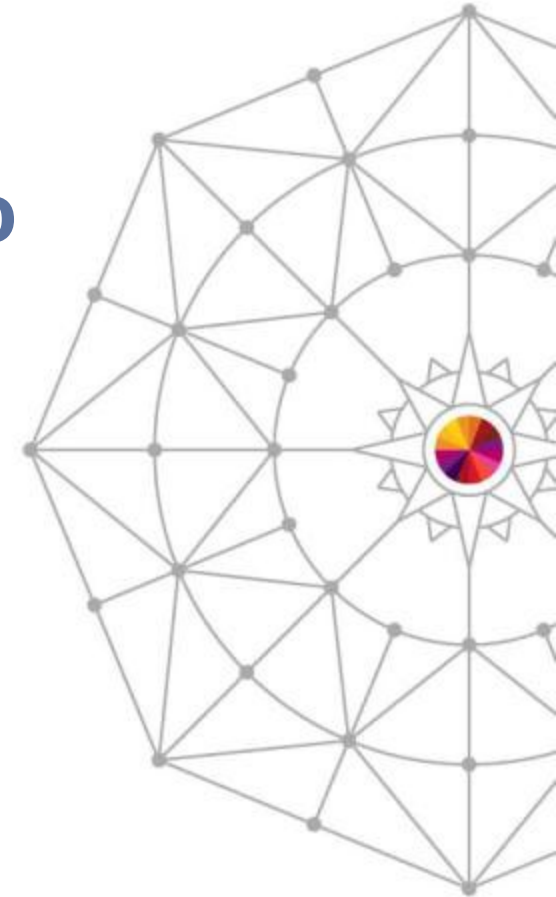# RLS and Catalogs
# A Practical Guide / How-to

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Session 15089

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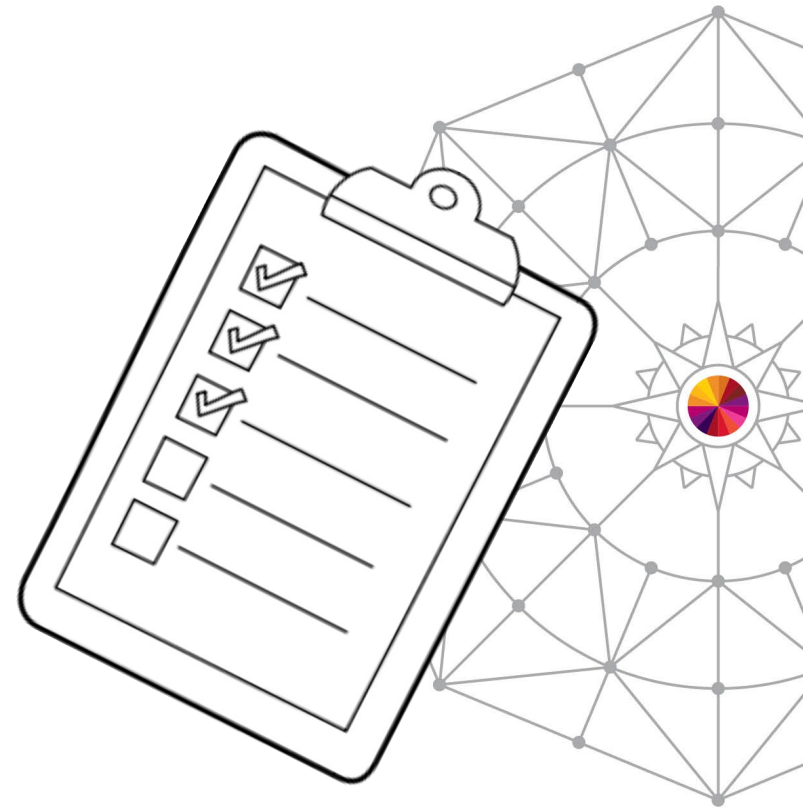
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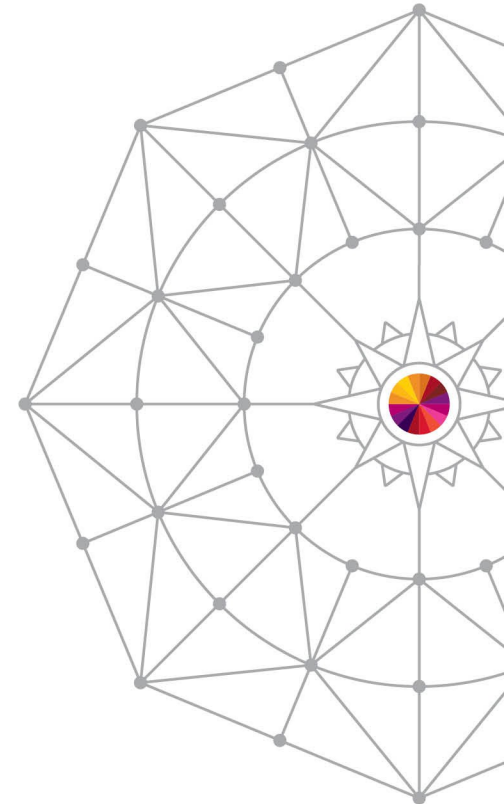
# Master Agenda

- **Why use RLS for catalogs?**
  - Getting it Going
    - Monitoring
      - Maintenance
        - If things go wrong

# Why RLS
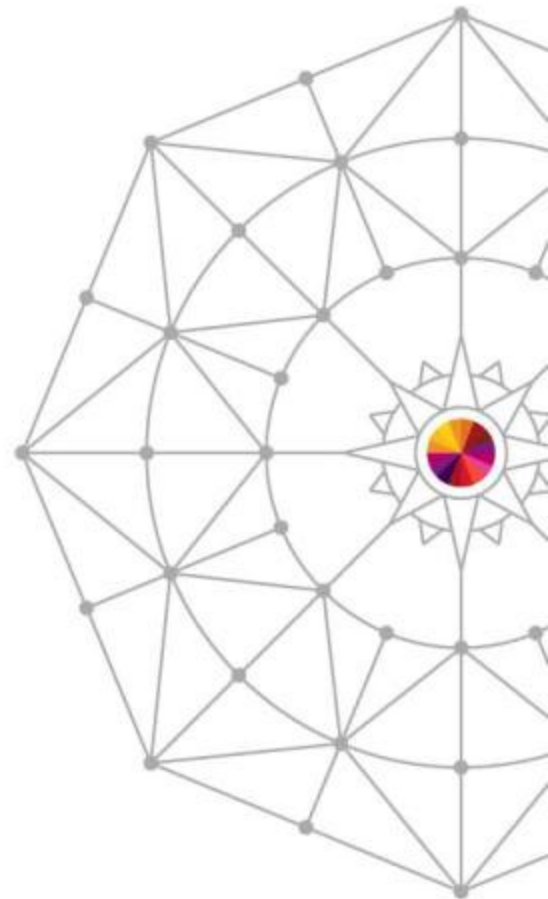
# Current Catalog Limitations

- **Performance**
  - Contention on SYSIGGV2 when updating
  - Limited catalog buffering and buffer invalidation
  - Limited VSAM buffers/strings/storage
- **Availability**
  - Catalogs need to be split to resolve contention
  - Catalogs unavailable during split / recovery
- **Integrity**
  - Catalogs can be damaged by utilities updating while OPEN
  - Lack of SYSPLEX control and serialization
- **Recovery**
  - Long / error prone forward recovery process

# Regular Catalog Access



Catalog on SYS1

Catalog on SYS2

Catalog on SYS3

SYSIGGV2 Conflict
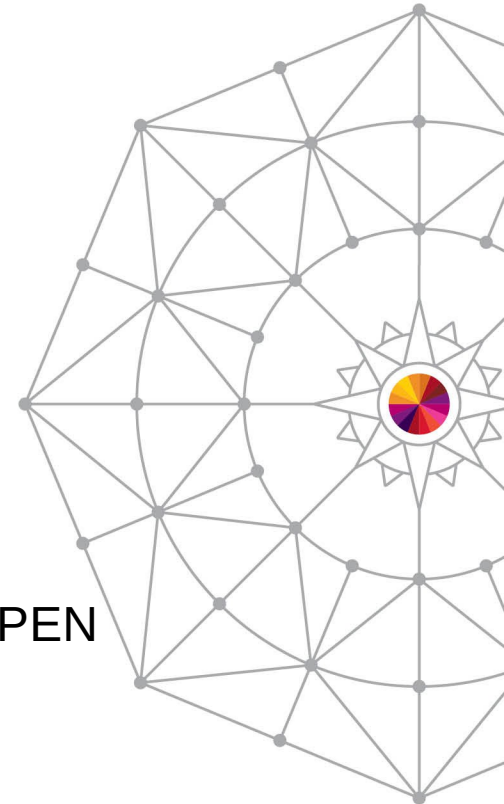
Catalog
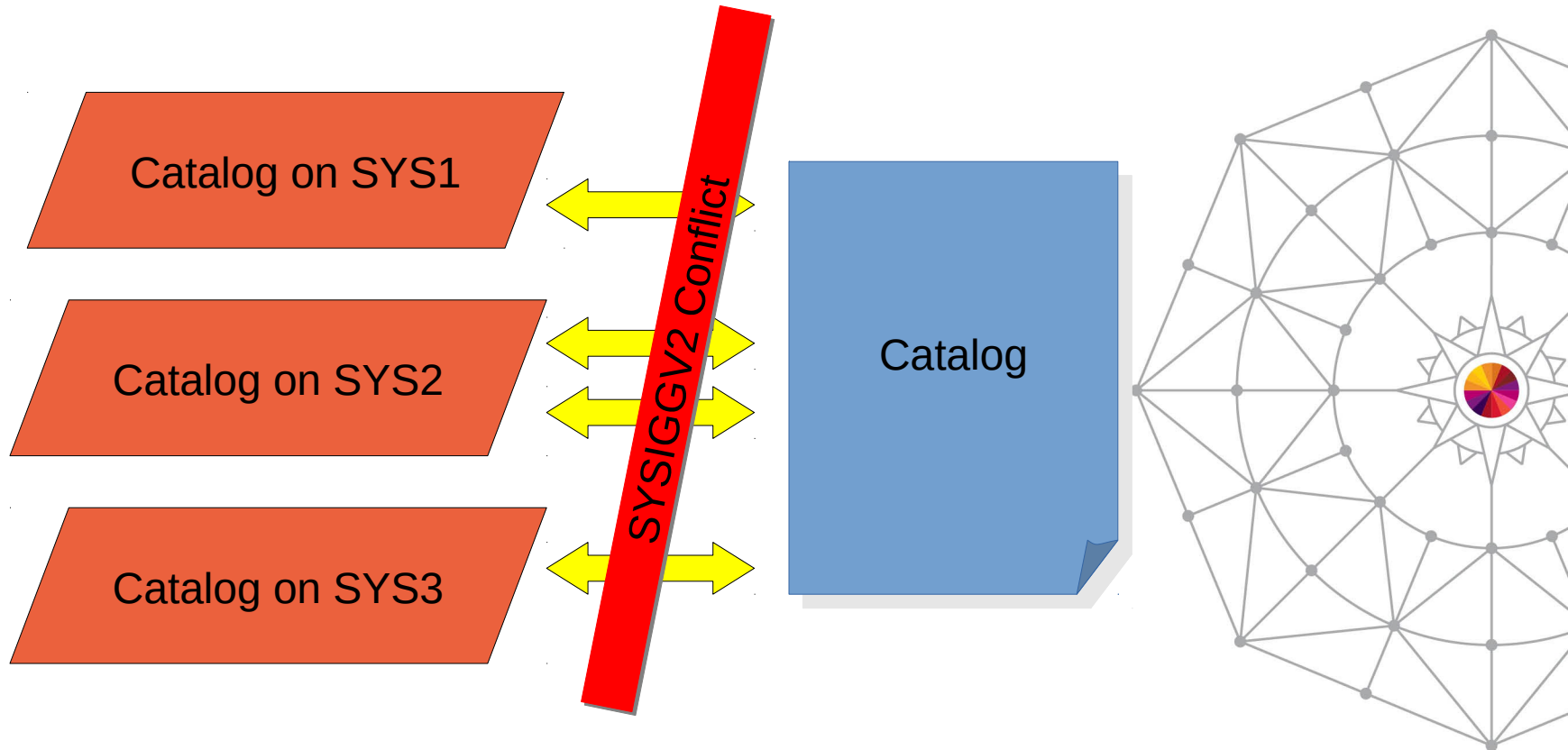
*Potential contention on SYSIGGV2 'ucat' during updates*

