command in the CBROAMxx member of PARMLIB or operator command so that keyword *keyword-name* is associated with an object storage group.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

(SPE) OAM Cloud as a Tier (OA55700)

3.5.17 CBR0360I (New)

CBR0360I PARMLIB member *member* contains no SETCLOUD commands.

Explanation: OAM is processing the *member* member of PARMLIB. One of the following conditions was encountered:

- There were no SETCLOUD statements in the PARMLIB member.
- All the SETCLOUD statements were ignored due to ONLYIF statements indicating that the statements should not be processed on this system or, in a multiple OAM configuration, for this OAM instance.

System action: OAM initialization continues without any support for the cloud level of the OAM storage hierarchy.

Operator response: If cloud support is not needed for this instance of OAM, no action is required. If this instance of OAM needs cloud support, contact your system programmer.

System programmer response: If cloud support is needed, update the *member* member of PARMLIB to add appropriate SETCLOUD statements to enable cloud support and ensure any ONLYIF statements that are specified allow the SETCLOUD statements to be processed on this system and, in a multiple OAM configuration, for this OAM instance, then restart OAM.

See *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support* for information on the SETCLOUD statement.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.18 CBR0361I (New)

CBR0361I SETCLOUD statement encountered in PARMLIB member *member* with no keywords.

Explanation: OAM is processing the SETCLOUD statements in the *member* member of PARMLIB. A SETCLOUD statement was encountered with no specified keywords.

System action: OAM initialization continues. The SETCLOUD statement is ignored.

System programmer response: Verify the syntax of the SETCLOUD statement in the *member* member of PARMLIB. If the statement is needed, update it to correctly specify the necessary keywords and restart OAM. If it is not needed, remove the statement to avoid this message when the OAM address space starts in the future.

See *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support* for information on the SETCLOUD statement syntax.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.19 CBR0362I (New)

CBR0362I SETCLOUD specification for storage group *group_name* did not include both *keyword-1* and *keyword-2*.

Explanation: OAM is processing SETCLOUD statements in the CBROAMxx member of PARMLIB. The storage group *group_name* was specified on a SETCLOUD statement but the *keyword-1* keyword and/or *keyword-2* keyword was not specified. Both keywords must be specified either at the global level or storage group level to enable support for the cloud level in the OAM storage hierarchy for this storage group.

System action: OAM initialization continues without support for the cloud level of the OAM storage hierarchy for storage group *group_name*. All keywords that were specified for the storage group are ignored.

System programmer response: If cloud support is desired for storage group *group_name*, then correct the SETCLOUD statements so that both *keyword-1* and *keyword-2* are specified either at the global level or for this specific storage group.

If cloud support is not desired for storage group *group_name*, then remove all SETCLOUD statements for the storage group.

After completing the updates to the SETCLOUD statement, restart OAM.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.20 CBR0363I (New)

CBR0363I GLOBAL specification for *statement-name* statement keywords *keyword-1* and *keyword-2* must both be provided if either is.

Explanation: OAM is processing statements in the CBROAMxx member of PARMLIB. Keyword *keyword-1* or *keyword-2* was specified at the global level on a *statement-name* statement but the other keyword was not specified. Both keywords must be specified if either one is.

System action: OAM initialization continues, but ignores the keyword that was specified.

System programmer response: Correct the *statement-name* statements so that either both keywords are specified at the global level or neither is.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.21 CBR0443I (Changed / Explanation Only)

CBR0443I Location = *location-flag*

Explanation: The OSREQ QUERY request was issued and completed successfully. *location-flag* indicates where the primary copy of the object resides.

location-flag values are interpreted as follows:

- C** object resides on cloud level
- D object resides on disk sublevel 1 (DB2/DASD)
- E object resides on disk sublevel 2 (file system)
- R object resides on disk sublevel 1 (DB2/DASD) in recalled mode
- 2 object resides on disk sublevel 2 (file system) in recalled mode
- T object resides on a tape sublevel 1 volume
- U object resides on a tape sublevel 2 volume
- blank object resides on an optical volume

System Action: The OSREQ QUERY function completed successfully.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: -

3.5.22 CBR1075I (Changed / Explanation Only)

CBR1075I {GLOBAL | *groupname*} value for *keyword* is *value*.

Explanation: An F OAM,DISPLAY command was issued with either the [SETCLOUD](#), [SETDISK](#), [SETOAM](#), [SETOPT](#), [SETOSMC](#) or [SETTLIB](#) keyword. The GLOBAL insert indicates the value that is being displayed is a global value to OAM. The *groupname* insert indicates the value being displayed is the value for a particular storage group *groupname*. The current value for the ([SETCLOUD](#), [SETDISK](#), [SETOAM](#), [SETOPT](#), [SETOSMC](#) or [SETTLIB](#)) keyword *keyword* that is being displayed is *value*.

System action: OAM processing continues.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: 5

3.5.23 CBR1090I (Changed)

CBR1090I *oam* Access Backup processing started for *reason* using the {1st | 2nd} backup copy.

Explanation: The operator has entered the following command:

```
F oam,START,AB,reason,backup1|backup2
```

The OAM access backup processing for [OAM address space](#) *oam* is started for *reason*. When the primary copy is not available, the first or second backup copy of the object will be retrieved, depending on which backup copy was specified. The value of *reason* can be:

- UNREADABLE VOLUMES
- OFFLINE LIBRARIES
- NOT OPERATIONAL LIBRARIES
- DB2 OBJECT TABLE ERRORS
- FILE SYSTEM ERRORS
- [CLOUD ERRORS](#)
- LOST VOLUMES

If the option specified in the command is 'ALL':

- If access backup processing was not previously started for a specific reason or reasons, this message will be displayed for each of those reasons that access backup is now being activated.
- CBR1092I will be displayed for any access backup reasons that were previously active when this command was issued.

System action: OAM processing continues.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 5

3.5.24 CBR1091I (Changed)

CBR1091I *oam* Access Backup processing stopped for *reason*.

Explanation: The operator has entered the following command:

```
MODIFY oam,STOP,AB,reason
```

The OAM access backup processing for OAM address space *oam* is stopped for *reason*. The value of *reason* can be:

- UNREADABLE VOLUMES
- OFFLINE LIBRARIES
- NOT OPERATIONAL LIBRARIES
- DB2 OBJECT TABLE ERRORS
- FILE SYSTEM ERRORS
- **CLOUD ERRORS**
- LOST VOLUMES

If the option specified in the command is 'ALL':

- If access backup processing is active for a specific reason or reasons, this message will be displayed for each of those reasons that access backup is being stopped.
- CBR1093I will be displayed for any access backup reasons that are already stopped when this command was issued.

System action: OAM processing continues.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 5

3.5.25 CBR1092I (Changed)

CBR1092I *oam* Access Backup processing already started for *reason* using the {1st | 2nd} backup copy.

Explanation: The operator has entered the following command:

```
F oam,START,AB,option,backup1|backup2
```

The OAM access backup processing for OAM address space *oam* has been started previously for *reason*. When the primary copy is not available, the first or second backup copy of the object will be retrieved, depending on which backup copy was specified. The value of *reason* can be:

- UNREADABLE VOLUMES
- OFFLINE LIBRARIES
- NOT OPERATIONAL LIBRARIES
- DB2 OBJECT TABLE ERRORS
- FILE SYSTEM ERRORS
- **CLOUD ERRORS**
- LOST VOLUMES

If the option specified in the command is 'ALL':

- If access backup processing is already started for a specific reason or reasons, this message will be displayed for each of those reasons that access backup is already active.
- CBR1090I will be displayed for any access backup reasons that are not already active when this command was issued. If the option specified in this command is not ~~X~~'ALL' and access backup is already active for the reason specified, this command is ignored.

