OMEGAMON XE for Storage News and Tips

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Agenda

- **Recent Enhancements (V5.3.0)**
  - Packaging and Installation
  - Performance Enhancements
  - Dataset Attribute Group Data Extractor
  - Near Term History
- **Maximizing Performance**
  - Setting Thresholds
  - Reducing User Demand
  - Defining masks and Using wildcards
  - Understanding of Data Collection
  - Historical Data Collection
  - Situations and Policies
- **Configuration Recommendations**
  - Data Collection Parameters

Packaging and Installation

Packaging

- Product code is S3
  - SMP/E package includes
    - HKS3530 – OMEGAMON XE for Storage on z/OS
    - HKOB730 – OMNIMON Base
    - HKSB730 – Shared Probes
  - SMP/E service level requirements (ITM 6.3.0 FP2)
    - HKCI310 with PTF UA73688
    - HKDS630 with PTFs UA70675, UA70678
    - HKLV630 with PTFs UA70676, UA70677
  - Distributed package includes
    - ITM 6.3.0 FixPack 2
    - Java JRE 1.7
    - OMEGAMON XE Data files for several products

Requisite Maintenance

- If SB730 installed with prior versions of OMEGAMON XE for Storage
  - Following compatibility PTFs required
    - HKS3520: UA74314
    - HKS3510: UA74313
    - HKS3420: UA74314
  - Only required if SB730 is installed into SMP/e CSI without HKS3530

Installation

- Parmgen required
- No changes to existing architecture
- Upgrade
  - SMP/E install of new functions
    - No upgrade of ITM if installing into v6.3.0 FP2 environment
  - LOAD of Run Time Environment (RTE) with either Parmgen or ICAT
  - Stop/start associated address spaces
  - Refresh of TEMS stc JCL is required
- Fresh Install
  - SMP/E install of new functions
  - Build RTE using Parmgen
  - LOAD of RTE with Parmgen (part of RTE build)
    - Self Describing Agent support (if implemented) will upgrade TEP/TEPS environment
    - Install/upgrade TEP/TEPS environment using standard installation media

Performance Enhancements

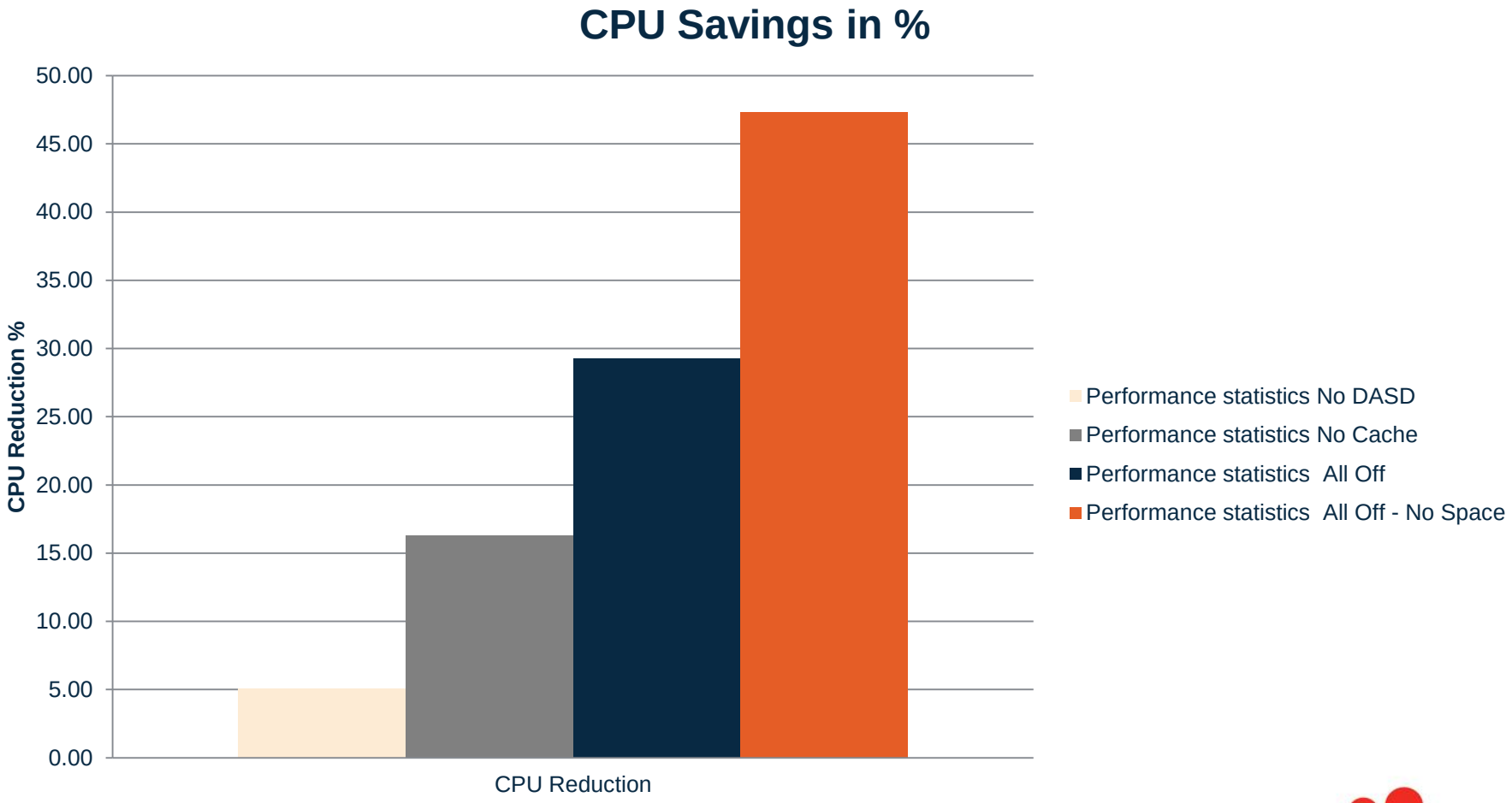
PERFORMANCE ENHANCEMENTS

- Ability to turn off collection
- Enhanced space collection
- Cache collection improvement

Performance - Option to turn off collection

- Available as PTF for v520 (UA71331)
- Disable the collection of performance data in RKANPARU(KDFDEVIN)
  - RESPINTV(0)
    - Volume performance statistics
    - Channel data
  - CACHINTV(0)
    - Control Unit statistics
    - Volume caching information
    - Storage Facility hardware information
- In association with existing controls (collection frequency, application definitions, etc) provides ability to eliminate virtually all collection of performance data and reduce associated overhead

Performance – Turning off collection



Enhanced Space Collection

- Eliminates redundant issuing of LSPACE
- Dynamically invoked when applicable
- Requires z/OS 1.13 and above
- DASD farm must be in a Sysplex or Monoplex
- Storage agent must be active on every member of the Sysplex
- Recommendation to collect space data on only one system remains valid
- Exclude list (KDFDEVSU member of RKANPARU) is still honored

Enhanced Space Collection – How it works

- TEMS joins an OM XE for Storage XCF Group
  - XCF Group name is KS3*tems-port-number*; KS31980
  - XCF member name is KS3SPACE*system-name*; KS3SPACESYSNAME1
  - Monitoring is done for group member changes
  - Messages are received from other members of XCF Group
  - By default efficient space processing is in effect when each member of the sysplex has a Storage agent that has joined the XCF Group
  - XCF Group is hub and sysplex centric
- DADSM post processing exit builds table of devices with changes to the VTOC map
- On an interval
  - Table is built of changed devices obtained via received XCF messages and DADSM exit
  - Device changes captured by DADSM exit are sent to other members of XCF Group via XCF message
- During space collection processing, if the device VTOC has not been altered; LSPACE is not done for the device
- Space data is collected for all devices at least once, unless masked out via KDFDEVSU member input

Enhanced Space Collection – is it working?

Can issue following (undocumented) command to obtain status/statistics for space processing:

F *tems-name*,DFESP STATUS

Output returned is:

2014.189 12:06:51.87 KDFDESPC SPACE COLLECTION STATISTICS:
2014.189 12:06:51.87 TOTAL COLLECTION CYCLES = 000000000000005C
2014.189 12:06:51.87 DASD TABLE REBUILDS = 0000000000000000
2014.189 12:06:51.87 TOTAL LSPACES AVOIDED = 000000000002324D
2014.189 12:06:51.87 LSPACES AVOIDED THIS INTERVAL = 000009A5
2014.189 12:06:51.87 TOTAL LSPACES ISSUED = 0000000000016658
2014.189 12:06:51.87 LSPACES ISSUED THIS INTERVAL = 0000005D
2014.189 12:06:51.87 TOTAL VOLSER SEARCHES = 0000000000000000
2014.189 12:06:51.87 SYSPLEX TABLE BUILDS = 00000003
2014.189 12:06:51.87 UPDATE INTERVAL = 00001770
2014.189 12:06:51.87 CURRENT MODE = FORCE, START-UP MODE = ON
2014.189 12:06:51.87 SYSPLEX INFORMATION; SYSTEMS IN SYSPLEX = 7, SYSTEMS IN XCF GROUP = 1, V530 MEMBERS IN GROUP = 1
2014.189 12:06:51.87 STATUS FLAGS: E#STATE1 = C4, E#STATE2 = 00, W#DCFL3I = C0

Enhanced Space Collection - Modes

- Three processing modes
  - ON
    - Default mode
    - Efficient Space Processing controlled dynamically based upon status of sysplex members in XCF group
  - OFF
    - Set manually
    - Efficient Space Processing disabled on this z/OS image AND on all other z/OS images in the sysplex unless overridden
  - Force
    - Set manually
    - Efficient Space Processing enabled for this z/OS image regardless of the status of other z/OS images in the sysplex
- Manually setting Efficient Space Processing mode
  - ESPMODE(*xxx*) where *xxx* is ON, OFF, or FORCE in KDFDEVIN member of RKANPARU dataset
  - /F *tems-name*,DFESP MODE,*xxx* with *xxx* is ON, OFF, or FORCE

Enhanced Space Collection – More Information

- Handy Operator Commands:
  - D PROG,EXIT,EN=IGGPOST0_EXIT

```
CSV461I 12.26.51 PROG,EXIT DISPLAY 170
EXIT              MODULE    STATE MODULE    STATE MODULE    STATE
IGGPOST0_EXIT     IGGPOST0    A   S3TMS57C    A   S3TMS53     A
```

Module name is TEMS STC name

  - D XCF,GROUP,KS318817,ALL

```
IXC333I  12.48.13  DISPLAY XCF 766
INFORMATION FOR GROUP KS318817
MEMBER NAME:         SYSTEM:     JOB ID:    STATUS:
KS3SPACERS22         RS22        S3TMS02S   ACTIVE
KS3SPACERS23         RS23        S3TMS02S   ACTIVE
INFO FOR GROUP KS318817 MEMBER KS3SPACERS22 ON SYSTEM RS22
```

- Component Debug:
  - F *tems-name*,S3DB ON,ESPD
    - Traces logic path through modules
    - Some data written to RKLVSNAP