# RLS VSAM Access



Catalog on SYS1

Catalog on SYS2

Catalog on SYS3

SMSVSAM

Catalog
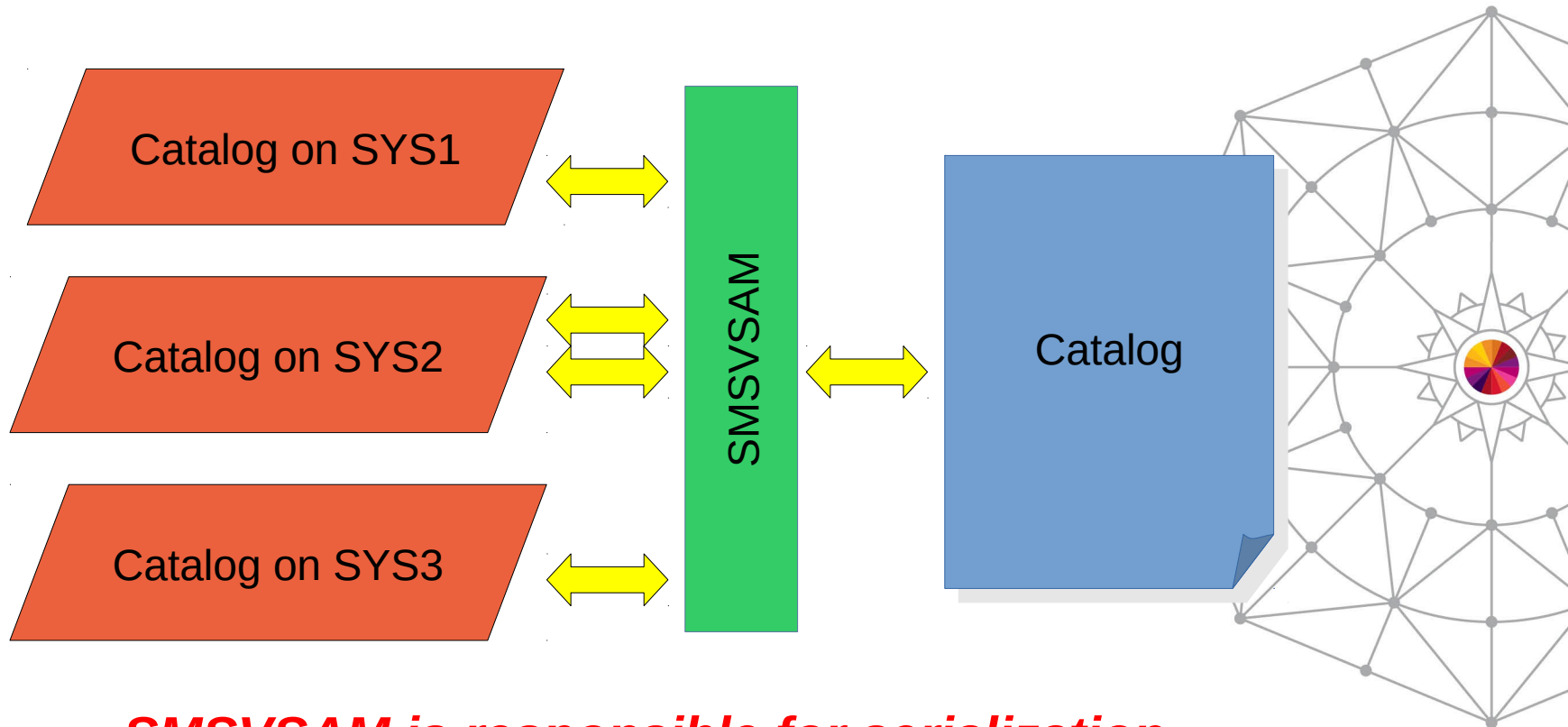
*SMSVSAM is responsible for serialization.*
*Serialization is at the RECORD level instead of DS*
*No more SYSIGGV2 'ucat' ENQ contention*

SHARE
in Anaheim

# Improvements RLS Offers

- **Reduced contention**
  - Eliminates SYSIGGV2 'UCAT' ENQ contention
  - Plans to remove the SYSIGGV2 'sphere' ENQ
  - No need to split catalogs to lower contention
- **Higher throughput**
  - Significant improvement in elapsed time & CPU
  - Much shorter wait times
- **Improved control**
  - Suspend / resume ALL catalogs, plex-wide
  - Prevents unserialized updates
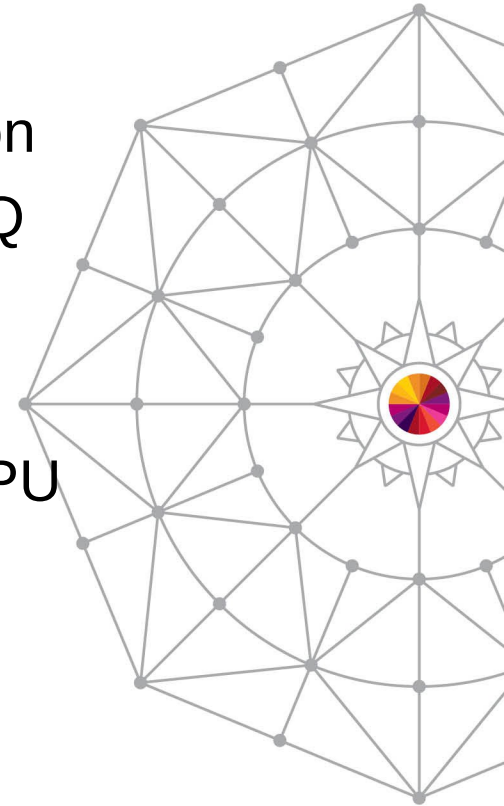
# Performance Benchmark Test

| Test | Elapsed Time (min) | | CPU* (sec) | | Deltas | |
|---|---|---|---|---|---|---|
| | Non-RLS | RLS | Non-RLS | RLS | Elapsed | CPU* |
| DELETE | 80.42 | 8.42 | 1269.3 | 298.7 | 89.51% | 76.46% |
| DEFINE | 48.84 | 21.42 | 685.6 | 130.8 | 56.13% | 80.91% |
| SEQ READ | 7.40 | 5.03 | 65.1 | 75.2 | 32.08% | -15.52% |
| DIR READ (first sys) | 26.77 | 20.33 | 94.0 | 109.6 | 24.1% | -14.3% |
| DIR READ (second sys) | 26.86 | 20.29 | 95 | 109.9 | 24.5% | -13.5% |

**\*CPU reduction in GRS, CATALOG may see a small increase – best to compare per request**

Test environment: Z10 2097 E12, 3 LPARs, 7 CPUs, 1 CF, z/OS 2.1
Catalog parms: TASKMAX=180, CISIZE(32768) and CISIZE(4096), STRNO(255)
RLSABOVETHEBAR(NO) RLSCFCACHE(ALL) RLSMAXPOOLSIZE(100M) CF Cache size 1G
Catalog RLS vs Catalog VLF at z/OS 2.1
Tests: 300,000 data sets, 100 jobs using 1000 data sets on each LPAR
Source: "Unclog your Systems with z/OS 2.1 – Something New and Exciting for Catalog" by Terri Menendez, IBM
Spring 2013 Session #12977, 12978
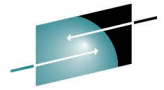
# Performance Benchmark Test
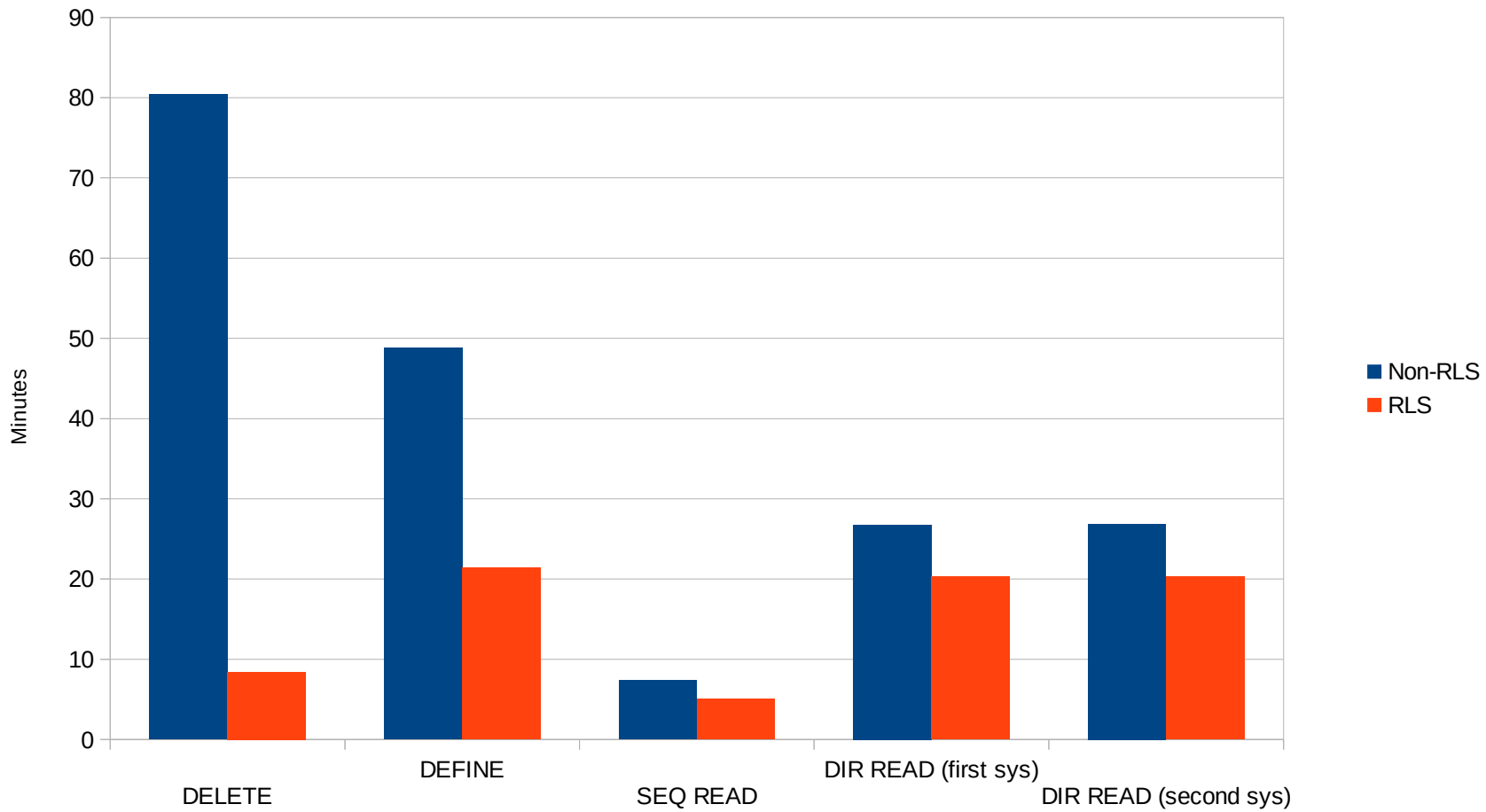
# Enough, let's do it!
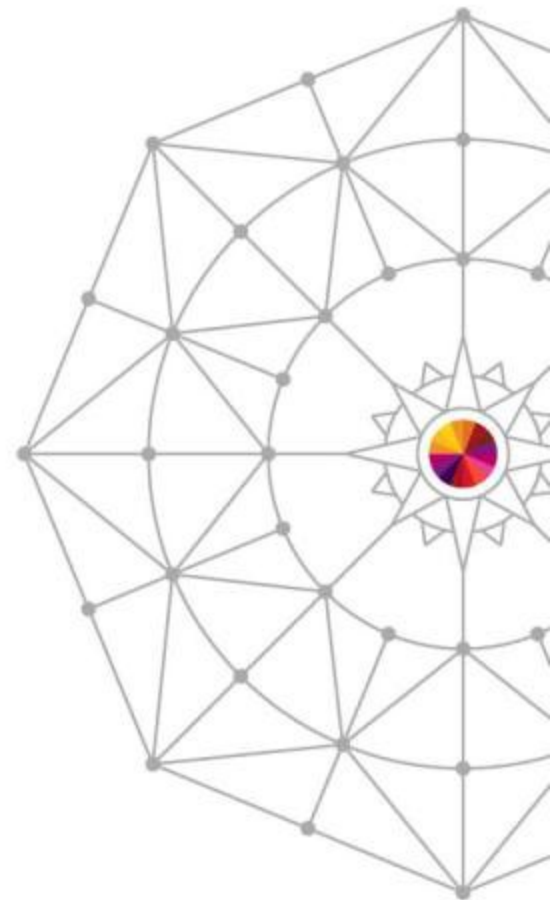
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- Why use RLS for catalogs?
  - **Getting it Going**
    - Monitoring
      - Maintenance
        - If things go wrong
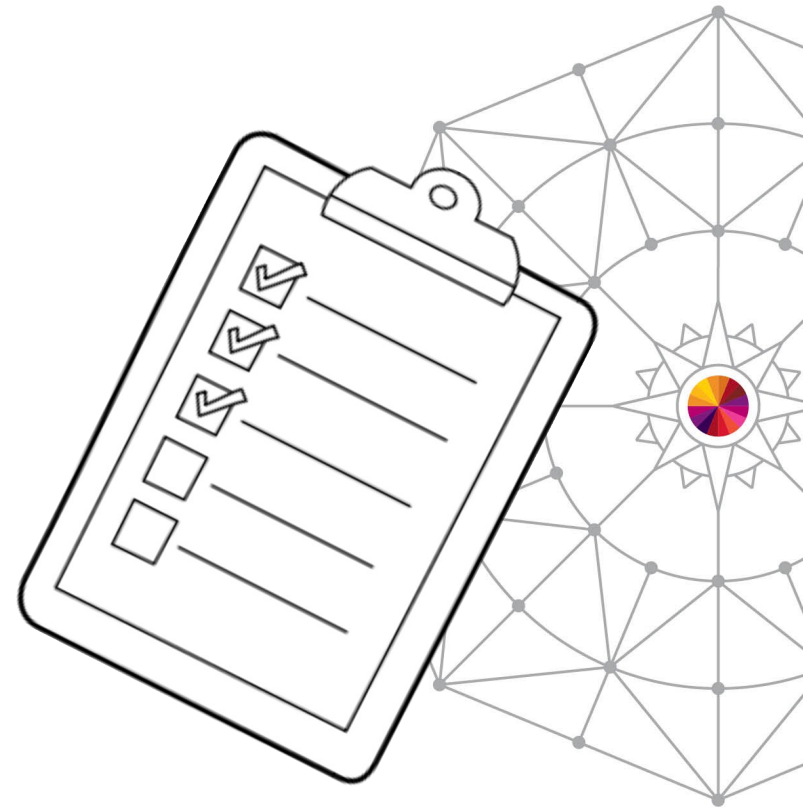
# Simplest Case