System action: This command is ignored.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 5

3.5.26 CBR1093I (Changed)

CBR1093I *oam* Access Backup processing already stopped for *reason*.

Explanation: The operator has entered the following command:

```
MODIFY oam,STOP,AB,reason
```

The OAM access backup processing for OAM address space *oam* has been stopped previously and is currently inactive. This stop command is ignored. The value of *reason* can be:

- UNREADABLE VOLUMES
- OFFLINE LIBRARIES
- NOT OPERATIONAL LIBRARIES
- DB2 OBJECT TABLE ERRORS
- FILE SYSTEM ERRORS
- **CLOUD ERRORS**
- LOST VOLUMES

If the option specified in the command is 'ALL':

- If access backup processing is not active for a specific reason or reasons, this message will be displayed for each of those reasons that access backup is already inactive.
- CBR1091I will be displayed for any access backup reasons that are active when this command was issued. If the option specified in this command is not 'ALL' and access backup is already inactive for the reason specified, this command is ignored.

System action: This command is ignored.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 5

3.5.27 CBR1100I (Changed)

CBR1100I OAM status:

Explanation: The OAM status is:

```

OAM PROCNAME: procname      OAM TASKID: taskid
OPT. TOT  USE  TOT  USE  AVL  TOT  USE  AVL  TOT  USE  AVL  SCR  REQ
      LIB  LIB  DRV  DRV  DRV  LDR  LDR  LDR  SDR  SDR  SDR  VOL  CT
      aaa  bbb  ccc  ddd  eee  fff  ggg  hhh  iii  jjj  kkk  lll  mmm
TAPE TOT  ONL  TOT  TOT  TOT  TOT  TOT  TOT  ONL  AVL  TOTAL
      LIB  LIB  AL  VL  VCL  ML  DRV  DRV  DRV  SCRTCH
      nnn  ooo  ppp  qq  rrr  sss  tttt  uuuu  vvvv  wwwwww
Category count scratch transition {ENABLED|OPERATOR DISABLED}
exit-name processing {ENABLED|DISABLED|BYPASSED|OPERATOR DISABLED}.
CBRUXSAE processing {ENABLED|BYPASSED|BYPASSED_RS}for STORE.
CBRUXSAE processing {ENABLED|BYPASSED} for RETRIEVE.
CBRUXSAE processing {ENABLED|BYPASSED} for QUERY.
CBRUXSAE processing {ENABLED|BYPASSED} for CHANGE.
CBRUXSAE processing {ENABLED|BYPASSED} for DELETE.
Access Backup {ACTIVE|INACTIVE} for reason, using {1st|2nd|no} backup copy.
Diagnostic messages {ACTIVE|INACTIVE} for error-type. Limit=nnnn.
DB2 ID: db2-id
XCF GROUP NAME: group-name
XCF MEMBER NAME: member-name
CBROAM: cbroam-parmlib-suffix
OAMx Parms: TIME=xxx  MSG=xx  OTIS=x
            UPD=x  QB=x  MOS=xxxx  LOB=x  DP=x

```

The operator has entered one of the following commands:

```

D SMS,OAM
F oam,D,OAM

```

A display of OAM address space status has been generated.

In a multiple OAM configuration, a line is shown to indicate for which OAM instance the information is being displayed:

procname

The name of the procedure used to start the OAM address space.

taskid

The task identifier provided when the address space was started (or the procname if no task identifier was provided).

In a classic OAM configuration, if both optical and tape libraries have been defined in the SMS configuration, data for both will be generated. Otherwise, only the data for the library type defined will be generated.

In a multiple OAM configuration, an Object OAM address space will only display object related output and a Tape Library OAM address space will only display tape library related output as shown below:

When no SETTLIB statement has been specified:

```

OAM PROCNAME: procname      OAM TASKID: taskid
TAPE TOT  ONL  TOT  TOT  TOT  TOT  TOT  TOT  ONL  AVL  TOTAL
      LIB  LIB  AL  VL  VCL  ML  DRV  DRV  DRV  SCRTCH
      nnn  ooo  ppp  qq  rrr  sss  tttt  uuuu  vvvv  wwwwww
Category count scratch transition {ENABLED|OPERATOR DISABLED}

```


(SPE) OAM Cloud as a Tier (OA55700)

```
exit-name processing {ENABLED|DISABLED|BYPASSED|OPERATOR DISABLED}.
DB2 ID: NONE
OAMx Parms: TIME=xxx  MSG=xx  OTIS=x
```

When SETTLIB statement has been specified:

```
OAM PROCNAME: procname      OAM TASKID: taskid
TAPE TOT  ONL  TOT  TOT  TOT  TOT  TOT  ONL  AVL  TOTAL
      LIB  LIB  AL  VL  VCL  ML  DRV  DRV  DRV  SCRTCH
      nnn  ooo  ppp  qqg  rrr  sss  tttt  uuuu  vvvv  wwwwww
Category count scratch transition {ENABLED|OPERATOR DISABLED}
exit-name processing {ENABLED|DISABLED|BYPASSED|OPERATOR DISABLED}.
DB2 ID: NONE
CBROAM: cbroam-parmlib-suffix
OAMx Parms: TIME=xxx  MSG=xx  OTIS=x
```

Actual TAPELIB AS with SETTLIB:

```
16.36.34 SYSTEM1 d sms,oam
CBR1100I OAM status:
OAM PROCNAME: OAMXT      OAM TASKID: OAMXT
TAPE TOT  ONL  TOT  TOT  TOT  TOT  TOT  ONL  AVL  TOTAL
      LIB  LIB  AL  VL  VCL  ML  DRV  DRV  DRV  SCRTCH
      4    1    0    0    1    1    16    2    2    38
There are also 1 VTS distributed libraries defined.
Category count scratch transition ENABLED.
CBRUXCUA processing ENABLED.
CBRUXEJC processing ENABLED.
CBRUXENT processing ENABLED.
CBRUXVNL processing ENABLED.
DB2 ID: NONE
CBROAM: XT
OAXT Parms: TIME=LOC  MSG=EM  OTIS=Y
```

Note: The values displayed for TIME=, MSG= and OTIS= will be the specified or default value for the first OAM subsystem to be started following the last IPL. The values for these parameters are the same for all OAM subsystems on a system and are established by the first OAM subsystem to initialize.

For an optical library, the fields displayed in the data line of the multi-line message are as follows:

aaa Total number of optical libraries in the configuration.
bbb Number of usable optical libraries (online and operational).
ccc Total number of optical drives in the configuration.
ddd Number of usable optical drives.
eee Number of available optical drives (online, operational, and not currently in use).
fff Total number of library optical drives in the configuration.
ggg Number of usable library optical drives.
hhh Number of available library optical drives.
iii Total number of stand-alone optical drives in the configuration.
jjj Number of usable stand-alone optical drives.
kkk Number of available stand-alone optical drives.
lll Number of scratch optical volumes in the OAM configuration database.
mmm Total number of read requests waiting to be scheduled.

For a tape library, the fields displayed in the data line of the multi-line message are as follows:

nnn Total number of tape libraries defined in the active SMS configuration (excluding the Peer-to-Peer VTS distributed libraries) that are connected to the current system (referred to in the following explanations as a connected tape library). The current system is the system on which the OAM command is entered. For the number of distributed libraries that are defined to the system, refer to the status line towards the bottom of the display.

