

Managing HSM so that HSM doesn't manage you!

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Agenda Topics








- Introduction
- HSM Status
- Control data sets and journal
- Information sources
- Return Codes and reporting
- Common causes for migration and backup failures
- Thrashing
- Storage Group thresholds
- Message automation
- Reorganizing Control Data Sets
- HSM Audits
- Monitoring

Session Abstract

- In the normal data center, DFSMSHsm is an integral part of the overall production process. Do you know what is really happening in your HSM environment? Do you know what problems are lurking? We will provide suggestions on some of the error conditions that you can report on and monitor, using the DFSMS Report Generator and the latest tools to assist you.
- We will demonstrate how to use monitoring to do work for you and notify you right away before problems occur. At the end of this session, the attendee will have a better understanding of the typical daily activities of a storage administrator.

Check status of HSMs

- Make sure that the HSM started tasks are running as expected
 - No held functions
 - All functions held could indicate CDS backup failure!

DFSMSHsm Functions Summary						
	Function	 Function Status	Dataset Requests	Volume Requests	Active Requests	Waiting Requests
	Migration	Held	0	0	0	0
	Recall	Not Held	0	0	0	0
	Backup	Not Held	0	0	0	0
	Recovery	Held	0	0	0	0
	Dump	Not Held	0	0	0	0
	Delete	Not Held	0	0	0	0

Control Data Set Occupancy

- Automate action for Control data set backup failures
 - ARC0744E message
 - Highlighted message
- Monitor for ARC0026E (Journaling disabled)
 - Most functions will be held
- Monitor for ARC0909E message (CDS/Journal percent full)
 - Thresholds set by SETSYS MONITOR
 - Different thresholds can be set for different control entities
- If Journal fills up, processing will stop until journal is cleared
 - BACKVOL CDS
 - Recalls should still continue to process

Information Source - HSM Log files

- HSM Logfiles are used to track HSM activity
- Required if using an ISV solution that reads the logs
- Disable if not needed
 - Additional overhead when using logging
- One set of log files per HSM started task
- Active logfile is always the HSMLOGX dataset
 - Exclusive enqueue issued by HSM started task
 - HSM swaps the log files by renaming them
 - Must reside on the same volume
- HSMLOGY data set can be analyzed using ARCPRLOG/ARCPEDIT programs

Using ARCPRLOG

- Members provided by HSM starter set
 - Member ARCSTRST in SYS1.SAMPLIB
- ARCSTRST creates xxx.SAMPLE.CNTL
- HSMLOG prints the contents of the HSMLOGY data set
 - As delivered, the 2nd step zeros out the HSMLOGY data set
- HSMEDIT formats the output from the previous job
- Both are still somewhat cryptic

ARCPRINT PRINTLOG

```

FUNC=MIGRATE L0->L2      TOVOL=500361  FRVOL=SMS004  JOBNM=HSM      RC=00019  REAS=00008
TIMES: REQUEST RECEIVED=130159, STARTED=130159, ALLOCATED=130200, ENDED=130200.
DSN=ITM622.ADCD.RKDSTHRE      DSORG=VS  RECFM=
DLU=10245  DLM=00000  BYTR=0000000000  TRKR=000000  BYTW=0000000000  TRKW=000000
04EC0000 02F10000 00000000 0000E2E8 E2F1C8E2 D4404040 40400000 00000000
00005C5C C8E2D45C 5C5C0300 C9E3D4F6 F2F24BC1 C4C3C44B D9D2C4E2 E3C8D9C5
40404040 40404040 40404040 40404040 40404040 40404040 F5F0F0F3 F6F14304
8083E2D4 E2F0F0F4 00000000 00000013 00000008 00000000 00000000 00000000
00000000 00000000 0111039F 13015992 13015992 13020006 13020002 0110245F
0000000F 00000000 00000000 00000000 00080000 00000003 00000000 00000000
00000005 E2C3C4C5 C6404040 00000000 00000000 0005D4C3 D7D9C440 40400000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
F1400000 00000000 00000000
LEN=0150 TOD=130200 DATE=11/02/08 ID=03 NAME=OUTPUT MSG TO OPER/USER
MSGID=0734 TO=**OPER** NI=9 ARC0734I ACTION=MIGRATE FRVOL=SMS004 TOVOL=500361 TRACKS=      16 RC= 19, REASON=      8, AGE=
159, DSN=ITM622.ADCD.RKDSTHRE
  
```

ARCPRINT EDITLOG

- EDITLOG shows request but does not show outcome

```
***** TOD=130200 DATE=00111039 NAME=MIGRATION ENDED *****  
FUNC=MIGRATE L0->L2          TOVOL=500361 FRVOL=SMS004 DEVT=43048083 START=130159 END=130200  
DSN=ITM622.ADCD.RKDSTHRE          DSORG=VS  RECFM=  
BATCH REQUEST    NOWAIT SPECIFIED  
SYSTEM REQUEST  
  
***** TOD=130200 DATE=00111039 NAME=MIGRATION ENDED *****
```

Information Source – HSM Activity Logs

- Activity Logs contain information from the automated functions
 - Space Management (Primary & Secondary)
 - Automatic Backup
 - Autodump
- Not to be confused with HSMLOGX and HSMLOGY
- Can be written to SYSOUT or DASD
 - SETSYS ACTLOGTYPE
 - SYSOUT can be accessed while automatic function is active
- SETSYS ACTLOGMSGLVL controls messages issued
 - Recommend FULL rather than EXCEPTIONONLY
 - This parm also controls which messages are written to LOGX/Y

Activity Log Error Summary

```

ERROR SUMMARY OF ERRORS IN DFSMSHsm Space Management    2011/02/10
RC RC  TEXT
 6  0  DUPLICATE DATA SET NAME IN DFSMSHSM DATA BASE      2  DATASETS
19  1  DATASET IN USE (NON-VSAM)                             4  DATASETS
19  8  DATASET IN USE (VSAM)                                 24  DATASETS
20  4  NON-SMS DATASET CATALOGED TO WRONG VOLUME           1  DATASETS
30  0  DATASET NOT CATALOGED                                3  DATASETS
58  4  VTOC SAYS MULTI VOL, CAT SAYS NOT                   2  DATASETS
58  8  NO CATALOG ENTRY FOUND                             176  DATASETS
70 13  CATALOGED TO A DIFFERENT VOLUME                      16  DATASETS
99  6  INVALID BLOCKSIZE                                    1  DATASETS
99 14  APF AUTHORIZED DATASET                              15  DATASETS
  
```


Information Source – SMF Records

- HSM can write SMF records
 - Default is SETSYS NOSMF
- To activate, SETSYS SMF(xxx)
 - SETSYS SMF(240) commonly used
- If activated, HSM writes 2 SMF records
 - In above example, 240 and 241
- 1st record contains
 - Daily Statistics (DSR)
 - Volume Statistics (VSR)
- 2nd record contains
 - Function Statistics (FSR)
 - ABARS function Statistics (WWFSR)

SMF Records

- Monitoring products can gather SMF records
 - Hooks into IEFU83, IEFU84, etc.
- **Warning!** Not all records are written to SMF
 - Example:
 - RC=99
 - RC=58
 - There may be others.....

Homegrown Reporting Tools

- Purpose –
 - Report on DFSMSHsm activity.
 - Migration, backup, recall, recover, extent reduction, PSM, SSM, etc.
 - *What and Why?*
 - *Age, times, etc.*
 - Successful/unsuccessful
 - What, Why and How long?
- Things to know –
 - Requires in-depth knowledge of HSM and internal records.
 - Often requires other OEM software license
 - SAS
 - What is the plan for support and knowledge transfer?

DFSMSrmm Report Generator

- DFSMShsm reporting added in z/OS V1R10 DFSMS
- Available in ISMF Option G
 - Create Storage Management Reports
- Reports created from FSR and WWFSR SMF records
- Additional reports from data obtained using DCOLLECT
- SMF records need to be dumped from SYS1.MANx or logstream first
- More info in Sessions 9232 and 9233 on Friday morning

Storage Management Reports

- Various reports available

```

DFSMSrmm Report Definitions                               Row 1 to 17 of 41
Command ==> _____ Scroll ==> CSR

The following line commands are valid: A,D,G,H,J,L,M,N,S, and T

S Name      Report title      Report type      User id
-----
_ ARCGAB01  ABARS ABACKUP Statistics  DFSMShsm ABARS Report  HSM
_ ARCGAR01  ABARS ARECOVER Statistics  DFSMShsm ABARS Report  HSM
_ ARCGDB01  DCOLLECT BACKUP DATA      DFSMShsm DCOLLECT BACKUP  P390
_ ARCGDD01  DCOLLECT DASD CAPACITY PLANNIN DFSMShsm DCOLLECT DASD CAP  P390
_ ARCGDM01  DCOLLECT MIGRATION DATA    DFSMShsm DCOLLECT MIGRATION  P390
_ ARCGDT01  DCOLLECT TAPE CAPACITY PLANNIN DFSMShsm DCOLLECT TAPE CAP  P390
_ ARCGS001  Statistics for DFSMShsm      DFSMShsm FSR-SMF Records  HSM
_ ARCGS002  Statistics for Backup        DFSMShsm FSR-SMF Records  P390
_ ARCGS003  Statistics for Migration     DFSMShsm FSR-SMF Records  P390
_ ARCGS004  Statistics for Recall        DFSMShsm FSR-SMF Records  P390
_ ARCGS005  Statistics for Recovery      DFSMShsm FSR-SMF Records  HSM
_ ARCGS006  Statistics for Volume Dump   DFSMShsm FSR-SMF Records  HSM
_ ARCGS007  Statistics for Restore from Du DFSMShsm FSR-SMF Records  HSM
_ ARCGS008  Statistics for FRBACKUP     DFSMShsm FSR-SMF Records  HSM
_ ARCGS009  Statistics for FRRecover     DFSMShsm FSR-SMF Records  HSM
_ ARCGS010  DFSMShsm Thrashing Report    DFSMShsm FSR-SMF Records  P390
  
```

Backup Error Report using DFSMSrmm Report Generator



```
Statistics for Backup      - 1 -      02/14/2011      14:59:30
```

DATE	TIME REQ	DSN	SOURCE	RC	REASON CODE	KB READ
2011040	12003814	SYS2.RMM.CONTROL.FILE	SMS001	68	412	0
2011040	12003937	DSN810.DSNDBC.BJTBASE.BJTARCSP.I0001.A001	SMSOM1	68	412	0
2011040	12004166	ITM622.ADCD.RRNSGRP1	SMS001	19	0	0
2011040	12004220	DSN810.DSNDBC.BJTBASE.BJTATTSP.I0001.A001	SMSOM1	68	412	0
2011040	12004950	DSN810.DSNDBC.BJTBASE.BJTARCSP.I0001.A001	SMSOM1	0	0	16612
2011040	12004959	ITM622.ADCD.RRNSGRP1	SMS001	0	0	8323
2011040	12004962	SYS2.RMM.CONTROL.FILE	SMS001	0	0	2344
2011040	12004994	AKD.AUDIT.CATLIST	SMS001	0	0	1
2011040	12005002	AKD.AUDIT.RMMCNTL	SMS001	0	0	1
2011040	12005039	DSN810.DSNDBC.BJTBASE.BJTACTSP.I0001.A001	SMSOM1	68	412	0
2011040	12005057	AKD.MEDIACTL.V900018.ERRORS	SMS001	0	0	1
2011040	12005129	P390.SPFTEMP0.CNTL	SMS001	19	0	0
2011040	12005157	P390.SPFTEMP0.CNTL	SMS001	0	0	8
2011040	12005264	AKD.AUDIT.OCDS.TTCVAUDT	SMS001	0	0	23
2011040	12005271	IXGLOGR.ATR.ADCDPL.DELAYED.UR.ADCDPL	SMS001	68	412	0
2011040	12005331	ITM622.ADCD.RRVSGRP1	SMS001	19	0	0
2011040	12005739	DSN810.DSNDBC.BJTBASE.BJTATTSP.I0001.A001	SMSOM1	0	0	16612



Migration Error Report using DFSMSrmm Report Generator



Statistics for Migration - 1 - 02/11/2011 11:04:31

DATE	TIME REQ	DSN	AGE	SOURCE	RC	REASON CODE	KB READ
2011041	13000719	SYS2.TDS.DCOLLECT.G0353V00	0002	SMS002	0	0	18836
2011041	13001273	SYS2.RMM.HSKP.MESSAGE.SAVE.G2712V00	0001	SMS002	0	0	6
2011041	13001399	ITM622.ADCD.RKDSSTSA	0000	SMS002	19	8	0
2011041	13001565	ITM622.ADCD.RKDSCKPT	0000	SMS002	19	8	0
2011041	13001612	ITM622.ADCD.RKDSQURY	0000	SMS002	19	8	0
2011041	13001633	ITM622.ADCD.RKDSDYST	0000	SMS002	19	8	0
2011041	13001649	ITM622.ADCD.RKDSEPRM	0000	SMS002	19	8	0
2011041	13001666	ITM622.ADCD.RKDSEVMP	0000	SMS002	19	8	0
2011041	13001680	ITM622.ADCD.RKDSGRPC	0000	SMS002	19	8	0
2011041	13001696	SYS2.BJTBASE.BJTBUCCSP.D2011039.T181622	0002	SMS002	0	0	24
2011041	13002005	SYS2.BJTBASE.BJTUAMSP.D2011040.T001701	0002	SMS002	0	0	12
2011041	13002090	SYS2.BJTBASE.BJTDDSSP.D2011039.T181622	0002	SMS002	0	0	1903
2011041	13002249	SYS2.BJTBASE.BJTLAYSP.D2011040.T001701	0002	SMS002	0	0	3377
2011041	13002397	SYS2.BJTBASE.BJTATTSP.D2011040.T001701	0002	SMS002	0	0	12
2011041	13002469	SYS2.BJTBASE.BJTBANSP.D2011040.T001701	0002	SMS002	0	0	96
2011041	13002595	SYS2.BJTBASE.BJTBUISP.D2011040.T001701	0002	SMS002	0	0	8
2011041	13002671	SYS2.BJTBASE.BJTAVRSP.D2011040.T001701	0002	SMS002	0	0	8