- If you already have SMSVSAM running

  1. **IDCAMS ALTER ucat LOG(NONE)**
  2. **F CATALOG,RLSENABLE(ucat)**
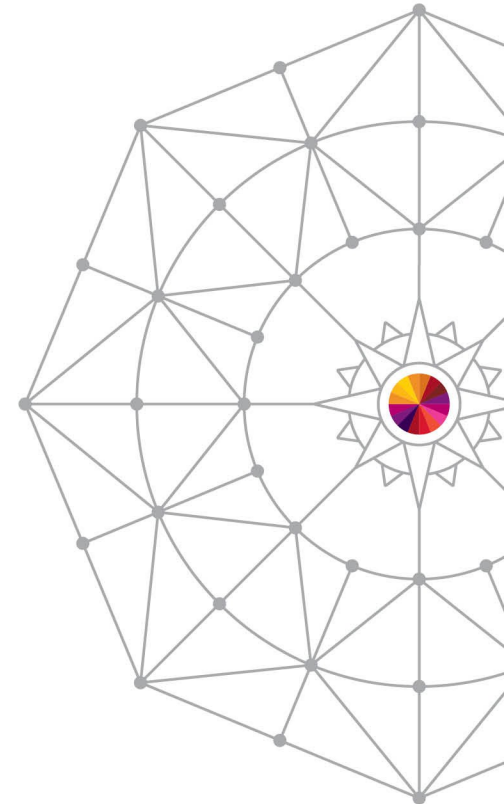
- Message:

  ```
  IEC352I MODIFY CATALOG cat.name TO
  STATE RLSENABLE SUCCESSFUL
  ```
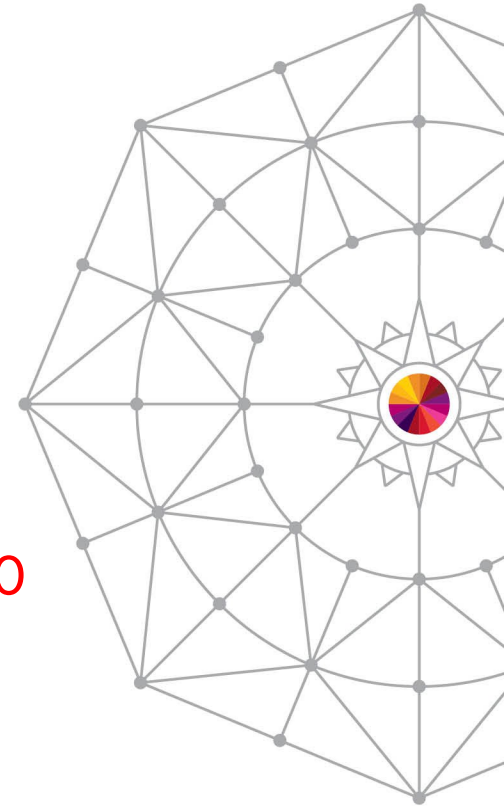
# Getting Going

- **Prepare Systems**

- Configure SMS / SMSVSAM

- Configure Catalog Data Set Parms

- Turn it on!

# Preparation

- If possible, migrate all systems to z/OS 2.1
  - **Catalog in RLS-mode will not share with < 2.1**
- Install toleration and roll-up maintenance
  - OA36403, OA36409, OA36916,
    OA36492, OA36422, OA36414,
    OA40447, OA41517, OA42489
- SMSVSAM should be on all systems
  - Even pre-2.1
- Choose your catalogs
  - All catalogs benefit, but master not supported yet
  - Frequent contention
  - Cross-system sharing

# Getting Going

- Prepare Systems

- **Configure SMS / SMSVSAM**

- Configure Catalog Data Set Parms

- Turn it on!
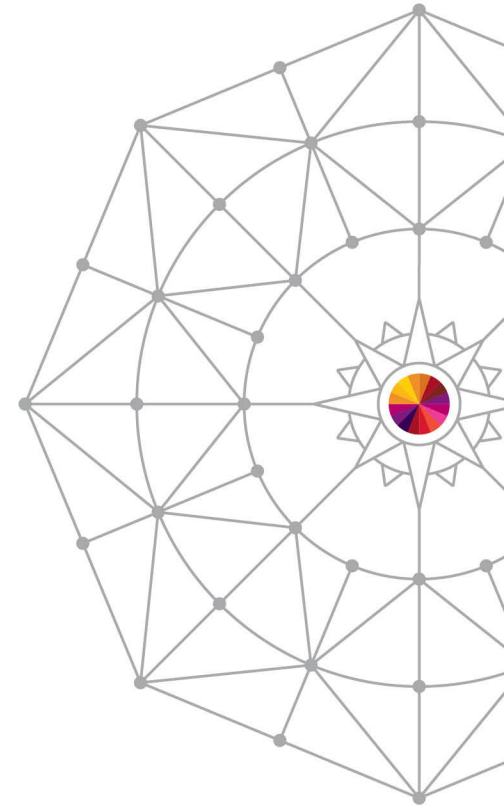
# Configuring SMS / SMSVSAM

- **No SMSVSAM**
  - How to Set Up SMSVSAM
  - Start SMSVSAM

- With existing SMSVSAM
  - Buffering considerations
  - Caching considerations
  - Making the changes
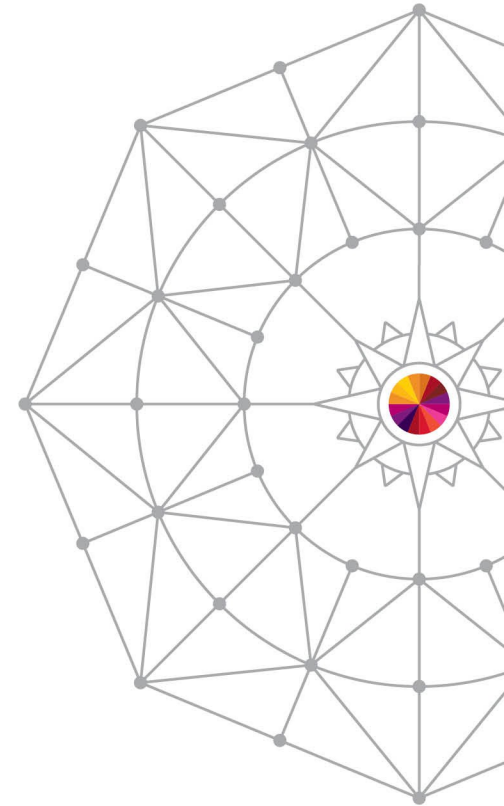
# Configure SMSVSAM – From Scratch

- Define SHCDS
    - Two ACTIVE, one SPARE
    - Linear VSAM DS, named SYS1.DFPSHCDS.qualifier.Vvolser
    - CISIZE(4096), SHR(3,3), single volume
    - At least 13MB, see manual for sizing
- Define CFRM Policy
    - One cache (any name)
        - At least 30MB
        - The larger the better, but no bigger than total size of shared catalogs
    - One CF lock structure (IGWLOCK00) – at least 20MB per system
    - Use CFSIZER to help size structures:
      http://www-947.ibm.com/systems/support/z/cfsizer/vsamrls/

* see *z/OS DFSMSdfp Storage Administration* (SC23-6860), section "Preparing for VSAM record-level sharing" for complete details

# Configure SMSVSAM – From Scratch

- Edit IGDSMSxx parmlib member
  - **RLSINIT(YES)**
  - RLS_MAX_POOL_SIZE(100)
  - RLS_MAXCFFEATURELEVEL(A|Z)
- Update SMS Configuration
  - Add cache set to base config / create cache set
  - Specify cache set in Storage Class (CF Cache Set)
- Start SMSVSAM
  - Started at IPL with RLSINIT(YES)
  - V SMS,SMSVSAM,ACTIVE

* see *z/OS DFSMSdfp Storage Administration* (SC23-6860), section "Preparing for VSAM record-level sharing" for complete details
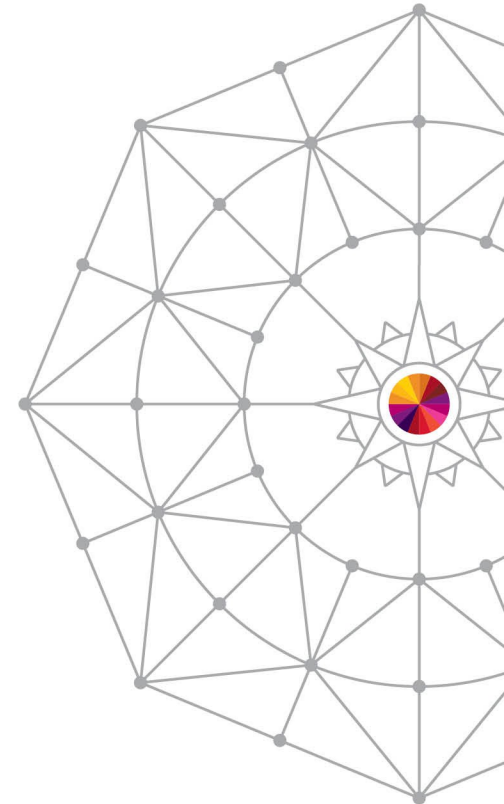
# Configuring SMS / SMSVSAM

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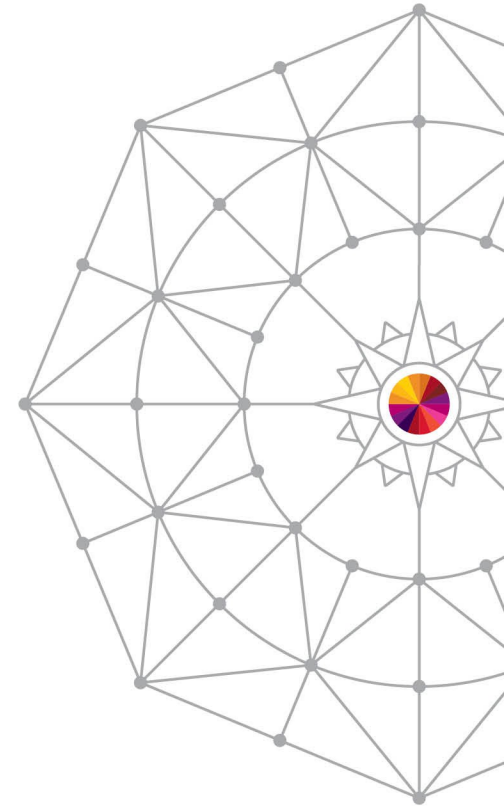
# Configure SMSVSAM – Existing Config

- **Buffering Considerations**
  - How large are your catalogs?
  - Above or Below the bar? (64-bit buffering)
  - Add catalog amount to current setting

- Available RLS Buffering
  - Below-the-Bar:
    - Maximum 1728 MB
    - < 850 MB recommended setting
    - Same on all systems
    - Accellerated LRU starts at 120%
  - Above-the-Bar
    - Limited by real memory
    - Specified per-system
    - Good for high-volume activity
    - Accelerated LRU starts at 90%

**Below (2GB)**
**Maximum 1728**

**LRU Modes:**
**Accel: 120%**
**Panic: 200%**

**Above (> 2GB)**
**Limited by available storage**

**LRU Modes:**
**Accel: 90%**
**Panic: 100%**
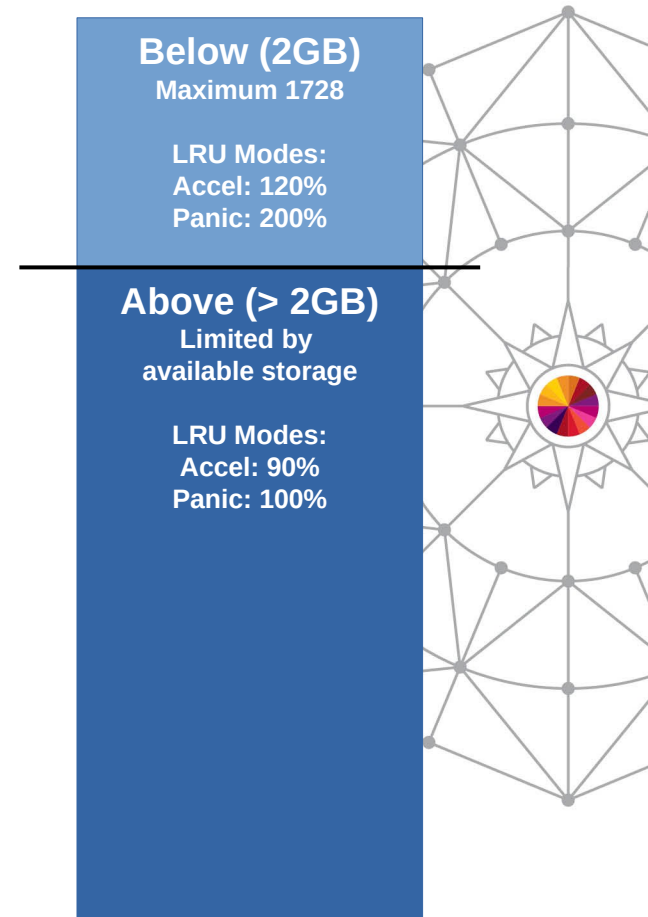
# Configure SMSVSAM – Existing Config

- Update configuration accordingly
  - Parmlib (IGDSMSxx)
    - RLS_MAX_POOL_SIZE(850)
    - RLSABOVETHEBARMAXPOOLSIZE(xxxx)
  - Data Class
    - RLS Above the 2-GB Bar (Y|N)

- Recommendations:
  - At least enough space to hold your catalogs
  - See session #15090 for RLS Best Practices

# Configure SMSVSAM – Existing Config

- **Caching Considerations**
  - Do you want a new cache just for catalog?
  - Re-using existing storage class?
  - How much cross-system exists?