(SPE) OAM Cloud as a Tier (OA55700)

ooo Number of connected tape libraries that are online (excluding the Peer-to- VTS distributed libraries).
ppp Number of connected automated tape library dataservers (non-virtual tape servers).
qqq Number of connected virtual tape servers (excluding the Peer-to-Peer VTS tape libraries).
rrr Number of connected Peer-to-Peer VTS composite libraries.
sss Number of connected manual tape libraries.
ttt Total number of tape drives, known to the current system, residing in the connected tape libraries.
uuuu Total number of tape drives, known to the current system and residing in the connected tape libraries, that are online.
vvvv Total number of tape drives, known to the current system and residing in the connected tape libraries, that are online and not allocated.
wwwwwww Total number of scratch volumes of all media types in the connected tape libraries.

If there are Peer-to-Peer VTS subsystems defined to the system, the following status line will be displayed reflecting the number of distributed libraries that are associated with the composite libraries above:

There are also *numvdl-lib* VTS distributed libraries defined.

For OAM installation exits, the fields displayed in the status messages are as follows:

exit-name

The name of the exit for which status is being displayed. This can be CBRUXENT, CBRUXEJC, CBRUXCUA, CBRUXVNL, or CBRUXSAE or EDGTVEXT.

ENABLED

The exit is enabled and executed when the requested function is required.

DISABLED

The exit has been disabled due to an error or an abend in the installation exit. For CBRUXCUA, the exit is disabled for CBRXLCS FUNC=CUA PRIVATE to SCRATCH requests only. For EDGTVEXT, OAM continues releasing object tape volumes from the OAM inventory.

BYPASSED

For CBRUXVNL, either the exit returned a return code 16, indicating that it was not to be called again, or an error (or abend) occurred in the exit and the exit will not be invoked. For CBRUXSAE, either the exit returned a return code 16, or it returned return codes for each of the five OSREQ functions (STORE, RETRIEVE, QUERY, CHANGE and DELETE), effectively putting all OSREQ functions in bypass mode. For all other exits, the exit returned a return code 16, indicating that the requested function is to continue without calling the exit.

BYPASSED_RS

Bypass in restricted-store mode: This is used exclusively for the CBRUXSAE PROCESSING for STORE. The exit returned a return code 254 for an OSREQ STORE (or STOREBEG) request indicating that subsequent stores are allowed to existing collections but are not allowed to collections that do not exist.

OPERATOR DISABLED

For CBRUXENT, the operator has requested that cartridge entry processing be disabled by issuing the LIBRARY DISABLE, CBRUXENT command. Cartridge entry processing can only be enabled by issuing a LIBRARY RESET, CBRUXENT command, or a system IPL. For CBRUXVNL, the operator has requested that the volume not in library installation exit be disabled by issuing the LIBRARY DISABLE, CBRUXVNL command. The CBRUXVNL installation exit is not invoked during job processing. Use the LIBRARY RESET, CBRUXVNL command or IPL the system to reactivate the invoking of the CBRUXVNL installation exit.

If the CBRUXSAE user exit is in ENABLED mode, the following lines are displayed:

```
CBRUXSAE processing {ENABLED|BYPASSED|BYPASSED_RS}  
for STORE.  
CBRUXSAE processing {ENABLED|BYPASSED} for RETRIEVE.  
CBRUXSAE processing {ENABLED|BYPASSED} for QUERY.  
CBRUXSAE processing {ENABLED|BYPASSED} for CHANGE.  
CBRUXSAE processing {ENABLED|BYPASSED} for DELETE.
```

For OAM Access Backup processing, the fields displayed in the status messages are as follows:

(SPE) OAM Cloud as a Tier (OA55700)

reason The reason for which Access Backup processing can be activated. This can be:

- * UNREADABLE VOLUMES
- * OFFLINE LIBRARIES
- * NOT OPERATIONAL LIBRARIES
- * DB2 OBJECT TABLE ERRORS
- * **CLOUD ERRORS**
- * FILE SYSTEM ERRORS
- * LOST VOLUMES

ACTIVE

Access Backup processing is active for one of these reasons.

INACTIVE

Access Backup processing is inactive for one of these reasons.

- 1st** Access Backup processing accesses the first backup copy of the object when the primary copy is unavailable for one of these reasons.
- 2nd** Access Backup processing accesses the second backup copy of the object when the primary copy is unavailable for one of these reasons.
- no** Access Backup processing is inactive for one of these reasons; therefore, no backup copy is being used.

For OAM diagnostic messages processing, the fields displayed in the status messages are as follows:

ACTIVE

Diagnostic messages will be issued for **the indicated type of** errors originating from OSREQ requests.

INACTIVE

Diagnostic messages will not be issued for **the indicated type of** errors originating from OSREQ requests.

error-type

The type of errors for which this diagnostic message shows the status (OSREQCLD is for cloud errors; OSREQFS is for file system errors.)

- nnnn* When the status for diagnostic messages issued for **the indicated type of** errors originating from OSREQ requests is 'ACTIVE', indicates the approximate number of messages yet to be issued.

If a DB2 subsystem name or group attachment name was specified for OAM object support with the D= keyword on an OAM subsystem definition in the IEFSSNxx member of PARMLIB (for a multiple OAM configuration) or in the IGDSMSxx member of PARMLIB or in response to a WTOR during OAM initialization (for a classic OAM configuration), the following information is displayed:

db2-id The DB2 subsystem identifier (SSID or Group Attachment Name) used by OAM for object support.

For OAM XCF processing, the fields displayed in the status messages are as follows:

group-name

The XCF group name for this OAMplex, if a group name and member name were specified in the CBROAMxx PARMLIB member when OAM was initialized. If OAM is not running as part of an OAMplex, the value of this field will be 'N/A'.

member-name

The XCF member name for this instance of OAM in an OAMplex, if a member name and group name were specified in the CBROAMxx PARMLIB member when OAM was initialized. If OAM is not running as part of an OAMplex, the value of this field will be 'N/A'.

cbroam-parmlib-suffix

This field displays the suffix of the CBROAMxx PARMLIB member that was in effect during OAM initialization.

OAMx Parms displays settings that resulted from the parameters specified for the OAMx entry in the IEFSSNxx PARMLIB member when the OAMx subsystem was initialized at IPL time. **Note:** See z/OS

(SPE) OAM Cloud as a Tier (OA55700)

DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support for more information on these parameters.

System action: None.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: 5,8,9

3.5.28 CBR1130I (Changed)

CBR1130I OAM storage group status:

Explanation: The OAM status for the storage group is:

(For tape storage group in either classic or multiple configuration)

```
CBR1130I OAM storage group status:
TAPE      LIBRARY
STORGRP   NAMES
sgname    libname1 libname2 libname3 libname4
          libname5 libname6 libname7 libname8
```

(For object or object backup storage group in Classic configuration)

```
CBR1130I OAM storage group status:
OBJECT    TY  REQ  OSMC  BACKUP  BACKUP  RET  DEL
STORGRP   COUNT SYSTEM STORGRP1 STORGRP2 PRO  PRO
sgname    a  bbbbb sysname objbusg1 objbusg2 n   o
TAPE      DATA  L2TAPE  L2DATA
UNIT      CLASS  UNIT     CLASS
unitname  dataclass unitname2 dataclass2
Library Names: libname1 libname2 libname3 libname4
               libname5 libname6 libname7 libname8
DSL2 Directory: dsl2dir
DSL2 Type:      dsl2type
Cloud values
PROV: provider-name
CONT: container-name
```

(For object or object backup storage group in Multiple configuration)

```
CBR1130I OAM storage group status:
OAM PROCNAME: procname OAM TASKID: taskid
OBJECT    TY  REQ  OSMC  BACKUP  BACKUP  RET  DEL
STORGRP   COUNT SYSTEM STORGRP1 STORGRP2 PRO  PRO
sgname    a  bbbbb sysname objbusg1 objbusg2 n   o
TAPE      DATA  L2TAPE  L2DATA
UNIT      CLASS  UNIT     CLASS
-----  -----  -----  -----
unitname  dataclass unitname2 dataclass2
DSL2 Directory: dsl2dir
DSL2 Type:      dsl2type
Cloud values
PROV: provider-name
CONT: container-name
```

The operator has entered one of the following commands:

- .
- .
- .

o The deletion-protection status for this object storage group, as follows:

- .
- .
- .

