Omegamon XE for Storage –
Hints and Tips to Improve
Performance and Usage

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Agenda

• Maximizing Performance
  • Monitoring Activities
  • Demand on System Resources
  • Understanding of Data Collection

• Product Usage Guidelines
  • Defining masks and Using wildcards
  • Data Collection Usage

• Best Practices
  • Situations and Policies
  • Storage Toolkit
  • Data Collection Parameters
Maximizing Performance

- Reduce the impact of monitoring activities
  - Review collection intervals and data filtered
  - Use masking to reduce the data collected
  - Adjust collection intervals

- Demand on system resources
  - Improve the Performance of ITM by reducing the demand on system resources

- Make collection of historical data more efficient
  - Understand short vs/long term historical data collection
  - Review the types of data to collect as well as the interval settings
Maximizing Performance – Monitoring Activities

• Use masks to reduce the amount of resources required to retrieve data (exclude non-critical devices)

• Specify appropriate collection intervals to collect sufficient information. It is a balance between using resources and getting the information on resources.
Maximizing Performance –
Demand on System Resources

• Reduce steady-state demand
  • reviewing and limiting processes that use resources
  • Demand on System Resources
  • Historical Data Collection

• Reduce user demand
Maximizing Performance – Reduce Steady-state Demand

- **Reviewing and limiting processes** that use resources all of the time such as background collectors, historical collection, auto-started situations and policies.
  
  - 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 method that uses less system resources. Not all methods use the same resources.
    - Omegamon XE uses Boolean logic which provides for more complex situations.
Maximizing Performance – Reduce Steady-state Demand

• Reviewing and limiting processes…
  • Disable data collection for noncritical resources
  • Configure data collection intervals
    • Understand how intervals control data collection.

• Situation monitoring
  • Omegamon XE for Storage comes with many pre-built situations. Only turn on/activate the ones that are necessary.
Maximizing Performance – Reduce Steady-state Demand

• **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.
Maximizing Performance – Reduce Steady-state Demand

**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
Maximizing Performance – Reduce 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
Maximizing Performance – Reduce 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.
Maximizing Performance – Understanding 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
Maximizing Performance –
Understanding Historical Data Collection

• Sample Historical Collection Intervals
  • Realtime - 5 minutes
  • Short term - 15 minutes
  • Long term - 1 hour
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Product Usage Guidelines

• **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
Product Usage Guidelines

• **Historical Data**
  • For data set groups, collect only data that you need
  • Use an appropriate data collection rate
    (5, 15, 30, 60, or 1440 minutes)

• **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
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Best Practices – 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**
  - Only run critical situations from those provided
  - Distribute certain situations to only one z/OS image in a shared environment
    - Those with space attributes, cache status or performance attributes, hardware related
Best Practices – 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
Best Practices – Policies

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

• The Storage Toolkit is a feature rich function available only in Omegamon XE for Storage

• Interfaces with DFDSS and HSM to issue commands

• With V420 IF4, Situation definitions have a Storage Toolkit Take Action facility.
  • This allows for Volume actions, Dataset actions, Commands, and Batch jobs when a Situation becomes true
Best Practices – Data Collection Parameters

- DASD Space and Fragmentation Collection
- VTS Collection
- Dataset Performance Collection
- Dataset Statistics Collection
- Collection Parameters Information
Best Practices –
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)
Best Practices – VTS Collection

• Collect VTS data on one image only
Best Practices – 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.
Best Practices – 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)
Best Practices – 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
Best Practices –
Collection Parameters Information

• Monitoring Sampling Intervals

• Historical data collection

• DASD Device Monitoring

• PARMGEN Fields
Best Practices – Monitor Sampling Intervals

- **Cache Statistics**
  - Controls the frequency of data collections for cached volumes and control units (1-999 secs)
  - Set to greater than zero on one LPAR per shared DASD environment. Zero does not disable the collection as documented in the manuals. Set the other LPARs to 999.

