z/OS V1R13

DFSMShsm: Space management performance

Session objectives

- **At the completion of this session, you will be able to understand the following Space Management Performance Improvements made for DFSMShsm in V1R13:**
  - A functional enhancement to replace interval migration (IM) with on demand migration (ODM).
  - An enhancement to listen for an SMS configuration change and refresh DFSMShsm internal SMS configuration information upon receiving the notification from SMS.

Overview: On demand migration

- Problem:
  - A well-known constraint relief problem for customers of DFSMShsm is interval migration (IM). At the top of every hour, DFSMShsm performs a space check on every volume that it manages which causes a spike in DFSMShsm CPU usage and can consume a lot of wall clock time.
- Solution:
  - Beginning in V1R13, installations have their preference on what type space management processing they would like DFSMShsm to perform:
    - on the hour (ie interval migration) or
    - whenever a volume exceeds its threshold (ie on demand migration).
- Benefit:
  - A new option for space management processing is on demand migration(ODM). The ODM support allows DFSMShsm to replace interval migration to provide timely space management against those SMS volumes that have exceeded their threshold.
- A new option for space management processing is DFSMShsm's On Demand Migration. When in On Demand Migration mode, DFSMShsm has a new listening exit that listens for a new SMS ENF signal. The new SMS ENF is issued when a volume goes over threshold due to a new data set allocation or extension. This function provides timely space management against those volumes that have exceeded their threshold rather than having the volumes wait for the top of the hour space management. Interval Migration remains an option and it is the default option for DFSMShsm.

Usage and invocation: On demand migration

- SMS will issue a new ENF 72 event when the volume threshold is exceeded during allocation of a data set on an SMS volume.
- The ENF 72 notification is SMS complex (SMSplex) wide.
- DFSMShsm will process the volume after receiving the ENF 72 from SMS when in an on demand migration environment.
- ENF72 is a newly created ENF signal. ENF72 event types and qualifiers are described in the "z/OS MVS Authorized Assembler Services Reference" and "z/OS MVS Authorized Assembler Services Guide" publications.
- SMS will issue a ENF72 whenever a volume has reached or exceeded its high threshold, regardless of the AM=x setting(where x can be Y,I,P or N). This allows for other products listening for the new ENF72 to take advantage of the new function.
- New SETSYS parameters called ONDEMANDMIGRATION(Y|N) and ODMNOTIFICATIONLIMIT(*limit*) are introduced:
  - SETSYS ONDEMANDMIGRATION(Y|N) specifies whether on demand migration should be used instead of interval migration on SMS-managed volumes that have AM=Y specified.
  - SETSYS ODMNOTIFICATIONLIMIT specifies a notification limit for the number of volumes being processed by on demand migration.
- SETSYS ONDEMANDMIGRATION(Y|N) *(or ODM(Y))*

Y - The on demand migration function should be used instead of interval migration on SMS-managed volumes with storage group settings of AUTOMIGRATE=Y.
N - Interval migration will be performed for SMS-managed volumes at the top of every hour.
Default is N.
Abbreviated as ODM.

Example: Activation of the on demand migration function

Activate the on demand migration function with the following command:

SETSYS ODM(Y)

Interval migration will not be performed for SMS-managed volumes with storage group settings of AUTOMIGRATE=Y at the top of every hour. Space management will be performed on demand for these SMS-managed volumes when a new SMS ENF 72 type is issued.

- SETSYS ODMNOTIFICATIONLIMIT(*limit*)

The subparameter *limit* is a decimal number from 1 to 99999.

Default: 100 is the default setting for the ODMNOTIFICATIONLIMIT parameter.

For example, if the following command

SETSYS ODMNOTIFICATIONLIMIT(250)

is issued, then when the number of SMS-managed volumes with storage group settings of AUTOMIGRATE=Y whose high thresholds are exceeded hits 250, a new highlighted message to the operator console will be issued. The new message is:

ARC1901E NUMBER OF VOLUMES ELIGIBLE FOR ON DEMAND MIGRATION HAS REACHED 250

When the number of SMS-managed volumes with AM=Y whose high thresholds are exceeded becomes less then 250, this message will be removed from the operator console.