Cache Collection

- Rewrite of original cache collector
- Engineered for the ‘large’ environment
- Does not support 3880 control units
- Parameter values unchanged in KDFDEVIN member of RKANPARU
  - RESET – Interval for setting the base line measurements
  - REFRESH – Interval for collecting measurements
- New attributes to support zHPF
  - 2 new attributes in S3_Channel_Path attribute group
  - 8 new attributes in S3_Cache_Devices attribute group

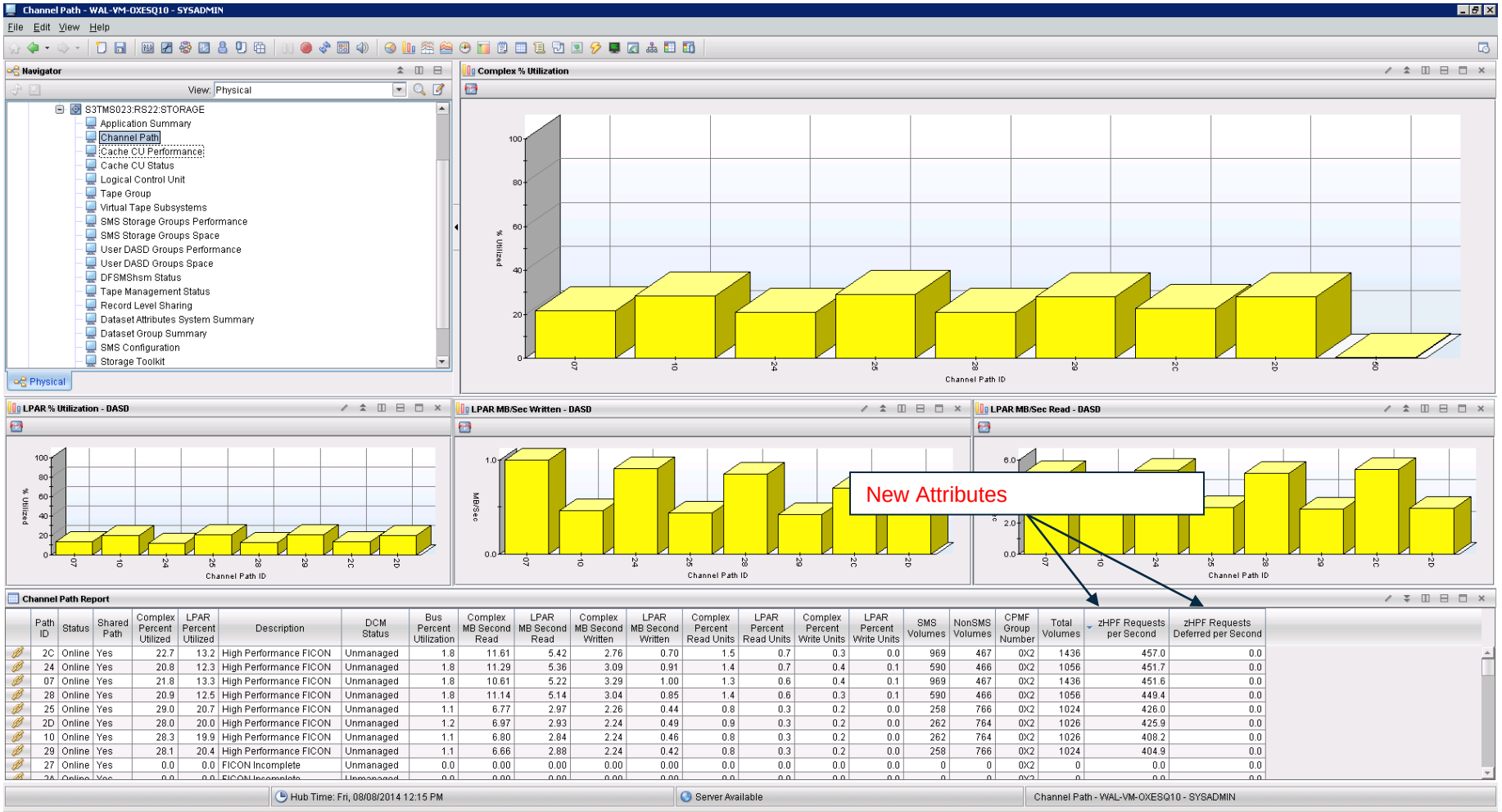
Legacy Cache Collector

- Some installations may not benefit from new collector
  - Using 3880 control units
  - Small DASD farm
- Users of legacy cache collector will not see new cache attributes

New Attributes

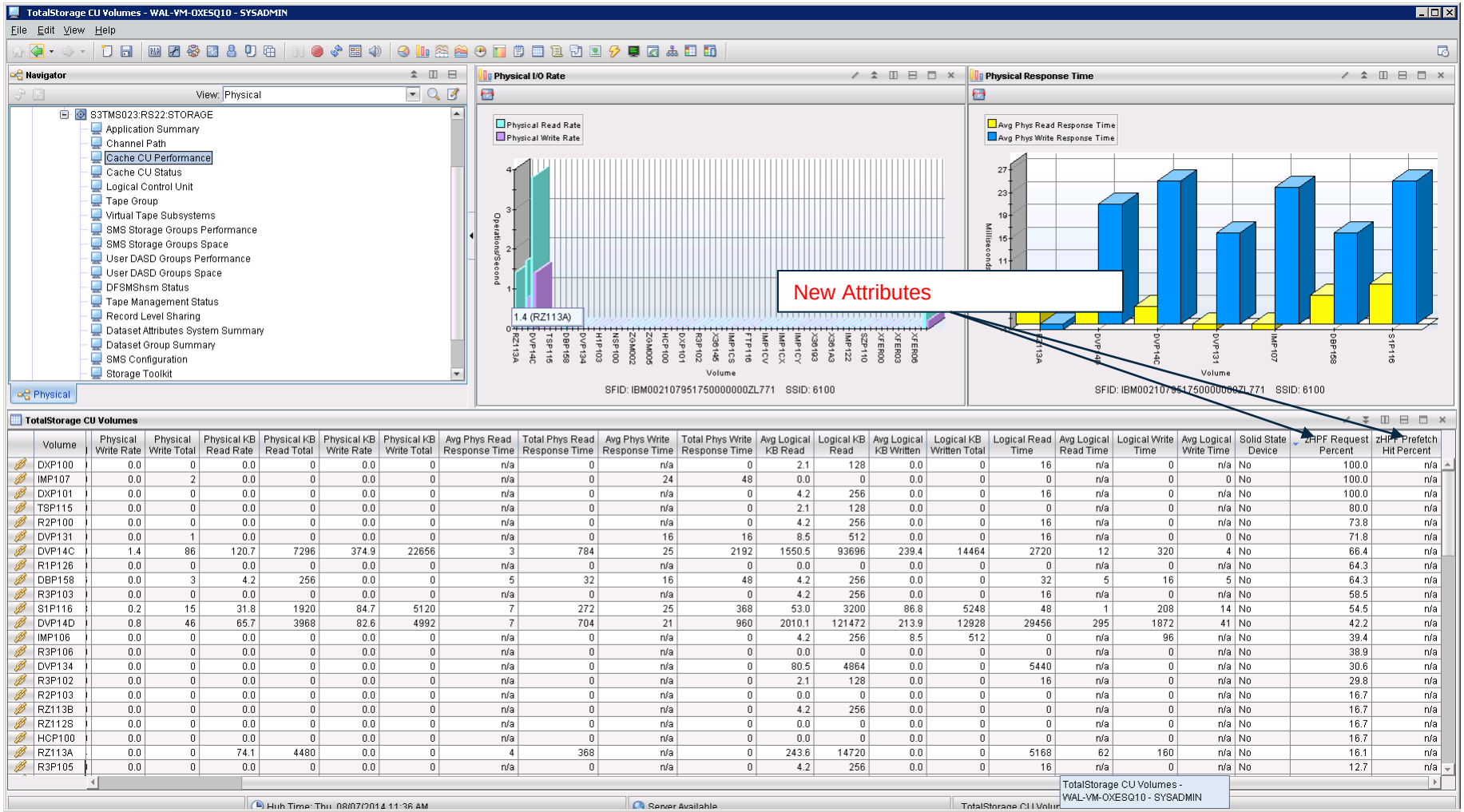
- S3_Channel_Path attribute group
  - zHPF Requests per Second
  - zHPF Requests Deferred per Second
- S3_Cache_Devices attribute group
  - zHPF Read I/O Requests
  - zHPF Write I/O Requests
  - zHPF Prefetch Requests
  - zHPF Prefetch Hits
  - zHPF Read I/O per Second
  - zHPF Write I/O per Second
  - zHPF Prefetch Hit Percent
  - zHPF Request Percent

Channel Path Report



Path ID	Status	Shared Path	Complex Percent Utilized	LPAR Percent Utilized	Description	DCM Status	Bus Percent Utilization	Complex MB Second Read	LPAR MB Second Read	Complex MB Second Written	LPAR MB Second Written	Complex Percent Read Units	LPAR Percent Read Units	Complex Percent Write Units	LPAR Percent Write Units	SMS Volumes	NonSMS Volumes	CPMF Group Number	Total Volumes	zHPF Requests per Second	zHPF Requests Deferred per Second
2C	Online	Yes	22.7	13.2	High Performance FICON	Unmanaged	1.8	11.61	5.42	2.76	0.70	1.5	0.7	0.3	0.0	969	467	0X2	1436	457.0	0.0
24	Online	Yes	20.8	12.3	High Performance FICON	Unmanaged	1.8	11.29	5.36	3.09	0.91	1.4	0.7	0.4	0.1	590	466	0X2	1056	451.7	0.0
07	Online	Yes	21.8	13.3	High Performance FICON	Unmanaged	1.8	10.61	5.22	3.29	1.00	1.3	0.6	0.4	0.1	969	467	0X2	1436	451.6	0.0
28	Online	Yes	20.9	12.5	High Performance FICON	Unmanaged	1.8	11.14	5.14	3.04	0.85	1.4	0.6	0.3	0.1	590	466	0X2	1056	449.4	0.0
25	Online	Yes	29.0	20.7	High Performance FICON	Unmanaged	1.1	6.77	2.97	2.26	0.44	0.8	0.3	0.2	0.0	258	766	0X2	1024	426.0	0.0
2D	Online	Yes	28.0	20.0	High Performance FICON	Unmanaged	1.2	6.97	2.93	2.24	0.49	0.9	0.3	0.2	0.0	262	764	0X2	1026	425.9	0.0
10	Online	Yes	28.3	19.9	High Performance FICON	Unmanaged	1.1	6.80	2.84	2.24	0.46	0.8	0.3	0.2	0.0	262	764	0X2	1026	408.2	0.0
29	Online	Yes	28.1	20.4	High Performance FICON	Unmanaged	1.1	6.66	2.88	2.24	0.42	0.8	0.3	0.2	0.0	258	766	0X2	1024	404.9	0.0
27	Online	Yes	0.0	0.0	FICON Incomplete	Unmanaged	0.0	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0	0	0X2	0	0.0	0.0