Using an ISPF-based product

- Ability to filter on particular conditions
 - Functions
 - Return Codes
 - Date/Time
- Ability to store queries
- Able to take corrective actions
- Also provides means to execute in batch

ISPF view of Migration errors

```

      FILTERED VIEW OF MIGRATE/BACKUP
Enter 0 at Command for list of options.
Panel 1 of 3. Scroll right for more information.
Key S beside entry for return/reason codes.
S   Dsn                               Action   Rc Rsrc   Trks   Age
   DSN810.DSNDBD.BJTBASE.BJTACTX2.I0001.A001  MIGRATE  58 00008    0  286
   DSN810.DSNDBD.BJTBASE.BJTACTX5.I0001.A001  MIGRATE  58 00008    0  286
   MAINSTAR.MCR0703.SMCRLOAD                 MIGRATE  99 00014    0   20
   DSN810.DSNDBD.BJTBASE.BJTARCX3.I0001.A001  MIGRATE  58 00008    0  286
   DSN810.DSNDBD.BJTBASE.BJTARCX7.I0001.A001  MIGRATE  58 00008    0  286
S   SYS2.MXH0902.SMXHLOAD                   MIGRATE  99 00014    0   0
   DSN810.DSNDBD.BJTBASE.BJTARCX8.I0001.A001  MIGRATE  58 00008    0  286
   DSN810.DSNDBD.BJTBASE.BJTARCXC.I0001.A001  MIGRATE  58 00008    0  286
   DSN810.DSNDBD.BJTBASE.BJTARCXD.I0001.A001  MIGRATE  58 00008    0  286
   DSN810.DSNDBD.DRLDB.EXCEPTRI.I0001.A001    MIGRATE  58 00008    0  286
   DSN810.DSNDBD.BJTBASE.BJTARCXE.I0001.A001  MIGRATE  58 00008    0  286
   DSN810.DSNDBD.BJTBASE.BJTATTX1.I0001.A001  MIGRATE  58 00008    0  286
   IXGLOGR.ATR.ADCDPL.RM.DATA.A0000000.DATA  MIGRATE  70 00013    0  278
   DSN810.DSNDBD.DRLDB.DRLEXPRI.I0001.A001    MIGRATE  58 00008    0  286
   DSN810.DSNDBD.BJTBASE.BJTATTX2.I0001.A001  MIGRATE  58 00008    0  290
   DSN810.DSNDBD.DRLDB.DFSMSACT.I0001.A001    MIGRATE  58 00008    0  286

```

Drill-down from migration errors

```
Rc/Rsn ----- Advanced Reporting for DFSMSHsm V2R3 ----- 13:58  
Command ==> █
```










```
Refer to DFHSM message ARC1299I for more information
```

```
MIGRATE Return Code 99 - UNSUPPORTED DS
```

```
Reasons=> 00014 DSN IS APF AUTHORIZED LIBRARY
```


Monitor ABARS events

- If using ABARS, ensure that these jobs are successful

Application Backup Events (Base Events)												
	ABARS Event Name	Base Version	Incremental Version	Type of Backup	Status of Backup	⊗ Utility RC	⊗ ITABR RC	Event Timestamp	Elapsed Time	Datasets Backed Up	Total Space Backed Up	
	OM	0	0	BI	COMPLETE	0	0	02/11/11 09:30:06	00:24:53	6591	1,512,136	
	P390	0	0	I	COMPLETE	34	999	02/10/11 15:30:16	*****	0		
	P390	0	-1	I	COMPLETE	0	4	02/09/11 15:30:41	00:01:35	24	82,954	
	P390	0	-2	I	COMPLETE	0	4	02/08/11 15:31:00	00:01:24	15	21,011	
	P390	0	-3	BI	COMPLETE	0	4	02/07/11 15:30:36	00:14:53	917	3,413,906	
	SYS2	0	0	I	COMPLETE	0	0	02/10/11 17:16:02	00:08:40	130	2,480,861	
	SYS2	0	-1	I	COMPLETE	0	0	02/09/11 17:15:24	00:08:23	132	2,398,480	
	SYS2	0	-2	I	COMPLETE	0	0	02/08/11 17:15:42	00:09:00	134	2,482,871	
	SYS2	0	-3	BI	COMPLETE	0	4	02/07/11 17:15:21	00:17:12	771	6,212,594	

Common Causes of Migration & Backup Failures



- Everyday in most shops DFSMSHsm primary, secondary and backup are run at specific times daily. In most cases business's have grown, storage farms have grown and managed data has grown, but when was the last time your scheduled tasks were reviewed or verified?
- Here are some common failures that we have seen
 - Data Set in Use (RC=19) –
 - A common encountered error, everyday DFSMSHsm will try to migrate and backup these data sets and fail.
 - *Waste of DFSMSHsm resources*

Common Causes of Migration & Backup Failures



- Common causes of migration/backup failures (continued) –
 - No space on ML1 Volume (RC=37)
 - This is usually seen with large data sets. Some simple solutions include adding additional volumes to ML1 pool, modifying management rules to expire more data on primary pools, using an ARCMDEXT to migrate large data sets straight to tape or consider using ML1 Overflow volumes
 - HSM Backup Critical Errors (condition code ne 0) –
 - HSM backup is critical to shops using this as their first level data recovery.
 - *Backup window overlaps batch processing*
 - *Ctlg errors (rc30) / DFDSS errors (rc68) / vtoc discrepancy (rc87)*
 - *Waste of DFSMSHsm resources*

Common Causes of Migration & Backup Failures



- Common causes of migration/backup failures (continued) –
 - Unsupported Datasets (rc99, rsn04) are a very common migration and backup error.
 - Cause of the problem is incorrectly defined data sets (no DSORG).
 - Every day HSM will try to migrate/backup these data sets and fail. We have seen situations where the same data sets have been failing for nine years and more. The quickest and easiest correction is to update the SMS routines to automatically assign a data class.
 - *Waste of DFSMSHsm resources.*
- Running Interval Migration means that errors may occur multiple times a day
 - Reports show repeated errors against same data set name

Patches – Problem Determination

- Examples
 - `PATCH .MGCB.+26 X'FF'`
 - Used to determine why an SMS-managed data set is not selected during volume migration
 - `PATCH .BGCB.+24 X'FF'`
 - Used to determine why SMS-managed data sets are not being selected during volume backup
- These patches produce a lot of messages
 - `ARC1245I` with Reason Codes GT 90 for migrations
 - `ARC1334I` with Reason Codes GT 90 for backups
- Use diagnostic patches only when needed or directed by Level 2 support
 - Excessive non-zero return codes
 - Extra processing overhead

Recall Failures

- You will probably hear about recall issues long before running a report!
 - RC=2 often means that the user tried the recall multiple times
- If you see a lot of failures, check to see if a process is issuing HRECALLs, regardless of whether the data is migrated or not

```

Statistics for Recall      - 1 -      02/14/2011      15:36:04
  
```

DATE	TIME REQ	DSN	RC	AGE	TARGET	MC NAME	HOST
2011045	15315242	P390.ABA.LOG	0	175	SMS003	MCDEF	1
2011045	15315262	P390.ABARSMGR.JCLPROF	0	293	SMS002	MCDEF	1
2011045	15315281	P390.ABR.DEMO.INSTJCL	0	441	SMS006	MCDEF	1
2011045	15315297	P390.ABR.DEMO.XFRBIN	0	293	SMS008	MCDEF	1
2011045	15315314	P390.ABR.DEMO.XFRBINR	0	475	SMS006	MCDEF	1
2011045	15320662	P390.ABARSMGR.JCLPROF	2	0			1
2011045	15320679	P390.ABR.DEMO.INSTJCL	2	0			1
2011045	15320694	P390.ABR.DEMO.XFRBIN	2	0			1
2011045	15320711	P390.ABR.DEMO.XFRBINR	2	0			1
2011045	15320727	P390.ABRACDI.PROD.INJCL	0	390	SMS008	MCDEF	1

Common Recall Queue - CRQ

- Consolidates recall requests and spreads them across HSM instances
 - Balances workloads around the complete HSMplex
 - Can help reduce recall delays
- Allows important recalls to be prioritized ahead of lesser ones
 - Use **ARCRPEXT** (Return Priority exit)
- Optimizes Tape mounts
 - Single tape mount satisfies requests from multiple LPARS
- Requests can be carried out by all or some of the systems
 - Allows systems **without** attached tape to issue recall requests

Expire Errors

- Expire processing is performed as part of Space Management
 - Primary, Secondary Space Management & Interval Migration
- Check for RC=53
 - Means that data set needs a backup first
 - Can also be seen when trying to migrate to ML2
- Data sets with explicit expiration dates can be expired by HSM
 - Review **SETSYS EXPIREDDATASETS**
 - SCRATCH will delete, NOSCATCH will ignore
 - Explicit expiration dates override management class rules

Thrashing

- Thrashing can be described in 2 ways
 - A data set which is migrated and recalled within a few days
 - Data sets which are migrated and recalled multiple times
- Often generation data sets involved
 - Management Class says to allows GDS early migration
 - MC Class field # GDG Elements on Primary
 - Some jobs recall entire GDG rather than relative generation
 - Data is recalled even when not needed
- Consider not migrating small datasets
 - Migration may not be worth the processing overhead
 - Use ARCMDEXT exit to exclude from migration
 - Can also allow migration to ML1 but exclude from ML2

Thrashing

- HSM SMF records (FSR) can be used to look for thrashing

```
DFSMShsm Thrashing Report      - 1 -      02/14/2011      15:54:02
```

DSN	AGE	SIZE KB	DATE	TIME REQ	JOB NAME REQUESTIN SERVICE	TARGET	MC NAME
AAH230.GLOBAL.CSI	0	1444	2011039	14203238	CONSINV	SMS009	MCPRD
ABR220.GLOBAL.CSI	0	1444	2011039	14203671	CONSINV	SMS009	MCPRD
ACM230.GLOBAL.CSI	0	1444	2011039	14204094	CONSINV	SMS009	MCPRD
ARH230.GLOBAL.CSI	0	1444	2011039	14204781	CONSINV	SMS007	MCPRD
ATH310.GLOBAL.CSI	0	722	2011039	14205140	CONSINV	SMS006	MCPRD
BJT230.GLOBAL.CSI	0	1444	2011039	14205417	CONSINV	SMS006	MCPRD
GLO310.GLOBAL.CSI	0	722	2011039	14210189	CONSINV	SMS008	MCPRD
HDSM612.GLOBAL.CSI	0	3125	2011039	14210468	CONSINV	SMS006	MCPRD
HSMACT.H1.ABACKUP.OM.D11034.T093138	1	37	2011041	15460296	P390	SMS007	MCHSMACT
P390.SMPE.CNTL	0	609	2011039	14195043	P390	SMS007	MCSPEC
SYS2.ARH230.SMPE.CNTL	0	156	2011039	14421312	P390	SMS007	MCDEF
SYS2.MXH0902.SMXHCMS	1	180	2011039	08023825	XXHXJOB	SMS008	MCDEF
SYS2.MXH0902.SMXHMSG	1	229	2011040	08023032	XXHXJOB	SMS008	MCDEF
SYS2.SMFDUMP.G2412V00	0	97842	2011040	15120984	JES2	SMS003	MCSMF21
SYS2.SMFDUMP.G2413V00	0	100569	2011041	14090052	JES2	SMS007	MCSMF21

Note: FSR records can also include data sets processed for extent reduction

- These are not really thrashing
- Review SETSYS MAXEXTENTS

Thrashing – IEFBR14

- Production jobs often use IEFBR14 with DISP=(x,DELETE) as first step
- HSM will recall the data set in order to delete
- z/OS V1R11 allows data sets to be deleted without Recall
- Changes in ALLOCxx member in SYS1.PARMLIB
 - SYSTEM IEFBR14_DELMIGDS(NORECALL)
 - Default value is LEGACY
- Recommend NORECALL unless another product already being used
 - e.g. ZOSEM

Migration and SMS Storage Group Thresholds



- We have seen sites using unrealistic storage group thresholds
 - E.g. High threshold 80%, low threshold 1%
- Primary Space Management will attempt to process down to low threshold
- Interval Migration starts after halfway between high- & low-threshold is exceeded
 - Ends at low-threshold
- Leads to excessive cycles and missed space management windows
- Set values that are realistic for the storage group

Automation for SMS Allocation failures

- Monitor syslog for allocation failures and space issues
 - IGD17380I when high threshold has been exceeded
 - IGD17223I when an overflow storage group is used
 - IGD17272I when allocation failed due to insufficient space
- Initiate action
 - E-mail
 - Volume migration
 - On-demand migration (new V1V13 function)

Automation for early completion

- Definition: HSM automatic function finishes before all volumes processed
- Check for following messages
 - ARC0717I Automatic Backup
 - ARC0625I Automatic Dump
 - ARC0521I Primary Space Management
- Solution
 - Increase windows
 - Earlier start time, later end-time
 - Increase number of tasks
 - This can be automated and performed dynamically if needed
- Device availability may be restricting factor
 - Physical tape drives

Reorganizing Control Data Sets

- Should you reorganize a Control Data Set?
 - Some Say Yes, Some Say No
- Why are you Reorganizing a Control Data Set?
 - Receiving warning messages from DFSMSHsm
 - Incorrect sizing
 - Single cluster at 4Gb limit
 - “That is what we have been doing for years”

