# IBM Education Assistance for z/OS V2R2

Items:

- SMS Space Constraint Relief Enhancements
- New User Defined ACS R/O Variable in SMS PARMLIB
- SMS RAS Enhancements
- Storage Group Space Alert Messages

Element/Component:  DFSMSdfp SMS

Material current as of May 2015

# Agenda

- Trademarks
- Presentation Objectives
- Overview
- Usage & Invocation
- Interactions & Dependencies
- Migration & Coexistence Considerations
- Presentation Summary
- Appendix

# Trademarks

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

# Presentation Objectives

- Describe the following Enhancements
  - Space Constraint Relief
  - New user defined ACS Read-only Variable in SMS PARMLIB
  - RAS Enhancements
    - New Informational Console Message when activate SMS without IGDCDSXS specified in GRS RESERVE Conversion RNL
    - Enhance SELECT/DESELECT Command to have more than Two Lines
    - Include Data Set Name and Storage Group Name in ACS Messages
    - Display Storage Group(s) in IGD17800I Message
    - Externalize IGD17364I to Hardcopy Log
  - New storage group alert threshold parameters

# Overview: Space Constraint Relief

- Problem Statement / Need Addressed
  - Currently for non-Guaranteed Space Allocation, SMS Space Constraint Relief (SCR) processing simply reduces the requested space by the specified percentage, 'Reduce Space Up To (%)', in the data class if the originally requested space can not be satisfied
    - Some users requested SMS to extend this space reduction function to Guaranteed Space allocations to reduce allocation failures
    - Some users requested SMS to allocate the largest possible space that satisfies the specified reduction percentage to reduce space failures
  - Currently the user is not notified to take preventive actions for potential space failures when Dynamic Volume Count (DVC) function is used

# Overview: Space Constraint Relief

- Solution
  - A new sub-parameter, Guaranteed Space Reduction (Y | N), is added to the data class panel for the user to specify whether space reduction on guaranteed space allocation is permitted or not

```
Space Constraint Relief....N          (Y or N)
  Reduce Space Up To (%)....          (0 to 99 or blank)
  Guaranteed Space Reduction....N     (Y or N)
  Dynamic Volume Count....            (1 to 59 or blank)
```

  - SCR Space Reduction function is enhanced to support guaranteed space non-striping allocations
    - Space reduction will remain unsupported for striping allocation

# Overview: Space Constraint Relief

- Instead of allocating the smallest space quantity, SCR space reduction function is enhanced to allocate the largest possible space that satisfies the specified reduction percentage for both guaranteed space and non-guaranteed space requests
- SMS dynamic volume count (DVC) function is enhanced to issue a new informational message, IGD17296I, to the hardcopy and job logs when DVC is used to allocate or extend a data set
  - DVC is an existing field in the data class that defines the maximum number of volumes a data set can span
  - DVC is used during allocation/extend processing when the specified volume count is not sufficient
  - IGD17296I DYNAMIC VOLUME COUNT (DVC=nn) WAS USED TO {ALLOCATE|EXTEND} DATA SET dsn
  - The intent is to allow the user to take preventive action to avoid potential space failures

# Overview: Space Constraint Relief

- Benefit / Value
  - Space Reduction function is extended to include guaranteed space allocations to further reduce allocation failures
  - Space Reduction function is enhanced to allocate the largest possible space, instead of the minimum allowed space, to reduce space failures
  - DVC function is enhanced to issue a new IGD17296I message that allows the user to take preventive action for potential space failures

# Usage & Invocation: Space Constraint Relief

- Specify 'Y' to the existing parameter, Space Constraint Relief, in the data class panel to activate SMS Space Constraint Relief function
- Specify a value (0 to 99%) in the existing sub-parameter, Reduce Space Up To (%), for the highest reduction percentage that will be allowed
- Specify 'Y' to the new sub-parameter, 'Guaranteed Space Reduction', to activate the space reduction function for guaranteed space allocations
- Specify the maximum number of volumes (1 to 59) a data set can span in the existing sub-parameter, Dynamic Volume Count, to activate the DVC function and the issuance of IGD17296I notification

# Overview: Read Only Variable

- Problem Statement / Need Addressed
  - Currently the user can not provide installation specific values to the ACS routines via existing ACS read-only variables.
  - Some customers have requested to allow the ACS routines to reference the system symbolic variables or some values set at IPL time.
- Solution
  - Since referencing the system symbolic variables would be a huge impact to ACS translation and execution processing, SMS provides a new user defined ACS Read-only variable in SMS PARMLIB.
- Benefit / Value
  - Each installation can specify unique values, similar to how the system symbols are defined, to assign proper constructs without a need to modify the ACS routines constantly.
  - It's easier to reuse ACS routines on different systems.

