

IBM Education Assistance for z/OS V2R2

Item: DFSMS OAM OSREQ API 64-bit Buffers

Element/Component: DFSMS OAM



Agenda

- Trademarks
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- Usage & Invocation
- Interactions & Dependencies
- Presentation Summary
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Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.



Presentation Objectives

Features

- New **optional** capability for OAM OSREQ applications to exploit **virtual storage above the 2GB “bar”** (the limit of 31 bit addressing)
 - compatible interface change
 - no change in behavior for non-exploiters
 - no migration actions
- **64-bit addressable virtual storage** can be used for the **data buffer**
 - to store object data using **OSREQ STORE**
 - to retrieve object data using **OSREQ RETRIEVE**

Background info: Object Access Method (OAM) is a component of DFSMSdftp providing storage and management of “objects” (unstructured binary data such as scanned images, documents, video, etc.) using SMS constructs. The OAM API (named OSREQ) allows applications to store, retrieve, and delete objects and to query or change information about objects. Objects can also be managed throughout their life cycle in an OAM storage hierarchy consisting of “Disk”, “Optical”, and “Tape” levels including scheduled movement within the hierarchy, object backups, and expiration.



Overview

Benefits

- Provides **virtual storage constraint relief** within the application address space
- Can **improve efficiency** of application interactions with OAM
 - when used as an alternative for **storing** objects up to 2000MB in “parts” with the OSREQ “store sequence” functions (STOREBEG/STOREPRT/STOREEND) which requires multiple OSREQ invocations – one to begin the store activity, one for each “part” to be stored (limited in size by available virtual storage below the 2GB “bar”), and one to end the store activity
 - when used as an alternative for **retrieving** objects up to 2000MB which requires multiple OSREQ invocations each retrieving up to a maximum of 256MB

Note: The OAM OSREQ application programming interface itself remains **AMODE 31** (only the data **buffer** is 64-bit)



Usage & Invocation

OSREQ API – STORE

- Object stored in its **entirety**
- Supported to **all destinations** in OAM storage hierarchy (DB2 sublevel, File System sublevel, Optical, Tape)
- Object sizes from **1 byte** to **2000MB** (optical restricted to current maximum limit of 256MB)
- Object data provided in a **single** 64-bit addressable virtual storage buffer (no buffer list)