Total Storage CU Volumes



Volume	Physical Write Rate	Physical Write Total	Physical KB Read Rate	Physical KB Read Total	Physical KB Write Rate	Physical KB Write Total	Avg Phys Read Response Time	Total Phys Read Response Time	Avg Phys Write Response Time	Total Phys Write Response Time	Avg Logical KB Read	Logical KB Read	Avg Logical KB Written	Logical KB Written Total	Logical Read Time	Avg Logical Read Time	Logical Write Time	Avg Logical Write Time	Solid State Device	zHPF Request Percent	zHPF Prefetch Hit Percent
DXP100	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	2.1	128	0.0	0	16	n/a	0	n/a	No	100.0	n/a
IMP107	0.0	2	0.0	0	0.0	0	n/a	0	24	48	0.0	0	0.0	0	0	n/a	0	0	No	100.0	n/a
DXP101	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	4.2	256	0.0	0	16	n/a	0	n/a	No	100.0	n/a
TSP115	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	2.1	128	0.0	0	0	n/a	0	n/a	No	80.0	n/a
R2P100	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	4.2	256	0.0	0	16	n/a	0	n/a	No	73.8	n/a
DVP131	0.0	1	0.0	0	0.0	0	n/a	0	16	16	8.5	512	0.0	0	16	n/a	0	0	No	71.8	n/a
DVP14C	1.4	86	120.7	7296	374.9	22656	3	784	25	2192	1550.5	93696	239.4	14464	2720	12	320	4	No	66.4	n/a
R1P126	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	0.0	0	0.0	0	0	n/a	0	n/a	No	64.3	n/a
DBP158	0.0	3	4.2	256	0.0	0	5	32	16	48	4.2	256	0.0	0	32	5	16	5	No	64.3	n/a
R3P103	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	4.2	256	0.0	0	16	n/a	0	n/a	No	58.5	n/a
S1P116	0.2	15	31.8	1920	84.7	5120	7	272	25	368	53.0	3200	86.8	5248	48	1	208	14	No	54.5	n/a
DVP14D	0.8	46	65.7	3968	82.6	4992	7	704	21	960	2010.1	121472	213.9	12928	29456	295	1872	41	No	42.2	n/a
IMP106	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	4.2	256	8.5	512	0	n/a	96	n/a	No	39.4	n/a
R3P106	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	0.0	0	0.0	0	0	n/a	0	n/a	No	38.9	n/a
DVP134	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	80.5	4864	0.0	0	5440	n/a	0	n/a	No	30.6	n/a
R3P102	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	2.1	128	0.0	0	16	n/a	0	n/a	No	29.8	n/a
R2P103	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	0.0	0	0.0	0	0	n/a	0	n/a	No	16.7	n/a
RZ113B	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	4.2	256	0.0	0	0	n/a	0	n/a	No	16.7	n/a
RZ112S	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	0.0	0	0.0	0	0	n/a	0	n/a	No	16.7	n/a
HCP100	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	0.0	0	0.0	0	0	n/a	0	n/a	No	16.7	n/a
RZ113A	0.0	0	74.1	4480	0.0	0	4	368	n/a	0	243.6	14720	0.0	0	5168	62	160	n/a	No	16.1	n/a
R3P105	0.0	0	0.0	0	0.0	0	n/a	0	n/a	0	4.2	256	0.0	0	16	n/a	0	n/a	No	12.7	n/a

Dataset Attribute Group Data Extractor

Dataset Attributes Group - Review

- The Storage product collects dataset attribute data based on user defined groups.

Dataset Attributes Group Summary

	Group Name	Number of Datasets in group	Total Allocated Tracks	Maximum Allocated Tracks	Minimum Allocated Tracks	Total Used Tracks	Maximum Used Tracks	Minimum Used Tracks	Total Unused Tracks	Maximum Unused Tracks	Minimum Unused Tracks
	Production datasets	4314	113602	6720	1	110292	6711	0	3310	344	0
	User datasets	25	1252	715	1	1072	715	0	180	22	0

Dataset Attributes Group - Review

- A group definition is a set of conditions evaluated over the properties and attributes of a collection of datasets
  - Properties are dataset properties such as DSN, catalog, SMS class, VOLSER.
  - Attributes are attribute group values which have been collected for the dataset. Examples: allocated space, EXCPs, percent used, days since creation, etc.
- Property conditions are OR'ed
- Attribute conditions are AND'ed
- Example group: all datasets with HLQ=TDSMS.** and management class=PROD where percent used > x or days since creation > 30 days

Dataset Attributes Group – limitations

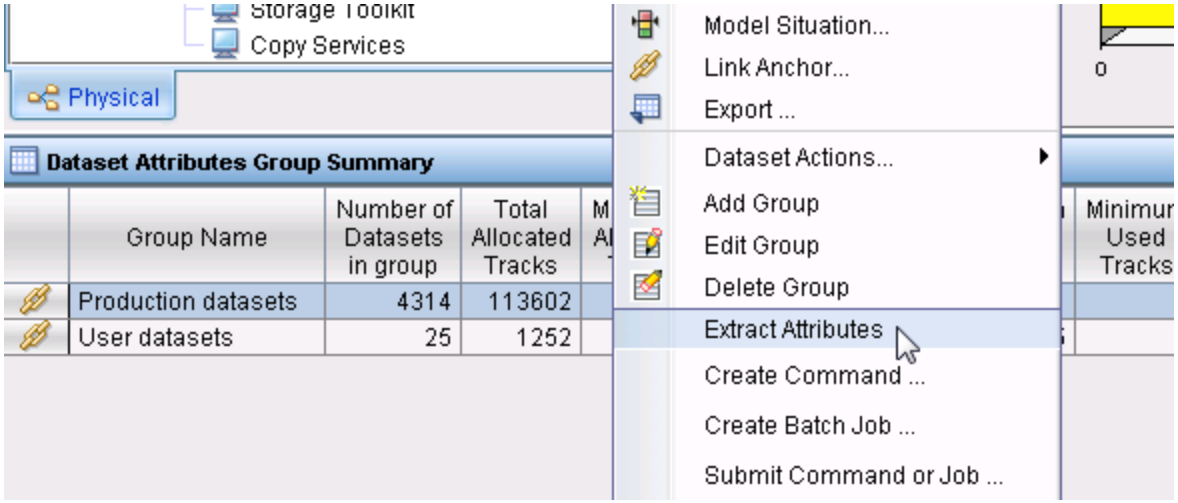
- Group definitions provide some flexibility but restrictions on properties and attributes make some definitions impossible.
  - all datasets with HLQ=TDSMS.** AND management class=PROD where percent used > x **AND** days since creation > 30 days
- The DAG database can hold a vast amount of data but ITM/TEPS is limited in what it can transport/display.
- Customers make large groups (millions of datasets) and want access to the data.
- Also a need for more advanced filtering and processing options.

Dataset Attributes Group Extractor

- Will be available in v520 via PTF (APAR OA44362).
- Built on top of the Storage Toolkit as a new action.
- The same authentication/permission requirements apply as with any toolkit action.
- Runs as low priority batch job.
- Extracts data collected by the dataset attributes group collector.
- Output dataset is FB LRECL=1700. Data is formatted in CSV, with the first record being a header record.
- Concurrent operation of the collector and extractor is not possible. Schedule accordingly.

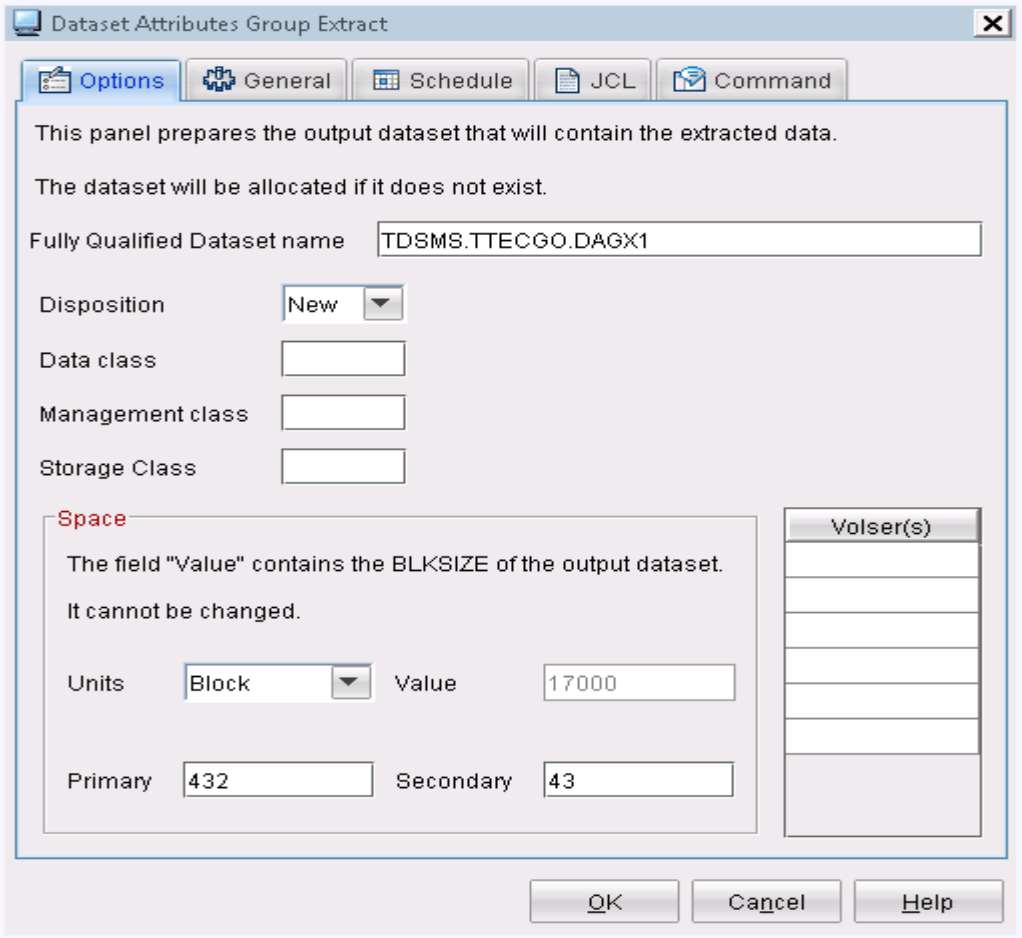
Dataset Attributes Group Extractor – How To

- Create a dataset attributes group definition
- Run collection
- Navigate to the Dataset Attributes Group Summary workspace
- Select the group or groups you want to extract, right click and choose Extract Attributes