(SPE) OAM Cloud as a Tier (OA55700)

ds/2dir Name of the file system directory specified on the SETDISK statement...
provider-name The name of the cloud provider for this object storage group.
container-name The name of the cloud container for this object storage group.

·
·
·

If the command issued was:
 DISPLAY SMS,STORGRP(storage-group-name),DETAIL or
 MODIFY oam,DISPLAY,GROUP,storage-group-name

and the storage group that is requested is an object storage group or an object backup storage group, additional data lines are displayed as follows. For a classic OAM configuration:

| | OPTICAL | TAPE | TSL1 | TSL2 |
|-------------------------|-----------------|-----------------|--------------|---------------|
| All Volumes Full: | <i>c</i> | <i>d</i> | <i>u</i> | <i>v</i> |
| Writable Volumes: | <i>eeeeee</i> | <i>ffffff</i> | <i>wwwww</i> | <i>xxxxxx</i> |
| Full Volumes: | <i>sssss</i> | <i>ttttt</i> | <i>yyyyy</i> | <i>zzzzz</i> |
| Drive Start Threshold: | <i>ggggg</i> | <i>hhhhh</i> | | |
| Volume Full Threshold: | <i>iiiii</i> | <i>jjjjj</i> | | |
| Reinit / Recycle Mode: | <i>kkkkkkkk</i> | <i>pppppppp</i> | | |
| # of Active Drives: | <i>lllll</i> | <i>mmmmm</i> | | |
| Recall Status: | <i>qqqqqqqq</i> | <i>rrrrrrrr</i> | | |
| Recall to disk sublevel | <i>s</i> | | | |

CLOUD
 Recall Status: **uuuuuuuu**

For a multiple OAM configuration:

| | TAPE | TSL1 | TSL2 |
|-------------------------|-----------------|--------------|---------------|
| All Volumes Full: | <i>d</i> | <i>u</i> | <i>v</i> |
| Writable Volumes: | <i>ffffff</i> | <i>wwwww</i> | <i>xxxxxx</i> |
| Full Volumes: | <i>ttttt</i> | <i>yyyyy</i> | <i>zzzzz</i> |
| Drive Start Threshhold: | <i>hhhhh</i> | | |
| Volume Full Threshold: | <i>jjjjj</i> | | |
| Recycle Mode: | <i>pppppppp</i> | | |
| # of Active Drives: | <i>mmmmm</i> | | |
| Recall Status: | <i>rrrrrrrr</i> | | |
| Recall to disk sublevel | <i>s</i> | | |

CLOUD
 Recall Status: **uuuuuuuu**

·
·
·

rrrrrrr Tape recall to disk status. Indicates...

·
·
·

uuuuuuuu Cloud recall to disk status. Indicates the current recall to disk setting for objects residing on the cloud. These values were based on SETOSMC statements in the CBROAMxx Parmlib member. Valid values are:

nnn Implicit recalls are enabled because of RECALLCLOUD or RECALLALL keywords specified in a SETOSMC statement. When an object from this storage group is retrieved

3.5.30 CBR1295I (New)

CBR1295I Cloud tier is not configured in any defined storage groups. Display cloud command has been canceled.

Explanation: The operator has entered the following command:

```
F oam,D,CLOUD,ID,cloudid1[,cloudid2,...]
```

to display information about the cloud storage configuration, but there are no storage groups configured to use cloud storage.

System action: The command is not processed.

Operator response: If cloud storage should be configured, contact the system programmer.

System programmer response: If use of cloud storage is desired, add SETCLOUD statements to the CBROAMxx member of SYS1.PARMLIB to define the cloud storage configuration.

Source: Object Access Method (OAM)

Routing Code: -

Descriptor Code: 5,8,9

3.5.31 CBR1705I (New)

CBR1705I Cloud waiting summary:

Explanation:

```
----- CLOUD REQUESTS WAITING FOR PROCESSING -----  
  READS  WRITES  
aaaaaaa bbbbbb
```

The operator has entered one of the following commands:

```
MODIFY oam,QUERY,WAITING  
MODIFY oam,QUERY,WAITING,SUMMARY
```

A display of cloud work requests waiting for execution in the OAM address space is generated. The fields displayed in the data line of the multi-line message are as follows:

aaaaaa Total number of object read requests from a cloud file waiting to be processed.
bbbbbb Total number of object write requests to a cloud file waiting to be processed.

Note: All counts above are a snapshot in time count and the numbers can change quickly.

Routing Code: -

Descriptor Code: 5,8,9

3.5.32 CBR1795I (New)

CBR1795I Cloud active summary:

Explanation:

```
----- CLOUD REQUESTS CURRENTLY BEING PROCESSED -----  
  READS  WRITES  
aaaaaaa bbbbbb
```

The operator has entered one of the following commands:

```
MODIFY oam,QUERY,ACTIVE  
MODIFY oam,QUERY,ACTIVE,SUMMARY
```

A display of cloud work requests currently being processed in the OAM address space is generated. The fields displayed in the data line of the multi-line message are as follows:

aaaaaa Total number of object read requests from a cloud file currently being processed.
bbbbbb Total number of object write requests to a cloud file currently being processed.

Note: All counts above are a snapshot in time count and the numbers can change quickly.

Routing Code: -

Descriptor Code: 5,8,9

3.5.33 CBR1810I (New)

CBR1810I Read request for object *object-name*, **in collection** *collection-name*, **in storage group** *group-name*, **with instance ID** *inst-id*, **cloud ID** *cloud-id*, **offset =** *offset*, **length =** *length*, **waiting to be processed, request =** *request*.

Explanation:

The operator has entered one of the following commands:

```
MODIFY oam,QUERY,WAITING,DETAIL,ALL  
MODIFY oam,QUERY,WAITING,DETAIL,READ
```

A read request for an OAM object within cloud container *container-name* is waiting to be processed. The object name is *object-name*, in collection *collection-name*, in storage group *group-name* and the cloud instance id is *inst-id*. The cloud ID (index of the CLOUDID DB2 table row showing the provider and container name for the cloud file) is *cloud-id*. The object's length is *length* and offset is *offset*. The request number associated with this request is *request*.

Note: This message is issued to the hardcopy log only.

Routing Code: -

Descriptor Code: 5,8,9

3.5.34 CBR1811I (New)

CBR1811I Write request for object *object-name*, **in collection** *collection-name*, **in storage group** *group-name*, **cloud ID** *cloud-id*, **length =** *length*, **waiting to be processed, request =** *request*.