# Usage & Invocation: Read Only Variable

- A new parameter in 'SYS1.PARMLIB(IGDSMSxx)':
  - USER_ACSVAR(value1,value2,value3)
  - The new parameter has 3 positional values.
  - Each value is a user-defined 8 character string.
- A new ACS R/O variable to access 3 positional values of the new parameter:
  - &USER_ACSVAR
    - Each positional value can be referenced as &USER_ACSVAR(1), &USER_ACSVAR(2), or &USER_ACSVAR(3)
    - &USER_ACSVAR without an index will be default to &USER_ACSVAR(1)
    - All four ACS routines are able to access this new variable.
- The positional values of the new parameter can be altered by the following SETSMS command:
  - SETSMS USER_ACSVAR(value1,value2, value3)

# Usage & Invocation: Read Only Variable (cont'd)

- The format of the new optional SMS PARMLIB parameter:

**USER_ACSVAR(**[[*value1*][**,**[[*value2*][**,**[*value3*]]]]]**)**

  - Specifies the values for a 3-positional value parameter in SMS PARMLIB member. These values will remain in effect until the next IPL, the issuance of a SET SMS=xx command or a SETSMS USER_ACSVAR command.
  - If any positional value is not specified in the command, the default value will be blank. For example, USER_ACSVAR() or USER_ACSVAR(,,) will set all 3 positional values to be blank.
  - If a single dash (-) is specified in any positional value, that current positional value will be kept. For example, USER_ACSVAR(-,-,ABC) will keep the value1 and value2 as they are but change value3 to be ABC.
  - value1, value2, and value3 can be any 1 to 8 alphanumeric or national characters ($, #, @) or period (.) or dash (-).
  - SMS will initialize the new ACS R/O variable &USER_ACSVAR with these positional values which can be accessed via &USER_ACSVAR(1), &USER_ACSVAR(2), and &USER_ACSVAR(3) respectively in ACS routines.

# Usage & Invocation: Read Only Variable (cont'd)

- The format of the new SETSMS command:

**SETSMS USER_ACSVAR(**[[*value1*][**,**[[*value2*][**,**[*value3*]]]]]**)**

  - Specifies the new values for USER_ACSVAR. This change is effective between IPLs since the active SMS PARMLIB member itself will remain unchanged.

# Usage & Invocation: Read Only Variable (cont'd)

Example of using the new variable to derive the data class:

*Product System*

SYS1.PARMLIB(IGDSMSxx):
**USER_ACSVAR(PROD,,)**

*Test System*

SYS1.PARMLIB(IGDSMSxx):
**USER_ACSVAR(TEST,,)**

```
PROC DATACLAS                                    /* DATA CLASS ACS ROUTINE */
  IF &USER_ACSVAR(1) = 'PROD' THEN
    SET &DATACLAS = 'PROD_DC'
  ELSE
    IF &USER_ACSVAR(1) = 'TEST' THEN
      SET &DATACLAS = 'TEST_DC'
    ELSE
      WRITE '***** UNEXPECTED VALUE FOR USER_ACSVAR'
  EXIT CODE(0)
END                                              /* END DATACLAS ROUTINE   */
```

Note: Positional values for second and third are blank in this example.

# Overview: SMS RAS Enhancements

- Problem Statement / Need Addressed
  - Currently, SMS does not have a console message if IGDCDSXS is not specified in GRS RESERVE Conversion RNL.
  - SELECT/DESELECT in SMS PARMLIB member cannot go to third line.
  - ACS messages, IGD01012I and IGD01015I, do not contain Data Set Name and Storage Group Name.
  - Need to display Storage Group(s) in IGD17800I Message for the specified volume(s) to help diagnosis.
  - Data sets assigned with a RETENTION LIMIT value of zero days, specified in their Management Class, are immediately expired with an IGD17364I message to the job log. This IGD17364I needs to externalize to the Hardcopy Log.

