

DFSMSdss Best Practices in an SMS Environment

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Agenda

- **System Managed Storage Overview**
 - What is SMS
 - Benefits of SMS
 - SMS Configurations
 - ACS Routines
- **DFSMSdss Best Practices utilizing SMS**
 - Converting nonSMS data to SMS without data movement
 - Keywords related to SMS processing
 - SG ACS and renaming data sets
 - Volume Selection
 - VSAM CA Size Requirements
- **DFSMSdss FlashCopy Batch Protection**

What is system managed storage?

- Lets the operating system take over storage management tasks
 - Data set allocation
 - Backup management
 - Space management
 - Availability management
- Reduces number of people needed to manage storage

What is SMS?

- SMS is an MVS subsystem
 - Manages the current storage management policy (active configuration)
 - Reduces end user data set creation & allocation complexity
 - Increases installation control of DASD, tape, and optical storage
- There is one SMS and one SMS address space per instance of MVS (z/OS)
- SMS runs in both the user's and the SMS address space

SMS Design Considerations

- Clearly separate the domains of users, data and storage media
- Introduce the role of storage administrator
- Preserve customer investment in JCL and other structures

Why should I use it?

- Reduce out of space abends (X37)
- Reduce device fragmentation
- Balance allocations across a pool of devices
- Improve storage utilization
- Help achieve device independence

Some Basic Terms

- SMS configuration
- Minimal configuration
- Base configuration information
- Storage group
- Storage class
- Management class
- Data class
- ACS routine

Some Basic Terms...

- SMS configuration
 - Minimal configuration
 - Base configuration information
 - Storage group
 - Storage class
 - Management class
 - Data class
 - ACS routine
- **A configuration is a storage management policy**
 - **It contains elements which define that policy:**
 - **Storage groups & volumes**
 - **Storage classes**
 - **Management classes**
 - **Data Classes**
 - **Automatic Class Selection (ACS) routines**
 - **Optical and tape libraries and drives**
 - **Aggregate groups**

Some Basic Terms...

- SMS configuration
- Minimal configuration
- Base configuration information
- Storage group
- Storage class
- Management class
- Data class
- ACS routine
- **Base configuration information**
- **One storage class definition**
- **One storage group with at least one volume**
- **A storage class ACS routine**
- **A storage group ACS routine**

Some Basic Terms...

- SMS configuration
- Minimal configuration
- Base Configuration Definition
- Storage group
- Storage class
- Management class
- Data class
- ACS routine
- **System & system group names**
- **Default management class**
- **Default unit**
- **Default device geometry**

Some Basic Terms...

- SMS configuration
- Minimal configuration
- Base configuration information
- Storage group
- Storage class
- Management class
- Data class
- ACS routine
- **Physical storage managed by SMS**
 - **Collection of DASD volumes**
 - **Volumes in tape libraries**
 - **Volumes in optical libraries**
 - **Virtual I/O storage**
- **Can be enabled, quiesced, quiesced new, disabled or disabled new**
- **Can be set to auto migrate, auto backup and/or auto dump**

Some Basic Terms...

- SMS configuration
- Minimal configuration
- Base configuration information
- Storage group
- Storage class
- Management class
- Data class
- ACS routine
- **Performance attributes**
 - **Direct & sequential millisecond response**
 - **Direct & sequential bias**
 - **Initial access response time**
- **Availability**
- **Accessibility**
- **Guaranteed space**
- **Guaranteed synchronous write**

Some Basic Terms...

- SMS configuration
- Minimal configuration
- Base configuration information
- Storage group
- Storage class
- Management class
- Data class
- ACS routine
- **Space management attributes**
 - **Expiration & retention attributes**
 - **Migration attributes**
 - **GDG management attributes**
- **Backup attributes**
 - **Backup frequency**
 - **Backup versions**
 - **Backup retention**
- **Class transition attributes**
- **Aggregate backup attributes**

Some Basic Terms...

- SMS configuration
- Minimal configuration
- Base configuration information
- Storage group
- Storage class
- Management class
- Data class
- ACS routine
- **RECORD or RECFM**
- **LRECL**
- **Space**
- **DSNTYPE**
- **Volume count**
- **VSAM attributes**
- **RETPD or EXPDT**
- **Compaction**

Some Basic Terms...

- SMS configuration
- Minimal configuration
- Base configuration information
- Storage group
- Storage class
- Management class
- Data class
- ACS routine
- **Used to determine SMS classes and storage groups**
- **Used for both data sets and objects**
- **Can override specifications of SMS classes and groups on:**
 - JCL DD statements
 - Dynamic allocation requests
 - DFSMSdss COPY, RESTORE & CONVERTV
 - DFSMShsm RECALL & RECOVER
 - IDCAMS DEFINE, ALTER & IMPORT
 - OAM STORE, CHANGE & class transition

Converting nonSMS data to SMS

- CONVERTV Command
 - Allows the converting of volumes to and from SMS without data movement
 - Good practices prior to converting volumes
 - Using the PREPARE keyword
 - *Reduced I/O activity but data sets are still accessible (read-only)*
 - *Status is set to INITIAL*
 - Using the TEST keyword
 - *Simulates a conversion*
 - *Shows you the classes ACS would assign to data set*
 - Combining both keywords does not change volume status
 - Customer case: Used function to address problems with uncataloged data sets on SMS volumes
 - Used the REDETERMINE keyword
 - Updates the management and storage class to match current ACS routines