Explanation:

The operator has entered one of the following commands:

```
MODIFY oam,QUERY,WAITING,DETAIL,ALL  
MODIFY oam,QUERY,WAITING,DETAIL,WRITE
```

A write request for an OAM object within cloud container *container-name* is waiting to be processed. The object name is *object-name*, the collection name is *collection-name* and the storage group is *group-name*. The cloud ID (index of the CLOUDID DB2 table row showing the provider and container name for the cloud file) is *cloud-id*. The object's length is *length*. The request number associated with this request is *request*.

Note: This message is issued to the hardcopy log only.

Routing Code: -

Descriptor Code: 5,8,9

3.5.35 CBR1812I (New)

CBR1812I Reading object *object-name*, **in collection** *collection-name*, **in storage group** *group-name*, **with instance id** *inst-id*, **cloud ID** *cloud-id*, **offset =** *offset*, **length =** *length*, **request =** *request*.

Explanation:

The operator has entered one of the following commands:

```
MODIFY oam,QUERY,ACTIVE,DETAIL,ALL  
MODIFY oam,QUERY,ACTIVE,DETAIL,READ
```

A read request for an OAM object within cloud container *container-name* is currently being processed. The object name is *object-name*, in collection *collection-name*, in storage group *group-name* and the cloud instance id is *inst-id*. The cloud ID (index of the CLOUDID DB2 table row showing the provider and container name for the cloud file) is *cloud-id*. The object's length is *length* and offset is *offset*. The request number associated with this request is *request*.

Note: This message is issued to the hardcopy log only.

Routing Code: -

Descriptor Code: 5,8,9

3.5.36 CBR1813I (New)

CBR1813I Writing object *object-name*, **in collection** *collection-name*, **in storage group** *group-name*, **cloud ID** *cloud-id*, **length =** *length*, **request =** *request*.

Explanation:

The operator has entered one of the following commands:

```
MODIFY oam,QUERY,ACTIVE,DETAIL,ALL  
MODIFY oam,QUERY,ACTIVE,DETAIL,WRITE
```

A write request for an OAM object within cloud container *container-name* is currently being processed. The object name is *object-name*, the collection name is *collection-name* and the storage group is *group-name*. The cloud ID (index of the CLOUDID DB2 table row showing the provider and container name for the cloud file) is *cloud-id*. The object's length is *length*. The request number associated with this request is *request*.

Note: This message is issued to the hardcopy log only.

Routing Code: -

Descriptor Code: 5,8,9

3.5.37 CBR1990I (Changed)

CBR1990I *oam* diagnostic messages started for [OSREQCLD | OSREQFS]. Limit = *nnnn*.

Explanation: The operator has entered one of the following commands:

```
F oam,START,DIAGMSGs,OSREQCLD
F oam,START,DIAGMSGs,OSREQCLD,LIM=nnnn
F oam,START,DIAGMSGs,OSREQFS
F oam,START,DIAGMSGs,OSREQFS,LIM=nnnn
```

Approximately *nnnn* OAM diagnostic messages will be issued for the indicated type of errors (cloud or file system) for OAM task id *oam* originating from an OSREQ request.

System action: OAM processing continues.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 5

3.5.38 CBR1991I (Changed)

CBR1991I *oam* diagnostic messages will no longer be issued for [OSREQCLD | OSREQFS].

Explanation: One of the following occurred:

- The operator has entered [one of the following commands](#):

```
F oam,STOP,DIAGMSGs,OSREQCLD
F oam,STOP,DIAGMSGs,OSREQFS
```

- OAM issued this message automatically when the limit of messages to be issued has been met.

OAM will no longer issue diagnostic messages for the indicated type of errors (cloud or file system) for OAM task id *oam* originating from an OSREQ request.

Operator Response: To continue receiving diagnostic messages for file system related errors originating from an OSREQ request, use the F OAM,START,DIAGMSGs,OSREQFS[,LIM=*nnnn*] operator command to specify the number of additional messages to be displayed. [To continue receiving diagnostic messages for cloud related errors originating from an OSREQ request, use the F OAM,START,DIAGMSGs,OSREQCLD\[,LIM=*nnnn*\] operator command to specify the number of additional messages to be displayed.](#)

System action: OAM processing continues.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 5

3.5.39 CBR1992I (Changed)

CBR1992I *oam* diagnostic messages reset for [OSREQCLD | OSREQFS]. Limit=*nnnn*.

Explanation: The operator has entered one of the following commands:

```
F oam,START,DIAGMSGs,OSREQCLD
F oam,START,DIAGMSGs,OSREQCLD,LIM=nnnn
F oam,START,DIAGMSGs,OSREQFS
F oam,START,DIAGMSGs,OSREQFS,LIM=nnnn
```

OAM issuing diagnostic messages for the indicated type of errors (cloud or file system) for OAM task id *oam* originating from an OSREQ request had been started previously. Regardless of the previous limit and the number of messages already issued, the new limit *nnnn* will now be in effect.

System action: OAM processing continues.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 5

3.5.40 CBR1993I (Changed)

CBR1993I *oam* diagnostic messages already stopped for [OSREQCLD | OSREQFS].

Explanation: The operator has entered one of the following commands:

```
F oam,STOP,DIAGMSGs,OSREQCLD
F oam,STOP,DIAGMSGs,OSREQFS
```

OAM issuing of diagnostic messages for the indicated type of errors (cloud or file system) for OAM task id *oam* originating from an OSREQ request has been stopped previously and is currently inactive. This stop command is ignored.

System action: This command is ignored.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 5

3.5.41 CBR6000I (Changed)

CBR6000I Error attaching {drive task for drive | file system task for | cloud task for} *drive-or-task-name*.

Explanation: An error was detected while trying to create a task to manage one of the following:

- optical or tape drive *drive-or-task-name*
- file system task *drive-or-task-name*
- cloud task *drive-or-task-name*

If this message is for a file system task, the task name *drive-or-task-name* is in the format of 'FST#nn', where nn is the file system task ID:

- FST#00 is used for the file system task manager
- FST#nn with a non-zero value for nn is used for a file system task.

If this message is for a cloud task, the task name *drive-or-task-name* is in the format of 'CLT#nn', where nn is the cloud task ID:

- CLT#00 is used for the cloud task manager
- CLT#nn with a non-zero value for nn is used for a cloud task.

System action: If the failed task is an optical or tape drive task, OAM marks the drive not operational. No work can be scheduled to, or performed on the drive until the OAM address space has been stopped and restarted.

If the failed task is the file system task manager, OAM marks the file system not operational. No work can be scheduled to, or performed on, the file system until the OAM address space has been stopped and restarted.

If the failed task is the cloud task manager, OAM marks the cloud not operational. No work can be scheduled to, or performed on, the cloud until the OAM address space has been stopped and restarted.

If the failed task is one of the file system tasks or cloud tasks identified by its task ID, OAM only marks this task not operational. No work can be scheduled to this task until the OAM address space has been stopped and restarted.

Operator response: Notify the system programmer.

System programmer response: This message is preceded by message CBR7000I, which gives additional information about the cause of the error.

Source: Object Access Method (OAM)

Routing Code: 4,6

Descriptor Code: 4

3.5.42 CBR6001I (Changed)

CBR6001I Unexpected {drive | file system | cloud} task termination for {drive | task} *drive-or-task-name*.

Explanation: The task which manages optical or tape drive *drive-or-task-name* or the file system or **cloud task** *drive-or-task-name* ended prematurely.