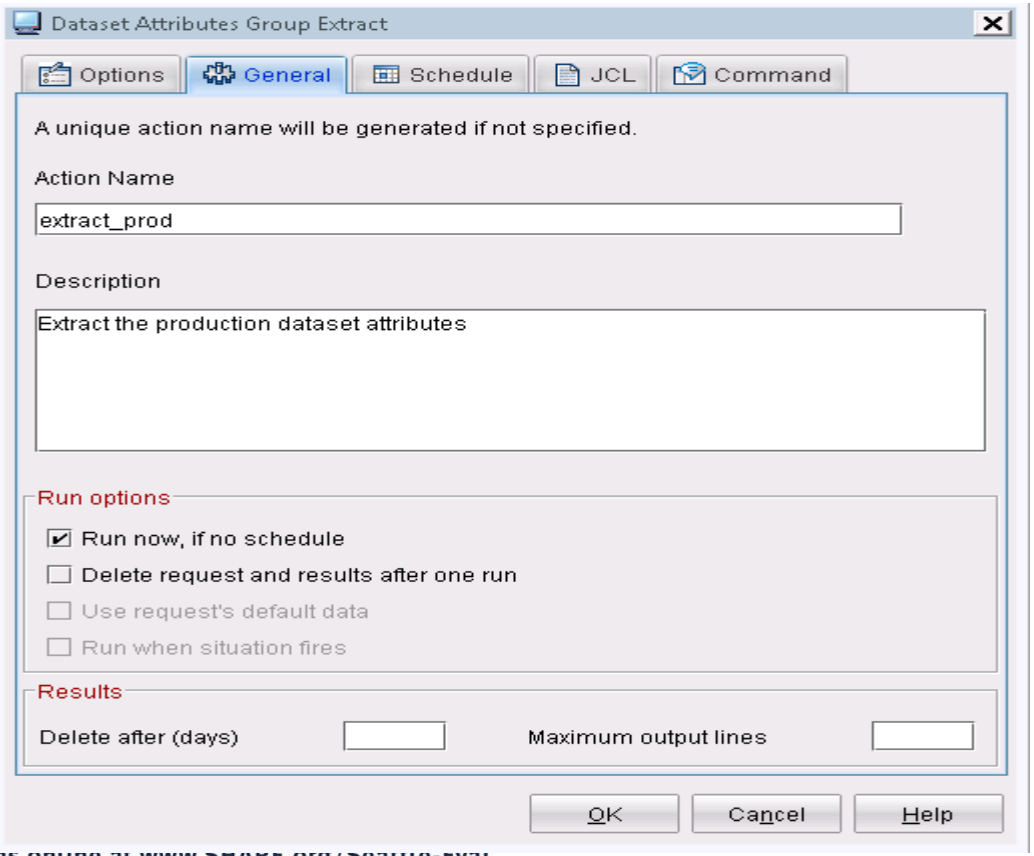
Dataset Attributes Group Extractor – How To

- Define the output dataset.



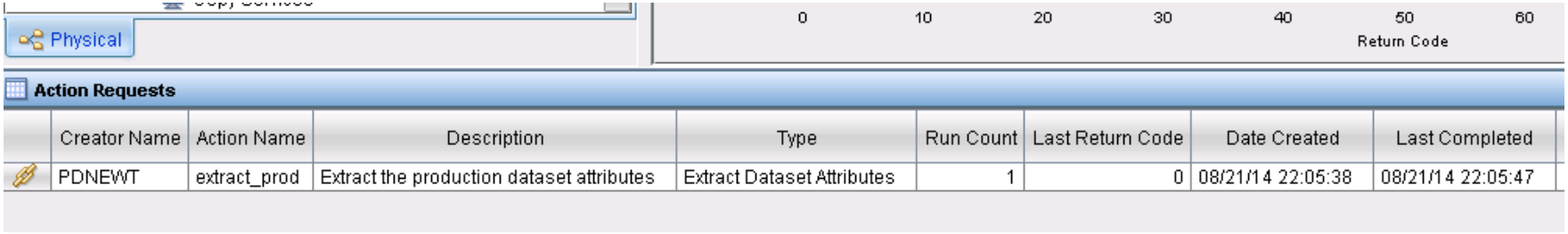
Dataset Attributes Group Extractor – How To

- On the remaining tabs, specify standard storage toolkit parameters such as schedule, job card, etc.



Dataset Attributes Group Extractor – How To

- View the results of execution on the Storage Toolkit workspace



	Creator Name	Action Name	Description	Type	Run Count	Last Return Code	Date Created	Last Completed
	PDNEWT	extract_prod	Extract the production dataset attributes	Extract Dataset Attributes	1	0	08/21/14 22:05:38	08/21/14 22:05:47

- The data is now available for further processing via REXX, Java, etc or as input into other workloads.

```
Command ===>
000001 Dataset Name,Volser,Device Type,Allocated Tracks,Allocated
000002 TDSMS.$.SB620STG.AA45452.KDFLCHP,DVP128,3390,34,2,0,34,2,0,
000003 TDSMS.$.SB620STG.AA45452.KDF3LCHP,DVP14B,3390,1,0,0,1,0,0,0
000004 TDSMS.$.SB620STG.AA454520.KDF3LCHP,DVP102,3390,1,0,0,1,0,0,
000005 TDSMS.$.SB620STG.AA45452Z.KDFLCHP,DVP12C,3390,1,0,0,1,0,0,0
000006 TDSMS.$.SB620STG.AA45612.KDFDEVIN,DVP124,3390,27,1,0,27,1,0
000007 TDSMS.$.SB620STG.AA456120.KDFDEVIN,DVP11C,3390,1,0,0,1,0,0,
000008 TDSMS.$.SB620STG.AA45803.KDFCSRBD,DVP10E,3390,14,1,0,14,1,0
000009 TDSMS.$.SB620STG.AA45803.KDF3CSUB,DVP122,3390,1,0,0,1,0,0,0
000010 TDSMS.$.SB620STG.AA458030.KDF3CSUB,DVP11F,3390,2,0,0,2,0,0,
000011 TDSMS.$.SB620STG.AA458032.KDFCSRBD,DVP117,3390,1,0,0,1,0,0,
000012 TDSMS.$.SB620STG.PTF.AA45452.CWIZ,DVP12A,3390,1,0,0,1,0,0,0
000013 TDSMS.$.SB620STG.PTF.AA45452.SUPERC,DVP100,3390,1,0,0,1,0,0
000014 TDSMS.$.SB620STG.PTF.AA45452.SUPERCU,DVP132,3390,1,0,0,1,0,
000015 TDSMS.$.SB620STG.PTF.AA45612.CWIZ,DVP145,3390,1,0,0,1,0,0,0
000016 TDSMS.$.SB620STG.PTF.AA45612.SUPERC,DVP145,3390,1,0,0,1,0,0
000017 TDSMS.$.SB620STG.PTF.AA45612.SUPERCU,DVP11C,3390,1,0,0,1,0,
000018 TDSMS.$.SB620STG.PTF.AA45803.CWIZ,DVP11C,3390,1,0,0,1,0,0,0
```

Dataset Attributes Group Extractor – How To

- Or download the member to your PC, change file extension to .csv and load it into your favorite spreadsheet program.

	A	B	C	D	E	F	G
1	Dataset Name	Volser	Device	Allocated Tracks	Allocat	Allocat	Used T
13	TDSMS.PARMGEN.BETA	DVP100	3390	476	26	0	476
44	TDSMS.$.S3530REL.LINK	DVP100	3390	114	6	0	114
49	TDSMS.$.S3520STG.KS3	DVP100	3390	87	5	0	87
72	TDSMS.$.S3520FIX.KS3S	DVP101	3390	38	2	0	38
85	TDSMS.S3510REL.MAKE	DVP101	3390	36	2	0	36
88	TDSMS.$.SB730BAS.KDF	DVP100	3390	30	2	0	30
97	TDSMS.S3510JLP.TKANN	DVP100	3390	30	2	0	25
108	TDSMS.$.SB730BAS.KDF	DVP101	3390	28	2	0	28
121	TDSMS.$.S3530BAS.KDF	DVP101	3390	25	1	0	25
123	TDSMS.$.SB730BAS.KDF	DVP100	3390	19	1	0	19

Dataset Attributes Group Extractor - Scenarios

- Build a report containing every dataset on every volume, in order to look back and see what was on a particular volume at a point in time to potentially recover a file from physical / logical volume backups and for billing purposes, etc.

- There are datasets with production management classes but the datasets have been renamed by users and no longer belong in the storage group. Extract all datasets then filter with multiple ‘Not Equal' to high level qualifier conditions to find datasets which can be migrated.

Near Term History

Enhanced 3270 Near Term History

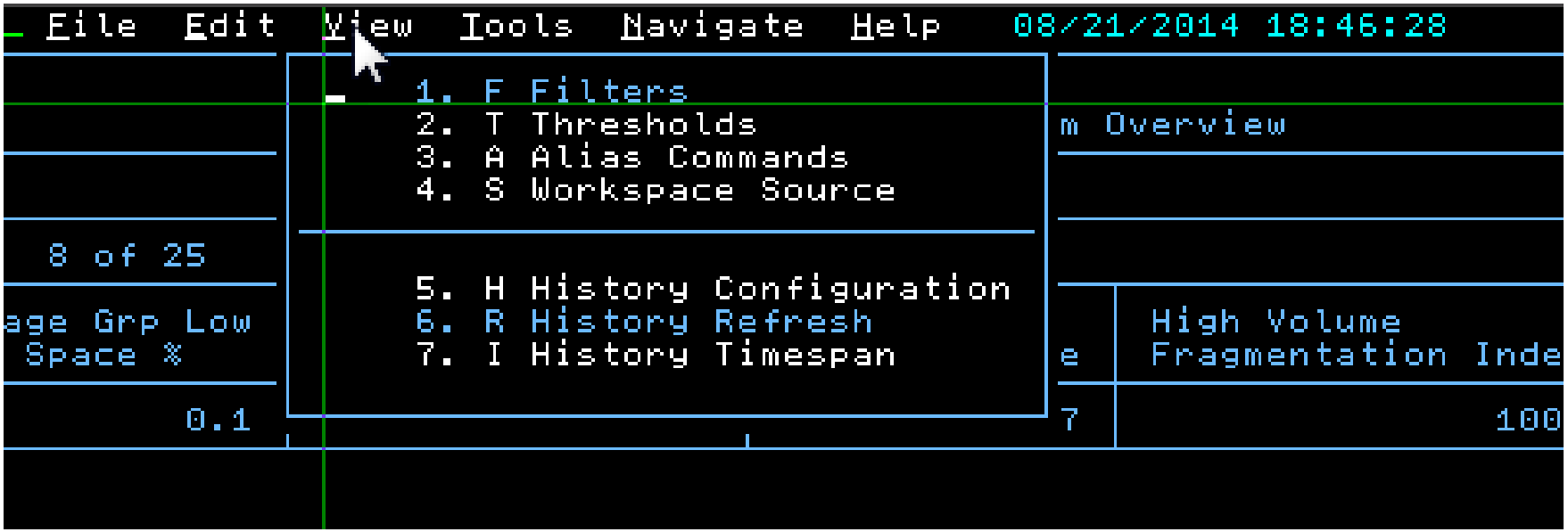
- Provides access to TEPS/TEMS “short term history” data stored in PDS (persistent data store) files.
- “h” action key is now reserved for accessing history screens. Previous h actions have been changed.
- Part of HKOB730 (OMNIMON base v7.3)
- PARMGEN change: the default allocation for the RKS3DSA1 group has been increased to allow for 3 days retention. Your allocation value will most likely require tuning.
- History configuration can be edited in either E3270 or TEP.
- Configuration gotcha: enabling TEPS-only features (e.g. data warehouse options) will prevent you from modifying the configuration in E3270. Data will be available regardless.