DFSMSdss Keywords related to SMS

- STORGRP keyword
 - Specifies that all online volumes in the Storage Groups be dynamically allocated
 - Can specify up to 255 storage group names
 - Do not need to specify SELECTMULTI keyword
 - Catalog filtering is used to find data sets but DSS will only select data sets for volumes in the specified storage groups
 - May cause an increase in job run time
 - Can be used for COPY, DUMP, and RELEASE commands
 - Customers have used this to determine which volumes in a storage group data sets have been copied to

DFSMSdss Keywords related to SMS

- **STORCLAS** keyword
 - Specifies a storage class name for DFSMSdss to pass to ACS
 - Does not guarantee that the storage class specified will be assigned to the data set
 - Must specify **BYPASSACS** to guarantee specified **STORCLASS** is assigned to target
 - You can also use a guaranteed-space defined storage class to placed data sets on specified **OUTDD/OUTDYNAM** volumes
 - SG ACS must use **SC** to determine storage group
 - Method to move data sets from all your storage classes, except two, into one storage class using **BY FILTERING**

```
COPY DATASET(INCLUDE(**)
BY(STORCLAS,NE,(SCNAME1,SCNAME2))) -
STORCLAS(SCNAME3) BYPASSACS(**) DELETE
```

SG ACS and renaming data sets using DFSMSdss

- Using RENAMEU to have ACS select storage group without STORCLAS keyword

```
STORCLASACS :
```

```
FILTLIST JOBC    INCLUDE (**.DSTGT.**)
```

```
/*  DSTARGET      */  
  WHEN (&DSN = &JOBC)  
  DO  
  SET &STORCLAS = 'DSTARGET'  
  EXIT CODE(0)
```

```
STORGROUPACS :
```

```
IF &STORCLAS='DSTARGET' THEN SET &STORGRP = 'FCTARGET'
```

```
ADDRDSSU job :
```

```
COPY DS(INC(SYS1.DSSRC.DS01.XX1900)) -  
  RENAMEU(*.DSSRC.** , *.DSTGT.**)
```

DFSMSDss Keywords related to SMS

- MGMTCLAS keyword
 - Specifies a management class to replace the source management class to pass to ACS
 - Specifying NULLMGMTCLAS provides a null management class to the input of the ACS routines
 - Also does not propagate source management class to target
 - You can also do BY FILTERING by MGMTCLAS name

```
COPY DATASET(INCLUDE(**)  
BY(MGMTCLAS,EQ,(MGTNAME1,MGTNAME2))) -  
STORCLAS(SCNAME3) DELETE
```

DFSMSDss Keywords related to SMS

- BYPASSACS keyword
 - Way to force the specified STORCLAS and MGMTCLAS to be assigned to target
 - ACS routines are not invoked

```
COPY DATASET(INCLUDE(**)  
MGMTCLAS(MGNAME1)  
STORCLAS(SCNAME3)  
BYPASSACS(**)
```


DFSMSdss Keywords related to SMS

- Using NULLSTORCLAS and BYPASSACS(**) keywords
 - Way to force the COPY and RESTORE of the data sets to be nonSMS managed
 - ACS routines are not invoked

```
COPY DATASET(INCLUDE(**)  
  BYPASSACS(**)  
  NULLSTORCLAS  
  RENAMEU((SOURCE.** ,TARGET.**))  
  OUTDYNAM(TARGETV)
```

DFSMSDss and SMS volume selection

- SMS follows same sequence of steps as it does for normal allocations (outside of DSS)
 - Volumes must be defined in a storage groups selected for the data set by the storage group ACS routine
 - For data sets allocated for FlashCopy, SMS will attempt to select volumes in the same SFI as the source data set
 - Performance considerations:
 - When processing many (100's) of FC's, when accessing target, response time will be better when FC source and target reside in the same cluster on an DS8000
 - Keeping data sets from crossing extents pools is also a performance benefit

VSAM CA Size Requirements

- New in V1R10
- New VSAM allocations must have a control area size of 1, 3, 5, 7, 9, or 15 tracks
- IDCAMS will automatically force any allocations to abide
- When copying data sets that don't follow the CA size requirements DFSMSDss must process it using IDCAMS
 - Prevents use of Fast Replication
 - Must be able to obtain exclusive enqueue
- Tool available to perform this migration action
- Please refer to the zOS V1R10 Migration publication for more information

Enable or Disable DFSMSdss CSI usage?

- Good question, it depends. First a history.....
- Prior to V1R11, OA25644 introduced using CSI to locate data sets
 - Enabled via ADRPATCH
- Became the default in V1R11, but OA32120 changed it back
 - Reason: run times increased when specifying INCAT
- You should see a benefit when CSI is enabled when INCAT is not specified
- No benefit if input volumes or STORGRP is specified
 - CSI is not used by DFSMSdss
- If using CSI be sure to have fix provided in OA32165
 - Filter containing * in first character of qualifier will not select data sets
 - INCLUDE(DS(*.FILT or *P.FILT))

DFSMSdss FlashCopy Batch Protection using SMS

- Forces data sets to be copied to a specific storage group when FlashCopy is used as the data mover
- Create a new storage group to contain the FlashCopy target eligible volumes
- Populate new SG with the FlashCopy target volumes for
- Modify SG ACS routine to direct allocations to the new SG when the value of the new ACS variable &ACSENV2 is equal to 'FLASHCPY'
- Revalidate the ACS routine and re-activate the SMS configuration
- APARs OA32101 and OA32103
 - Will be available late 3Q2010

Reference Materials

- Publications:
 - SC35-0428: z/OS V1R10.0 Migration
 - GA22-7499: z/OS V1R12 Migration
 - GA22-7499 : DFSMSdss Storage Administration

Summary

- SMS Overview
- DFSMSdss Best Practices
- Questions?