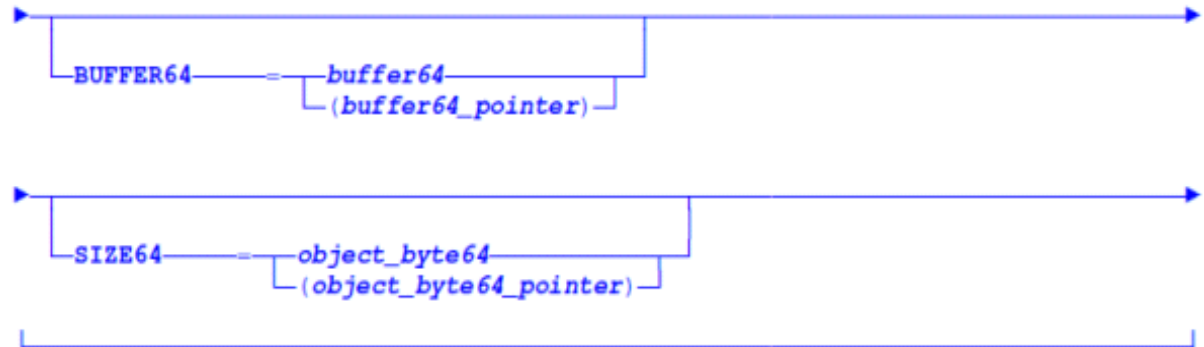


Usage & Invocation

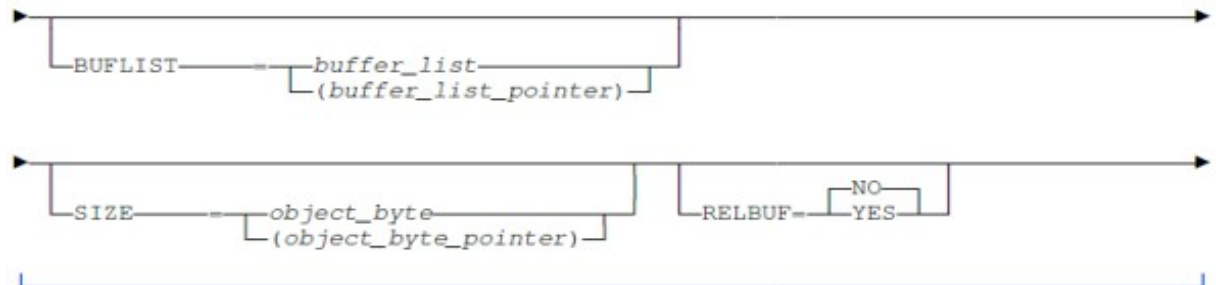
OSREQ API – STORE Externals

- New OSREQ STORE keywords **BUFFER64** and **SIZE64** used when specifying **64-bit values**

For 64-bit virtual address buffers:



For 31-bit virtual address buffers:



Usage & Invocation

OSREQ API – RETRIEVE

- Object retrieved **partially** or in its **entirety** (up to 2000MB)
- Supported from **all destinations** in OAM storage hierarchy (DB2 sublevel, File System sublevel, Optical, Tape)
- Object sizes from **1 byte** to **2000MB** (optical restricted to current maximum limit of 256MB)
- Object data retrieved into a **single** 64-bit addressable virtual storage buffer (no buffer list)

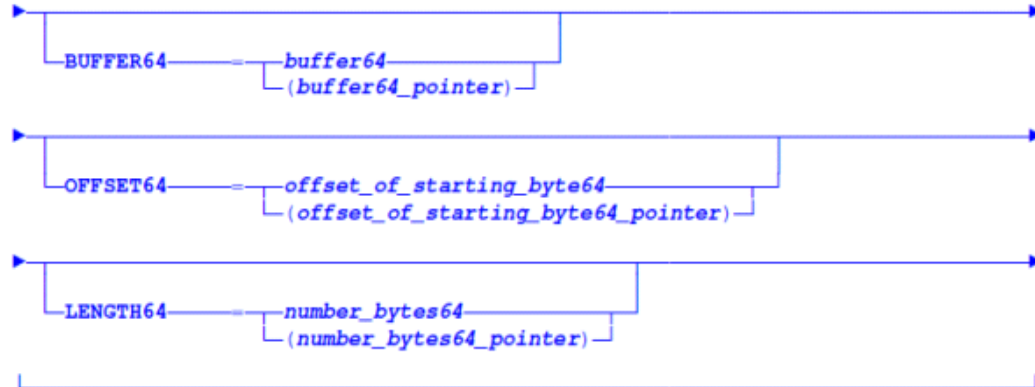


Usage & Invocation

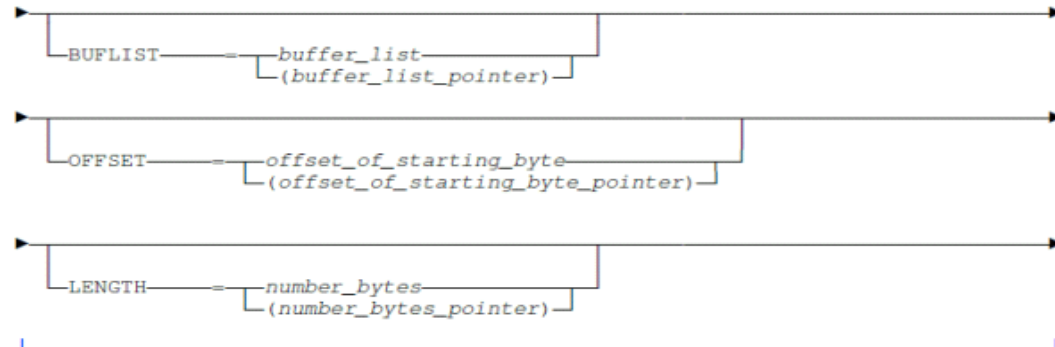
OSREQ API – STORE Externals

- New OSREQ RETRIEVE keywords **BUFFER64**, **OFFSET64** and **LENGTH64** used when specifying **64-bit values**
- Note: **LENGTH64** is *required* when **BUFFER64** is specified for OSREQ RETRIEVE

For 64-bit virtual address buffers:



For 31-bit virtual address buffers:



Usage & Invocation

OSREQ API Return and Reason Codes

Return Code	Reason Code (hex)	Description
8	24xx1701	The BUFFER64 area (double word) passed to OAM on the OSREQ macro is in unusable storage.
8	24xx1801	The SIZE64 area (double word) passed to OAM on the OSREQ macro is in unusable storage.
8	24xx1802	The size specified in the SIZE64 area for an OSREQ STORE request is negative or zero.
8	24xx1803	The size specified in the SIZE64 area for an OSREQ STORE request has an invalid value. The value exceeds the maximum configured object size (which may be up to 2000MB).
8	24xx1804	The size specified in the SIZE64 area for an OSREQ STORE request has an invalid value. The value exceeds 256MB which is the maximum for an object to be stored to Optical.
8	24xx1901	The LENGTH64 area (double word) passed to OAM on the OSREQ macro is in unusable storage.
8	24xx1902	The length specified in the LENGTH64 area for an OSREQ RETRIEVE request is negative or zero.
8	24xx1903	The length specified in the LENGTH64 area for an OSREQ RETRIEVE request has an invalid value. For a retrieve of a full object, the value is larger than the object size. For a partial retrieve, the length, when added to the offset specified in the OFFSET64 area, is beyond the end of the object.
8	24xx1A01	The OFFSET64 area (double word) passed to OAM on the OSREQ macro is in unusable storage.
8	24xx1A02	The offset specified in the OFFSET64 area for an OSREQ RETRIEVE request is negative.
8	24xx1A03	The offset specified in the OFFSET64 area for an OSREQ RETRIEVE request has an invalid value. The offset value specified is beyond the last byte of the object.
8	44xx01xx	A 64-bit OSREQ STORE request requires that both BUFFER64 and SIZE64 values are specified.
8	44xx02xx	A 64-bit OSREQ RETRIEVE request requires that both BUFFER64 and LENGTH64 values are specified and, optionally, an OFFSET64 can be specified when both BUFFER64 and LENGTH64 have been specified.
8	44xx03xx	For a 64-bit OSREQ STORE request, BUFFER64 and SIZE64 are mutually exclusive with BUFLIST, RELBUF, and SIZE.
8	44xx04xx	For a 64-bit OSREQ RETRIEVE request, BUFFER64, LENGTH64, and OFFSET64 are mutually exclusive with BUFLIST, LENGTH, and OFFSET.
12	7Cxx04xx	Insufficient 31-bit virtual storage available in the application address space needed to transfer data to or from a 64-bit addressable storage area.
12	B2xx01xx	For a 64-bit OSREQ STORE request, the required LOB environment does not exist for storage of an object greater than 256MB to the DB2 sublevel.



Usage & Invocation

CBROSR2 Sample

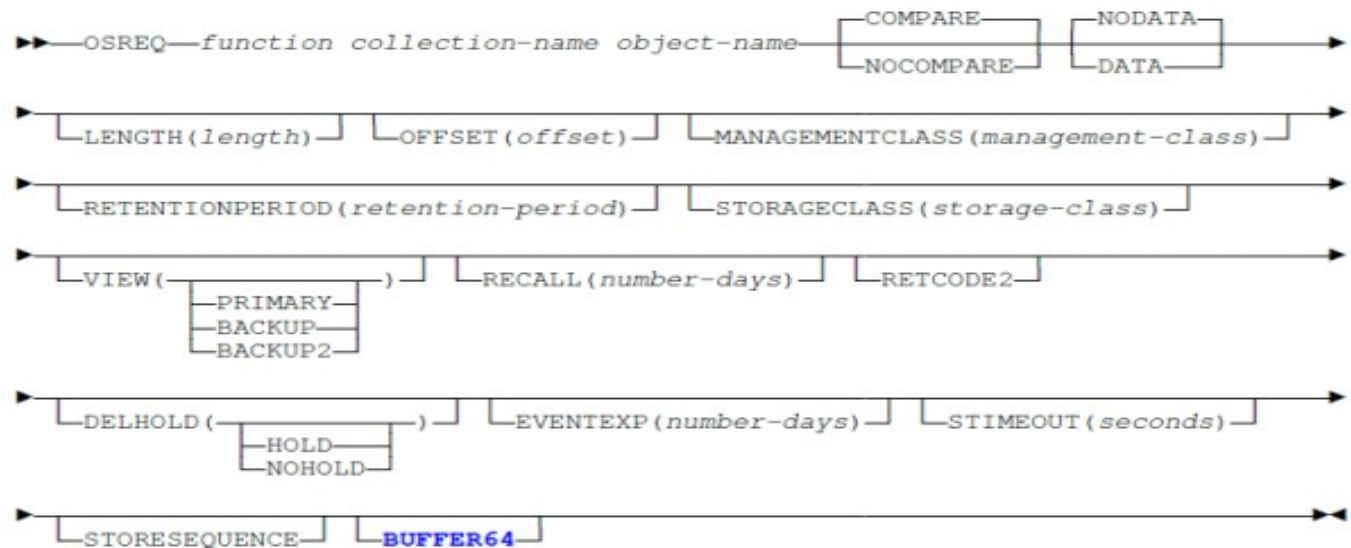
- The CBROSR2 sample program has been updated to accept and process **optional** new parameters:
 - 64-bit buffer address
 - 64-bit size
 - 64-bit length
 - 64-bit offset
- Can be used directly by application programs to exploit new 64-bit buffer support