- Sizing Notes:
  - Limited by CF availability
  - Too small can result in cross-invalidation, increasing response time
  - Minimum: 30mb, Maximum: size of all shared catalogs
  - Watch BMF False Invalid rate to determine if it's too small
  - Use CFSIZER to help find best size: http://www-947.ibm.com/systems/support/z/cfsizer/vsamrls/

LPAR

LPAR

LPAR
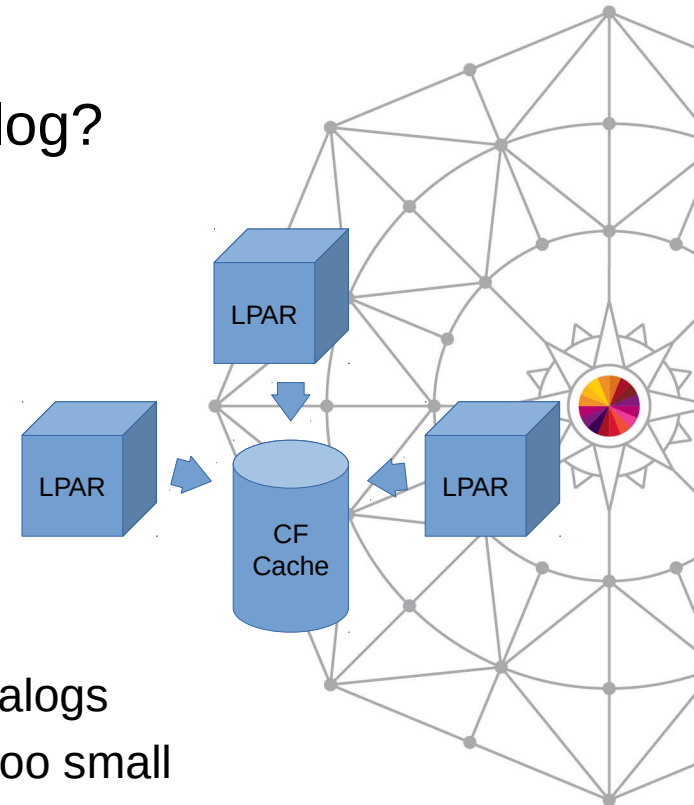
CF Cache

# Configure SMSVSAM – Existing Config

- Make the changes
  - Define / size your cache via CFRM Policy
    - Use INITSIZE = SIZE = MAXSIZE
  - Update SMS
    - Cache sets in Base Configuration
    - Update Storage Class - CF Cache Set Name
    - Update Data Class - RLS CF Cache Value
    - Update ACS
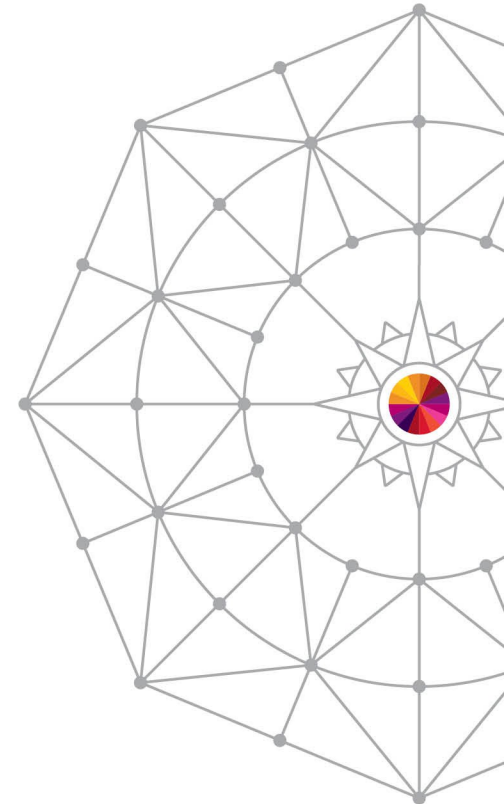
# Summary of SMS Changes

- IGDSMSxx Parmlib:
  - RLS_MAX_POOL_SIZE
  - RLSABOVETHEBARMAXPOOLSIZE
  - RLS_MAXCFFEATURELEVEL(A)
  - RLSINIT(YES)
- Base configuration – add/update cache set
- Storage Class - CF Cache Set Name
- Data Class
  - RLS Above the 2-GB Bar
  - RLS CF Cache Value
- ACS routines – assign the correct storage class
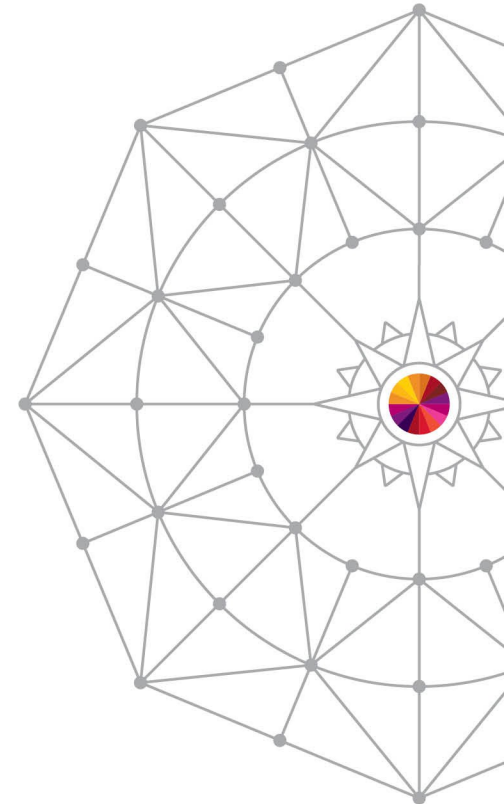
# Getting Going

- Prepare Systems

- Configure SMS / SMSVSAM

- **Configure Catalog Data Set Parms**

- Turn it on!
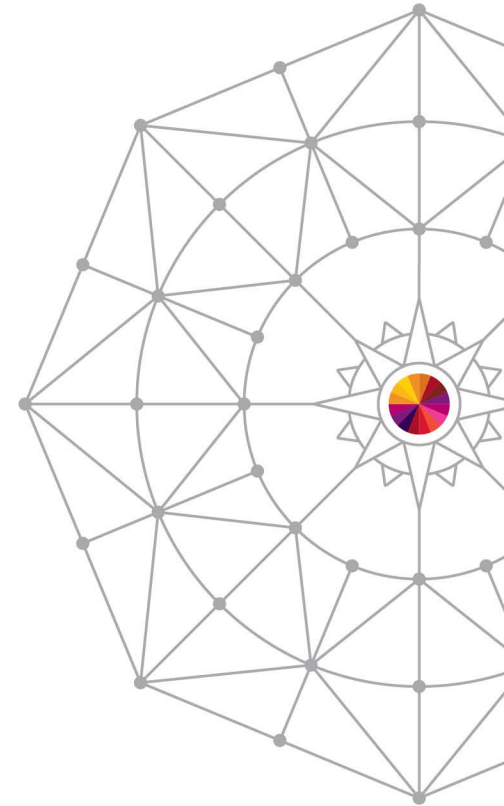
# Data Set Parameters

- ## New IDCAMS parameters for RLS:

**DEFINE** USERCATALOG(NAME(bcsname)  <u>ICFCATALOG</u>/VOLCATALOG -
       LOG(<u>NONE</u>) -
       <u>RLSQUIESCE</u>/RLSENABLE –
       SUSPEND/<u>RESUME</u> –
       RECONNECT
       LOCK/<u>UNLOCK</u>
       STORCLAS(storclasname))

**ALTER** 'bcsname' –
       LOG(NONE) -
       RLSQUIESCE/RLSENABLE -
       SUSPEND/RESUME –
       LOCK/UNLOCK –
       NULLIFY(LOG))

**DELETE** USERCATALOG(NAME(bcsname)  -
       NODISCONNECT)
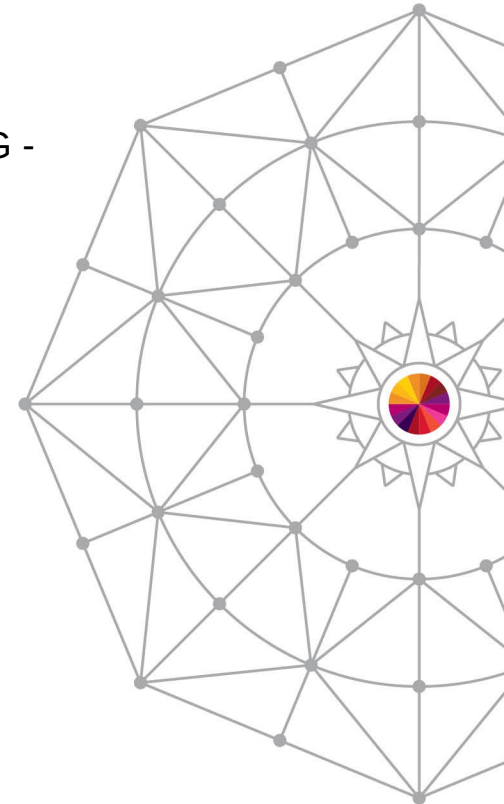
# New Data Set Parameters

- **LOG(NONE)**
  - **Makes a catalog RLS-eligible**
  - Defines logging quantity – use NONE for Catalog
- **RLSQUIESCE / RLSENABLE**
  - Enabled – use RLS when accessing catalog
  - QUIESCE – don't use RLS
- **SUSPEND / RESUME**
  - Suspends or resumes activity against that catalog
- **NODISCONNECT / RECONNECT**
  - Does not delete UCONN / Alias info
  - Reuses UCONN / alias info during define

# Other Data Set Considerations

- **CISIZE**
  - With RLS, contention may be at the CI level for CI/CA split, or spanned records
  - **Larger CISIZE** recommended for:
    - SEQ accessed catalogs
    - High INSERT/ERASE
    - Avoiding spanned records
  - **Smaller CISIZE** recommended for
    - High UPDATE catalogs

| CI1 | CI2 | CI3 | CI4 | FREE |
|-----|-----|-----|-----|------|

| CI1 | CI2 | FREE |
|-----|-----|------|
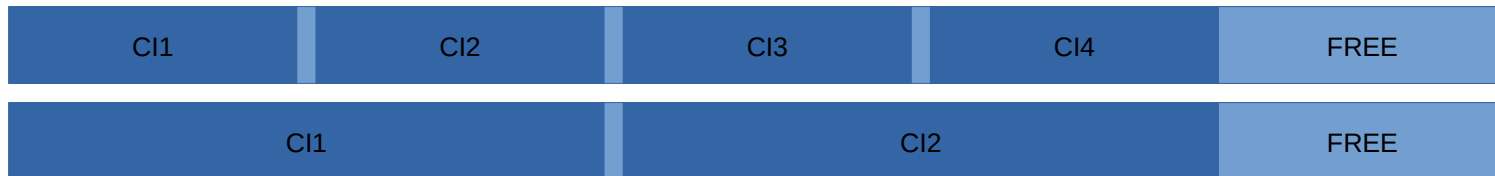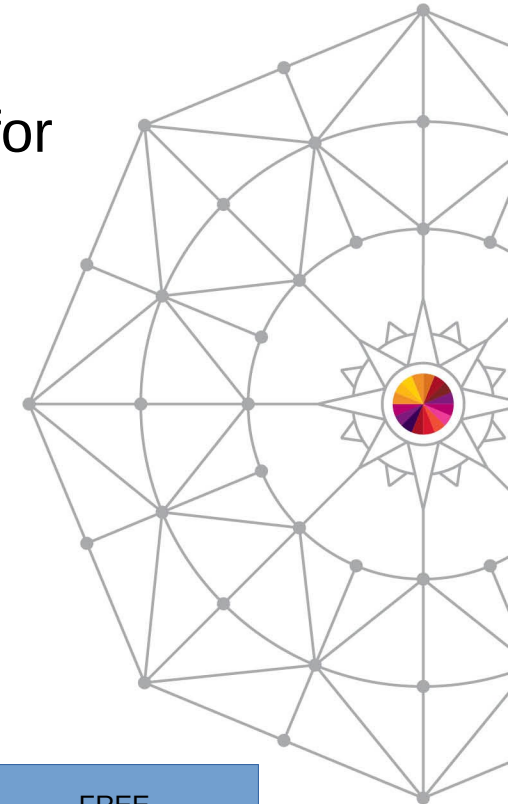
# What about VVDS or ECS mode?