Reorganizing Control Data Sets

- Think of DFSMSHsm as a crucial part of the OS
 - Every minute it is down –
 - Migrated data cannot be recalled
 - *Production delays*
 - Backed up data cannot be recovered
- Most common reason for having to perform CDS forward recovery is after a reorg

Reorganizing Control Data Sets

- Should you reorganize a Control Data Set (cont) ?
 - Look for alternative solutions
 - Correct sizing of CDSs
 - Reorg While Open products
 - CA Reclaim (Session 9007 from Share in Anaheim)
 - Review why and if needed, use tried and tested procedure
 - Is there a performance degradation after a reorg?
 - Yes, the reorg removes all splits, but when HSM is restarted the first thing it will do inside a CDS is a split.
 - Performance impact for a number of weeks

HSM Audits

- Recommend running audits regularly
- Always run an audit after the CDSs have been reorganized
- HSM audits run l-o-n-g.....
 - VSAM Record Level Sharing can help improve CDS audits
- If you are not able to regularly run audits, you might need an external audit product
 - Allows a more targeted approach
 - Example: IBM Tivoli Advanced Audit for DFSMSHsm

Using a monitoring product

- Allows drilling down to additional information
- Ability to group similar errors together
- Allows setting up of automation
 - Situations
 - Policies
- Visual indicators
 - User thresholds
- Problem determination is built in
 - Dynamic workspace links for faster diagnosis

Monitoring

Monitoring Products:

- IBM Tivoli Omegamon XE for Storage
- IBM Tivoli Advanced Audit for DFSMSHsm
- IBM Tivoli Advanced Reporting for DFSMSHsm
- IBM Tivoli Advanced Backup and Recovery Manager
- IBM Tivoli Advanced Catalog Management

- Other vendors products can monitor as well

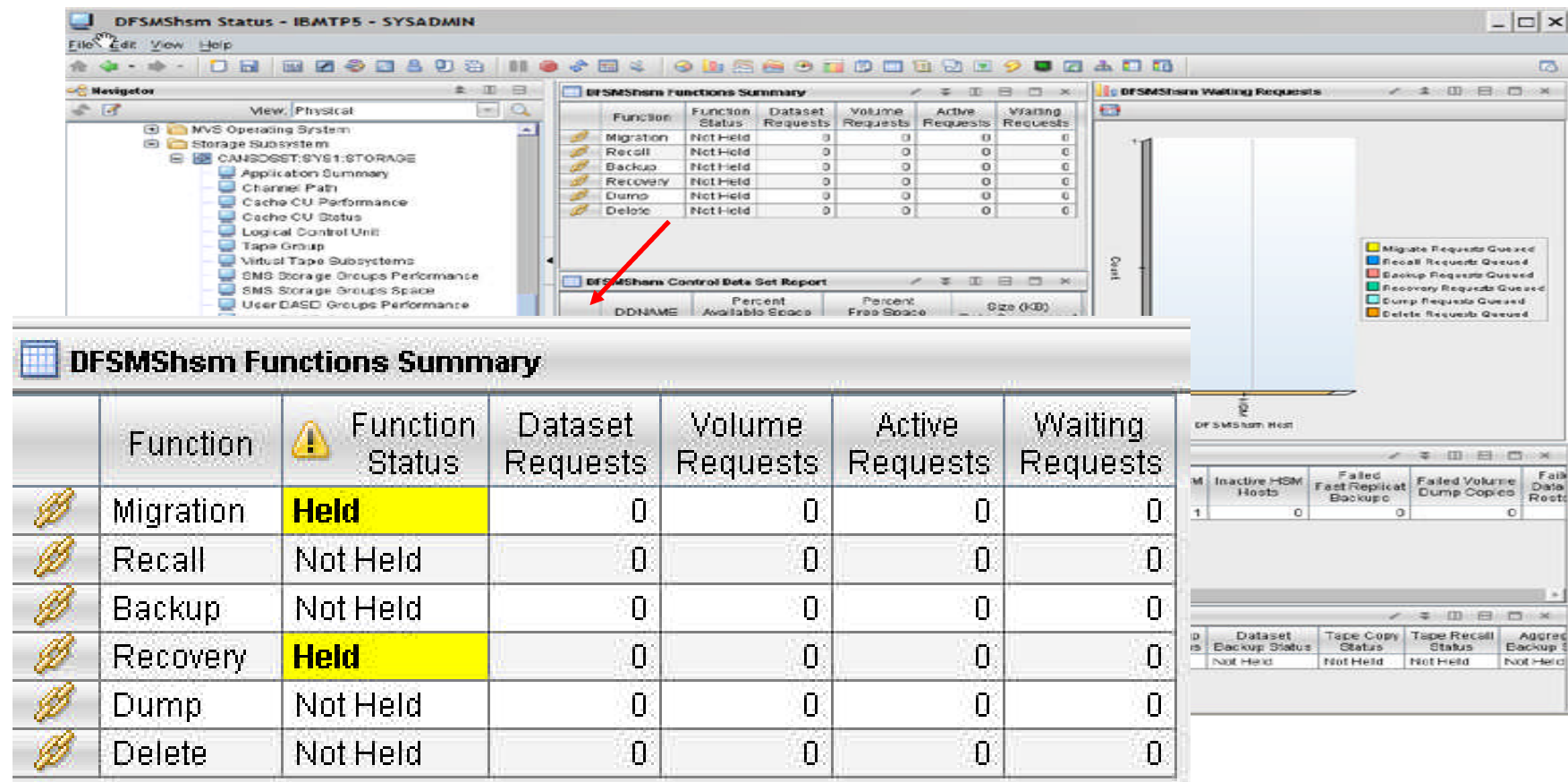
Monitoring

Items to be monitored

- HSM Function Status
- HSM CDS utilization
- HSM ML1 Volumes
- Migrate/Recall Success/Failure
- Return Codes LOGX
- HSM user catalog
 - Space
 - Backup
- Aggregate Backups
- Common Recall Queue HSMPLEX

Monitoring

- HSM Function Status

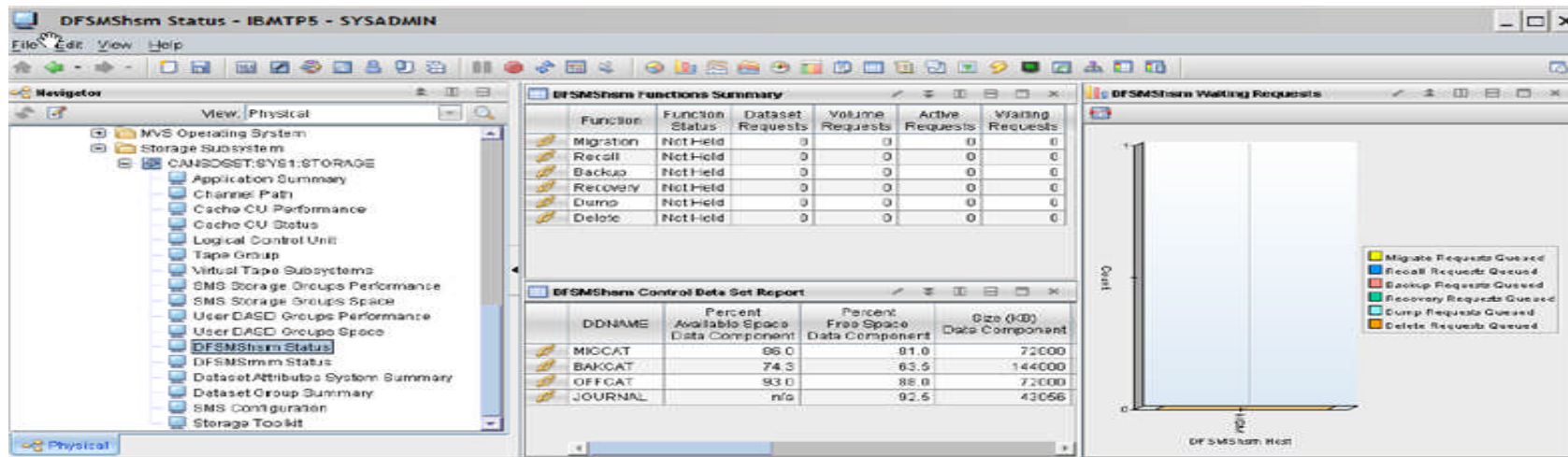


The screenshot shows the DFSMSHsm Status interface. A red arrow points to the 'Migration' and 'Recovery' rows in the 'DFSMSHsm Functions Summary' table, which are marked as 'Held'.

Function	Function Status	Dataset Requests	Volume Requests	Active Requests	Waiting Requests
Migration	Held	0	0	0	0
Recall	Not Held	0	0	0	0
Backup	Not Held	0	0	0	0
Recovery	Held	0	0	0	0
Dump	Not Held	0	0	0	0
Delete	Not Held	0	0	0	0

Monitoring

- HSM CDS Utilization



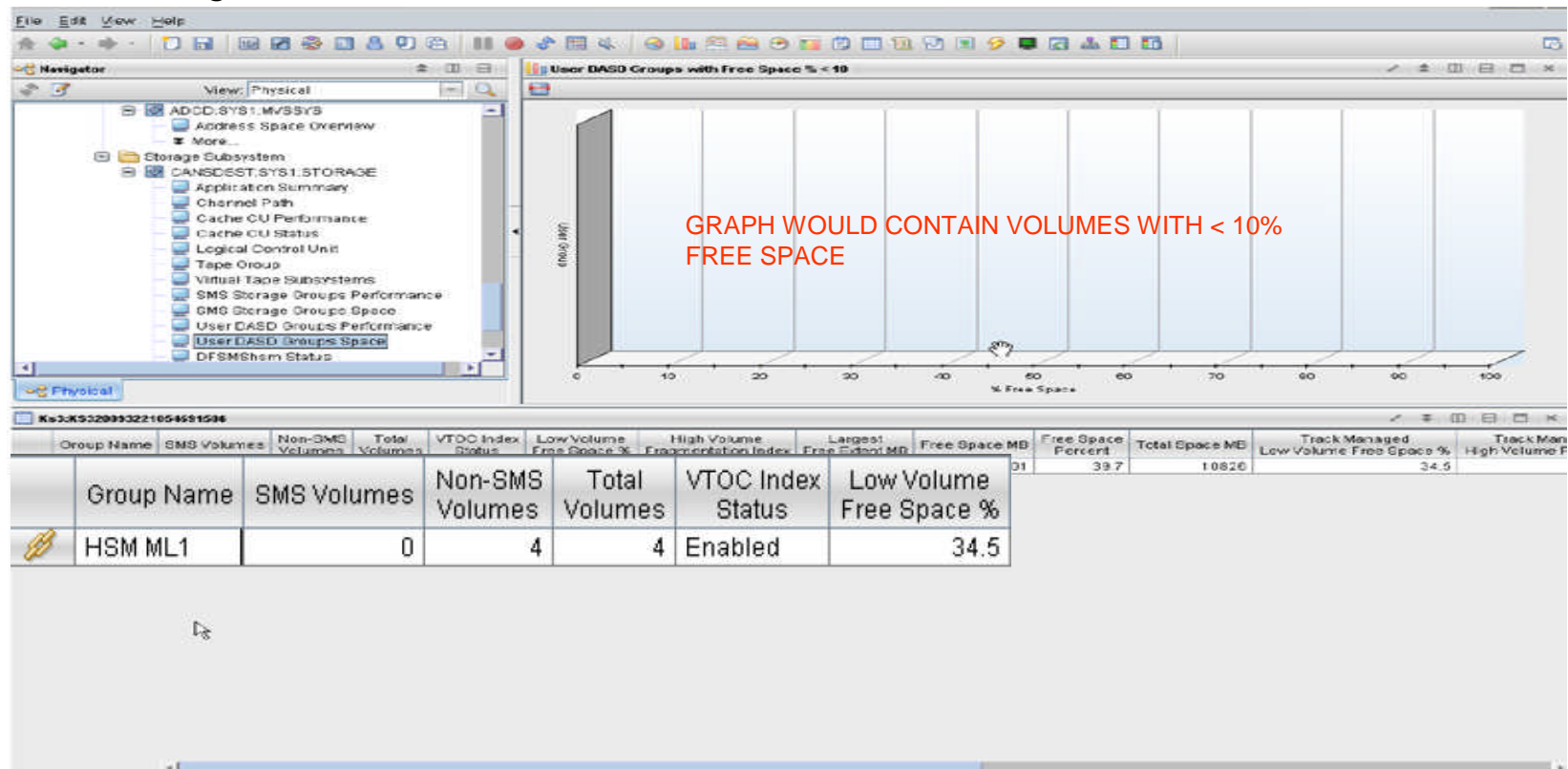
DFSMSHsm Control Data Set Report

	DDNAME	Percent Available Space Data Component	Percent Free Space Data Component	Size (KB) Data Component	Number of Extents Data Component	Percent Available Space Index Component	Percent Free Space Index Component	Size (KB) Index Component	Number of Extents Index Component	Display Order
	MIGCAT	85.6	80.0	72000	1	83.3	83.4	252	1	16
	BAKCAT	73.5	63.5	144000	1	70.6	70.7	504	1	48
	OFFCAT	92.8	88.0	72000	1	89.6	89.7	252	1	80
	JOURNAL	n/a	79.7	43056	1	n/a	n/a	n/a	n/a	112