Enhanced 3270 Near Term History

- Attribute groups which are NTH-enabled
  - Cache CU and Devices
  - Channel Path
  - Volume Group Summary
  - DASD Volume Space and Performance
  - Dataset Attributes System Summary
  - Logical Control Unit
  - RLS Lock Structure, Buffer LSU, Perf, Storage Class

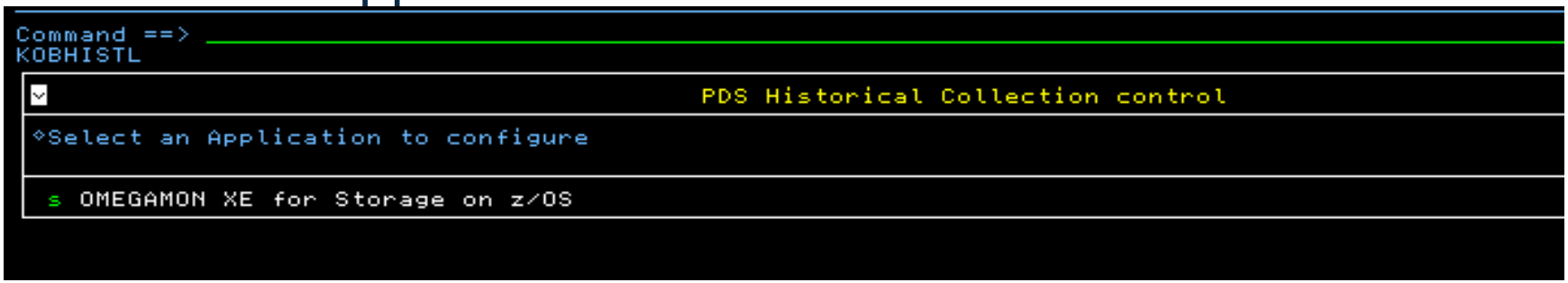
Enhanced 3270 NTH Configuration

- Select “History Configuration” from the View menu.

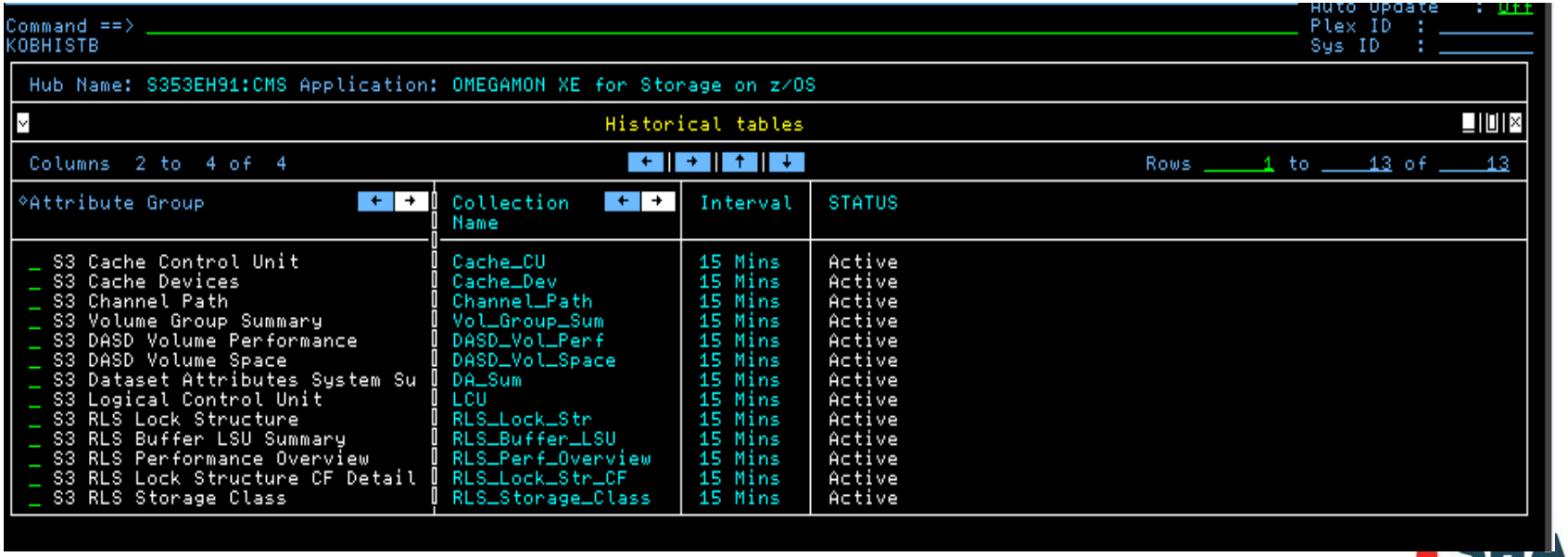


Enhanced 3270 NTH Configuration

- Select the application

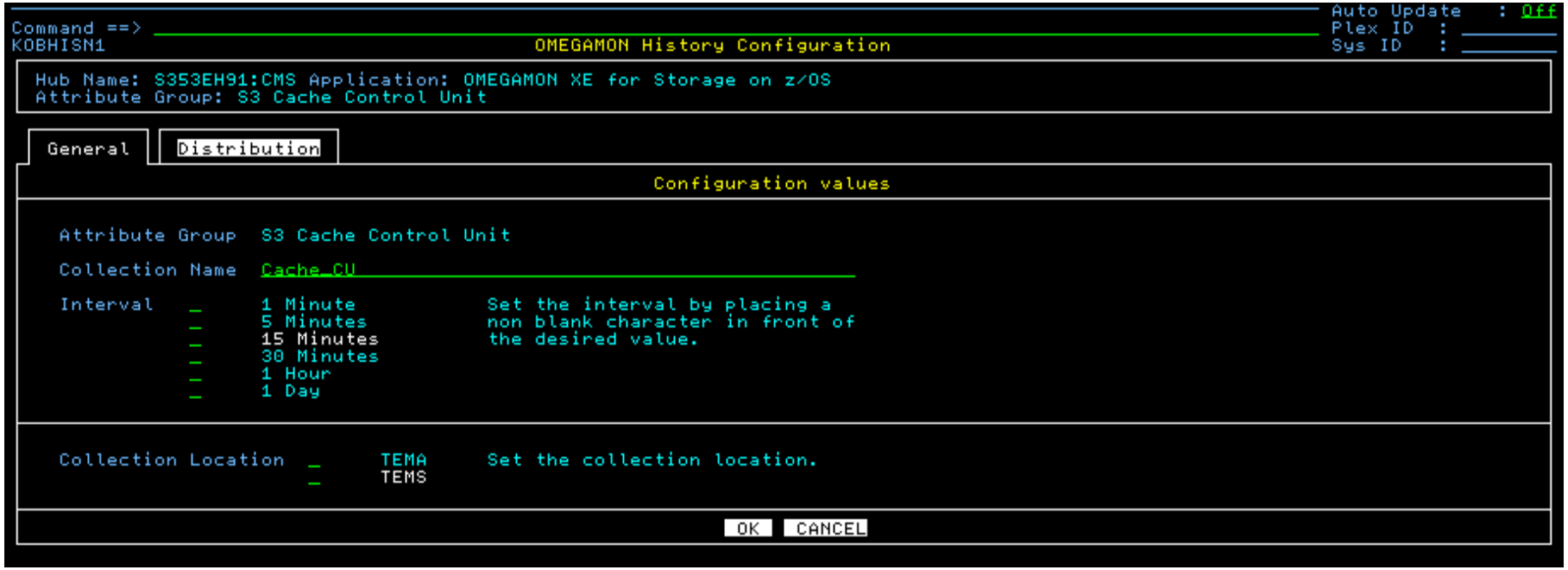


- Select an attribute group



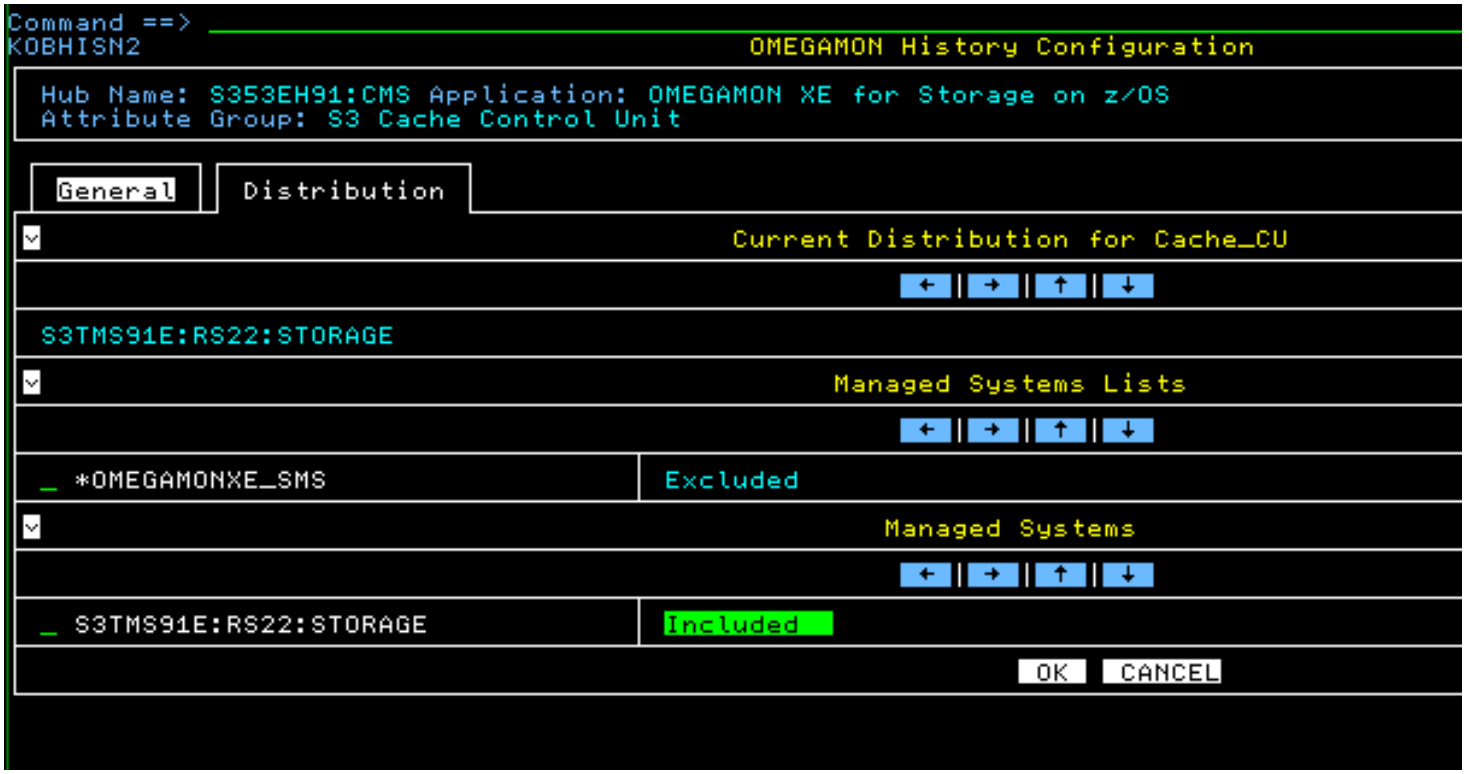
Enhanced 3270 NTH Configuration

- This screen mimics the TEP history configuration screens.
- General tab: enter name, interval and location.