- No immediate change is necessary
  - Issuing RLSENABLE will stop the current mode and switch to RLS
  - Issuing RLSQUIESCE will stop RLS and return to ECS or VVDS
- If OPEN in VVDS or ECS on a system at 1.13 or lower, 2.1 will use the same method

- Over time, you may be able to reduce space allocated for ECS or VVDS mode
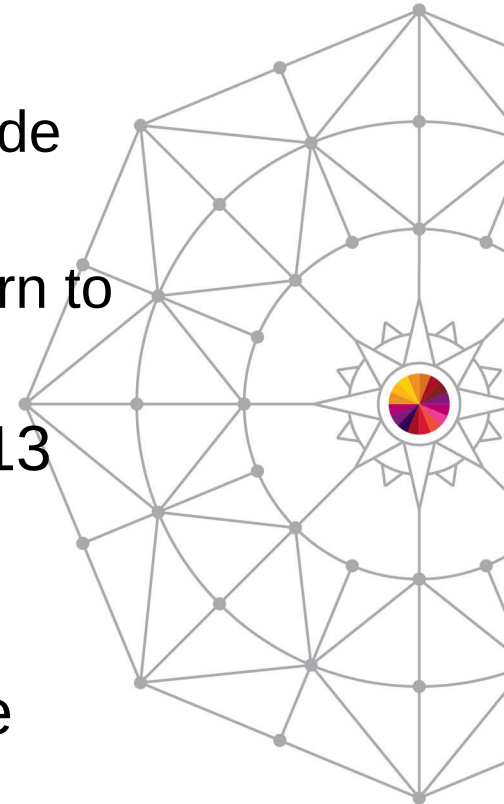
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- Prepare Systems

- Configure SMS / SMSVSAM

- Configure Catalog Data Set Parms
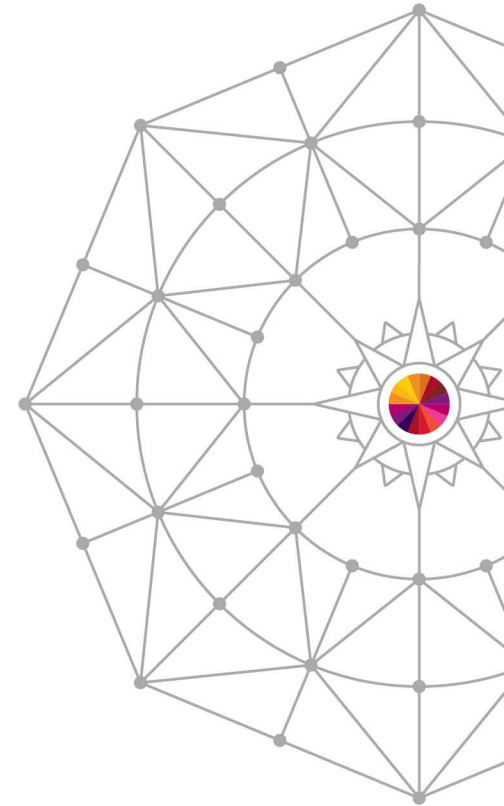
- **Turn it on!**

# Turn it on!

- Double check:
  - Cache defined?
  - SMS updated?
  - SMSVSAM running?
  - Closed on all systems running < 2.1?
  - LOG(NONE) on desired user catalogs?

- *Enable via one of the following:*
  - **F CATALOG,RLSENABLE(ucatname)**
  - **F CATALOG,RLSENABLE,SYSTEM**
  - Closes non-RLS accesses and uses RLS at next reference
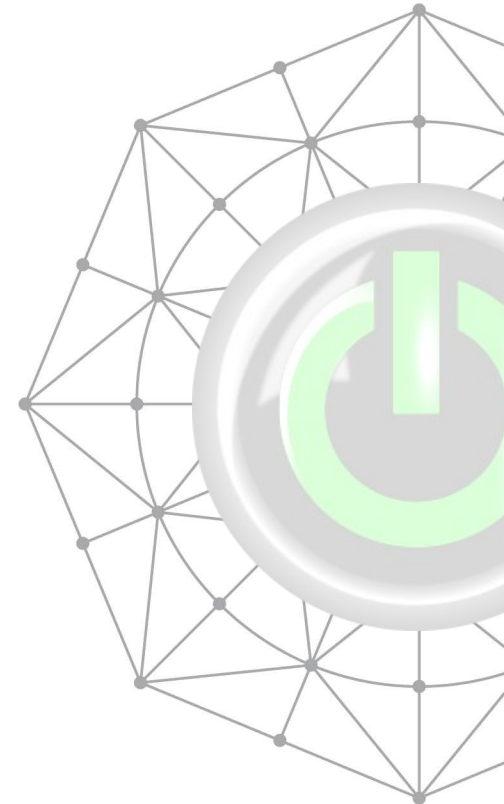
# Trust, but Verify

```
F CATALOG,ALLOCATED
IEC348I ALLOCATED CATALOGS 118
*CAS*********************************************************************
* FLAGS -VOLSER-USER-CATALOG NAME                                   % *
* YSU-R- XP0301 0001 BOHLING.RLS.UCAT                               1 *
* Y-I--- USRPAK 0001 SYS1.MVSRES9.MASTCAT                           1 *
*************************************************************************
* Y/N-ALLOCATED TO CAS, S-SMS, V-VLF, I-ISC, C-CLOSED, D-DELETED,   *
* R-SHARED, A-ATL, E-ECS SHARED, K-LOCKED, U-RLS, W-SUSPENDED       *
*CAS*********************************************************************



D GRS,RES=('SYSIGGV2',*)
ISG343I 16.27.56 GRS STATUS 077
S=SYSTEMS SYSIGGV2 BOHLING.RLS.UCAT
SYSNAME        JOBNAME       ASID      TCBADDR    EXC/SHR     STATUS
SYSTEM1        SMSVSAM       0037      008FA680   SHARE       OWN
```

# Complete Checklist

- Update maintenance
- Update CFRM:
  - Cache(s)
  - IGWLOCK00
- Update SMS
  - Update IGDSMSxx
    - RLSINIT(YES)
    - RLS_MAX_POOL_SIZE(xxxx)
    - RLSABOVETHEBARMAXPOOLSIZE
    - RLS_MAXCFFEATURELEVEL(A)
  - Update Cache Sets
  - Update Storage Class - CF Cache Set Name
  - Update Data Class
    - RLS Above the 2-GB Bar
    - RLS CF Cache Value
  - Update ACS
- Ensure SMSVSAM is up
- Close from all non 2.1 systems
- Update Data Set Parms - LOG(NONE)
- RLS Enable the user catalog
  - F CATALOG,RLSENABLE(ucat)

# Monitoring
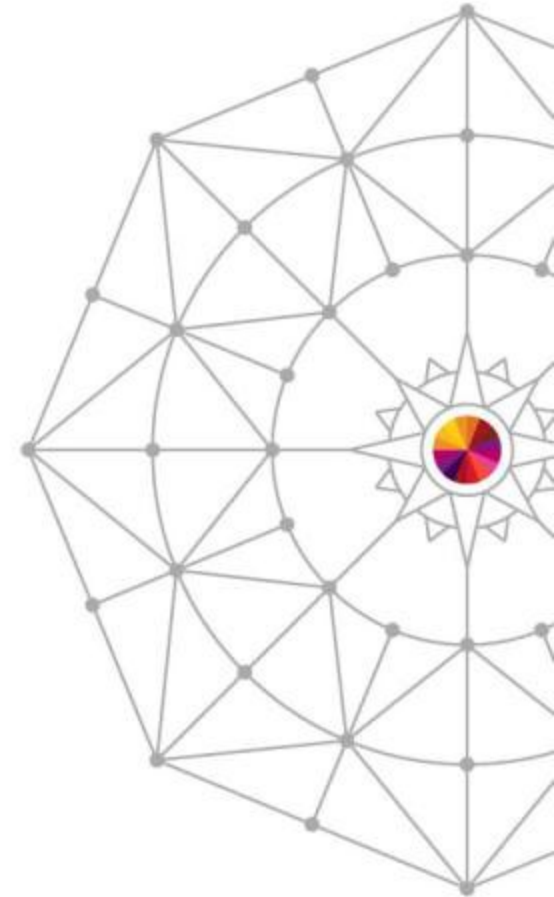
# Master Agenda

- Why use RLS for catalogs?
  - Getting it Going
    - **Monitoring**
      - Maintenance
        - If things go wrong

Complete your session evaluations online at www.SHARE.org/Anaheim-Eval
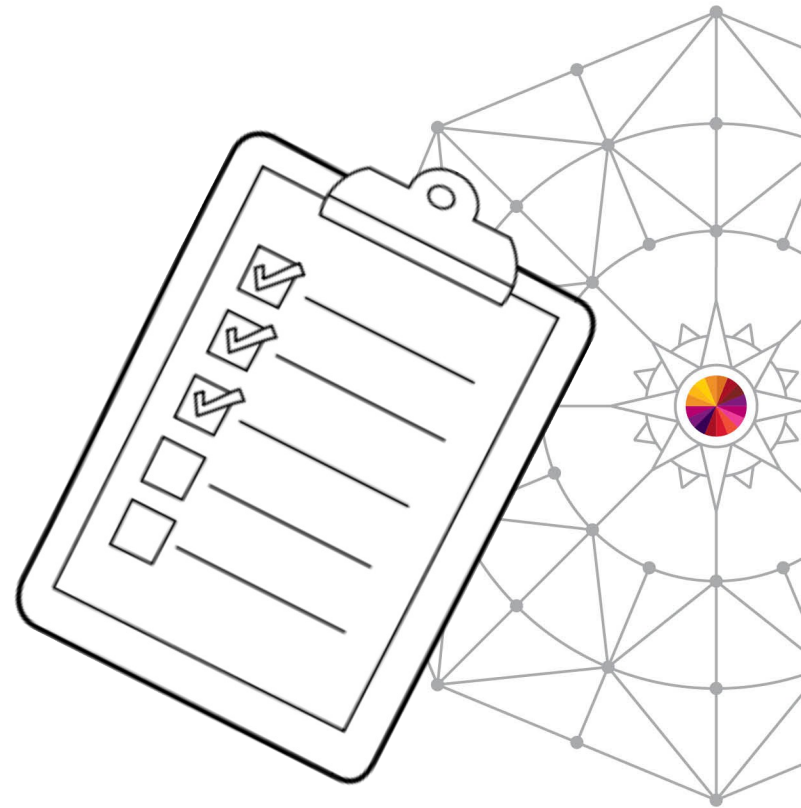
# Monitoring Options

- Messages
- Catalog side:
  - F CATALOG,ALLOCATED
  - F CATALOG,REPORT,PERFORMANCE
  - F CATALOG,REPORT,CATSTATS
  - F CATALOG,REPORT,CATSTATX(catname)
  - SMF60-66 records
- RLS side:
  - D SMS,CFLS
  - RMF Mon III
  - Omegamon XE
  - SMF42 subtype 15-19
- Both
  - SYSIGGV2 and SYSVSAM ENQ tracking
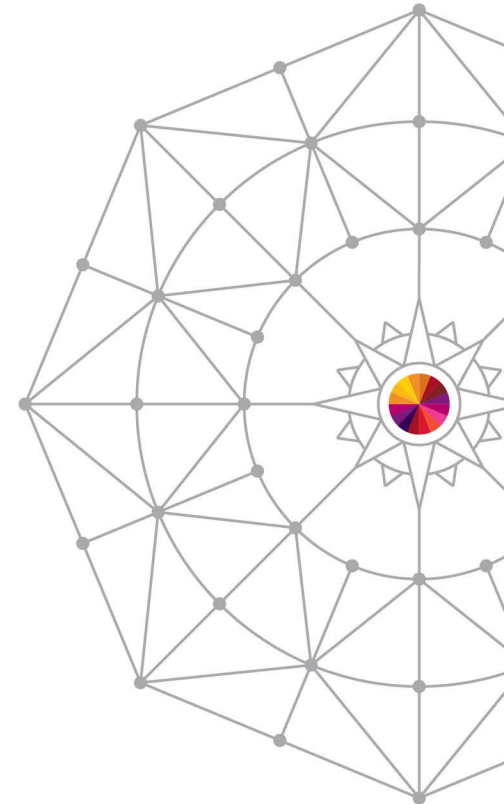
# Messages

- Catalog will show successful change:
  - `F CATALOG,RLSENABLE(BOHLING.RLS.UCAT)`
    `IEC351I CATALOG ADDRESS SPACE MODIFY COMMAND ACTIVE`
    `IEC352I MODIFY CATALOG BOHLING.RLS.UCAT TO STATE RLSENABLE`
    `SUCCESSFUL`

- SMSVSAM will issue message on CACHE connect
  - `IGW453I SMSVSAM ADDRESS SPACE HAS SUCCESSFULLY 700`
    `CONNECTED TO DFSMS CACHE STRUCTURE CACHE01`