Monitoring

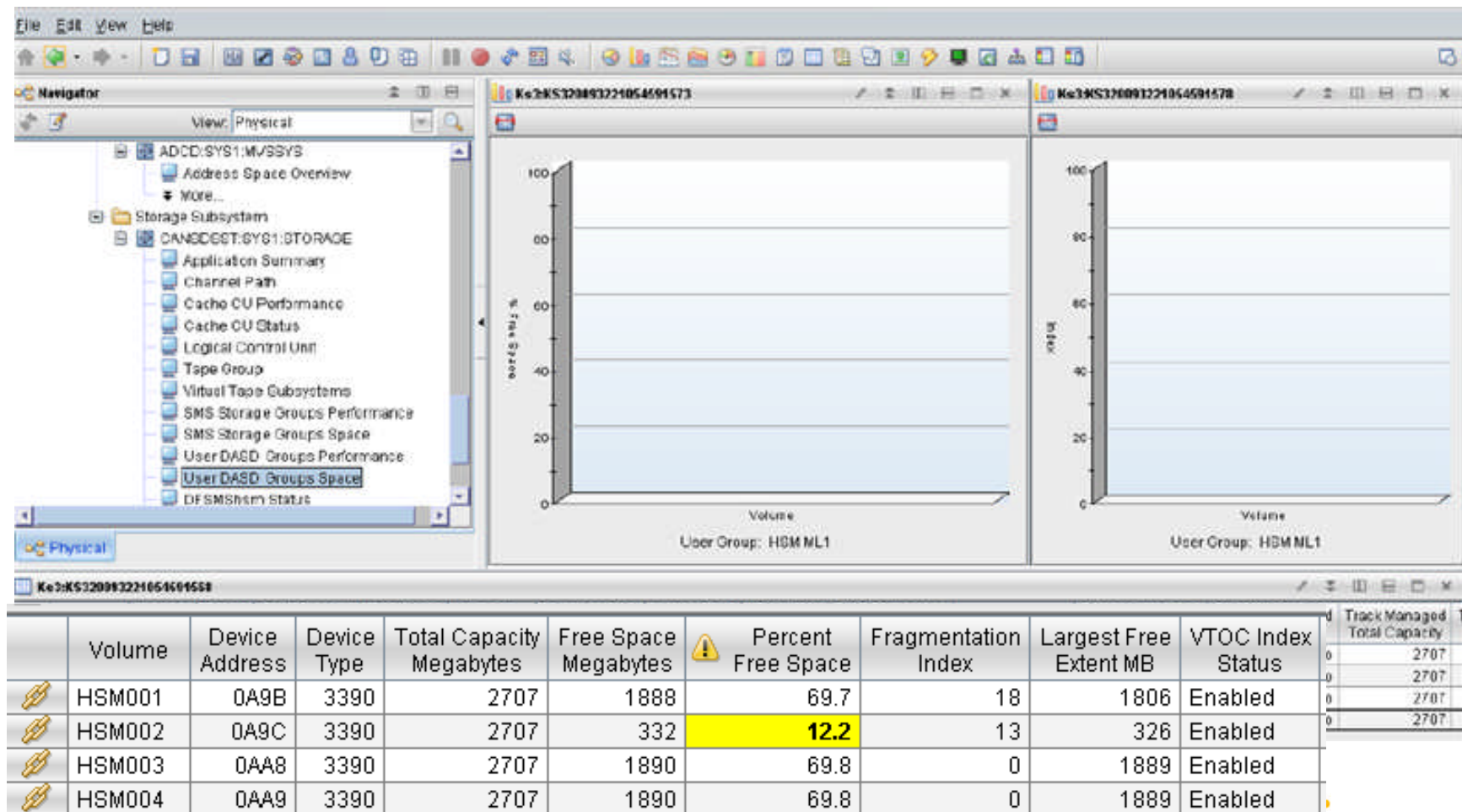
HSM ML1 Volume Utilization

A Group of the HSM ML1 volumes is defined to track the free space and fragmentation index.

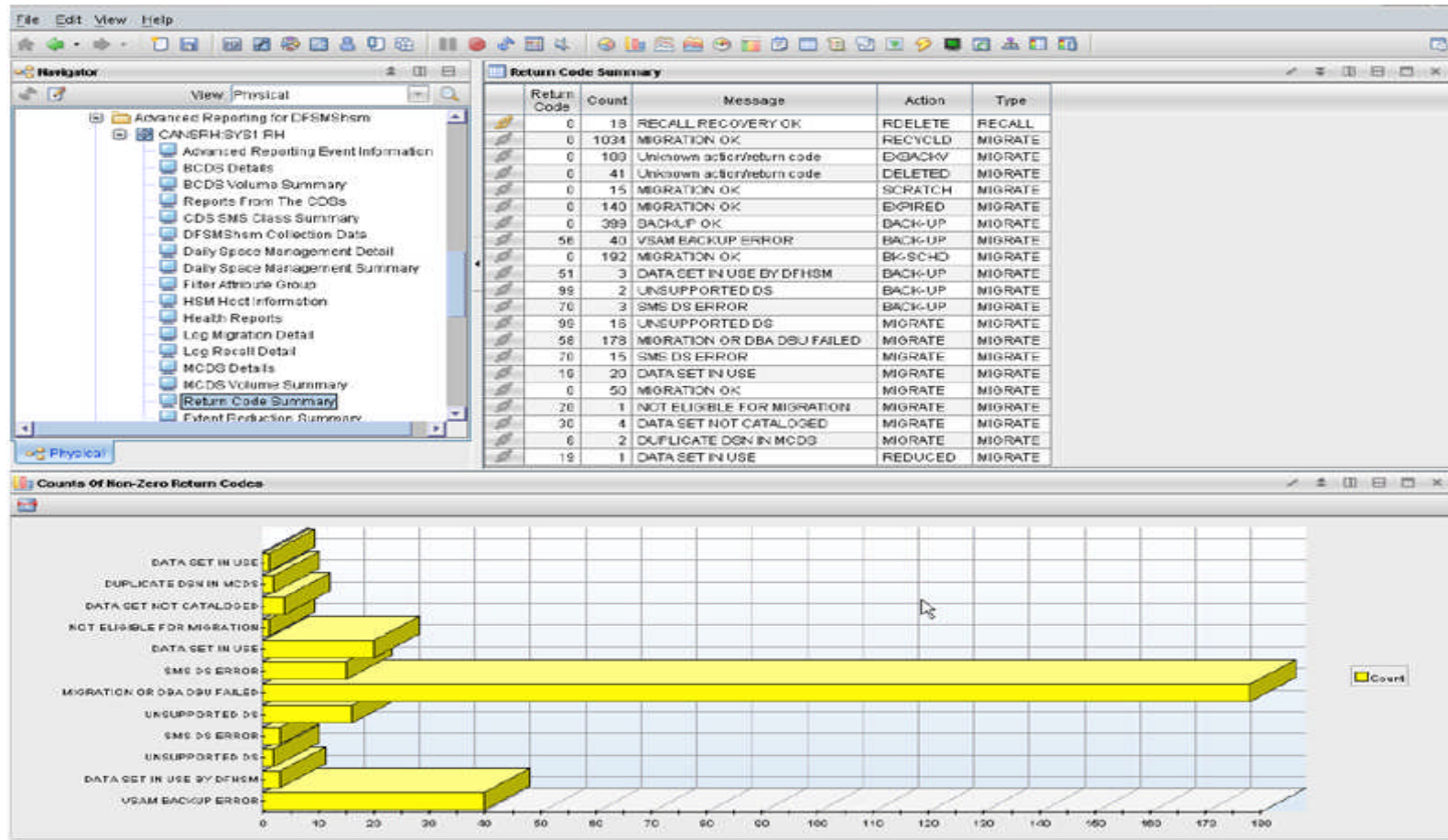


Monitoring

HSM ML1 Volume Utilization DETAILS



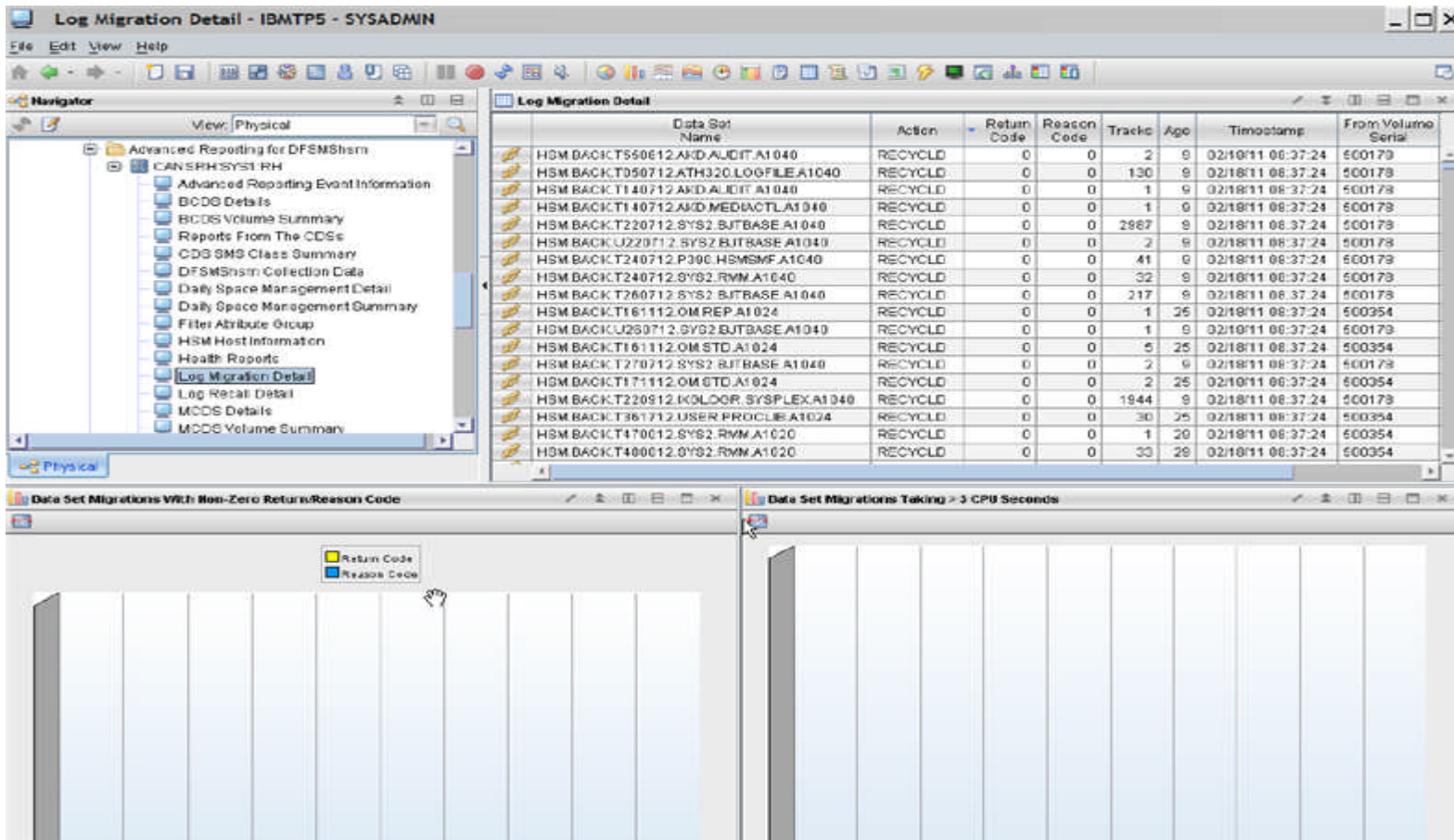
Monitoring Return Codes



Monitoring Return Codes

Return Code Summary					
	Return Code	Count	Message	Action	Type
	0	487	BACKUP OK	BACK-UP	MIGRATE
	68	56	BKUP FAILED BECAUSE OF DFDSS ERR	BACK-UP	MIGRATE
	19	1	DATA SET IN USE	REDUCED	MIGRATE
	19	19	DATA SET IN USE	MIGRATE	MIGRATE
	51	4	DATA SET IN USE BY DFHSM	BACK-UP	MIGRATE
	30	3	DATA SET NOT CATALOGED	MIGRATE	MIGRATE
	6	2	DUPLICATE DSN IN MCDS	MIGRATE	MIGRATE
	0	148	MIGRATION OK	MOVE VT	MIGRATE
	0	1591	MIGRATION OK	MIG1TO2	MIGRATE
	0	1192	MIGRATION OK	RECYCLD	MIGRATE
	0	7	MIGRATION OK	SCRATCH	MIGRATE
	0	58	MIGRATION OK	EXPIRED	MIGRATE
	0	194	MIGRATION OK	BK-SCHD	MIGRATE
	0	45	MIGRATION OK	MIGRATE	MIGRATE
	58	178	MIGRATION OR DBA DBU FAILED	MIGRATE	MIGRATE
	20	4	NOT ELIGIBLE FOR MIGRATION	MIGRATE	MIGRATE
	0	7	RECALL:RECOVERY OK	RECALL	RECALL
	0	20	RECALL:RECOVERY OK	RDELETE	RECALL
	70	16	SMS DS ERROR	MIGRATE	MIGRATE
	70	4	SMS DS ERROR	BACK-UP	MIGRATE

Monitoring Migration Return Codes



The screenshot displays the 'Log Migration Detail' window for 'IBMTPS - SYSADMIN'. The main table lists migration records with the following columns: Data Set Name, Action, Return Code, Reason Code, Tracks, Age, Timestamp, and From Volume Serial. All listed actions are 'RECYCLD' with return and reason codes of 0. Below the table, there are two summary panels: 'Data Set Migrations With Non-Zero Returns/Reason Code' and 'Data Set Migrations Taking > 3 CPU Seconds', both of which are currently empty.