If this message is for a file system task, the task name *drive-or-task-name* is in the format of 'FST#nn', where nn is the file system task ID:

- FST#00 is used for the file system task manager
- FST#nn with a non-zero value for nn is used for a file system task.

If this message is for a cloud task, the task name *drive-or-task-name* is in the format of 'CLT#nn', where nn is the cloud task ID:

- CLT#00 is used for the cloud task manager
- CLT#nn with a non-zero value for nn is used for a cloud task.

System action:

When the terminated task is an optical drive task:

- If OAM initialization has completed, OAM creates a new drive task to manage the optical drive. If a unit of work was active on the drive when the task failed, the unit of work is canceled.
- If OAM initialization has not yet completed, no attempt is made to create a new drive task. The optical drive is marked not operational and may not be used until OAM has been stopped and restarted.

When the terminated task is the file system task manager:

- If OAM initialization has completed, OAM creates a new file system task manager to manage the file system tasks.
- If OAM initialization has not yet completed, the file system is marked not operational and may not be used until OAM has been stopped and restarted.

When the terminated task is one of the file system tasks identified by the task ID:

- If OAM initialization has completed, OAM creates a new file system task with the same task ID. If a unit of work was active on the file system task, the unit of work is cancelled.
- If OAM initialization has not yet completed, the file system is marked not operational and may not be used until OAM has been stopped and restarted.

When the terminated task is the cloud task manager:

- If OAM initialization has completed, OAM creates a new cloud task manager to manage the cloud tasks.
- If OAM initialization has not yet completed, the cloud is marked not operational and may not be used until OAM has been stopped and restarted.

(SPE) OAM Cloud as a Tier (OA55700)

When the terminated task is one of the cloud tasks identified by the task ID:

- If OAM initialization has completed, OAM creates a new cloud task with the same task ID. If a unit of work was active on the cloud task, the unit of work is cancelled.
- If OAM initialization has not yet completed, the cloud is marked not operational and may not be used until OAM has been stopped and restarted.

Operator response: Notify the system programmer.

System programmer response: Notify the service representative. If the problem recurs and if the program is not in error, search problem reporting databases for a fix for the problem. If no fix exists, contact the IBM Support Center. Format the SVC dump with the interactive problem control system (IPCS).

Source: Object Access Method (OAM)

Routing Code: 4,6

Descriptor Code: 4

3.5.43 CBR6505I (New)

CBR6505I *taskid* cloud write request failed for collection *collect-name*, object *object-name*, and storage group *storage-group-name*. The storage group is not enabled for cloud processing.

Explanation: An attempt by OAM address space *taskid* to write object *object-name* in collection *collect-name* and storage group *storage-group-name* to cloud failed because keywords PROVIDER and CONTAINER were not specified on a SETCLOUD statement in PARMLIB member CBROAMxx at either the global level or for storage group *storage-group-name*. PROVIDER and CONTAINER must both be specified to enable use of the cloud level for the storage group.

System action: The write request fails.

Operator response: Notify the system programmer.

System programmer response: Specify a valid value for both the PROVIDER and CONTAINER keywords for the indicated storage group or at global level on a SETCLOUD statement in the CBROAMxx member of PARMLIB and restart OAM.

Source: Object Access Method (OAM)

Routing Code: 2,4,6

Descriptor Code: 4

3.5.44 CBR6520I (Changed)

CBR6520I *taskid* File **Storage** Delete Task has temporarily suspended processing all {file system | cloud} file deletes due to {CAF CONNECT | OPEN CURSOR | FETCH | FILE SYSTEM CONNECT | CLOUD CONNECT } error. Return code = *rc*, reason code = *reason*.

Explanation: The File **Storage** Delete Task for OAM address space *taskid* encountered an error while attempting to:

- access the FSDELETE table if the error is CAF CONNECT, OPEN CURSOR or FETCH
- connect to the specified storage tier if the error is FILE SYSTEM CONNECT or CLOUD CONNECT

. Return code *rc* and reason code *reason* are for diagnostic purposes only.

System action: OAM attempts to delete any files from the **specified storage tier** for which information was successfully read prior to the error, then stops processing file deletes from that storage tier. Any file deletes that could not be processed will be attempted again on the next cycle of the File **Storage** Delete Task.

Operator response: Notify the system programmer.

System programmer response: Determine why the File **Storage** Delete Task cannot access the FSDELETE table or cannot connect to the specified storage tier and correct the problem.

If the problem recurs and if the program is not in error, search problem reporting databases for a fix to the problem. If no fix exists, contact the IBM Support Center.

Source: Object Access Method (OAM)

Routing Code: 2,4,6

Descriptor Code: 4

3.5.45 CBR6521I (Changed)

CBR6521I *taskid* File **Storage** Delete Task has temporarily suspended processing file deletes for storage group *group* due to a repeating error condition. Return code = *rc*, reason code = *reason*.

Explanation: The File **Storage** Delete Task for OAM address space *taskid* encountered repeated errors with return code *rc* and reason code *reason* while attempting to delete object files from the file system for storage group *group*. Earlier CBR6503I messages provide details about the specific object instances that failed.

System action: OAM stops processing file system deletes for this storage group and continues with the next storage group. The file deletes that could not be processed will be attempted again on the next cycle of the File **Storage** Delete Task.

Operator response: Notify the system programmer.

System programmer response Determine why files cannot be deleted from the file system and correct the problem. Some possible causes are that the file system is not available or the directory containing the files was renamed or removed. Investigate the return code and the reason code in the message using the list of OAM return codes and reason codes in *z/OS DFSMSdfp Diagnosis*.

Source: Object Access Method (OAM)

Routing Code: 2,4,6

3.5.46 CBR6522I (Changed)

CBR6522I *taskid* File **Storage** Delete Task has temporarily suspended processing file deletes for storage group *group* because the storage group is {unknown | not file system enabled}.

Explanation: One or more files associated with storage group *group* are scheduled for deletion, but the File **Storage** Delete Task for OAM address space *taskid* was unable to determine the file system path containing the files.

System action: OAM stops processing file system deletes for this storage group and continues with the next storage group. The file deletes that could not be processed will be attempted again on the next cycle of the File **Storage** Delete Task.

Operator response: Notify the system programmer.

System programmer response: Define the storage group and/or identify it as being file system enabled, then restart OAM. If the storage group is unknown, the most likely cause is that it is not defined to SMS. If it is not file system enabled, the most likely cause is that the CBROAMxx PARMLIB member does not contain a SETDISK statement defining the storage group as file system enabled.

Source: Object Access Method (OAM)

Routing Code: 2,4,6

Descriptor Code: 4

3.5.47 CBR6523I (New)

CBR6523I *taskid* File Storage Delete Task has temporarily suspended processing cloud object deletes for storage group *storagegroup-name* due to a repeating error condition. Cloud ID = *cloud-id*, return code = *return-code*, reason code = *reason-code*, additional return code = *additional-return-code*, additional reason code = *additional-reason-code*.

Explanation: The File Storage Delete Task for OAM address space *taskid* encountered repeated errors with return code *return-code* and reason code *reason-code* while attempting to delete objects from cloud for storage group *storagegroup-name*. The cloud ID *cloud-id*, additional return code *additional-return-code*, and additional reason code *additional-reason-code* are for the last object that could not be deleted.

System Action: OAM continues processing the next storage group. Any files that could not be processed for the failing storage group will be attempted in the next cycle of the File Storage Delete Task.

Operator Response: Notify the system programmer.

System programmer response: Use the cloud ID, additional return code, and additional reason code in conjunction with the OAM diagnostics aid to properly identify and fix the issue.