Usage & Invocation

TSO/E OSREQ Command Processor Externals

- New **BUFFER64** keyword can be used on STORE or RETRIEVE functions to specify that a **64-bit addressable virtual storage buffer** be used internally when interacting with the OSREQ API



New **reason codes** can be returned with a return code of 20 from TSO/E OSREQ:

- 10** An OSREQ STORE command was issued with both the STORESEQUENCE and BUFFER64 keywords specified. Error message CBR0450I is issued.
- 11** A nonzero return code was issued from the IARV64 macro when storage was requested for a 64-bit addressable virtual storage buffer above the 2GB “bar”. Error message CBR0451I is issued.



Usage & Invocation

SMF

- ***Type 85 record Subtype Changes***

2	<i>OSREQ STORE</i>	<i>Flag added to indicate when 64-bit virtual storage buffer used</i>
3	<i>OSREQ RETRIEVE</i>	<i>Flag added to indicate when 64-bit virtual storage buffer used</i>



Interactions & Dependencies

- To exploit this support and gain the benefits, an application program will have to be written or modified to use the new keywords for the OSREQ STORE and RETRIEVE functions.



Presentation Summary

- OAM's OSREQ 64-bit Buffer Support can provide virtual storage constraint relief for OAM OSREQ applications that currently may have difficulty acquiring sufficient virtual storage within a traditional 2G address space.

This new functionality:

- May be used as an alternative to **storing** an object up to 2000M in “parts” with the OSREQ **store sequence** functions (STOREBEG/STOREPRT/STOREEND) where **multiple** OSREQ API invocations are required and the maximum size for each “part” is limited by the practical amount of virtual storage available below the 2G “bar” for each STOREPRT API invocation
- May be used as an alternative to **retrieving** an object (or a “partial” object) with OSREQ RETRIEVE where **multiple** OSREQ API invocations are required and the maximum size for each retrieve request is limited to 256M. This new functionality may also improve the efficiency of the OSREQ application since only a **single** OSREQ invocation is needed to store an object up to 2000M in size or to retrieve an object up to 2000M in size.

The “DFSMS OAM OSREQ API 64-bit Buffers” support major functionality includes:

- OSREQ macro changes for the STORE and RETRIEVE functions and associated new reason codes
- TSO/E OSREQ command processor changes for STORE and RETRIEVE functions
- CBROSR2 (in SAMPLIB) sample program changes in support of the OSREQ macro changes
- Support for the use of 64-bit addressable virtual storage buffers on OSREQ STORE and OSREQ RETRIEVE for objects from 1 byte to 2000M for all destinations in the OAM storage hierarchy: DB2 (4K, 32K, LOB), file system, tape, and optical (with the existing restriction of a maximum object size of 256M for optical)
- Includes the source system handling in OAMPLEX configurations for objects less than or equal to 50M for optical writes/reads and tape reads that are routed to another system in the OAMPLEX .



Appendix

▪ For More Information

<i>z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Object Support</i>	TSO/E OSREQ Command Processor Syntax SMF
<i>z/OS OAM Application Programmer's Reference</i>	OSREQ API OSREQ Return/Reason Codes CBROSR2 Sample Program
<i>z/OS DFSMSdfp Diagnosis</i>	OSREQ Return/Reason Codes LCS Return/Reason Codes
<i>z/OS MVS System Messages</i>	OAM Messages (CBR)