Data Set Name	Action	Return Code	Reason Code	Tracks	Age	Timestamp	From Volume Serial
HSM.BACK.T550612.AKD.AUDIT.A1040	RECYCLD	0	0	2	9	02/18/11 06:37:24	500179
HSM.BACK.T050712.ATH320.LOGFILE.A1040	RECYCLD	0	0	130	9	02/18/11 06:37:24	500179
HSM.BACK.T140712.AKD.AUDIT.A1040	RECYCLD	0	0	1	9	02/18/11 06:37:24	500179
HSM.BACK.T140712.AKD.MEDIACTLA1040	RECYCLD	0	0	1	0	02/18/11 06:37:24	500179
HSM.BACK.T220712.SYS2.BJTBASE.A1040	RECYCLD	0	0	2867	9	02/18/11 06:37:24	500179
HSM.BACK.U220712.SYS2.BJTBASE.A1040	RECYCLD	0	0	2	9	02/18/11 06:37:24	500179
HSM.BACK.T240712.P390.HSMSMF.A1040	RECYCLD	0	0	41	0	02/18/11 06:37:24	500179
HSM.BACK.T240712.SYS2.RWM.A1040	RECYCLD	0	0	32	9	02/18/11 06:37:24	500179
HSM.BACK.T260712.SYS2.BJTBASE.A1040	RECYCLD	0	0	217	9	02/18/11 06:37:24	500179
HSM.BACK.T161112.OM.REP.A1024	RECYCLD	0	0	1	25	02/18/11 06:37:24	500354
HSM.BACK.U260712.SYS2.BJTBASE.A1040	RECYCLD	0	0	1	9	02/18/11 06:37:24	500179
HSM.BACK.T161112.OM.STD.A1024	RECYCLD	0	0	5	25	02/18/11 06:37:24	500354
HSM.BACK.T270712.SYS2.BJTBASE.A1040	RECYCLD	0	0	2	9	02/18/11 06:37:24	500179
HSM.BACK.T171112.OM.STD.A1024	RECYCLD	0	0	2	25	02/18/11 06:37:24	500354
HSM.BACK.T220912.K9LOGR.SYSPLEX.A1040	RECYCLD	0	0	1944	9	02/18/11 06:37:24	500179
HSM.BACK.T361712.USER.PROCLIB.A1024	RECYCLD	0	0	30	25	02/18/11 06:37:24	500354
HSM.BACK.T40012.SYS2.RWM.A1020	RECYCLD	0	0	1	20	02/18/11 06:37:24	500354
HSM.BACK.T40012.SYS2.RWM.A1020	RECYCLD	0	0	33	20	02/18/11 06:37:24	500354

Audit Example

Migration Control Data Set Error Summary - IBMTP5 - SYSADMIN

File Edit View Help

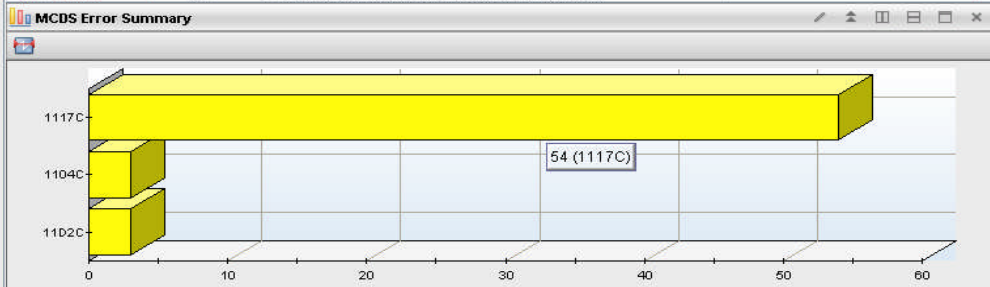
Navigator View: Physical

- Enterprise
 - z/OS Systems
 - ADCC:MVS:SYSPLEX
 - Coupling Facility Policy Data for Sysplex
 - Coupling Facility Structures Data for Sysplex
 - Coupling Facility Systems Data for Sysplex
 - Global Enqueue Data for Sysplex
 - GRS Ring Systems Data for Sysplex
 - Report Classes Data for Sysplex
 - Resource Groups Data for Sysplex
 - Service Classes Data for Sysplex
 - Service Definition Data for Sysplex
 - Shared DASD Groups Data For Sysplex
 - XCF Groups Data for Sysplex
 - XCF Paths Data for Sysplex
 - XCF Systems Data for Sysplex
 - SYS1
 - Catalog Management
 - Advanced Audit for DFSMSshm
 - CANSRG:SYS1:RG
 - Agent Status Summary
 - Backup Control Data Set Error Summary
 - Migration Control Data Set Error Summary**
 - Offline Control Data Set Error Summary
 - HSM Tape Error Summary
 - HSEND List Event Information
 - LISTCAT Event Information
 - Advanced Reporting for DFSMSshm
 - Advanced Backup and Recovery
 - MVS Operating System
 - Storage Subsystem

Migration Control Data Set Error Summary

Error ID	Error Count	Record Count	Error Message
11D1C	0	0	MCD ENTRY IS NOT CATALOGED
11V1C	0	0	MCO VSAM COMPONENT IS NOT CATALOGED
11D2C	3	3	MCD ENTRY IS CATALOGED ON DIFFERENT VOLUME
11V2C	0	0	MCO VSAM COMPONENT ON DIFFERENT VOLUME
1103W	0	0	MCD ENTRY IS MISSING THE MCA ENTRY
1104C	3	3	MCD LEVEL 1 ENTRY HAS NO VTOC ENTRY ON L1 VOLUME
1105W	0	0	MCD VSAM BASE NAME IS MISSING IN MCO
1106C	0	0	MCD IS ON VOLUME WHICH HAS NO MCV ENTRY
1106V	0	0	SUMMARY OF VOLUMES HAVING NO MCV ENTRY
1107W	0	0	MCD LEVEL 2 IS ON VOLUME WHICH HAS NO TTOC ENTRY
1107V	0	0	SUMMARY OF VOLUMES MISSING IN TTOC
1108W	0	0	MCA ENTRY IS MISSING MCO VSAM COMPONENT ENTRY
1109W	0	0	MCD ALIAS IS NOT ON TTOC
1109V	0	0	SUMMARY OF VOLUMES WHERE ALIAS IS NOT IN TTOC
1110W	0	0	MCD HAS DUPLICATE MCA ENTRY
1111W	0	0	MCA ENTRY IS MISSING MCD ENTRY
1112W	0	0	MCO VSAM BASE NAME IS MISSING IN MCD
1113W	0	0	MCO VSAM COMPONENT NAME IS MISSING IN MCA
1114W	0	0	ALIAS NAME EXISTS ON VTOC, MCA IS MISSING
1115W	0	0	VTOC ALIAS NAME HAS VTOC ERROR
1116C	0	0	CATALOG ENTRY HAS NO MCD ENTRY

MCDS Error Summary

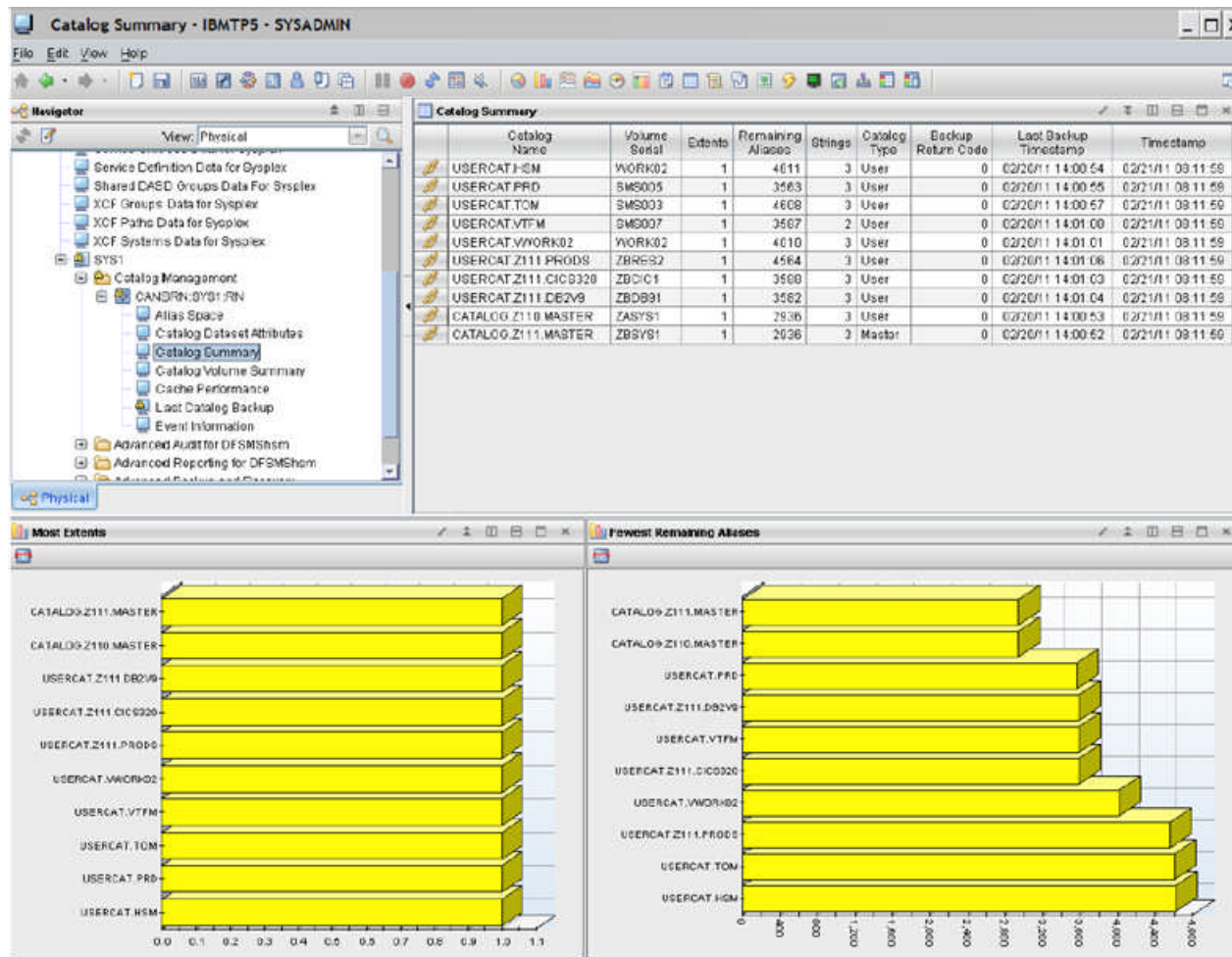


Error ID	Error Count
1117C	54
1104C	3
11D2C	3

Hub Time: Wed, 02/23/2011 04:03 PM Server Available Migration Control Data Set Error Summary - IBMTP5 - SYSADMIN

