CICS VSAM with RLS

• VSAM Record Level Sharing (RLS) is a major extension to VSAM.
NOTE: Although its design was for use by CICS, it can be used by any application.
• VSAM RLS extends the DFSMS storage hierarchy to support a data-sharing environment across multiple systems in a Parallel Sysplex.
- This support is primarily for VSAM data sets that use online-transaction-processing applications.
- It provides multi-system VSAM data sharing at a record level for CICS applications.
- The VSAM RLS product is designed to exploit z/OS Coupling Technology.
- VSAM RLS provides read-only access by non-CICS applications concurrent with read/write by CICS applications to recoverable data sets.
- It allows any number of users within your Parallel Sysplex to share your existing VSAM data sets.
- It can provide full data integrity (read and write).
NOTE: The serialization is at record level. However, to implement recoverable VSAM data sets the users must have their own backup log as CICS has.

• VSAM RLS does not introduce new types of VSAM data sets; rather, it introduces a new way of accessing existing data sets.
- Apart from the need to open data sets in RLS mode, the same VSAM record management interfaces are used. You need to modify the RLS parameter of the ACB macro to open the data set in your program or you can also specify the RLS mode by using the new keyword RLS in your DD card that points to your VSAM data set in your JCL.
NOTE: RLS must be used with KSIDS, RRRDS, VRRDS, and ESDS VSAM data sets. PATH (AD) access for KSIDS and ESSDS is allowed with RLS.
- Extended format, extended addressability, spanned, and compression are also supported by RLS.
-Beginning with z/OS 1.12, VSAM striping is also supported for VSAM data sets being accessed in RLS mode.

RLS and non-RLS VSAM data sets can coexist.
NOTE: Access method services do not use RLS when performing an IDCAMS EXPORT, IMPORT, PRINT, or REPRO command. If the RLS keyword is specified in the DD statement of a data set to be opened by method services, the keyword is ignored and the data set is opened and accessed in non-RLS mode.
• Both CICS and non-CICS jobs can have concurrent read or write access to non-recoverable data sets.
NOTE: there is no coordination between CICS and non-CICS, so data integrity can be compromised.
• Non-CICS jobs can have read-only access to recoverable data sets concurrently with CICS jobs, which can have write access.

- VSAM RLS uses a coupling facility to perform data-set-level locking, record locking, and data caching.
- VSAM RLS uses the conditional write and cross-invalidates of the Function Level Sharing cache structure, thereby avoiding the need for control interval (CI) level locking.
- VSAM RLS uses the Function Level Sharing cache as store-through caches.
- When a control interval of data is written, it is written to both the Coupling Facility cache and the direct access storage device (DASD).
- This ensures that problems occurring with a coupling facility data set do not result in the loss of VSAM data.
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- RLS does not support the following options and capabilities:
  • Linear, KEYRNAGE, IMBED, and temporary data sets
  • Addressed access to KSIDS data sets
  • Control Interval Access
  • User Buffering (UBF)
  • GETIX and PUTIX requests
  • VSAM Checkpoint/Restart facility
  • ACBSD (system data set) specification
  • Cross-memory mode, SRB mode, or under a FORR

CICS function shipping allows for writing CICS Application programs without regard to the location of the requested resources although this technique limits program independence.

Prior to VSAM RLS, a CICS VSAM data set was owned and directly accessed by one single CICS. Shared access across CICS Application Owning Regions (AORs) to a single VSAM data set was provided by CICS function shipping. With function shipping, one CICS File Owning Region (FOR) can access the VSAM data sets on behalf of other CICS regions.

Problems
There are a couple of problems with this CICS configuration:
  • Multiple function performance is not acceptable.
  • Lack of scalability.
  • Over time the FOR becomes a bottleneck because CICS environments become increasingly complex. CICS required a solution to have direct shared access to VSAM data sets from multiple CICSs.
  • Need to support remote.
- VSAM’s HURB/HARBA are updated only when CICS does the data set, causing conflicts along shared updates.
NOTE: These issues are fully addressed by VSAM RLS.

You can access VSAM data sets in RLS mode from users that run in just one z/OS image (monoplex).
NOTE: Even in a monoplex environment a Coupling Facility is required. The reason for this is to use the better serialization that is provided by RLS. For example, in a non-RLS mode two jobs cannot simultaneously access for update a VSAM data set with total read and write integrity. That is, for SHAREOPTIONS (1,3), just one can open the VSAM data set. The other must wait for the first to close the data set. The granularity of the serialization is at data set level.
- If the two jobs access the data set in RLS mode, both the OPENS succeed.
- Both in parallel can then update the VSAM data set.
- The serialization is at logical record level.
- VSAM SHAREOPTIONS are ignored when you access your data set in RLS mode.
- You can have any number of read/write users who can access VSAM data sets in RLS mode.

NOTE: If you specify NONE, then RLS caches only the index part of the VSAM data set.

VSAM SHAREOPTIONS are ignored when you access your data set in RLS mode.

AOR
CICS VSAM
Hyperbatch
Batch2
CICS IMS
IBM recommends that you use this option, caching feature before the function is enabled.

NOTE: If you specify NONE, then RLS caches only the index part of the VSAM data set.