- **Cache reset interval**
  - 0-999 minutes or RMF
Best Practices – Monitor Sampling Intervals

• **DASD response time**
  • Controls how often response time statistics for DASD volumes are collected (0-999 secs)

• **DASD space and fragmentation**
  • Controls how often to retrieve space and fragmentation statistics for DASD volumes. (0-99 intervals or RMF)
Best Practices – 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)
Best Practices –
Monitor Sampling Intervals

• **Example:**
  • Monitor sampling intervals:
    - Cache statistics: 300 (5 minutes)
    - Cache reset interval: RMF
    - DASD response time: 900 (15 minutes)
    - DASD space/fragmentation: 2 (30 minutes)
    - Tape monitoring interval: 900 (15 minutes)
    - Application vols/datasets: 300 (5 minutes)
Best Practices – 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
Best Practices – DASD Device Monitoring

• You can specify one of three monitoring methods for each volume

• Method 1
  • Track every I/O transaction to every data set on a volume and maintain statistics for each I/O transaction.
  • Tracking and maintaining statistics for every I/O transaction to a volume causes more resource consumption.
  • Using response time information to selectively turn on data set tracking for the volume is relatively inexpensive.
  • Tracking any data set activity to the volume uses resources.
Best Practices – DASD Device Monitoring

• **Method 2**
  - Track every $n$th I/O transaction to a volume based on a specified sample count and maintain statistics only for each sample observed.
  - This method provides a reasonable overview, while reducing the demand on system resources that is required to monitor every I/O transaction.
Best Practices –
DASD Device Monitoring

• Method 3
  • Based upon a specified MSR (millisecond response time) threshold, only track I/O transactions to the volume that exceed the threshold.
  • This method is a cost-effective way to track data set statistics when the volume is not meeting your response time objectives.
  • It ensures that critical statistics are maintained during periods of response time degradation without using system resources when response times are satisfactory.
Best Practices – 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
Best Practices – DASD Device Monitoring

- DASD devices can be excluded on the EXCLUDE DASD DEVICE FROM MONITORING panel.
  - Exclude as many volumes as possible.
Best Practices – DASD Device Monitoring

**Example:**

- DASD collection options:
  - Enable SMS storage class name collection?  
    - Y
  - MSR exception trip count:  
    - 51

- For Volsers/Pat terns
  - 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 51 times in this sampling interval, the I/O is not recorded as a problem.
** Parmgen Fields **

DASD Device Monitoring

** DASD Device Monitoring: **

** Entries for RKANPARU(KDFDSCIN) member: **

<table>
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<th>Field</th>
<th>Value</th>
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<tr>
<td>KDF_FM END</td>
<td></td>
</tr>
</tbody>
</table>

KDF_STG_CLAS_COLL          Y
KDF_MSR_TRIP_CNT           51
Parmgen Fields
DASD Device Monitoring

** DASD Device Monitoring Exclude List:  
** Entries for RKANPARU(KDFDEVSU) member:

*KDF_FX 
BEGIN  
*KDF_FX01_ROW  
01  
*KDF_FX01_VOL  
""  
*KDF_FX01_FIRST_DEV  
""  
*KDF_FX01_LAST_DEV  
""  
*KDF_FX 
END  

* Table begin *

* Table end *
**Data Collection Options:**

- **KDF_MON_CACHE_STATS_INTV**: 900
- **KDF_MON_CACHE_RESET_INTV**: RMF
- **KDF_MON_DASD_RESP_INTV**: 900
- **KDF_MON_SPACE_FRAG_INTV**: 4
- **KDF_MON_TAPE_INTV**: 900
- **KDF.MON_APBLL_VOLS**: 300
- **KDF_SMF_NUM**: 0
- **KDF_SMF_INTV**: OFF
- **KDF_SMF_IO_CNT_THRSH**: 25
- **KDF_HIS_DASD**: N
- **KDF_HIS_DSN**: N
- **KDF_HIS_APP**: N
References

- IBM Tivoli OMEGAMON XE for Storage on z/OS, Version 5.1.0, *Tuning Guide*- SC27-4380

- IBM Tivoli Monitoring OMEGAMON XE Performance Guidelines, Mike Goodman, Dec 2010