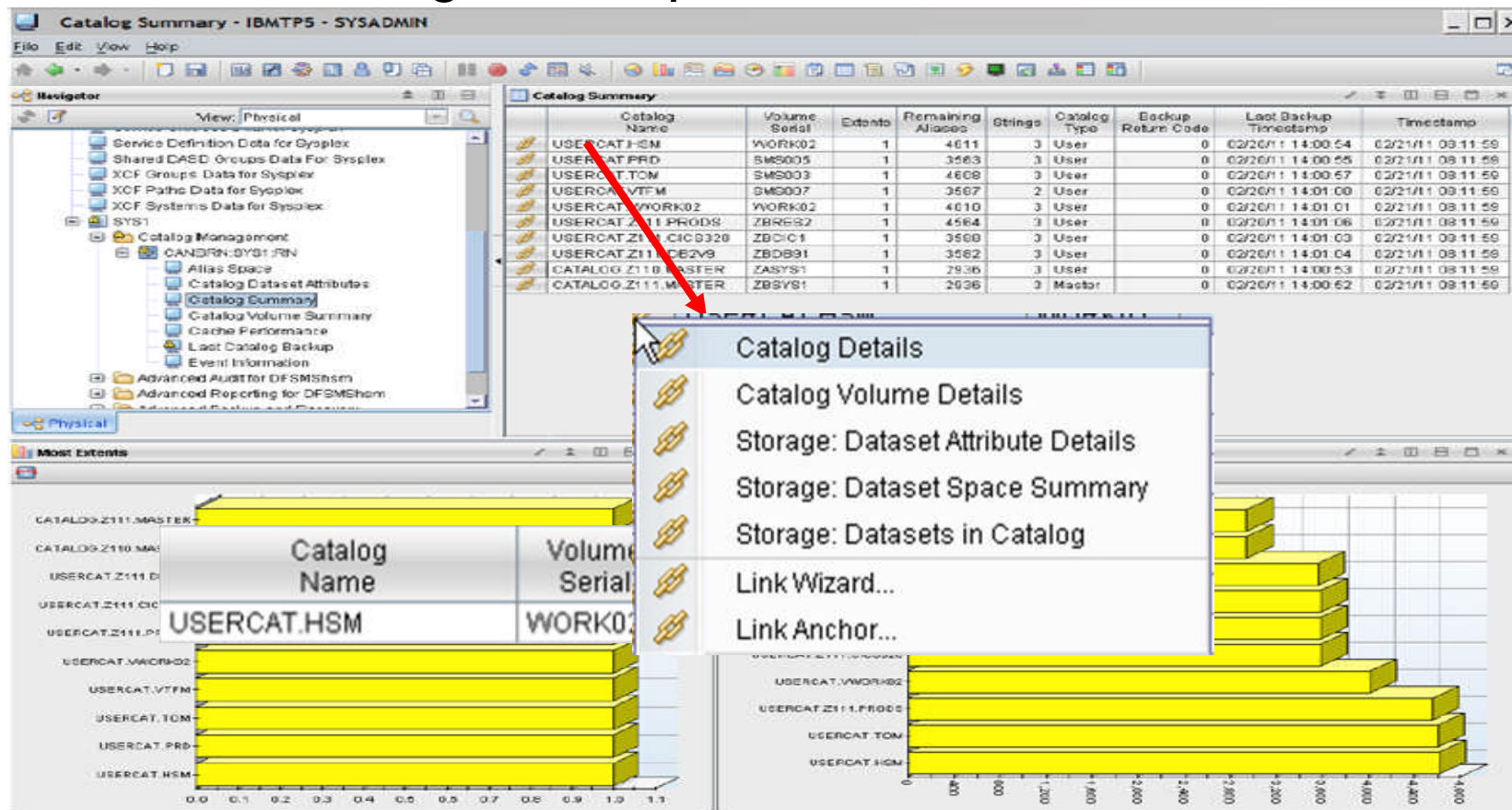
Monitoring

HSM user catalog Space and Backup Status



Monitoring

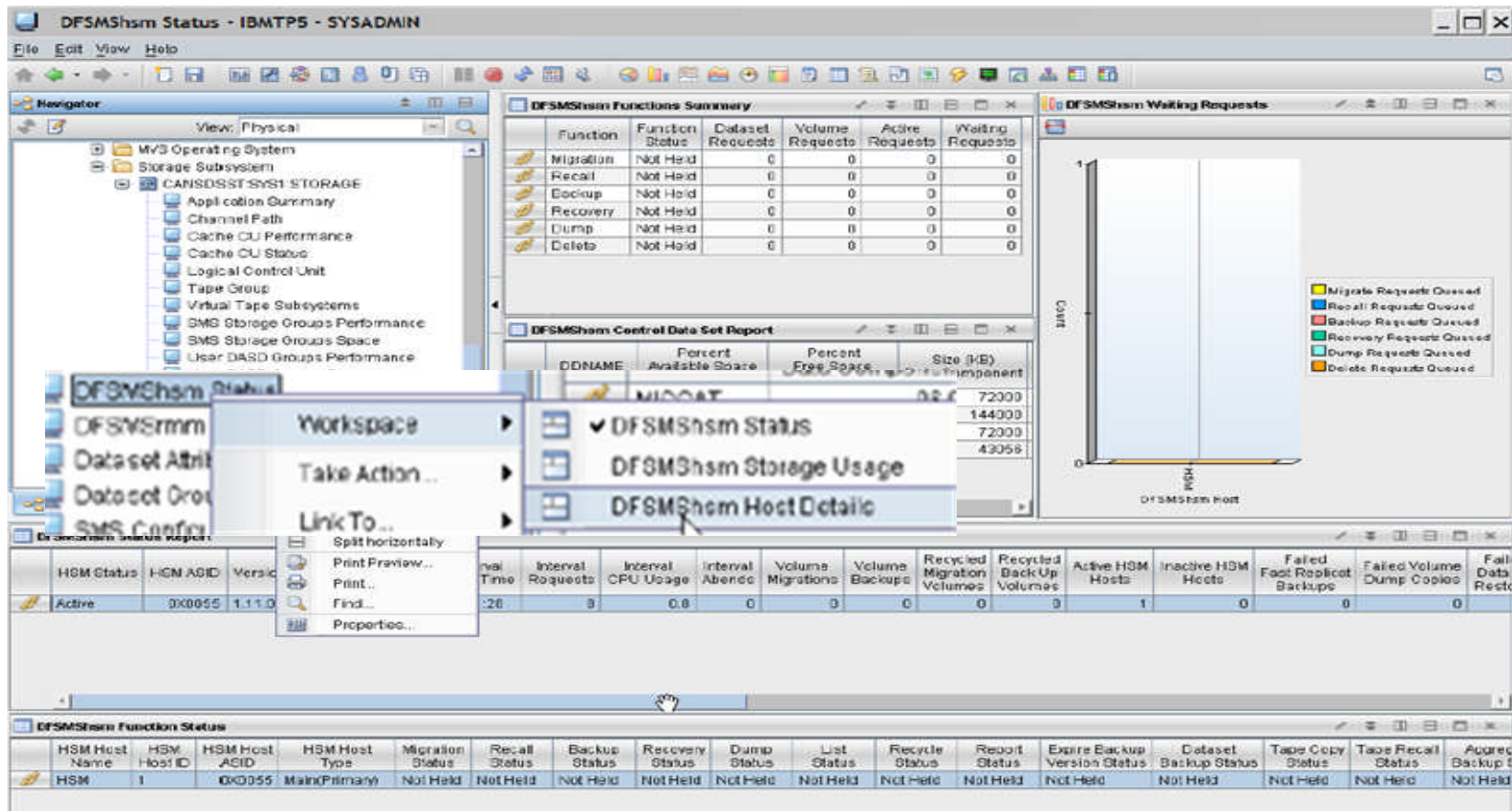
HSM user catalog backup status. Extents



The screenshot displays the 'Catalog Summary' window in IBM TSP5 - SYSADMIN. The main window shows a table with columns: Catalog Name, Volume Serial, Extents, Remaining Aliases, Strings, Catalog Type, Backup Return Code, Last Backup Timestamp, and Timestamp. A red arrow points to the 'USERCAT.HSM' row in the table. A context menu is open over this row, listing options: Catalog Details, Catalog Volume Details, Storage: Dataset Attribute Details, Storage: Dataset Space Summary, Storage: Datasets in Catalog, Link Wizard..., and Link Anchor... Below the table, there are two horizontal bar charts. The left chart, titled 'Most Extents', shows bars for various catalogs, with 'USERCAT.HSM' having the highest value. The right chart shows a similar view for 'Storage: Datasets in Catalog'.

Catalog Name	Volume Serial	Extents	Remaining Aliases	Strings	Catalog Type	Backup Return Code	Last Backup Timestamp	Timestamp
USERCAT.HSM	WORK02	1	4611	3	User	0	02/26/11 14:00:54	02/21/11 09:11:59
USERCAT.PRD	SMS005	1	3563	3	User	0	02/26/11 14:00:55	02/21/11 09:11:59
USERCAT.TOM	SMS003	1	4609	3	User	0	02/26/11 14:00:57	02/21/11 09:11:59
USERCAT.VTFM	SMS007	1	3567	2	User	0	02/26/11 14:01:00	02/21/11 09:11:59
USERCAT.WORK02	WORK02	1	4610	3	User	0	02/26/11 14:01:01	02/21/11 09:11:59
USERCAT.Z111.PRODS	ZBRE52	1	4564	3	User	0	02/26/11 14:01:06	02/21/11 09:11:59
USERCAT.Z111.CICD328	ZBCIC1	1	3569	3	User	0	02/26/11 14:01:03	02/21/11 09:11:59
USERCAT.Z111.DEZV9	ZBDB91	1	3562	3	User	0	02/26/11 14:01:04	02/21/11 09:11:59
CATALOG.Z111.MASTER	ZASYS1	1	2936	3	User	0	02/26/11 14:00:53	02/21/11 09:11:59
CATALOG.Z111.MASTER	ZBSYS1	1	2036	3	Master	0	02/26/11 14:00:52	02/21/11 09:11:59

Monitoring HSMplex and Common Recall Queue



The screenshot displays the DFSMSHsm Status - IBMTP5 - SYSADMIN interface. It features several panels:

- Navigator:** Shows a tree view of the system structure, including MVS Operating System, Storage Subsystem, and CANSDSST-SYST-STORAGE.
- DFSMSHsm Functions Summary:** A table showing the status of various functions.

Function	Function Status	Dataset Requests	Volume Requests	Active Requests	Waiting Requests
Migration	Not Held	0	0	0	0
Recall	Not Held	0	0	0	0
Backup	Not Held	0	0	0	0
Recovery	Not Held	0	0	0	0
Dump	Not Held	0	0	0	0
Delete	Not Held	0	0	0	0
- DFSMSHsm Control Data Set Report:** A table showing data set details.

DDNAME	Percent Available Space	Percent Free Space	Size (KB)
MIGCAT			72000
			144000
			72000
			43056
- DFSMSHsm Walking Requests:** A bar chart showing the count of various request types. The legend includes:
 - Migrate Requests Queued
 - Recall Requests Queued
 - Backup Requests Queued
 - Recovery Requests Queued
 - Dump Requests Queued
 - Delete Requests Queued
- Document Status Report:** A table with columns: HSM Status, HSM ABID, Versic, Interval Time, Interval Requests, Interval CPU Usage, Interval Abencd, Volume Migrations, Volume Backups, Recycled Migration Volumes, Recycled Back Up Volumes, Active HSM Hosts, Inactive HSM Hosts, Failed Fast Repliotc Backups, Failed Volume Dump Copies, and Fail Data Reclt.

HSM Status	HSM ABID	Versic	Interval Time	Interval Requests	Interval CPU Usage	Interval Abencd	Volume Migrations	Volume Backups	Recycled Migration Volumes	Recycled Back Up Volumes	Active HSM Hosts	Inactive HSM Hosts	Failed Fast Repliotc Backups	Failed Volume Dump Copies	Fail Data Reclt
Active	0X0055	1.11.0	:26	3	0.8	0	0	0	0	0	1	0	0	0	
- DFSMSHsm Function Status:** A table with columns: HSM Host Name, HSM Host ID, HSM Host ACID, HSM Host Type, Migration Status, Recall Status, Backup Status, Recovery Status, Dump Status, List Status, Recycle Status, Report Status, Expire Backup Version Status, Dataset Backup Status, Tape Copy Status, Tape Recall Status, and Append Backup t.

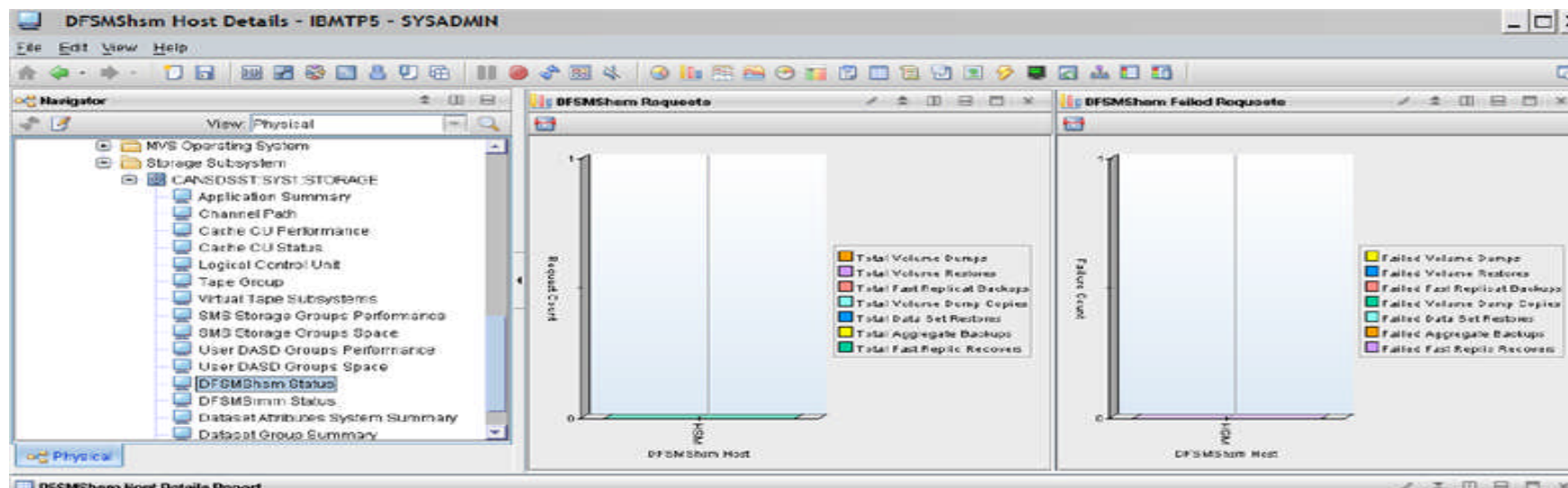
HSM Host Name	HSM Host ID	HSM Host ACID	HSM Host Type	Migration Status	Recall Status	Backup Status	Recovery Status	Dump Status	List Status	Recycle Status	Report Status	Expire Backup Version Status	Dataset Backup Status	Tape Copy Status	Tape Recall Status	Append Backup t
HSM	1	0X0055	Main(Primary)	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held	Not Held

A context menu is open over the 'DFSMSHsm Status' panel, showing options: Workspace, Take Action..., Link To..., Split horizontally, Print Preview..., Print..., Find..., and Properties... The 'Link To...' option is expanded, showing sub-options: DFSMSHsm Status, DFSMSHsm Storage Usage, and DFSMSHsm Host Details.