VSAM's HURBA/HARBA are updated only when RLS does not support record locks for a single VSAM sphere (index / data components) to be placed in multiple lock structures.
Two RLS Diagnostics Commands

D SMS,SMSVSAM,DIAg(contention)

- Will display any latch contention on SMSVSAM resources
- Latches are 8 bytes of storage used as a logical means to serialize resources. They are either held, or waited on; there are no shared requests.
- The contention displayed will show the latch address, the holder and any waiters if the latch is in contention.
- The display will show elapsed time for how long a latch was in contention.

Sample display for DIAg command #1

09.55.29 SYSTEM1  IGW343I VSAM RLS DIAg STATuS (y.O1)
|--------RESOURCE----|-------WAITER--------|-------HOLDER-----| ELAPSED |
TYPE | ID | JOB NAME | ASID | TASK | ASID | TASK | TIME |
------|----|---------|-----|------|-----|------|-----|
LATCH | 7F158C70 | SMSVSAM | 003A | 0080A250 | 003A | 00807218 | 00:00:06 |
DESCRIPTION: IGWLIST - SMB OBJECT POOL |
LATCH | 7F151E78 | SMSVSAM | 003A | 00807218 | 003A | 0080C1C8 | 00:00:21 |
DESCRIPTION: IGWLYDS - SMB OBJECT POOL |
LATCH | 78AD43B8 | SMSVSAM | 003A | 0080C1C8 | 002D | 007F3000 | 00:19:09 |
LATCH | 78AD43B8 | SMSVSAM | 003A | 00805A48 | 002D | 007F3000 | 00:22:09 |
LATCH | 07F181D0 | SMSVSAM | 003A | 00806938 | 002D | 007F3000 | 00:33:23 |
LATCH | 07F130B8 | SMSVSAM | 003A | 00806CF0 | 0000 | 00000000 | 11:23:30 |

Sample display for DIAg command #2

09.55.29 SYSTEM1  d sms,smsvsam,diag(c)
09.55.29 SYSTEM1  IGW343I VSAM RLS DIAg STATuS (y.O1)
|--------RESOURCE----|-------WAITER--------|-------HOLDER-----| ELAPSED |
TYPE | ID | JOB NAME | ASID | TASK | ASID | TASK | TIME |
------|----|---------|-----|------|-----|------|-----|
LATCH | 78AD43B8 | SMSVSAM | 003A | 00805A48 | 003A | 007F3000 | 00:22:09 |
LATCH | 07F181D0 | SMSVSAM | 003A | 007F3000 | 003A | 00805A48 | 00:22:09 |
LATCH | 07F181D0 | SMSVSAM | 003A | 008064F8 | 003A | 008064F8 | 00:22:24 |
LATCH | 07F181D0 | SMSVSAM | 003A | 00806CF0 | 003A | 00805A48 | 00:23:30 |

NOTES:
- DIAG should be used in conjunction with D GRS,C to determine if any of the latch holders are waiting on ENQs.
- Any latch contention with an elapsed time of more than a few seconds is most likely stuck.
- Sometimes the holding ASID id not SMSVSAM, but another address space like a CICS region. Canceling that region could avoid an SMSVSAM wide outage.

D SMS,SMSVSAM,QUIESCEN

- The quiesce display will show any outstanding quiesce events
- A quiesce event is a decision to allow unhindered CICS access to an RLS dataset.
- Any CICS regions that are part of the quiesce event will show up in the display.
- If there is not an event in progress you will receive an IGW540I message rejecting the command.

With quiesce activity

IGW540I 13.30.45 DISPLAY SMS,SMSVSAM,QUIESCEN
SYSTEM1
| SPHERE NAME: DLKHI,TEST1 |
| SYSTEM NAME: MVS | START TIME: | .27 .50 TOTAL ELAPSE: | 57.02 .55 |
| PARTICIPATING SUB-SYSTEM STATUS: SCHEDULED: | COMPLETED: ELAPSE: | |
| SUB-SYSTEM NAME: CICSAOP1 | 00.00.00 | 57.02 55 |
| SUB-SYSTEM NAME: CICSAOP2 | 27.50 | .27 50 |
| SYSTEM NAME: MVS1 |

Without quiesce activity

IGW540I 07.54.28 DISPLAY SMS,SMSVSAM,QUIESCEN
DISPLAY SMSVSAM QUIESCEN SPHERE IS REJECTED.
NO QUIESCEN EVENTS ARE ACTIVE ON THIS SYSTEM.

| SPHERE NAME: Name of dataset being quiesced/unquiesced. |
| SYSTEM NAME: System where command was issued. |
| SUB-SYSTEM NAME: Name of CICS region involved in quiesce event. |
- SCHEDULED: Time when the quiesce event was issued.
- COMPLETED: Time when CICS region responded to event.
- ELAPSE: Time between when the quiesce event was issued and it was finally responded to by CICS.

NOTES:
- The Quiesce command is invaluable to determine what CICS regions are holding up a quiesce request.
- Any CICS regions that have 00.00.00 in the completed section are most likely in trouble and should be dumped along with SMSVSAM before termination.
- In most scenarios, the CICS region, instead of SMSVSAM, can be terminated to allow the quiesce event to finish. Thus saving a SMSVSAM wide outage.