    `IGW468I DFSMS STATISTICS TASK FOR CACHE STRUCTURE: CACHE01`
    `IS RUNNING ON SYSTEM: SYSTEM1`

    `IGW500I DFSMS CACHE CONNECT PROTOCOL HAS DETECTED THAT`
    `SYSTEM SYSTEM1 IS USING RLS MAX FEATURE LEVEL=A.`
    `DFSMS DATACLASS VALUE SPECIFIED IN KEYWORD`
    `RLSCFCACHE WILL BE USED FOR`
    `DFSMS VSAMRLS SPHERES ASSIGNED TO DFSMS`
    `CACHE STRUCTURE CACHE01`
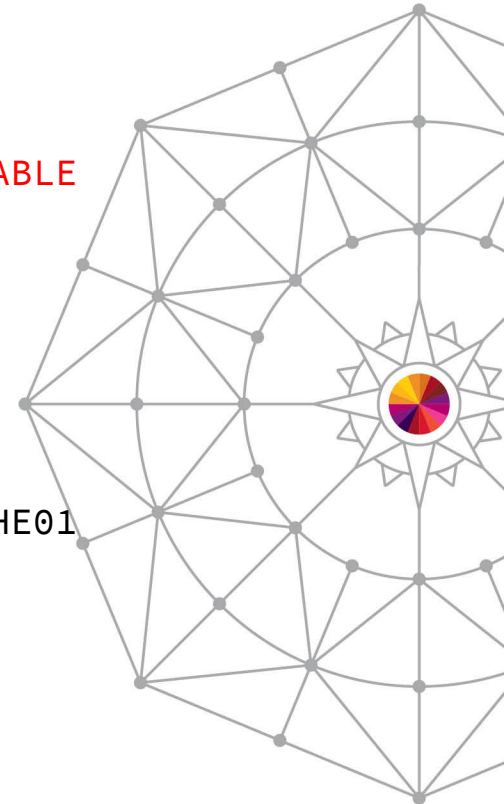
# F CATALOG,ALLOCATED

**F CATALOG,ALLOCATED**

```
IEC348I ALLOCATED CATALOGS 118
*CAS************************************************************
* FLAGS -VOLSER-USER-CATALOG NAME                             % *
* YSU-R- XP0301 0001 BOHLING.RLS.UCAT                         1 *
* Y-I--- USRPAK 0001 SYS1.MVSRES9.MASTCAT                     1 *
****************************************************************
* Y/N-ALLOCATED TO CAS, S-SMS, V-VLF, I-ISC, C-CLOSED, D-DELETED,  *
* R-SHARED, A-ATL, E-ECS SHARED, K-LOCKED, U-RLS, W-SUSPENDED      *
*CAS************************************************************
```
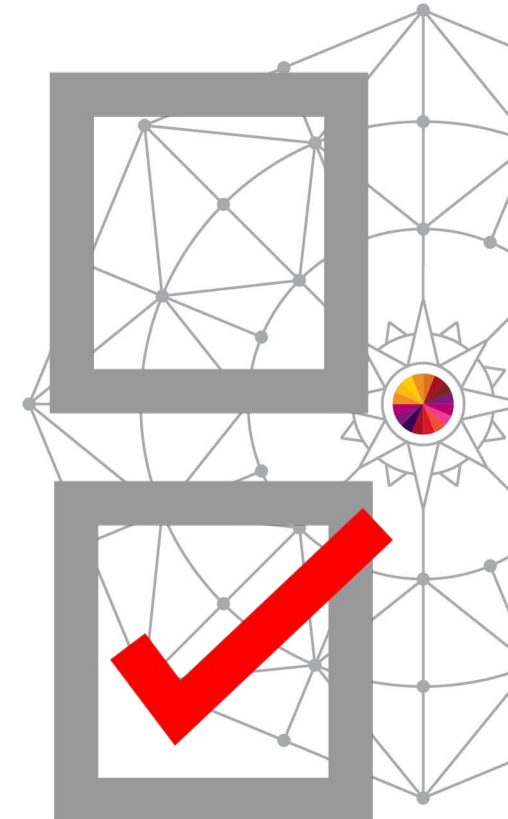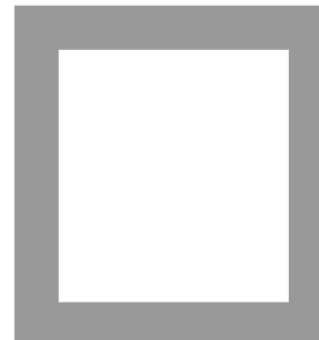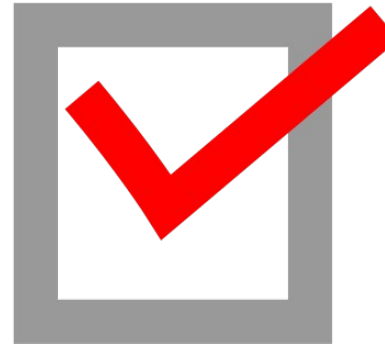
# F CATALOG,REPORTS,PERFORMANCE

```
IEC359I CATALOG PERFORMANCE REPORT 127
*CAS*****************************************************
*   Statistics since 21:45:12.84 on  03/07/2014        *
*   -----CATALOG EVENT----   --COUNT--  ---AVERAGE---   *
*   Entries to Catalog           840     27.624 MSEC   *
*   BCS ENQ Shr                  636      0.036 MSEC   *
*   BCS ENQ Shr Sys              380      9.266 MSEC   *
*   BCS ENQ Excl                   5      0.013 MSEC   *
*   BCS ENQ Excl Sys               5      9.830 MSEC   *
*   BCS DEQ                    1,255      3.879 MSEC   *
*   BCS Allocate                  13     58.862 MSEC   *
*   SMF Write                     35      0.020 MSEC   *
*   CAS MLA Lock                   1      0.288 MSEC   *
*   VVDS Format                    2     10.147 MSEC   *
*   MVS Allocate                   6    127.281 MSEC   *
*   SMS Active Config              3      0.073 MSEC   *
*   SYSVSAM S ENQ Excl            13     36.419 MSEC   *
*   SYSVSAM S DEQ                 13      8.585 MSEC   *
*   SYSVSAM D ENQ Shr             13      4.689 MSEC   *
*   SYSVSAM D DEQ                 13     10.067 MSEC   *
*CAS*****************************************************
        * (truncated to fit)
```
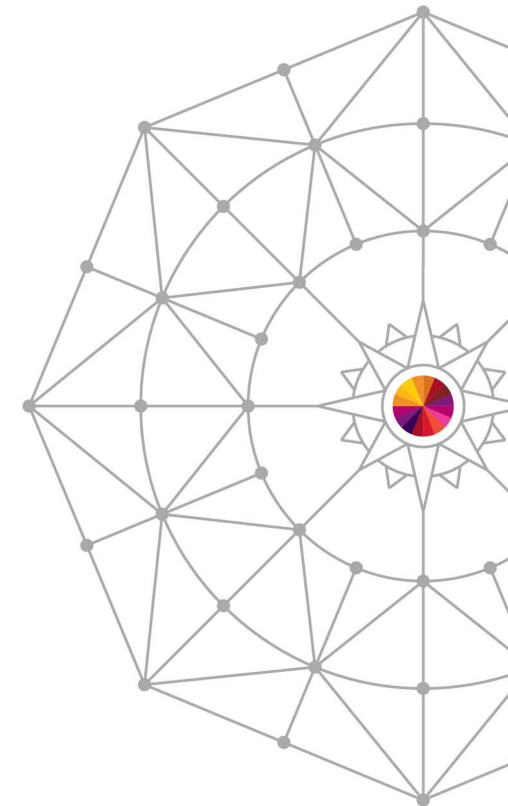
# F CATALOG,REPORT,CATSTATS

```
IEC359I CATALOG I/O STATS REPORT 143
*CAS*********************************************************
*      ADDS   UPDATES       GETS    GETUPD  DELETES   BUFNI   BUFND STRNO *
*                                                                        *
* BOHLING.RLS.UCAT                                                       *
*         4         1         36         3        0       1       2   180 *
* SYS1.MVSRES9.MASTCAT                                                   *
*         2         3      2,352         3        0       4       4     2 *
*CAS*********************************************************
```
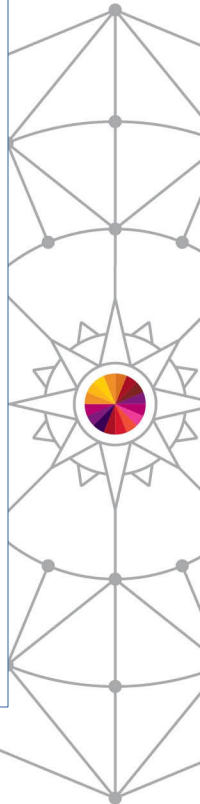
# F CATALOG,REPORT,CATSTATX(ucat)

```
IEC359I EXTENDED CATALOG STATS 279
*CAS*********************************************************************
*    CATALOG NAME       = BOHLING.RLS.UCAT                              *
*    INSERTS (ADDS)     =          19                                   *
*    UPDATES            =          13                                   *
*    RETRIEVES          =       3,776                                   *
*    RETRIEVES FOR UP   =         210                                   *
*    ERASES (DELETES)   =          12                                   *
*    CA-RECLAIMS        =         N/A                                   *
*    CA-REUSES          =         N/A                                   *
*    BUFNI SETTING      =           1                                   *
*    BUFND SETTING      =           2                                   *
*    STRNO SETTING      =         180                                   *
*    AVG ELAPSED TIME   =       3.608 MSEC                              *
*    AVG CPU TIME       =     525.240 USEC                              *
*CAS*********************************************************************
```
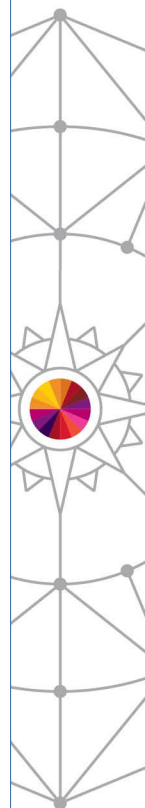
# Measurements – SMF 60

- SMF 6x types
  - **Type 60** - VVR Updated
  - **Type 61** - ICF Define
  - **Type 62** - VSAM Open
  - **Type 64** - VSAM Close*
  - **Type 65** - ICF Delete
  - **Type 66** - ICF Alter

- Type 64 records stats on catalog close as of z/OS 1.13
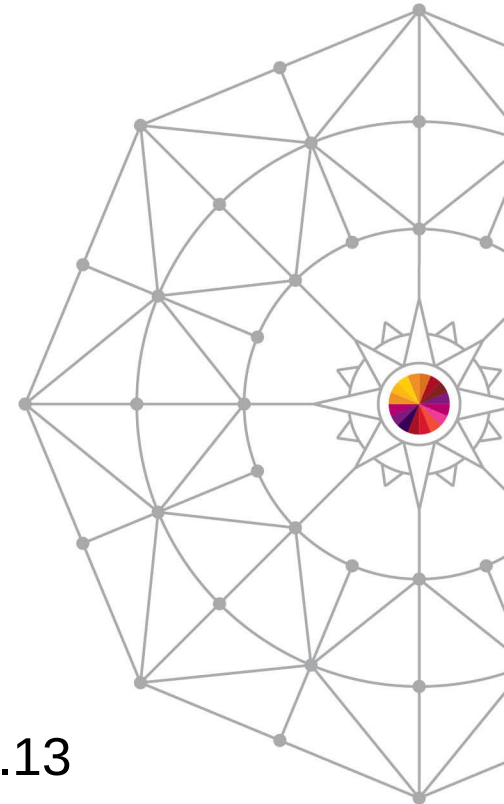
# D SMS,CFLS

```
IGW320I 15:23:13 Display SMS,CFLS(IGWLOCK00 )
PRIMARY STRUCTURE:IGWLOCK00 VERSION:CCD2152BAFB5342A SIZE:4096K
RECORD TABLE ENTRIES:10358 USED:6
SECONDARY STRUCTURE:IGWLOCK00 VERSION:CCD2152C352A9010 SIZE:4096K
RECORD TABLE ENTRIES:10358 USED:6
LOCK STRUCTURE MODE: DUPLEXED   STATUS: ENABLE
System     Interval    LockRate    ContRate   FContRate    WaitQLen
SYSTEM1   1 Minute      1079.9       0.000       0.000        0.00
SYSTEM1    1 Hour         42.5       0.000       0.000        0.00
SYSTEM1    8 Hour          5.3       0.000       0.000        0.00
SYSTEM1     1 Day    --------- ---------- ---------- ----------
*** No other systems provided data


***************** LEGEND ******************
  LockRate = number of lock requests per second
  CONTRATE = % of lock requests globally managed
  FCONTRATE = % of lock requests falsely globally managed
  WaitQLen = Average number of requests waiting for locks
```