Enhanced 3270 NTH Configuration

- Distribution tab: distribute collection to a Managed System



Enhanced 3270 NTH Scenario

- Storage Group response time for ARYSG08 is high. Is this a trend or one time spike?

File Edit View Tools Navigate Help 07/30/2014 17:57:16

Auto Update : Off
Plex ID : RSPLEX01
Sys ID : RS22

Command ==>
KS3SSGP SMS Storage Groups Performance

SMS Storage Group Performance Report

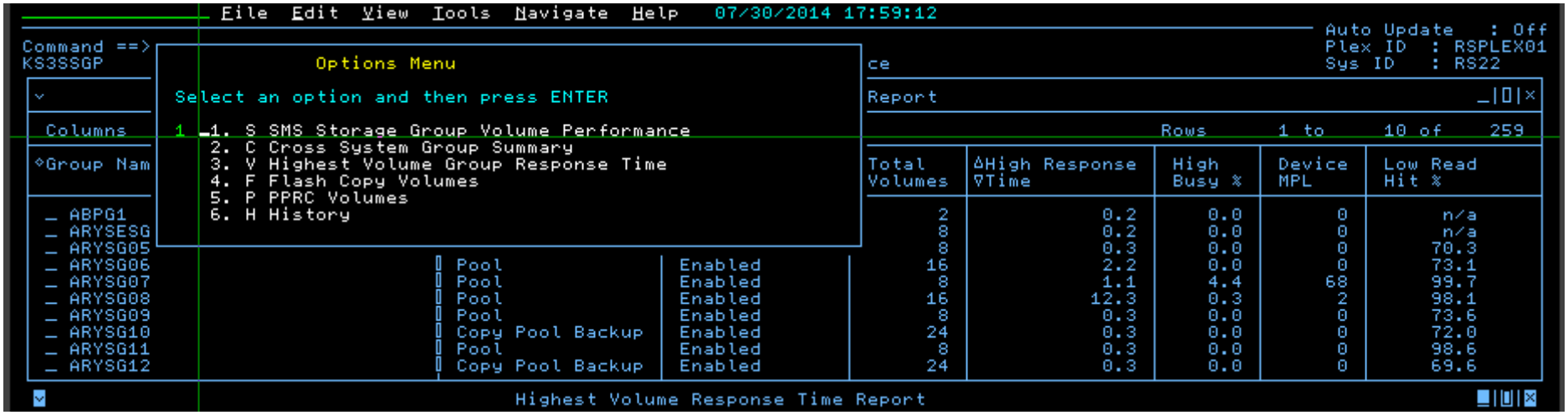
Columns 2 to 8 of 10 Rows 1 to 10 of 259

Group Name	Storage Group Type	Storage Group Status	Total Volumes	High Response Time	High Busy %	Device MPL	Low Read Hit %
ABPG1	Pool	Enabled	2	0.2	0.0	0	n/a
ARYSESG	Pool	Enabled	8	0.2	0.0	0	n/a
ARYSG05	Pool	Enabled	8	0.3	0.0	0	70.3
ARYSG06	Pool	Enabled	16	2.2	0.0	0	73.1
ARYSG07	Pool	Enabled	8	1.1	4.4	68	99.7
ARYSG08	Pool	Enabled	16	12.3	0.3	2	98.1
ARYSG09	Pool	Enabled	8	0.3	0.0	0	73.6
ARYSG10	Copy Pool Backup	Enabled	24	0.3	0.0	0	72.0
ARYSG11	Pool	Enabled	8	0.3	0.0	0	98.6
ARYSG12	Copy Pool Backup	Enabled	24	0.3	0.0	0	69.6

Highest Volume Response Time Report

Enhanced 3270 NTH Scenario

- Drill down to volume performance



Enhanced 3270 NTH Scenario

- Examine history via “h” action key for the volume.

```
Command ==>                                              Auto Update  : Off
                                                         Plex ID      : RSPLEX01
KS3SSGVP       SMS Storage Group Volume Performance      Sys ID       : RS22

Storage Group:   ARYSG08

                         Volume Performance Report

Columns  2 to 11 of 22                                   Rows   1 to  10 of  16
```

Volume	Device Address	Busy %	I/O Per Second	IOSQ Delay	Pend Time	Connect Time	Disconnect Time	Interrupt Delay Time	Response Time	MSR Connect Time %
_ ARY128	B808	0.1	0.2	0.0	0.1	8.6	0.0	n/a	8.9	96.6
_ ARY129	B809	0.2	0.2	0.0	0.1	9.3	0.1	n/a	9.6	96.9
h ARY12A	B80A	0.2	0.2	0.0	0.1	9.9	0.0	n/a	10.1	98.0
_ ARY12B	B80B	0.2	0.2	0.0	0.1	9.4	0.0	n/a	9.7	96.9
_ ARY12C	B80C	0.1	0.2	0.0	0.2	9.1	0.0	n/a	9.4	96.8
_ ARY12D	B80D	0.1	0.2	0.0	0.1	8.7	0.0	n/a	8.9	97.8
_ ARY12E	B80E	0.1	0.2	0.0	0.2	8.7	0.0	n/a	8.9	97.8
_ ARY12F	B80F	0.1	0.2	0.0	0.1	8.9	0.0	n/a	9.2	96.7
_ ARY130	B810	0.2	0.2	0.0	0.1	9.3	0.0	n/a	9.5	97.9
_ ARY131	B811	0.1	0.2	0.0	0.1	8.9	0.0	n/a	9.1	97.8

Volume Cache Report

Enhanced 3270 NTH Scenario

- The poor response time has just started.

Command ==>
KS3SSGVP

Historical Summary

Plex ID : RSPLEX01
Sys ID : RS22

Storage Group: ARYSG08

Selected item ARY12A

Columns 3 to 12 of 23

Rows 1 to 21 of 21

Recording Time	Volume	Device Address	Busy %	I/O Per Second	IOSQ Delay	Pend Time	Connect Time	Disconnect Time	Interrupt Delay Time	Response Time	+MSR Tim
18:00:26	ARY12A	B80A	0.2	0.2	0.0	0.1	9.9	0.0	n/a	10.1	
17:45:26	ARY12A	B80A	0.0	0.1	0.0	0.1	0.1	0.0	n/a	0.2	
17:30:36	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
17:15:23	ARY12A	B80A	0.0	0.1	0.0	0.1	0.1	0.0	n/a	0.2	
17:00:23	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
16:45:22	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.1	
16:30:22	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.1	
16:15:20	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
16:01:27	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.2	n/a	0.4	
15:45:23	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
15:30:22	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
15:15:21	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
15:00:23	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
14:45:22	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.1	
14:30:40	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
14:15:22	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.1	
14:00:22	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.1	
13:45:22	ARY12A	B80A	0.0	0.1	0.0	0.1	0.1	0.0	n/a	0.2	
13:30:22	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
13:15:23	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.2	
13:00:27	ARY12A	B80A	0.0	0.1	0.0	0.1	0.0	0.0	n/a	0.1	

Dataset Attributes Database Collector

- The Dataset Attributes Database Collector has been rewritten to improve performance.
  - APAR OA46289 – PTF UA76263 for V5.2
  - A PTF for V5.3 will be coming soon

Agenda

- **Recent Enhancements (V5.3.0)**
  - Packaging and Installation
  - Performance Enhancements
  - Dataset Attribute Group Data Extractor
  - Near Term History
- **Maximizing Performances**
  - Setting Thresholds
  - Reduce User Demand
  - Defining masks and Using wildcards
  - Understanding Data Collection
  - Historical Data Collection
  - Situations and Policies
- **Configuration Recommendations**
  - Data Collection Parameters

Setting Thresholds

Setting Thresholds

- Determine critical vs noncritical thresholds
  - For less critical events define an interval for the threshold
  - Production vs nonproduction
  - One size does not fit all

- Tune Thresholds
  - Use a method that uses the least amount of system resources. Not all methods use the same resources.
  - OMEGAMON XE uses Boolean logic which provides for more complex situations.

Defining Masks and Wildcards

Defining Masks and Wildcards

- **Masks**
  - Keep amount of data small
  - Use unique masks
  - Limit time to collect data
  - For data set masks, clear the Space Data option if space data is not required or if the last reference date is not required
  - For more information on masking, see *IBM Tivoli OMEGAMON XE for Storage on z/OS: User's Guide*
- **Wildcards**
  - Do not use wildcard characters in the first qualifier

Reducing User Demand

Reducing User Demand

- Each time a user requests data, a demand is made on system resources especially tabular views that return large volumes of data.

- When a workspace is opened or refreshed, a query is run.
  - Customize queries to filter out nonsignificant data - reduces memory
  - Limit the number of rows and columns. Default queries return all columns.
  - Apply same query to multiple views in a workspace (one query per table in a workspace)
  - Set auto-refresh to a long interval or turn off

Reducing User Demand

- ***Example:***
  - Use the Dataset Attribute Database feature to write a query that targets data sets on a specific control unit.
  - Refine your query so that it retrieves only monitoring information about space utilization.
  - Substantially reduce the amount of data that the query returns and reduce demand on system resources:
    - By limiting the query to the specific control unit
    - By specifying the attribute that you want to monitor

- It is more efficient to use queries than View filters.

Understanding Data Collection

Understanding Data Collection

- Specify appropriate collection intervals to collect sufficient information. It is a balance between using resources and getting the information on resources
  - Disable data collection for noncritical resources
  - Configure data collection intervals
    - Understand how intervals control data collection.
- **Optimize the collection of cache statistics**
  - For shared DASD environments that share a HUB TEMS:
    - Use one LPAR to collect cache space statistics
    - Turn off cache space collection on all other LPARs
    - *Note: this feature is available to turn off in OMEGAMON XE for Storage V5.2.0 with PTF*

Historical Data Collection

Historical Data Collection

- **Short Term history**
  - Stored in the Persistent Data Store files usually 24 hours
  - Short-term historical data is used to investigate and determine the nature of problems that arise
  - Data is stored on z/OS
- **Long term history**
  - Stored in the Tivoli Data Warehouse
  - Used to analyze trends and determine workload balance
  - Data is stored in a relational database (DB2, Oracle, Microsoft SQL)
  - Requires Warehouse Proxy Agent

Historical Data Collection

- For data set groups, collect only data that you need

- Use an appropriate data collection rate
  (5, 15, 30, 60, or 1440 minutes)

  - Sample Historical Collection Intervals
    - Realtime - 5 minutes
    - Short term - 15 minutes
    - Long term - 1 hour

Situations and Policies

Situations

- **Situations** are queries run on a specified interval and report results to the TEMS Situation Monitor.
  - The Situation Monitor forwards alerts to the TEPS.