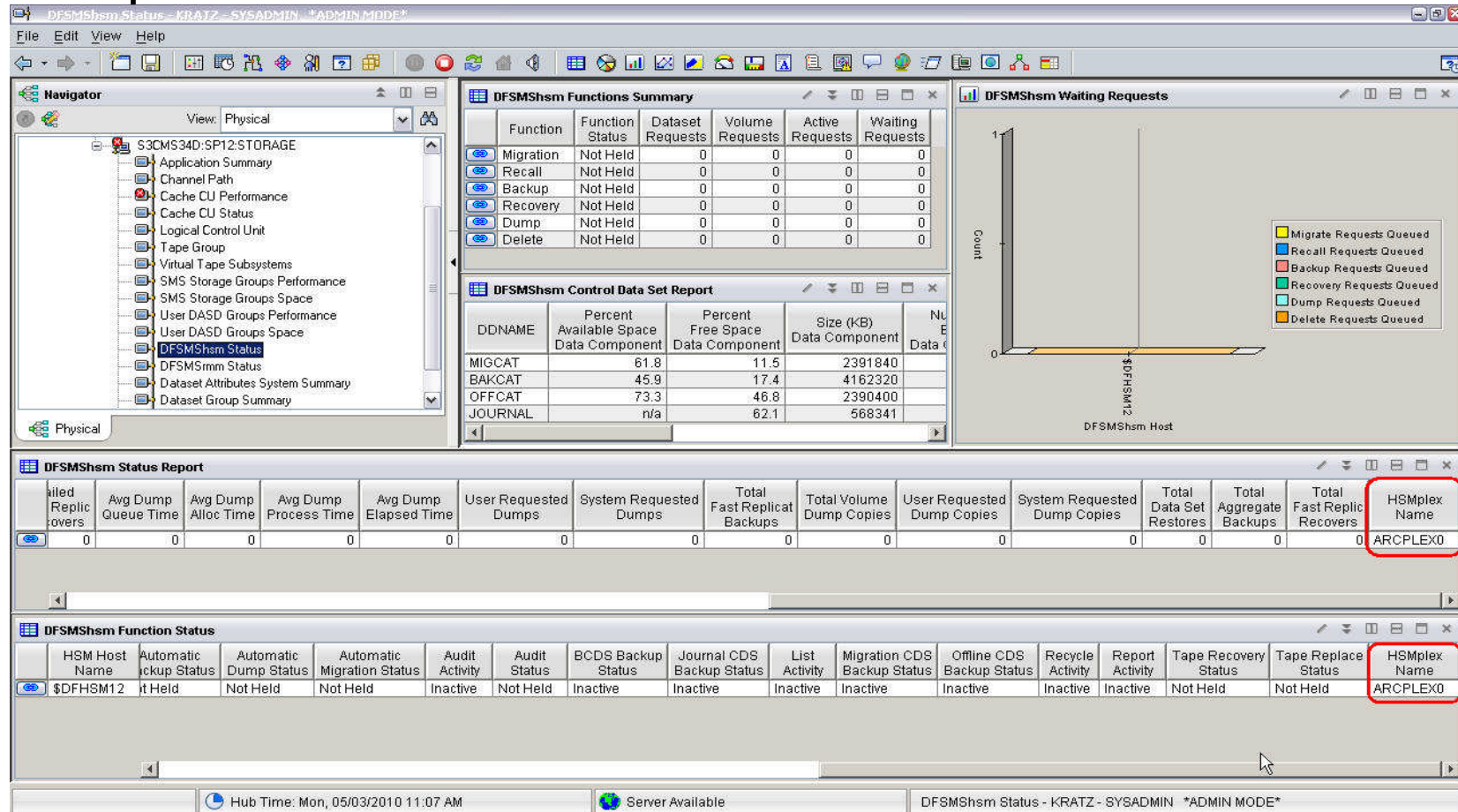
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Monitoring Hosts in your HSMplex



	HSM Host Name	HSM HostID	HSM Host Type	HSM Host Status	HSM Host ASID	HSM Host Start Time	Interval Abends	Interval CPU Usage	Interval Requests	Interval Start Time	Volume Migrations	Volume Backups	Recycled Migration volumes	Recycled Back Up volumes
	HSM	1	Main(Primary)	Active	0X0056	02/20/11 11:24:28	0	0.8	8	08:01:28	0	0	0	0

Monitoring HSMplex information



The screenshot displays the DFSMSHsm Status - KRATZ - SYSADMIN *ADMIN MODE* interface. It features several panels for monitoring HSMplex information:

- Navigator:** Shows a tree view of system components, with 'DFSMSHsm Status' selected.
- DFSMSHsm Functions Summary:** A table showing the status of various functions.

Function	Function Status	Dataset Requests	Volume Requests	Active Requests	Waiting Requests
Migration	Not Held	0	0	0	0
Recall	Not Held	0	0	0	0
Backup	Not Held	0	0	0	0
Recovery	Not Held	0	0	0	0
Dump	Not Held	0	0	0	0
Delete	Not Held	0	0	0	0
- DFSMSHsm Control Data Set Report:** A table showing data set details.

DDNAME	Percent Available Space Data Component	Percent Free Space Data Component	Size (KB) Data Component	Number of Data Components
MIGCAT	61.8	11.5	2391840	
BAKCAT	45.9	17.4	4162320	
OFFCAT	73.3	46.8	2390400	
JOURNAL	n/a	62.1	568341	
- DFSMSHsm Status Report:** A summary table with various performance metrics. The 'HSMplex Name' column is highlighted with a red box and contains the value 'ARCPLEX0'.

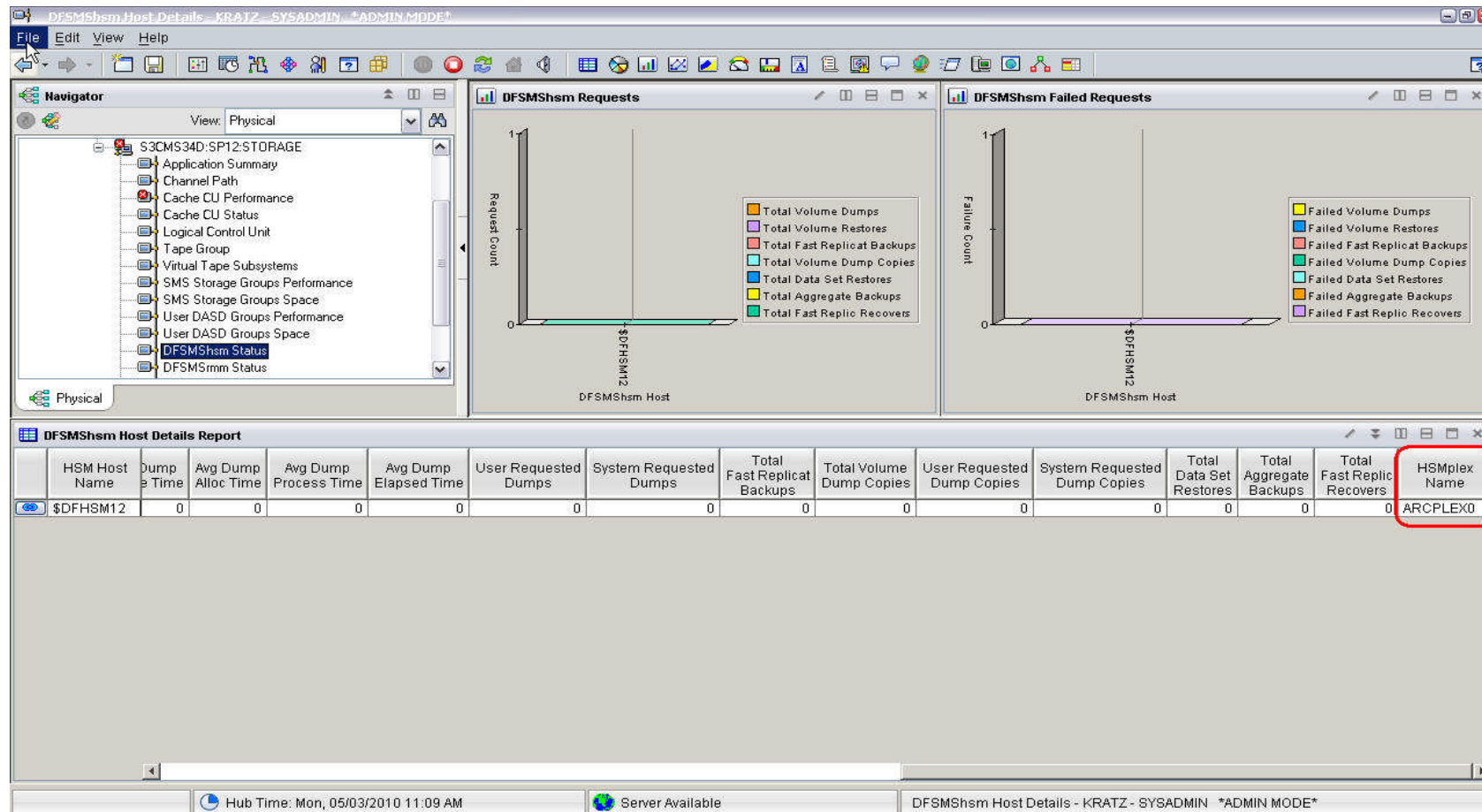
Failed Replicovers	Avg Dump Queue Time	Avg Dump Alloc Time	Avg Dump Process Time	Avg Dump Elapsed Time	User Requested Dumps	System Requested Dumps	Total Fast Replicat Backups	Total Volume Dump Copies	User Requested Dump Copies	System Requested Dump Copies	Total Data Set Restores	Total Aggregate Backups	Total Fast Replic Restores	HSMplex Name
0	0	0	0	0	0	0	0	0	0	0	0	0	0	ARCPLEX0
- DFSMSHsm Function Status:** A table showing the status of various functions for the host '\$DFHSM12'. The 'HSMplex Name' column is highlighted with a red box and contains the value 'ARCPLEX0'.

HSM Host Name	Automatic Backup Status	Automatic Dump Status	Automatic Migration Status	Audit Activity	Audit Status	BCDS Backup Status	Journal CDS Backup Status	List Activity	Migration CDS Backup Status	Offline CDS Backup Status	Recycle Activity	Report Activity	Tape Recovery Status	Tape Replace Status	HSMplex Name
\$DFHSM12	Not Held	Not Held	Not Held	Inactive	Not Held	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Not Held	Not Held	ARCPLEX0

The interface also includes a 'DFSMSHsm Waiting Requests' graph showing a count of requests for various functions (Migrate, Recall, Backup, Recovery, Dump, Delete) on the host '\$DFHSM12'. The graph shows zero requests for all categories.

At the bottom of the interface, the status bar indicates: Hub Time: Mon, 05/03/2010 11:07 AM, Server Available, and DFSMSHsm Status - KRATZ - SYSADMIN *ADMIN MODE*.

Monitoring HSM Host Details

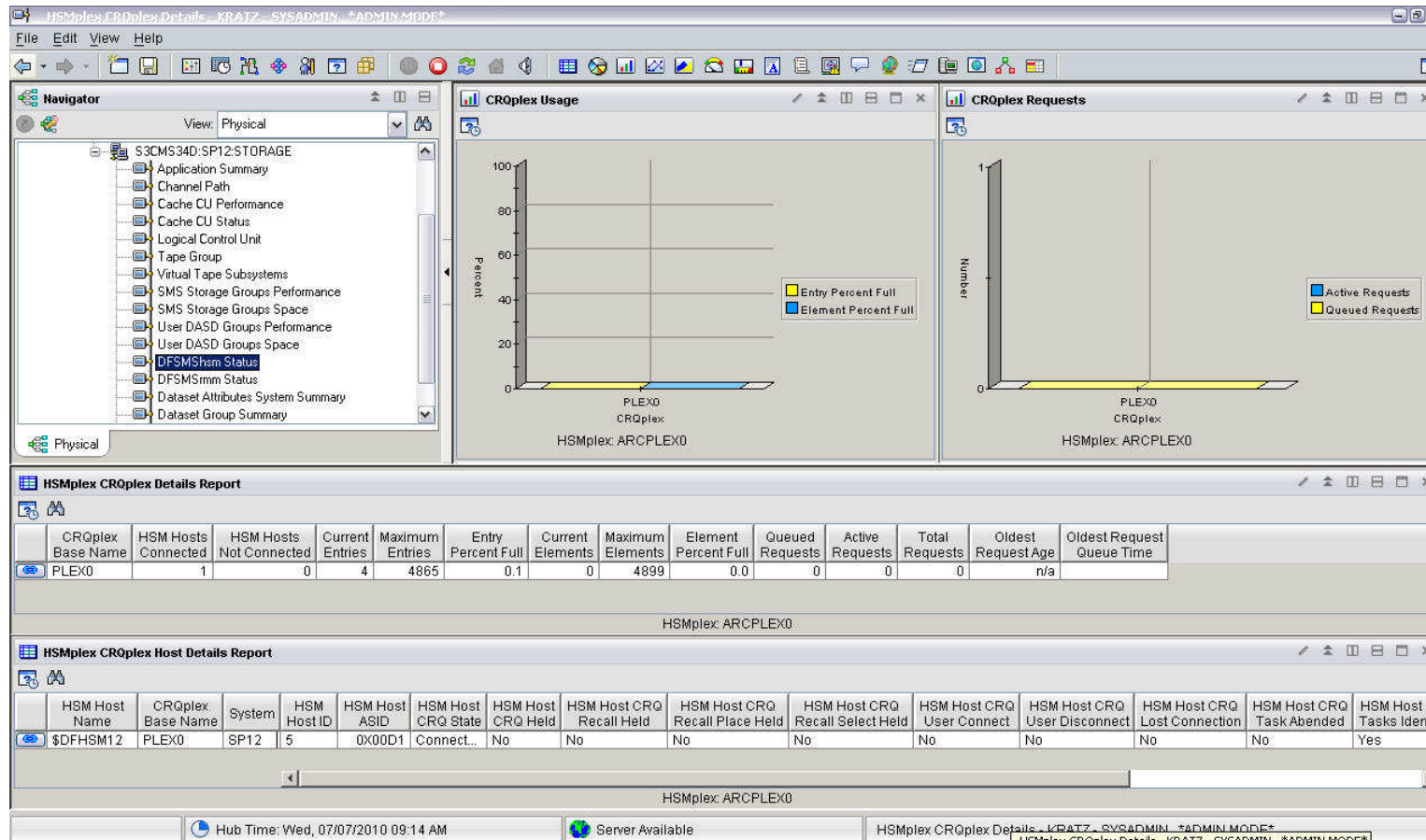


The screenshot displays the DFSMShsm Host Details Report for host \$DFHSM12. The report table is as follows:

HSM Host Name	Dump Time	Avg Dump Alloc Time	Avg Dump Process Time	Avg Dump Elapsed Time	User Requested Dumps	System Requested Dumps	Total Fast Replicat Backups	Total Volume Dump Copies	User Requested Dump Copies	System Requested Dump Copies	Total Data Set Restores	Total Aggregate Backups	Total Fast Replic Restores	HSMplex Name
\$DFHSM12	0	0	0	0	0	0	0	0	0	0	0	0	0	ARCPLEX0

Monitoring

HSM Common Recall Queue Details



The screenshot displays the HSMplex CRQplex Details Report interface. It includes a navigation tree on the left, two graphs (CRQplex Usage and CRQplex Requests), and two data tables.