# Overview: SMS RAS Enhancements (cont'd)

- Solution
  - New Informational Console Message can warn the system participating in a global resource serialization complex if IGDCDSXS is not specified in GRS RESERVE Conversion RNL

    IGD06041I SMS RESOURCE NAME IGDCDSXS IS NOT FOUND IN GRS RESERVE CONVERSION RNL. **RETURN CODE retcode REASON CODE rsncode**

  - Enhance SELECT/DESELECT command in SMS PARMLIB member to have more than 2 lines.
  - ACS messages, IGD01012I and IGD01015I, enhanced to include the data set name and the storage group name for problem diagnosis.
  - Display Storage Group(s) in IGD17800I Message for the specified volume(s) can improve problem diagnosis.
  - Data sets assigned with a RETENTION LIMIT value of zero days, specified in their Management Class, are immediately expired with an IGD17364I message sent to the Hardcopy Log can improve problem diagnosis.

# Overview: SMS RAS Enhancements (cont'd)

- Benefit / Value
  - New Informational Console Message can warn the system participating in a global resource serialization complex if IGDCDSXS is not specified in GRS RESERVE Conversion RNL for better serviceability
  - Enhance SELECT/DESELECT command in SMS PARMLIB member to have more than 2 lines for better serviceability.
  - Enhance messages, IGD01012I, IGD01015I and IGD17800I Message for improving problem diagnosis.
  - Data sets assigned with a RETENTION LIMIT value of zero days, specified in their Management Class, are immediately expired with an IGD17364I message sent to the Hardcopy Log can improve problem diagnosis.

# Overview: Storage Group Alert

- Problem Statement / Need Addressed
  - Currently, SMS VTOC Data Set Services (VDSS) issues IGD17380I to notify a user that the cumulative space allocated on the selected storage group has exceeded the high allocation threshold.

    **IGD17380I STORAGE GROUP (*sgname*) IS ESTIMATED AT *xx*% OF CAPACITY, WHICH EXCEEDS ITS HIGH ALLOCATION THRESHOLD OF *zz*%**

  - However, issuing an alert message based on the high allocation threshold may not be ideal.
    - The user may need to change it to a higher or lower value to capture more meaningful alerts
    - It may inadvertently affect SMS volume selection behavior.

# Overview: Storage Group Alert (cont'd)

- Solution
  - Some users would like SMS to provide new alert threshold parameters in the storage group.
  - DISPLAY SMS,SG command is designed to display the space usage statistics for the specified pool storage group.
- Benefit / Value
  - System administrators have more time to react to storage group space shortage conditions.
  - It's easier to see when it might be necessary to change a storage group's space management settings or add volumes to a storage group.

# Usage & Invocation: Storage Group Alert

- Create new alert threshold attributes in the storage group panel as below:

```
TOTAL SPACE ALERT THRESHOLD %.............  (0-99)
TRACK-MANAGED SPACE ALERT THRESHOLD %.....(0-99)
```

  - If the alert threshold value is not specified, it defaults to zero and no alert messages will be issued.
  - The alert threshold attributes are applicable to pool storage groups only.
  - The equivalent fields on NaviQuest:
    - **TOTSPALERT( )**
    - **TRKSPALERT( )**
  - The DCOLLECT record type 'SG' has 2 new one-byte fields:
    - **DSGTOTAP** at offset 916(X'394')
    - **DSGTMSAP** at offset 917(X'395')

# Usage & Invocation: Storage Group Alert (cont'd)

- The new alert messages, IGD400I and IGD401I, will be issued to the console when the alert thresholds have been reached.

```
IGD400I TOTAL SPACE ALERT ON STORAGE GROUP (sgname)
    CURRENT USAGE (xx%), ALERT THRESHOLD (yy%)
IGD401I TRACK-MANAGED SPACE ALERT ON STORAGE GROUP
(sgname)CURRENT USAGE (xx%), ALERT THRESHOLD (yy%)
```

  - SMS calculates space usage on “online and enabled” volumes only.
    - VARY ONLINE / OFFLINE a volume of a pool storage group.
    - Disable / Enable an online volume of a pool storage group.
    - CVAF notifies SMS on space change
  - The alert messages will be issued at an incremental interval to prevent them from being issued too frequently.
  - IGD401I is issued only for the pool storage group containing one or more EAV volumes.