# RMF MON III – RLSSC & RLSDS

```
                RMF V2R1    VSAM RLS Activity  - CAPTKEN1          Line 1 of 5


Samples: 100      Systems: 1    Date: 03/08/14  Time: 15.23.20  Range: 100    Se


              < 2GB / > 2GB

LRU Status    : Good  / Good

Contention % :   0.0 /   0.0

False Cont % :   0.0 /   0.0


Stor Class  Access  Resp   -------- Read ----------   ------ BMF ------- Write
                    Time    Rate  BMF%   CF%  DASD%  Valid%  False Inv%  Rate
RLS
  Below 2GB  DIR    0.000   0.00   0.0   0.0   0.0    0.0       0.00     0.00

             SEQ    0.000   0.00   0.0   0.0   0.0    0.0       0.00     0.00

  Above 2GB  DIR    0.001   2254  99.4   0.0   0.6    100       0.00     1137

             SEQ    0.000   0.00   0.0   0.0   0.0    0.0       0.00     0.00
```
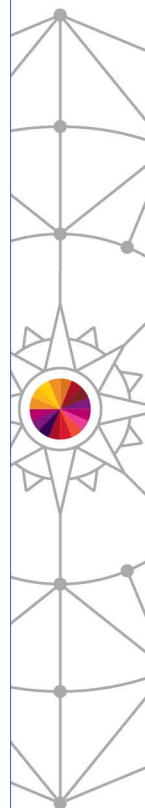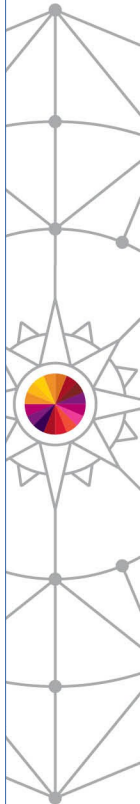
# RMF MON III - RLSLRU

```
                 RMF V2R1    VSAM LRU Overview  - CAPTKEN1          Line 1 of 3


 Samples: 100      Systems: 1     Date: 03/08/14  Time: 15.23.20  Range: 100    Sec


 MVS            Avg CPU  - Buffer Size -  Accel    Reclaim   ------ Read -----
 System          Time      Goal   High     %         %       BMF%   CF%   DASD%


 SYSTEM1
  Below 2GB     <.001     100M    10M      0.0       0.0      0.0    0.0    0.0
  Above 2GB     <.001    1000M   328M      0.0       0.0     99.4    0.0    0.6
```

# Omegamon XE

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# Performance Measurements – SMF 42

- SMF 42 Subtypes

  - **Subytpe 15** - RLS statistics by storage class

  - **Subtype 16** - RLS statistics by data set

  - **Subtype 17** - RLS CF lock structure usage

  - **Subtype 18** - RLS CF caching statistics

  - **Subtype 19** - Buffer Manager LRU statistics

- Note:  Only one system in the sysplex collects the SMF 42 records.  The system collecting the records is displayed in the D SMS,SMSVSAM operator command.

- Must use V SMS,MONDS(spherename),ON to collect subtype 16 statistics

# Monitor ENQs

- SYSIGGV2 'UCAT' will be held SHARED by SMSVSAM

- SYSIGGV2 'sphere' will be held by Catalog whenever updating that particular sphere record

```
D GRS,RES=('SYSIGGV2',*)

ISG343I 16.27.56 GRS STATUS 077

S=SYSTEMS SYSIGGV2 BOHLING.RLS.UCAT

SYSNAME          JOBNAME          ASID       TCBADDR    EXC/SHR     STATUS
SYSTEM1    SMSVSAM              0037       008FA680    SHARE       OWN
```

- SMF Type 77 also tracks ENQ use
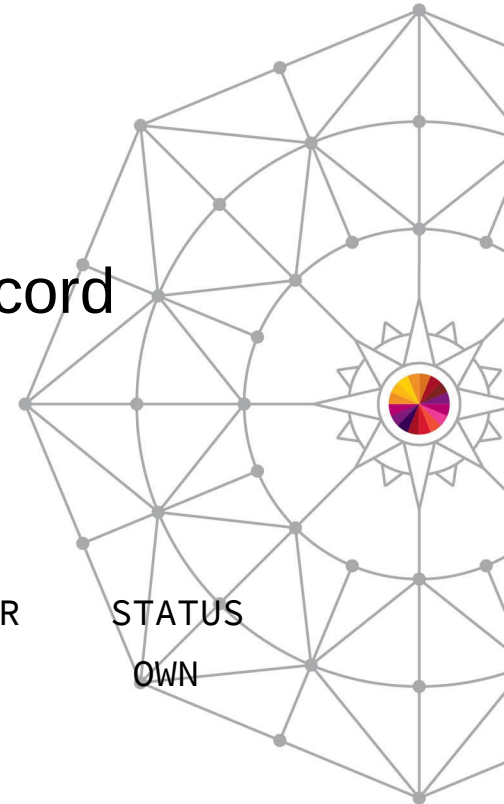
# Maintenance
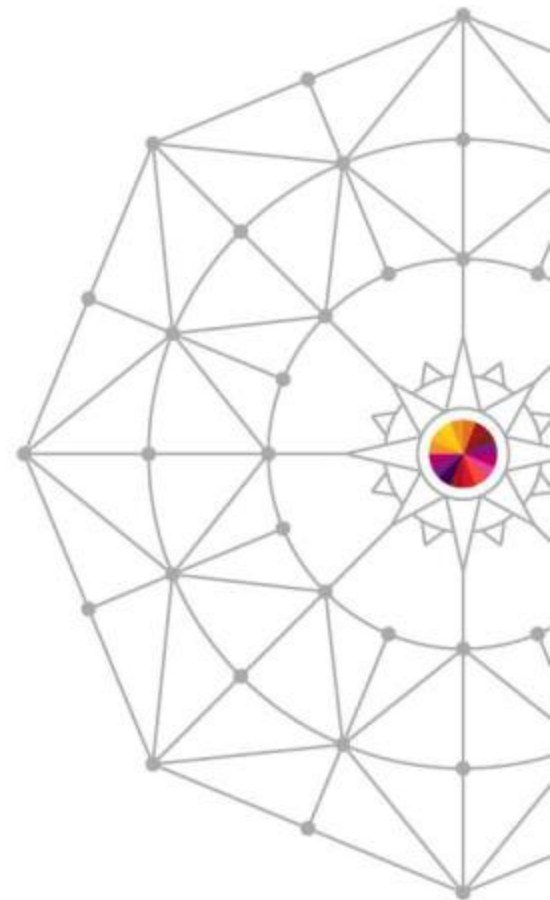
# Master Agenda

- Why use RLS for catalogs?
  - Getting it Going
    - Monitoring
      - **Maintenance**
        - If things go wrong

Complete your session evaluations online at www.SHARE.org/Anaheim-Eval

# Maintenance Modes

- **Quiesced for Copy**
  - Temporarily pauses all activity to that catalog
  - Used by DSS during COPY to get accurate copy
- **Suspended**
  - Catalog CLOSED, new requests WAIT
  - Used as part of recovery
  - Can be RESUMED
- **Locked**
  - Catalog CLOSED, new requests FAIL
  - Locks Catalog from update
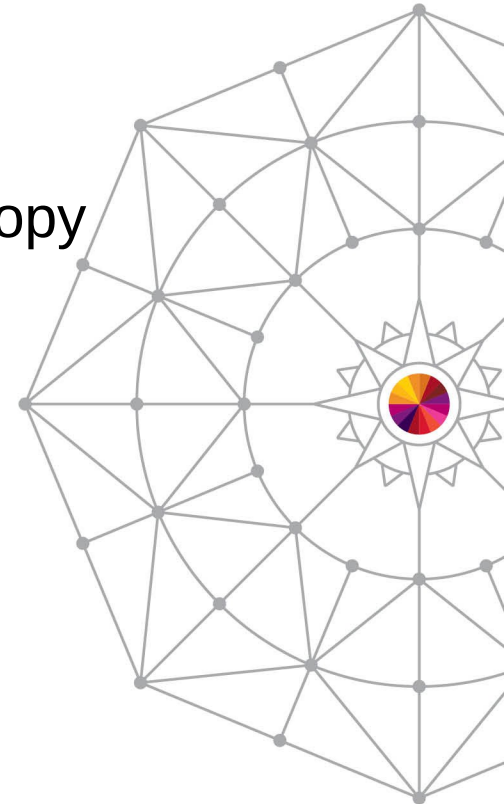
# Maintenance

- **IDCAMS PRINT / REPRO / IMPORT / EXPORT** all support RLS at z/OS 2.1

- New Parameters:
  - **RLSSOURCE**() and **RLSTARGET**()
    - YES = Use RLS to open SOURCE / TARGET
    - NO = Use NSR / Non-RLS VSAM to open
    - QUIESCE = Quiesce the activity before opening via RLS

- Example:
  ```
  REPRO INDATASET(TEST.FROM) OUTDS(TEST.TO) +
  RLSSOURCE(YES) RLSTARGET(NO)
  ```
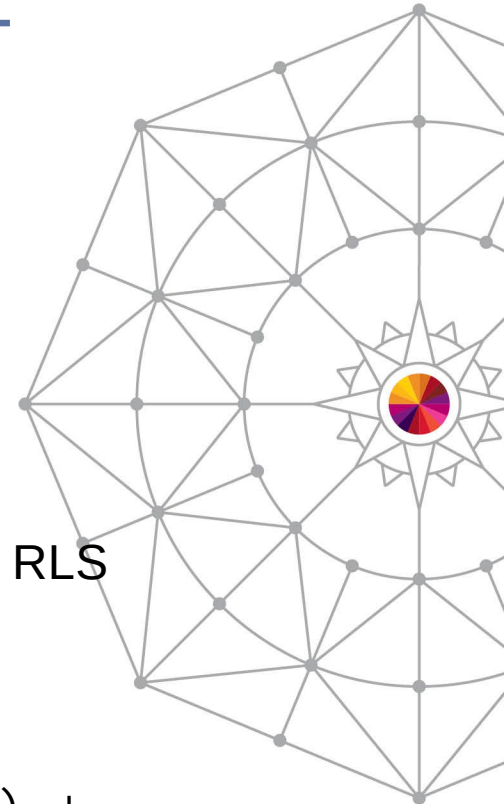
# Backups with DSS

- **DSS DUMP**:
  - Automatically issues QUIESCE for COPY the catalog in order to get a serialized copy
  - For Non-RLS, uses standard SYSIGGV2 to serialize

- **DSS RESTORE**
  - BCSRECOVER(LOCK/SUSPEND) – new parameter
    - LOCK – closed catalog plex-wide and fails requests
    - SUSPEND – closes catalog and holds requests
  - If used, DSS will unlock/resume after RESTORE
  - RESTORE will fail if not locked or suspended – so if DSS doesn't do it, administrator should

# Forward Recovery (to a new volume)

- **Ensure you have a backup**
- **Suspend or lock the catalog**
  - F CATALOG,RECOVER,SUSPEND(ucat) or
  - F CATALOG,RECOVER,LOCK(ucat)
- **DELETE ucat NODISCONNECT**
  - Deletes DSCB and VVR, but saves alias information
- **DEFINE UCAT NAME(ucat) RECONNECT VOL(volser2) SUSPEND**
  - Defines the user catalog, reconnects to alias information
  - SUSPEND ensures it remains suspended
  - Optionally add LOG(NONE) RLSENABLE for RLS access
- **IMPORT CONNECT VOL(volser2) ALIAS**
  - Run on other systems sharing the UCAT with different MCATs
  - Updates the UCONN with new volume
- **Restore backup copy**
  - DSS RESTORE – DSS will detect empty pre-existing target and will copy from backup
  - OEM utilities should perform the same way
- **Apply updates using ICFRU or other utility**
- **Resume catalog**
  - F CATALOG,RECOVER,RESUME(ucat) or UNLOCK(ucat)

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in Anaheim

# If Something Goes Wrong
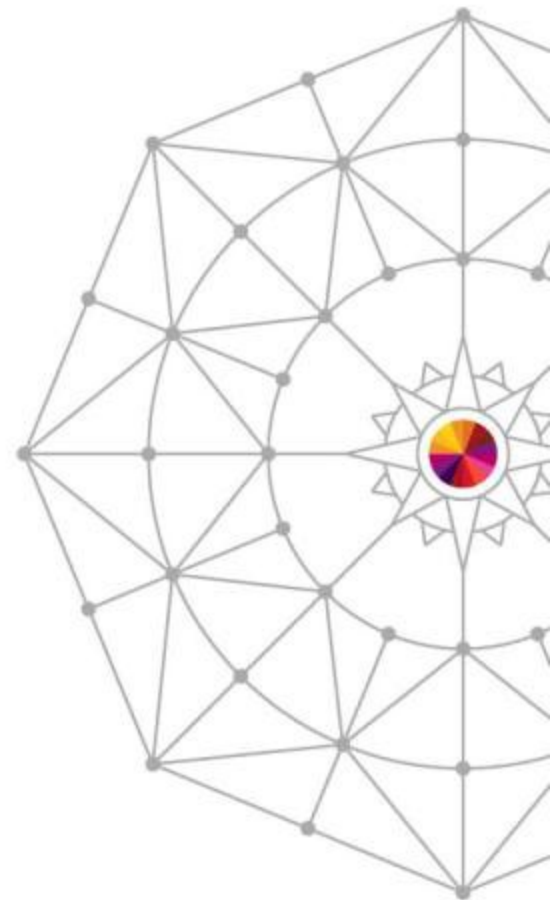
# Master Agenda

- Why use RLS for catalogs?
  - Getting it Going
    - Monitoring
      - Maintenance
        - **If things go wrong**