CRQplex Usage Graph: Shows Percent (0-100) for Entry Percent Full (yellow) and Element Percent Full (blue) for PLEX0 CRQplex. Both are at 0%.

CRQplex Requests Graph: Shows Number (0-1) for Active Requests (blue) and Queued Requests (yellow) for PLEX0 CRQplex. Both are at 0.

HSMplex CRQplex Details Report Table:

CRQplex Base Name	HSM Hosts Connected	HSM Hosts Not Connected	Current Entries	Maximum Entries	Entry Percent Full	Current Elements	Maximum Elements	Element Percent Full	Queued Requests	Active Requests	Total Requests	Oldest Request Age	Oldest Request Queue Time
PLEX0	1	0	4	4865	0.1	0	4899	0.0	0	0	0	n/a	

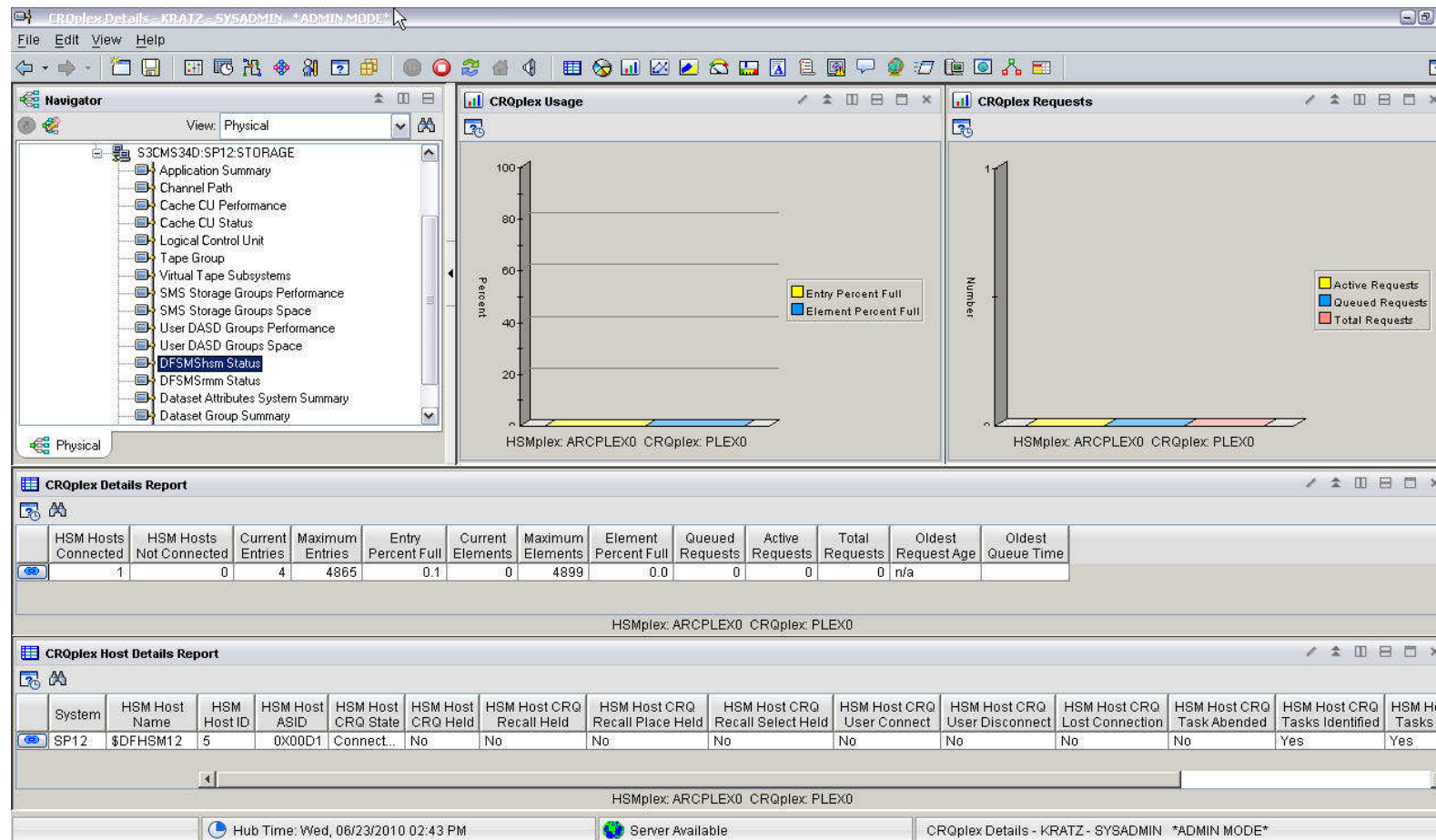
HSMplex CRQplex Host Details Report Table:

HSM Host Name	CRQplex Base Name	System	HSM Host ID	HSM Host ASID	HSM Host CRQ State	HSM Host CRQ Held	HSM Host CRQ Recall Held	HSM Host CRQ Recall Place Held	HSM Host CRQ Recall Select Held	HSM Host CRQ User Connect	HSM Host CRQ User Disconnect	HSM Host CRQ Lost Connection	HSM Host CRQ Task Abanded	HSM Host CRQ Tasks Identif
\$DFHSM12	PLEX0	SP12	5	0X00D1	Connect...	No	No	No	No	No	No	No	No	Yes

Hub Time: Wed, 07/07/2010 09:14 AM | Server Available | HSMplex CRQplex Details - KRATZ - SYSADMIN - *ADMIN MODE*

Monitoring

HSM CRQplex Details



CRQplex Details Report

HSM Hosts Connected	HSM Hosts Not Connected	Current Entries	Maximum Entries	Entry Percent Full	Current Elements	Maximum Elements	Element Percent Full	Queued Requests	Active Requests	Total Requests	Oldest Request Age	Oldest Queue Time
1	0	4	4865	0.1	0	4899	0.0	0	0	0	n/a	

HSMplex: ARCPLEX0 CRQplex: PLEX0

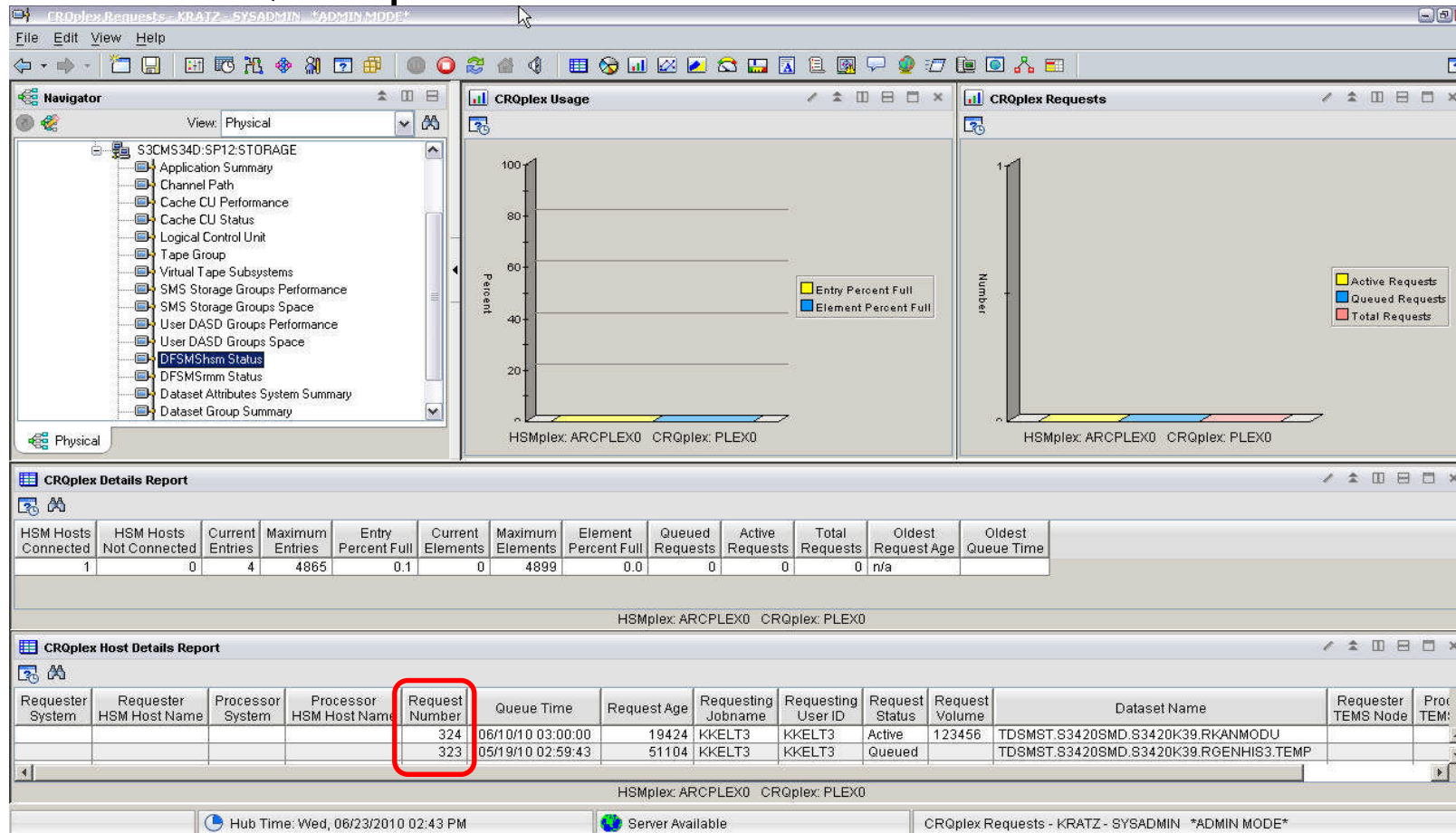
CRQplex Host Details Report

System	HSM Host Name	HSM Host ID	HSM Host ASID	HSM Host CRQ State	HSM Host CRQ Held	HSM Host CRQ Recall Held	HSM Host CRQ Recall Place Held	HSM Host CRQ Recall Select Held	HSM Host CRQ User Connect	HSM Host CRQ User Disconnect	HSM Host CRQ Lost Connection	HSM Host CRQ Task Abended	HSM Host CRQ Tasks Identified	HSM Host CRQ Tasks St
SP12	\$DFHSM12	5	0X00D1	Connect...	No	No	No	No	No	No	No	No	Yes	Yes

HSMplex: ARCPLEX0 CRQplex: PLEX0

Hub Time: Wed, 06/23/2010 02:43 PM Server Available CRQplex Details - KRATZ - SYSADMIN *ADMIN MODE*

Monitoring HSM CRQ Requests



The screenshot displays the 'CRQplex Requests' monitoring interface. It includes a 'Navigator' on the left showing a tree view of storage components. Two bar charts, 'CRQplex Usage' and 'CRQplex Requests', show performance metrics for HSMplex: ARCPLEX0 and CRQplex: PLEX0. Below the charts are two detailed reports: 'CRQplex Details Report' and 'CRQplex Host Details Report'. The 'Request Number' column in the host details report is highlighted with a red box.

CRQplex Details Report

HSM Hosts Connected	HSM Hosts Not Connected	Current Entries	Maximum Entries	Entry Percent Full	Current Elements	Maximum Elements	Element Percent Full	Queued Requests	Active Requests	Total Requests	Oldest Request Age	Oldest Queue Time
1	0	4	4865	0.1	0	4899	0.0	0	0	0	n/a	

HSMplex: ARCPLEX0 CRQplex: PLEX0

CRQplex Host Details Report

Requester System	Requester HSM Host Name	Processor System	Processor HSM Host Name	Request Number	Queue Time	Request Age	Requesting Jobname	Requesting User ID	Request Status	Request Volume	Dataset Name	Requester TEMS Node	Prot. TEM:
				324	06/10/10 03:00:00	19424	KKELT3	KKELT3	Active	123456	TDSMST.S3420SMD.S3420K39.RKANMODU		
				323	05/19/10 02:59:43	51104	KKELT3	KKELT3	Queued		TDSMST.S3420SMD.S3420K39.RGENHIS3.TEMP		

HSMplex: ARCPLEX0 CRQplex: PLEX0

Hub Time: Wed, 06/23/2010 02:43 PM | Server Available | CRQplex Requests - KRATZ - SYSADMIN *ADMIN MODE*

Monitoring

The monitoring tools aren't just used to look at the information from another product!

Let the **TOOLS** work for you....

Automate the monitor to look at value and WARN you

Send out a Page, text or email

Issue a command

Rest easy (or get your other work done) knowing your HSM's health is clean

Recap

- Introduction
- HSM Status
- Control data sets and journal
- Information sources
- Return Codes and reporting
- Common causes for migration and backup failures
- Thrashing
- Storage Group thresholds
- Message automation
- Reorganizing Control Data Sets
- HSM Audits
- Monitoring

Managing HSM so that HSM doesn't manage you!

Session Number 09351