- **Situation Distribution**
  - OMEGAMON XE for Storage comes with many pre-built situations.
  - Only turn on/activate the ones that are necessary
  - Distribute certain situations to only one z/OS image in a shared environment
    - Those with space attributes, cache status or performance attributes, hardware related

Situations

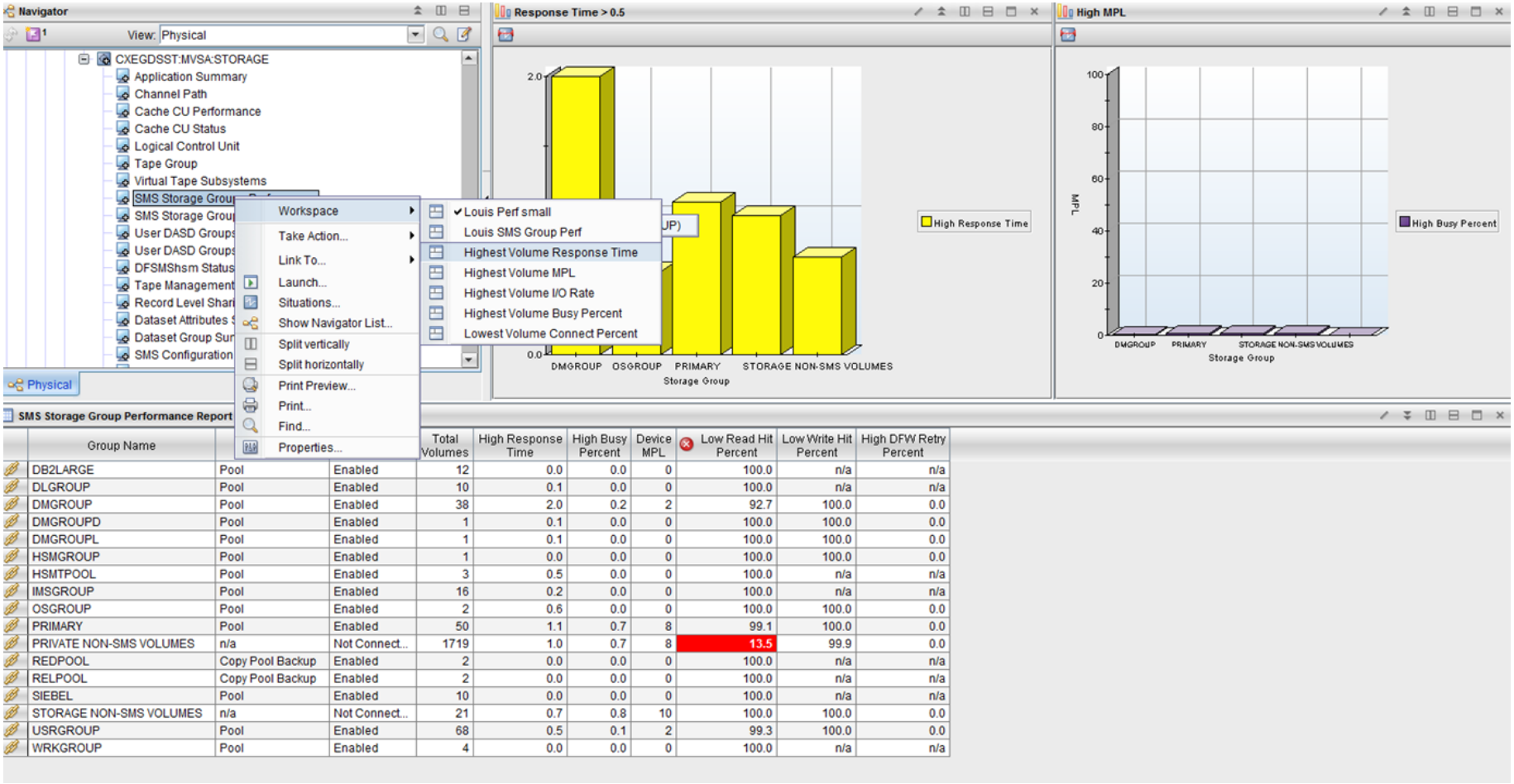
- **Situation Take Action**
  - Be careful with Take Action on volume and data situations. Can produce unexpected results. Don't want a situation true for 500 volumes at once and kick off 500 tasks.
  - Run situations on DASD groups and not all volumes at once
  - Time slice situations
  - Know your environment

- **Situation Sampling Interval**
  - Set sampling interval to the collection interval of the data
  - Data set attributes database is collected only once every 24 hours

Situations

- ***Example 1:***
  - The Navigator view is like a tree with leaves.
  - Each leaf has a name such as Application Summary, Cache CU Performance, etc.
  - Leaf names link to workspaces. Workspaces contain numerous columns of data gathered by a single data collector.
  - Right click a leaf to view all situations associated with the leaf. All situations on a leaf use the same data collector.
  - All situations are grouped if the same interval setting is used for all situations.
  - *However, if different interval settings are used, then the data collector is called for each situation on the leaf*

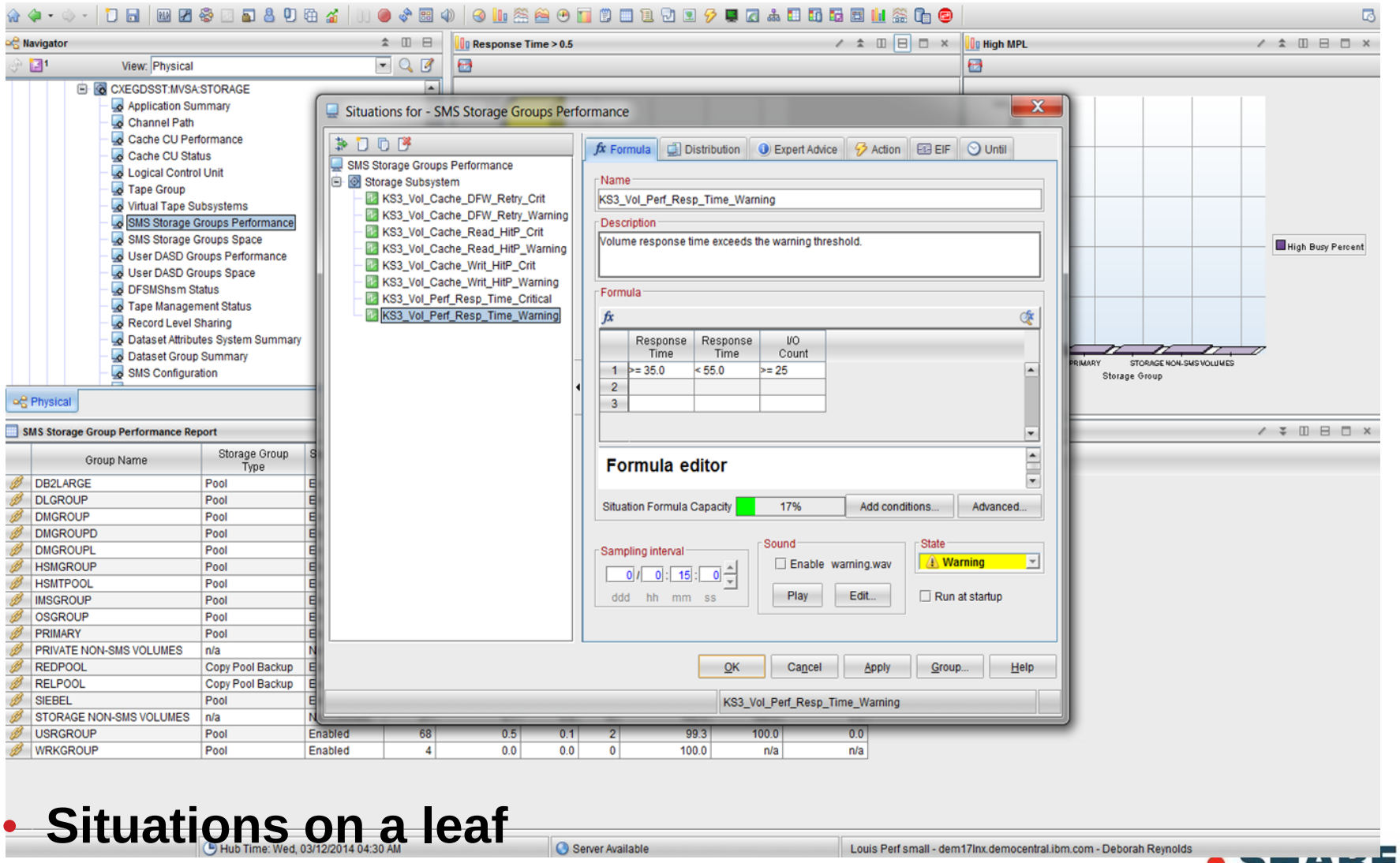
Situations



Group Name			Total Volumes	High Response Time	High Busy Percent	Device MPL	Low Read Hit Percent	Low Write Hit Percent	High DFW Retry Percent
DB2LARGE	Pool	Enabled	12	0.0	0.0	0	100.0	n/a	n/a
DLGROUP	Pool	Enabled	10	0.1	0.0	0	100.0	n/a	n/a
DMGROUP	Pool	Enabled	38	2.0	0.2	2	92.7	100.0	0.0
DMGROUPD	Pool	Enabled	1	0.1	0.0	0	100.0	100.0	0.0
DMGROUPL	Pool	Enabled	1	0.1	0.0	0	100.0	100.0	0.0
HSMGROUP	Pool	Enabled	1	0.0	0.0	0	100.0	100.0	0.0
HSMTPOOL	Pool	Enabled	3	0.5	0.0	0	100.0	n/a	n/a
IMSGROUP	Pool	Enabled	16	0.2	0.0	0	100.0	n/a	n/a
OSGROUP	Pool	Enabled	2	0.6	0.0	0	100.0	100.0	0.0
PRIMARY	Pool	Enabled	50	1.1	0.7	8	99.1	100.0	0.0
PRIVATE NON-SMS VOLUMES	n/a	Not Connect...	1719	1.0	0.7	8	13.5	99.9	0.0
REDPOOL	Copy Pool Backup	Enabled	2	0.0	0.0	0	100.0	n/a	n/a
RELPOOL	Copy Pool Backup	Enabled	2	0.0	0.0	0	100.0	n/a	n/a
SIEBEL	Pool	Enabled	10	0.0	0.0	0	100.0	n/a	n/a
STORAGE NON-SMS VOLUMES	n/a	Not Connect...	21	0.7	0.8	10	100.0	100.0	0.0
USRGROUP	Pool	Enabled	68	0.5	0.1	2	99.3	100.0	0.0
WRKGROUP	Pool	Enabled	4	0.0	0.0	0	100.0	n/a	n/a