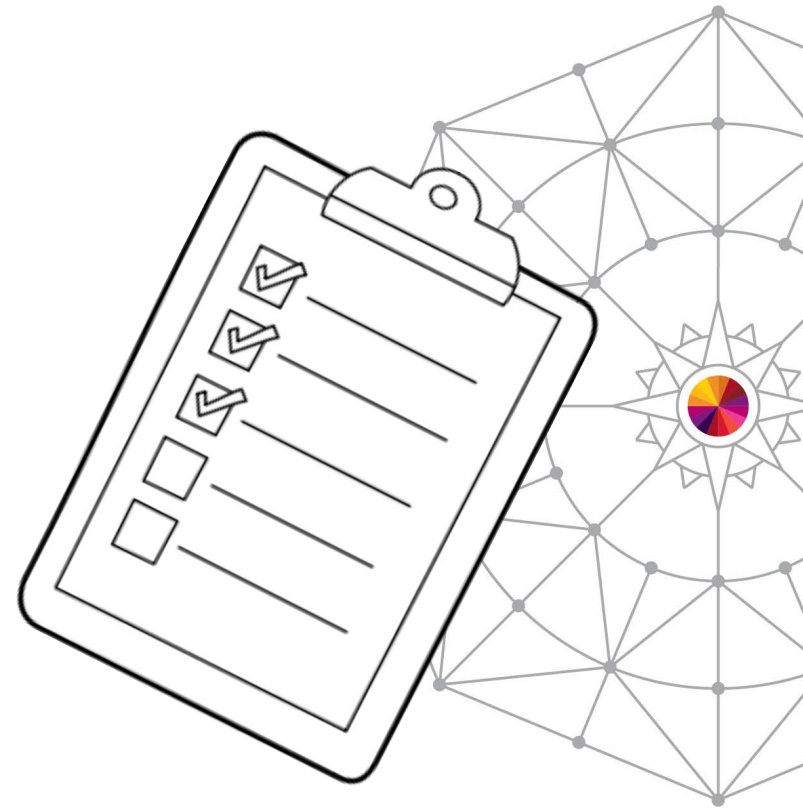# If SMSVSAM becomes unavailable

- **IGW408I** SMSVSAM SUCCESSFULLY TERMINATED AT END OF MEMORY
- **IGW416I** TERMINATING ERROR DETECTED IN SMSVSAM SERVER ADDRESS SPACE.
  RETURN CODE (IN HEX): return-code REASON CODE (IN HEX): reason-code

- If already opened:
  - **IEC251I** 016-0609,CATALOG,ALLOCATE,SYS00008,,,BOHLING.RLS.UCAT
  - **IEC365D** SMSVSAM ADDRESS SPACE STILL NOT AVAILABLE FOR CATALOG ADDRESS SPACE. REPLY RLSQUIESCE OR CANCEL
- If not currently open:
  - **IEC161I** 009-0663,CATALOG,ALLOCATE,SYS00015,,, BOHLING.RLS.UCAT

- To Resolve:
  - Start SMSVSAM – will respond to IEC365D
  - Respond to IEC365D with RLSQUIESCE
  - F CATALOG,RLSQUIESCE(ucat) or ,SYSTEM
  - IEC352I MODIFY CATALOG BOHLING.RLS.UCAT TO STATE RLSQUIESCE SUCCESSFUL

# Gathering Diagnostic Data

- F CATALOG,TAKEDUMP(SYSPLEX)
  - Automatically takes plex-wide dumps of SMSVSAM and CATALOG
- F CATALOG,DUMPON(rc,rsn,*)
  - Also updated to automatically dump RLS when involved

- Console dump:

  ```
  DUMP COMM=(some meaningful dump title)
    R xx,JOBNAME=(CATALOG,XCFAS),CONT
    R yy,DSPNAME=('SMSVSAM'.*),CONT
    R nn,SDATA=(PSA,NUC,SQA,LSQA,SUM,RGN,GRSQ,LPA,
          TRT,CSA,XESDATA),CONT
    R zz,REMOTE=(SYSLIST=(*('SMSVSAM')),
          DSPNAME,SDATA),END
  ```

- See session #15090 for RLS Best Practices
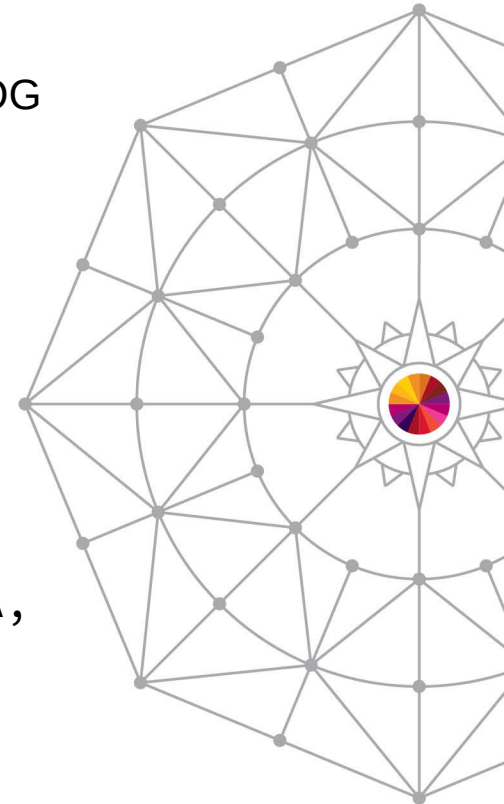
# On the Fly Diagnostics

- **Is the request hung in CATALOG or RLS?**
- F CATALOG,LIST
  - IEC347I LIST CATALOG TASK(S)
    ```
    *CAS***********************************************************
    * FLAGS -  TASK ADDRESS - JOBNAME  / STEPNAME - ELAPSED TIME - ID  *
    * -W---L    005AB2A8     ACCTING  / SORTSTEP    00.08.26    04  *
    **************************************************************
    * O-OLDEST, W-WAIT, A-ABEND, E-ENQ, R-RECALL, L-RLS              *
    *CAS***********************************************************
    ```
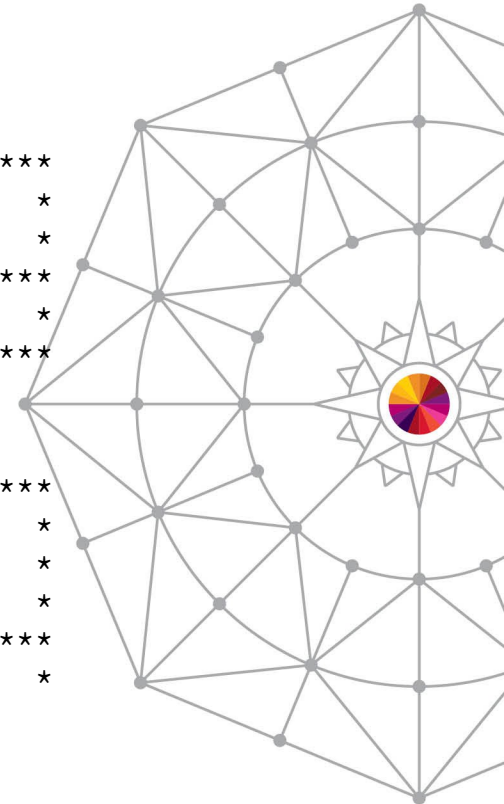
  - IEC347I LIST CATALOG TASK(S)
    ```
    *CAS***********************************************************
    * FLAGS -  TASK ADDRESS - JOBNAME  / STEPNAME - ELAPSED TIME - ID  *
    * -W-E--    00974E88     #PMF0663 / MFA8401     00.32.19    01  *
    *  WAITING FOR SPHERE ENQ Excl Sys    FROM 2268D8E8 FOR 00.32.19  *
    **************************************************************
    * O-OLDEST, W-WAIT, A-ABEND, E-ENQ, R-RECALL, L-RLS              *
    ```
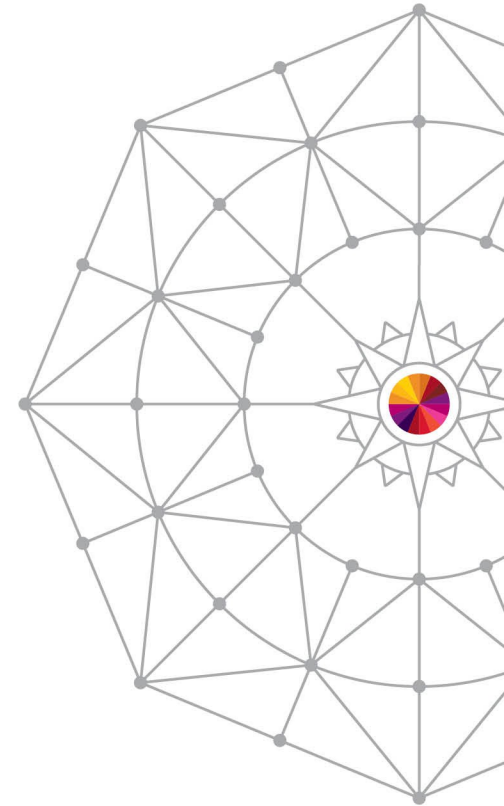
- D GRS,RES=('SYSIGGV2',*)
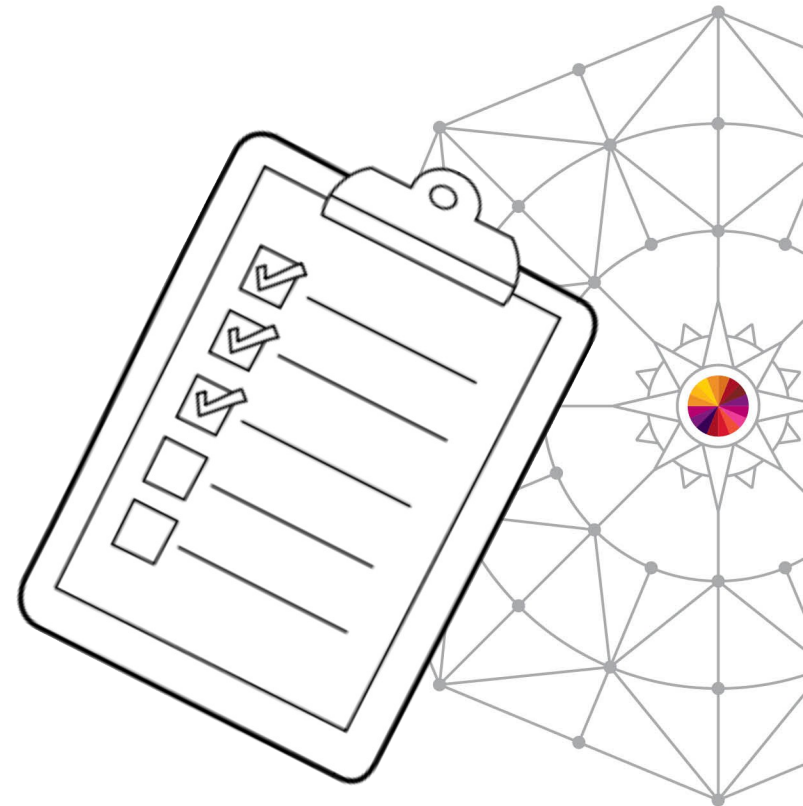- D GRS,RES=('SYSVSAM',*)
- D SMS,SMSVSAM,DIAG(C)

# Restarting

- To retry a task:
  - F CATALOG,LIST to get task id
  - F CATALOG,END(id),REDRIVE
  - F CATALOG,ABEND(id)
- To stop / restart SMSVSAM
  - FORCE SMSVSAM,ARM
  - V SMS,SMSVSAM,TERMINATESERVER
  - V SMS,SMSVSAM,ACTIVE
- To restart CATALOG
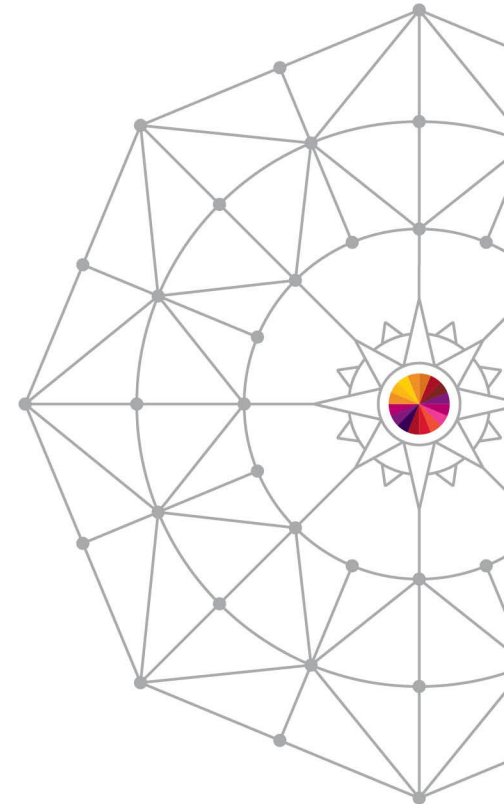  - F CATALOG,RESTART

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        - Monitoring
            - Maintenance
                - If things go wrong

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# References

- ***DFSMS Managing Catalogs***
  - SC26-7409
- ***DFSMS Access Methods Services for Catalogs***
  - SC26-7394
- ***DFSMS Diagnosis Reference***
  - GY27-7618
- **MVS Initialization and Tuning Reference**
  - SA22-7592
- **MVS System Commands**
  - SA22-7627
- ***MVS System Management Facilities (SMF)***
  - SA22-7630
- **"Unclog Your Systems with z/OS 2.1 – Something New and Exciting in Catalog"** by Terri Menendez
  - Share in San Francisco, Spring 2013, Session #12977 / 12978

*Special Thanks to:*

**Terri Menendez**, for her input and session
"Unclog Your Systems with z/OS 2.1"

**Frank McCune**, for his help with the presentation

# RLS and Catalogs
# A Practical Guide / How-to

Neal Bohling, IBM

March 11, 2014
Session 15089