Source: Object Access Method (OAM)

Routing Code: 2,4,6

Descriptor Code: 4

3.5.48 CBR6524I (New)

CBR6524I *taskid* File Storage Delete Task has encountered one or more errors while processing cloud object deletes. Failed deletions = xxx, Successful deletions = yyy.

Explanation: The File Storage Delete Task for OAM address space *taskid* encountered at least one error within the cloud delete processing cycle.

System Action: The File Storage Delete Task waits ten minutes until the next processing cycle. The failed deletions will be attempted again during the next cycle of the File Storage Delete Task.

Operator Response: Notify the system programmer.

System programmer response: Check earlier messages to determine the cause of the failed deletes and correct the problem so that the deletes can be processed successfully during the next File Storage Delete Task cycle.

Source: Object Access Method (OAM)

Routing Code: 2,4,6

Descriptor Code: 4

3.5.49 CBR6530I (New)

CBR6530I Cloud Diagnostic Data:

OAM-taskid cloud {write|read|delete} failure for cloud task *task-name*

Collection Name: *collection-name*

Object Name: *object-name*

Storage Group Name: *storage-group-name* Cloud ID: *cloud-id*

OAM Return Code: *OAM-return-code* OAM Reason Code: *OAM-reason-code*

[-----

Language Environment Preinitialization routine CEEPIPI failure

Function: {init_sub|call_sub|add_entry} Return code:PIPI-return-code]

[-----

Cloud Data Access Services Return Code: *CDA-return-code*]

[-----

Web Toolkit Return Code: *toolkit-return-code* Reason Code: *toolkit-reason-code*

Service ID: *toolkit-service-ID*

toolkit-diagnostic-message]

[-----

Cloud Provider Status Code: *cloud provider-status-code*

cloud-provider-status-message]

Explanation: An error was encountered while processing an OAM request to read, write, or delete an object in the cloud level of the storage hierarchy from OAM task *OAM-taskid*.

For a LE Preinitialization failure, the failing PIPi function name and *PIPI-return-code* are displayed.

For a CDA (Cloud Data Access) service failure, the return code *CDA-return-code* provided by CDA is displayed.

Additionally, if the CDA return code denotes that the error was a web toolkit failure or a bad response from the cloud provider, a second status area will be displayed after the CDA return code area.

(SPE) OAM Cloud as a Tier (OA55700)

For a web toolkit failure, the return code *toolkit-return-code*, the reason code *toolkit-reason-code*, the service ID *toolkit-service-ID*, and one or more lines (up to 70 characters each) of diagnostic messages *toolkit-diagnostic-message* will be shown.

If a bad HTTP response code is received from the cloud provider, the cloud provider status code *cloud-provider-status-code* and one or more lines (up to 70 characters each) of cloud provider status messages *cloud-provider-status-message* will be shown.

The web toolkit and cloud provider areas are mutually exclusive. At most one will be shown.

System action: The OAM read, write, or delete request fails.

Operator response: Notify the system programmer.

System programmer response: Use the diagnostic information provided to determine the cause of the error and take corrective action to resolve the problem so that the request can be retried and complete successfully.

Source: Object Access Method (OAM)

Routing Code: 2,4,6

Descriptor Code: 4

3.5.50 CBR9014I (Changed / Explanation only)

CBR9014I Error establishing the object service *object-service-name* **for control task** *ctcname*.

Explanation: The OAM storage management component (OSMC) control task attempted to establish an object service routine for the control task. OSMC control task was unable to establish the object service routine due to the attach of the object service failing or the object service not initializing successfully. In the message text:

object-service-name [The name of the object service that could not be established.](#)

ctcname The CTC name.

System action: OSMC initialization stops for this control task.

Operator response: Notify the system programmer.

System programmer response: Either the attach failed or the object service initialization failed. If the attach failed, this message will be preceded by message CBR7000I, which contains the return code from the ATTACH macro. If the object service initialization failed, this message will be preceded by messages which further describes that failure. Refer to documentation for preceding messages.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.51 CBR9015I (Changed / Explanation only)

CBR9014I Error detaching the object service *object-service-name* **for control task** *ctcname*.

Explanation: The OAM Storage Management Component (OSMC) control task end-of-task routine attempted to detach an object service routine. OSMC control task end-of-task routine was unable to detach the object service routine due to the failure of the DETACH macro. In the message text:

object-service-name [The name of the object service that could not be detached.](#)

ctcname The control task name.

System action: OSMC processing continues.

Operator response: Notify the system programmer.

System programmer response: The DETACH macro failed. This message will be preceded by message CBR7001I, which contains the return code from the DETACH macro. Refer to documentation for message CBR7001I.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.52 CBR9103I (Changed)

CBR9103I A {READ | WRITE | DELETE} error occurred during Storage Management Processing for {PRIMARY | BACKUP | BACKUP2} for Collection *collection-name*, Object *object-name*, in Storage Group *storagegroup-name*, on volume *volser*. The return code is *return-code* and the reason code is *reason-code*.

Explanation: The error was detected during processing in preparation of a read, write or delete request. Retries were attempted and were also unsuccessful. The error may be due to a problem with the configuration database, the operating environment, [the file system or cloud configuration](#), or with the optical or tape library and media. If this was a read error [and the request was read from optical or tape](#), the volume will be the volume the read was attempted for; [otherwise](#) the volume will be N/A.

System action: OAM Storage Management Component (OSMC) stops, except where otherwise noted.

Operator response: Refer to the "OAM Macro Return and Reason Codes" section under "OAM Diagnostic Aids" in *z/OS DFSMSdfp Diagnosis*, and inspect other messages that are issued by OAM to aid in solving this problem. If necessary, contact your system programmer.

System programmer response: Refer to the "OAM Macro Return and Reason Codes" section under "OAM Diagnostic Aids" in *z/OS DFSMSdfp Diagnosis*, and inspect other messages that are issued by OAM to aid in solving this problem. If necessary, contact your programming support personnel.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.53 CBR9106I (Changed)

CBR9106I {CBRHROPT | CBRHRDFS | CBRHRCLD} has incurred an error from a read request while processing object *object-name* in collection name *collection-name* in storage group *storage-group-name*. Error return code is *return-code*; reason code is *reason-code*.

Explanation: The error was detected during processing in preparation of a read request. Retries were attempted and were also unsuccessful. The error may be due to a problem with the configuration database, the operating environment, [the file system or cloud configuration](#), or with the hardware or media. Additional information is provided for specific reason codes.

System action: OAM Storage Management Component (OSMC) stops, except where otherwise noted.

Operator response: Refer to the "OAM Macro Return and Reason Codes" section under "OAM Diagnostic Aids" in *z/OS DFSMSdfp Diagnosis*, and inspect other messages that are issued by OAM to aid in solving this problem. If necessary, contact your system programmer.

System programmer response: Refer to the "OAM Macro Return and Reason Codes" section under "OAM Diagnostic Aids" in *z/OS DFSMSdfp Diagnosis*, and inspect other messages that are issued by OAM to aid in solving this problem. If necessary, contact your programming support personnel.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.54 CBR9225I (Changed)

CBR9225I One or more objects in **{collection | storagegrp} {collection-name | storage-group-name}** were not processed by OSMC {Object Processing | DASD Space Manager | Object Recovery | Volume Recovery | Move Volume} because the object's {current location | size | **desired location**} is not supported by this level of OAM.

Explanation: During the OAM Storage Management Component (OSMC) process specified, one or more objects were encountered where the **object's** current location, **size or desired location** is not supported by OAM at this release level.