- **Workspaces on a leaf**

Situations



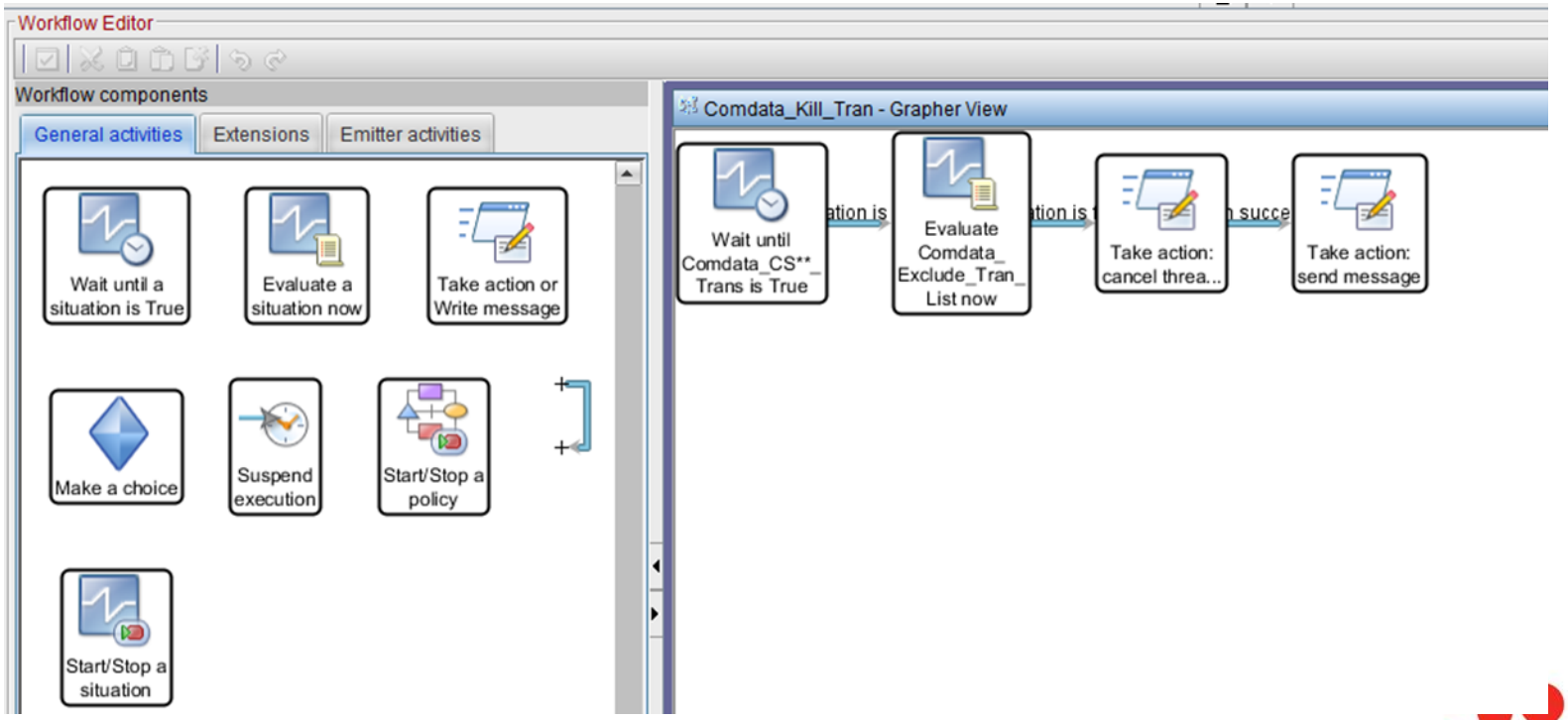
- **Situations on a leaf**

Situations

- ***Example 2:***
  - All situations with the same interval setting are scheduled together
  - Generally 4 or less situations are grouped together (have 2 conditions as most situations do)
  - More than 4 situations or complex situations will require more data collections
  - You can apply four warning situations for one interval and four critical situations for another higher interval to save on resources
  - You must restart the HUB TEMS in order to see the benefits of combining (or recombining) situations

Policies

- **Policies** allow you to combine Boolean logic with multiple situations and actions to be taken.
  - Very flexible and powerful



Agenda

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  - Packaging and Installation
  - Performance Enhancements
  - Dataset Attribute Group Data Extractor
  - Near Term History
- **Maximizing Performances**
  - Setting Thresholds
  - Reduce User Demand
  - Defining masks and Using wildcards
  - Understanding of Data Collection (ziip)
  - Historical Data Collection
  - Situations and Policies
- **Configuration Recommendations**
  - Data Collection Parameters

Data Collection Parameters

- DASD Space and Fragmentation Collection
- VTS Collection
- HSM Collecton
- Dataset Performance Collection
- Dataset Statistics Collection
- Collection Parameters Information

DASD Space and Fragmentation Collection

- Collect space data on one image in a shared DASD environment
- Use exclude list RKANPARU(KDFDEVSU) for system volumes (Page, JES and SYSRES)

VTS Collection

- Collect VTS data on one image only.
  - Data is hardware specific.
  - BVIR dataset collects the data and must reside on the VTS

HSM Collection

- Collect HSM messages where the HSM work is done

Dataset Performance Collection

- Dataset level I/O monitoring involves the TEMS address space which handles the data collected by the I/O exits. This collection of data needs to be tuned for the environment.

- Decide which volumes need to be monitored.

  Set appropriate thresholds for each volume

Dataset Performance Collection

- Collecting dataset level I/O can be done 2 ways:

  By a fixed interval or by exceptions during degraded performance.

  - Sample Count can be set from 1 - 99.

    If set to 1, every I/O is monitored

    If set to greater than 1, not every I/O is monitored reducing resources (e.g. 5 is every 5 I/Os is monitored)

  - Exception monitoring uses 2 values:
    - MSR exception value (response time threshold)
    - Global trip count (number of exceptions that must occur before logging of exception)

Dataset Statistics Collection

- Data Set Groups
  - Do not mask high level index
  - Do not collect data for same dataset or same space data multiple times

- Data Set Attributes Database ad hoc queries
  - Include volser in predicate
  - Include dataset name or mask
  - Include volser in situations

Collection Parameters Information

- Monitoring Sampling Intervals
- Historical data collection
- DASD Device Monitoring
- PARMGEN Fields

Monitor Sampling Intervals

- **Cache Statistics**
  - Controls the frequency of data collections for cached volumes and control units (0-999 secs)
  - Set to greater than zero on one LPAR per shared DASD environment.
    - *Note: with APAR OA43607 (PTF UA71330), this field can be set to 0 on OMEGAMON XE for Storage V5.2.*

- **Cache reset interval**
  - 0-999 minutes or RMF

Monitor Sampling Intervals

- **DASD response time**
  - Controls how often response time statistics for DASD volumes are collected (0-999 secs)
    - *Note: with APAR OA43607 (PTF UA71330), this field can be set to 0 on OMEGAMON XE for Storage V5.2*

- **DASD space and fragmentation**
  - Controls how often to retrieve space and fragmentation statistics for DASD volumes. (0-99 intervals or RMF)
  - If set to a value, collection value is calculated

    FREQ * RESPINTV

Monitor Sampling Intervals

- **Tape monitoring interval**
  - 0-999 secs or OFF

- **Application volumes and datasets**
  - Controls how often to rebuild the list of volumes and data sets of the applications that it monitors. (0-999 secs)

Monitor Sampling Intervals

- **Example:**
  - Monitor sampling intervals

Cache statistics:	300	(5 minutes)
Cache reset interval:	RMF	
DASD response time:	60	(1 minute)
DASD space/fragmentation	RMF	
Tape monitoring interval:	900	(15 minutes}
Application vols/datasets:	300	(5 minutes)

Historical Data Collection

- **Dataset collection enabled and DASD collection enabled?**
  - Writes information about the DASD and data sets that it monitors to IBM Tivoli Enterprise Monitoring Server's persistent data store (PDS)
  - Y/N - set to N to disable

- **Application collection enabled?**
  - Y/N - set to N to disable

DASD Device Monitoring

- MSR exception trip count
  - Number of MSR exceptions on a device for every 100 I/O events. Applies to MSR monitored devices (1-99)
- For groups of volumes or selected volumes
  - Specify VOLSER, VOLSER pattern or device address or device address range
- Monitor Status
  - Set method of monitoring (ON or MSR)
- Sample Cnt/MSR
  - Sample count or MSR threshold

DASD Device Monitoring

- ***Example for Method 2:***
  - DASD collection optons:

    Enable SMS storage class name collection? Y

    MSR exception trip count: 51

  - For Volsers/Patterns

    Monitor Status: MSR

    Sample Cnt/MSR: 25 (response time MS)

These settings will monitor every I/O but until an I/O MSR exceeds 25ms over 51 samples (100 consecutive I/Os) in this sampling interval, the I/O is not recorded as a problem.

DASD Device Monitoring

- DASD devices can be excluded from space and fragmentation monitoring on the

  EXCLUDE DASD DEVICE FROM MONITORING panel.
  - *Exclude as many volumes as possible*
    - *Page packs, spool, SYSRES, etc.*

Parmgen Fields - DASD Device Monitoring

```
** DASD Device Monitoring:
** Entries for RKANPARU(KDFDSCIN) member:
*KDF_FM                    BEGIN          * Table begin *
*KDF_FM01_ROW               01
*KDF_FM01_VOL               ""
*KDF_FM01_FIRST_DEV         ""
*KDF_FM01_LAST_DEV          ""
*KDF_FM01_MON_STAT          MSR
*KDF_FM01_SAM_CNT           25
*KDF_FM                   END            * Table end *
KDF_STG_CLAS_COLL            Y
KDF_MSR_TRIP_CNT            51
```

Note: Uncomment to activate table

Parmgen Fields - DASD Device Monitoring

```
** DASD Device Monitoring Exclude List:
** Entries for RKANPARU(KDFDEVSU) member:
*KDF_FX                    BEGIN          * Table begin *
*KDF_FX01_ROW               01
*KDF_FX01_VOL               ""
*KDF_FX01_FIRST_DEV         ""
*KDF_FX01_LAST_DEV          ""
*KDF_FX                    END            * Table end *
```

Note: Uncomment to activate table

Parmgen Fields - Data Collection Options

*** Data Collection Options:*

KDF_MON_CACHE_STATS_INTV	*0*
KDF_MON_CACHE_RESET_INTV	*RMF*
KDF_MON_DASD_RESP_INTV	*60*
KDF_MON_SPACE_FRAG_INTV	*4*
KDF_MON_TAPE_INTV	*900*
KDF_MON_APPL_VOLS	*300*
KDF_SMF_NUM	*0*
KDF_SMF_INTV	*OFF*
KDF_SMF_IO_CNT_THRSH	*25*
KDF_HIS_DASD	*Y*
KDF_HIS_DSN	*Y*
KDF_HIS_APP	*Y*

Thank You!