- To display the value of the subparameter *limit* and the value for ODM the following command can be issued:

QUERY SETSYS

The result of the command will display the ARC0153 message on the operator console:

ARC0153I SCRATCHFREQ=*days,* SYSOUT(CLASS=*class,* COPIES=*number,* SPECIAL

FORMS={*form* | NONE}), SWAP={YES | NO},

PERMISSION={YES | NO}, EXITS={NONE | *exits*}, UNLOAD={YES | NO},

DATASETSERIALIZATION= {USER | DFHSM}, USECMS={YES | NO},

ONDEMANDMIGRATION={YES|NO} , ODMNOTIFICATIONLIMIT=*nnnnn* <--- *NEW*

- By default, a volume that remains over threshold is eligible to be processed again by on demand migration (ODM) after 14 hours. However, sometimes a volume remains over threshold (after being processed by ODM) because there are no eligible data on the volume to be moved. If you do not want DFSMShsm to reselect such a volume for ODM processing after 14 hours, you can adjust the frequency of running ODM on over-threshold volumes by issuing a patch similar to the one in the following example:

```
PATCH .MGCB.+138 X '00015180' /* 24 hours in seconds */
```

Overview: Automatic SMS configuration change refresh

- Problem:
  - One of the unnecessary top-of-the-hour checks that DFSMShsm performs is to determine whether the SMS configuration was modified.
- Solution:
  - This hourly check is replaced with an exit that will listen for an existing ENF 15 signal that indicates that an SMS configuration change has occurred.
- Benefit:
  - Since SMS configuration changes are infrequent, this will eliminate the additional overhead of work that DFSMShsm does by checking for the SMS configuration change each hour.

Usage and invocation: Automatic SMS configuration change refresh

- DFSMShsm has implemented a new ENF 15 listening exit called ARCENF15 which will get control every time when an SMS configuration change has occurred.
- DFSMShsm checks to see if an ENF 15 event has occurred every time primary space management, interval migration or on demand migration starts. If an ENF 15 event has occurred then an internal SMS configuration information refresh is done by DFSMShsm.
- No additional SMS configuration refresh will be done until the next ENF 15 event occurs.
- The PATCH .MCVT.+C8 BITS(1.....) command description has been deleted from the publication "DFSMShsm Implementation and Customization", SC35-0418-12, this patch can be removed from parmlib if it was previously used. This was the patch command that prevented HSM from refreshing its internal SMS configuration records.

Interactions and dependencies

- **A functional enhancement to replace interval migration with on demand migration:**
  - None
- **An enhancement to listen for an SMS configuration change and refresh DFSMShsm internal SMS configuration information upon receiving the notification from SMS**
  - None

Migration and coexistence considerations

- **A functional enhancement to replace interval migration with on demand migration:**
  - None
- **An enhancement to listen for an SMS configuration change and refresh DFSMShsm internal SMS configuration information upon receiving the notification from SMS**
  - The command PATCH .MCVT.+C8 BITS(1.....) can be removed from ARCCMDxx member of SYS1.PARMLIB. This patch command used to prevent DFSMShsm from performing SMS configuration updates to internal records. It is not necessary to remove it but recommended to avoid any future misunderstandings of its usefulness.

Installation

- **A functional enhancement to replace interval migration with on demand migration:**
  - None
- **An enhancement to listen for an SMS configuration change and refresh DFSMShsm internal SMS configuration information upon receiving the notification from SMS**
  - None

Session summary

- You should now understand the following:
- **The functional enhancement to replace interval migration with on demand migration.**
  - On demand migration is now supported by DFSMShsm using the new ENF 72 over threshold event notification issued by SMS.

- **The enhancement to listen for an SMS configuration change and refresh DFSMShsm internal SMS configuration information upon receiving the notification from SMS.**
  - DFSMShsm now listens and takes action when the ENF 15 notification is issued by SMS when SMS configuration has changed.

Appendix - References

- **Publications**
  - *z/OS DFSMSdfp Storage Administration,* SC26-7402-15
  - *z/OS DFSMShsm Implementation and Customization,* SC35-0418-12
  - *z/OS DFSMShsm Storage Administration,* SC35-0421-12
  - *z/OS MVS Authorized Assembler Services Reference EDT-IXG,* SA22-7610-19
  - *z/OS MVS Authorized Assembler Services Guide,* SA22-7608-16
  - *z/OS MVS System Messages, Vol 2 (ARC-ASA),* SA22-7632-21