In the message text:

collection-name

If the collection-name specified is N/A, then the OSMC process specified was not processed on a collection boundary, in which case there will only be one CBR9225I message issued for the process.

storage-group-name

If the storage-group-name is specified, then the OSMC process specified was processed on a storage group boundary, in which case there will only be one CBR9225I message issued for each storage group.

current location

One of the following conditions occurred:

- ODLOCFL (Object location column) in the Object Directory table contains a value that is not valid for this release of OAM. As of z/OS® V2R3 and V2R4 with APAR OA55700, valid values for ODLOCFL are:
 - D equates to Disk Sublevel 1 (DB2®)
 - R equates to Recalled to Disk Sublevel 1
 - E equates to Disk Sublevel 2 (File System)
 - 2 equates to Recalled to Disk Sublevel 2
 - T equates to Tape Sublevel 1
 - U equates to Tape Sublevel 2
 - (blank) equates to Optical
 - **C equates to Cloud Level**
- ODLOBFL (Object Lob Flag column) in the Object Directory table contains a value of L on releases prior to z/OS V1R8. LOB storage structures are only supported in OAM at z/OS V1R8 and above.

size

An unsupported size consists of an ODSIZE (Object Size column) value in the Object Directory table that exceeds 268435456. Objects greater than 268435456 bytes are only supported in OAM at z/OS V1R10 and above.

(SPE) OAM Cloud as a Tier (OA55700)

desired location

An object was selected for transition processing, but the desired (target) location for the object is not supported.

System action: In the case of object processing, Volume Recovery, Move Volume or DASD space manager, OSMC does not process these objects, but processing continues for other objects. In the case of object recovery, the operation fails.

Operator response:

- If this message is issued on a pre-V1R8 level system and the object's LOB flag (ODLOBFL) contains L, then invoke the OSMC process on a z/OS V1R8 or higher level system.
- If the message is issued on a pre-V1R13 level system and the object's location column (ODLOCFL) contains E or 2, then invoke the OSMC process on a z/OS V1R13 or higher level system.
- If the message is issued for an OSMC process other than Object Recovery, on a pre-V1R10 level system and the object's size (ODSIZE) exceeds 268435456, then invoke the OSMC process on a z/OS V1R10 or higher level system.
- If the message is issued for Object Recovery, on a pre-V1R11 level system and the object's size (ODSIZE) exceeds 268435456, then invoke the OSMC process on a z/OS V1R11 or higher level system.
- If the message is issued on a system running at a release or maintenance level that does not support the cloud level and the object's transition criteria dictates that the object should transition to cloud, then invoke the OSMC process on a system that does support the cloud level.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.55 CBR9370I (Changed)

CBR9370I OSMC Detail for *taskname*:

Explanation:

| | | | | | | |
|---------|--------------|--------------|----------|----------|----------|----------|
| | READ | READ | READ | READ | READ | |
| | DISK1 | DISK2 | OPT | TAPE | CLOUD | |
| WORK Q: | aaaaaaaa | bbbbbbbb | cccccccc | dddddddd | eeeeeeee | |
| WAIT Q: | | fffffff | ggggggg | hhhhhhh | iiiiiii | |
| DONE: | jjjjjjj | kkkkkkk | lllllll | mmmmmm | nnnnnnn | |
| | WRITE | WRITE | WRITE | WRITE | WRITE | WRITE |
| | DISK1 | DISK2 | OPT | TAPE1 | TAPE2 | CLOUD |
| WORK Q: | oooooooo | pppppppp | qqqqqqq | rrrrrrr | sssssss | ttttttt |
| WAIT Q: | | uuuuuuu | vvvvvvv | wwwwwww | xxxxxxx | yyyyyyy |
| DONE: | zzzzzzz | a2a2a2a2 | b2b2b2b2 | c2c2c2c2 | d2d2d2d2 | e2e2e2e2 |
| | WRITE | WRITE | DIR | | | |
| | BACKUP1 | BACKUP2 | UPDTS | | | |
| WORK Q: | 11111111 | 22222222 | 33333333 | | | |
| WAIT Q: | 44444444 | 55555555 | 66666666 | | | |
| DONE: | 77777777 | 88888888 | 99999999 | | | |

End of Display Detail

Detail status information is provided for the OAM storage management component (OSMC) task specified in the DISPLAY command.

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. .
.

The column headings in the label lines of the messages are:

.
. .
.

READ CLOUD The READ CLOUD column contains the number of internal work items queued on the work and wait queues and the number of internal work items completed by the read cloud service

WRITE CLOUD The WRITE CLOUD column contains the number of internal work items queued on the work and wait queues and the number of internal work items completed by the write cloud service

.
. .
.

System action: The OSMC continues processing.

Source: Object Access Method (OAM)

Routing Code: 6

Descriptor Code: 5,8,9

3.5.56 CBR9842I (Changed / Explanation only)

CBR9842I Single Object Recovery did not recover collection *collection-name*, **object** *object-name* because of an invalid object location.

Explanation: An operator command has been issued to recover a single object; however, the object has an invalid value in the ODLOCFL column of the OAM DB2® Object Directory Table.

Valid values for the ODLOCFL column are: [\(As of z/OS V2R3 and V2R4 with APAR OA55700\)](#)

- "T" - object currently resides on tape
- "U" - object currently resides on tape sublevel 2
- " " - object currently resides on optical
- "D" - object currently resides on disk sublevel 1 (DB2/DASD).
- "R" - object currently resides on disk sublevel 1 (DB2/DASD) in a recalled state
- "E" - object currently resides on disk sublevel 2 (file system)
- "2" - object currently resides on disk sublevel 2 (file system) in a recalled state
- "C" - [object currently resides on cloud](#)

Note: [This message may be issued if this system is at a release or maintenance level that does not support objects on the indicated level.](#)

System action: Processing stops.

Operator response: Notify the storage administrator.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4

3.5.57 CBR9890I (Changed / Explanation only)

CBR9890I Object Recall could not recall collection *collection-name*, object *object-name* because the object has {been deleted | an invalid location}.

Explanation: OSMC attempted to recall collection *collection-name*, object *object-name*, but one of the following conditions occurred:

- The object with the name specified could not be found. The object was deleted after OSMC received the request to perform the recall, but before OSMC began to actually process the request.
- The object with the name specified has an invalid location, caused by an invalid value in the ODLOCFL column of the OAM DB2® Object Directory Table.

Valid values for the ODLOCFL column include: [\(As of z/OS V2R3 and V2R4 with APAR OA55700\)](#)

- blank - object currently resides on Optical.
- D - object currently resides on Disk Sublevel 1 (DB2).
- R - object currently resides on Disk Sublevel 1 in a recalled state.
- E - object currently resides on Disk Sublevel 2 (File System.)
- 2 - object currently resides on Disk Sublevel 2 in a recalled state.
- T - object currently resides on Tape Sublevel 1.
- U - object currently resides on Tape Sublevel 2.
- [C - object currently resides on Cloud.](#)

Note that the ODLOCFL column might contain an invalid value if the object was stored or transitioned at a higher level system. For example, ODLOCFL values of E and 2 are supported at z/OS® V1R13 and above, but would be considered invalid on pre-V1R13 level systems.

[This message may be issued if this system is at a release or maintenance level that does not support objects on the indicated level.](#)

System action: Object is not recalled.

Operator response: None.

Source: Object Access Method (OAM)

Routing Code: 2

Descriptor Code: 4