# Usage & Invocation: Storage Group Alert (cont'd)

- A new optional keyword, ALERT, is introduced for the following DISPLAY SMS command

  **D SMS[,{STORGRP|SG}{(*sgname*|ALERT|ALL)}[,LISTVOL]**

  - The new optional keyword, ALERT, is used to display any pool storage groups which have already reached either the total space alert threshold or the track-managed alert threshold.

- The existing message, IGD002I, will be enhanced to include the space information
  - The space information will contain total space, total track-managed space, usage percentages and alert thresholds on the system at which the command is issued if the information is available.
  - The space information is shown for pool storage groups only.

# Usage & Invocation: Storage Group Alert (cont'd)

- Sample Output for **D SMS,SG(ALERT)**

```
IGD002I 11:50:04 DISPLAY SMS 021

  STORGRP  TYPE    SYSTEM= 1 2 3 4 5 6 7 8
  SXP02    POOL            + + + + + + + +
    SPACE INFORMATION:
    TOTAL SPACE = 306458MB USAGE% = 99 ALERT% = 65
    TRACK-MANAGED SPACE = 106220MB USAGE% = 100 ALERT% = 50
  ***************************** LEGEND ******************************
  . THE STORAGE GROUP OR VOLUME IS NOT DEFINED TO THE SYSTEM
  + THE STORAGE GROUP OR VOLUME IS ENABLED
  - THE STORAGE GROUP OR VOLUME IS DISABLED
  * THE STORAGE GROUP OR VOLUME IS QUIESCED
  D THE STORAGE GROUP OR VOLUME IS DISABLED FOR NEW ALLOCATIONS ONLY
  Q THE STORAGE GROUP OR VOLUME IS QUIESCED FOR NEW ALLOCATIONS ONLY
  > THE VOLSER IN UCB IS DIFFERENT FROM THE VOLSER IN CONFIGURATION
  SYSTEM  1 = SYSTEM1    SYSTEM  2 = SYSTEM2    SYSTEM  3 = SYSTEM3
  SYSTEM  4 = SYSTEM4    SYSTEM  5 = SYSTEM5    SYSTEM  6 = SYSTEM6
  SYSTEM  7 = SYSTEM7    SYSTEM  8 = SYSTEM8
```

  - Note: Only one storage group SXP02 has its usages which have reached the alert thresholds.

# Usage & Invocation: Storage Group Alert (cont'd)

- After an activation of a new configuration, the DISPLAY SMS,SG command may show “UPDATE STILL IN PROGRESS” in some of the storage group space information.
- To force the space information to be updated sooner for the storage group that received “UPDATE STILL IN PROGRESS”, the operator may issue the following command:

**V SMS,{STORGRP(storgrp)|SG(storgrp)|VOLUME(volser)|VOL(volser)},{SPACE|S}**

# Interactions & Dependencies

- Read Only Variable Enhancement
  - &USER_ACSVAR can be tested through the ISMF ACS Test Function.

# Migration & Coexistence Considerations

- Read Only Variable Enhancement
  - &USER_ACSVAR is only available on z/OS V2R2 systems
  - IBM recommends lower releases should not reference &USER_ACSVAR
    - If the ACS routines are written and activated on V2R1, the programmer needs to add a logic to jump around all the references to &USER_ACSVAR
    - Otherwise, in lower releases, ACS processing will fail with the existing return code 20 and reason code 2035, which means invalid ACS Read-only variable

# Presentation Summary

- Many new SMS Enhancements
  - Space Constraint Relief
  - New user defined ACS Read-only Variable in SMS PARMLIB
  - RAS Enhancements
    - New Informational Console Message when activate SMS without IGDCDSXS specified in GRS RESERVE Conversion RNL
    - Enhance SELECT/DESELECT Command to have more than Two Lines
    - Include Data Set Name and Storage Group Name in ACS Messages
    - Display Storage Group(s) in IGD17800I Message
    - Externalize IGD17364I to Hardcopy Log
  - New storage group alert threshold parameters

# Appendix

- Publication references:
  - SC23-6860 z/OS DFSMSdfp Storage Administration
  - SC23-6856 z/OS Using the Interactive Storage Management Facility
  - SA22-7638 z/OS MVS System Messages, Vol 8 (IEF-IGD)
  - SA38-0666 z/OS MVS System Commands
  - SC23-6846 z/OS DFSMS Access Method Services Commands
  - SC23-6849 z/OS DFSMS Implementing System-Managed Storage
  - SA23-1380 z/OS MVS Initialization and Tuning Guide