Advanced Technical Support

z/OS 1.7 RMF Enhancements

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New RMF Functions

- **zFS support**
- **RMF Disk Space Monitoring**
- **CPU activity enhancements**
- **New Common Storage Enhancements**
- **Support for Common Information Module (CIM)**
  - Use CIM to access z/OS RMF online performance metrics
  - Related to new z/OS CIM base element
  - Based on z/OS RMF Distributed Data Server with DDS extensions

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zFS Enhancements

- RMF Monitor III support for the new z/OS UNIX file system - zFS
  - RMF by default will gather zFS activity.
  - Suppress gathering by specifying Mon III option NOZFS
- New Monitor III zFS reports provides data on:
  - zFS response time / wait times
  - zFS cache activity
  - zFS activity / capacity by aggregate
  - zFS activity / capacity by filesystem
- Data helps to control the zFS environment according to:
  - Cache sizes
  - I/O balancing
  - Capacity control for zFS aggregates

Disk Space Monitoring

- **New Monitor III report provides data on**
  - Storage space (storage group based)
  - Disk space (volume based)
- **Data helps to control the z/OS environment according to**
  - disk space capacity
  - disk space availability (with regard to free disk space)

CPU Activity Reports Overview

- SYSTEM ADDRESS SPACE ANALYSIS section is redesigned to reflect higher number of CPs available
- The upper boundaries of 14 and 35 for the queue length distribution are no longer up-to-date.
  - Upper boundary of 14 for the InReady queue was meaningful when MVS images used to have 3 to 5 CPs
  - With WLM CPU management number of online CPs can change during an interval
  - Difficult to determine whether and how many address spaces were actually waiting for a processor
- The upper boundary of 35 for queue types In, OutReady, OutWait, LogicalOutReady and LogicalOutWait as well as the address space types is no longer meaningful
  - Many queues always show 100% in the 35+ class
  - Actual distribution is not available

New Queue Distributions Overview

- **The InReady queue distribution is oriented towards the maximum number of online CPs**
  - This approach considers the fact that the number of online CPs may vary from Mon I sample to sample
  - The base of each distribution bucket is always the current number of standard CPs online at the point in time the sample is taken
    - Number of address spaces in the InReady queue is not distributed into fixed buckets
    - 1st bucket (B1) reflects the percentage of samples all jobs could be dispatched
    - 2nd bucket (B2) reflects the percentage of samples one job could not be dispatched
    - Last bucket (B13) reflects the percentage of samples more than 80 jobs could not be dispatched
  - The distribution of all other queue types and address space types is removed from the report
    - The minimum, maximum and average number of address spaces provides sufficient information.

New InReady queue distribution

Distribution buckets	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13
Number of Address Spaces	<= N	N+1	N+2	N+3	<= N+5	<= N+10	<= N+15	<= N+20	<= N+30	<= N+40	<= N+60	<= N+80	> N+80

N = Number of CPs online when sample is taken

Example of InReady Distribution

Sample	Time when sample taken	Address spaces on InReady queue	Number of CPs currently online	Bucket being incremented
1	08:10:00	9	10	B1 (<= N)
2	08:10:01	10	9	B2 (N+1)
3	08:10:02	15	8	B6 (<= N+10)
4	08:10:03	25	8	B8 (<= N+20)
5	08:10:04	18	8	B6 (<= N+10)
6	08:10:05	20	10	B6 (<= N+10)
7	08:10:06	15	10	B5 (<= N+5)
8	08:10:07	17	10	B6 (<= N+10)
9	08:10:08	10	9	B2 (= N+2)
10	08:10:09	8	9	B1 (<= N)

Usage & Invocation

```
                              C P U   A C T I V I T Y   R E P O R T

SYSTEM ADDRESS SPACE ANALYSIS                 SAMPLES =  3,600

NUMBER OF ADDRESS SPACES

          ------------------ QUEUE TYPES --------------------      --------- ADDRESS SPACE TYPES ---------
          IN                 OUT       OUT     LOGICAL   LOGICAL      BATCH      STC     TSO     ASCH      OMVS
          READY       IN     READY     WAIT    OUT RDY   OUT WAIT

 MIN          1       54         0        0          0         83          5      119      10        0         3
 MAX         10       85         1        0          0        118         19      154      12        0        23
 AVG        2.4     56.4       0.0      0.0        0.0      105.4        6.1    141.7    10.5      0.0       3.5


DISTRIBUTION OF IN-READY QUEUE

 NUMBER OF              0    10   20   30   40   50   60   70   80   90   100
 ADDR SPACES    (%)     |....|....|....|....|....|....|....|....|....|....|

 <=  N          82.1    >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
  =  N +  1     12.9    >>>>>>>>
  =  N +  2      3.6    >>>
  =  N +  3      1.1    >
 <=  N +  5      0.0
 <=  N + 10      0.0
 <=  N + 15      0.0
 <=  N + 20      0.0
 <=  N + 30      0.0
 <=  N + 40      0.0
 <=  N + 60      0.0
 <=  N + 80      0.0
 >   N + 80      0.0

 N = NUMBER OF PROCESSORS ONLINE    (  3.0 ON AVG )
```

NEW

Customer Req: MASTER Address Space Gathering

- Requirement: Monitor MASTER address space CSA utilization and LSQA storage. (Outages due to high private storage use in Master which lead to wait state 07E)
- RMF solution: Monitor III collects MASTER address space usage counts for:
  - Average number of user region pages below/above 16M
  - LSQA/SWA/229/230 pages below/above 16M
- Not reported in Mon III, only via RMF PM

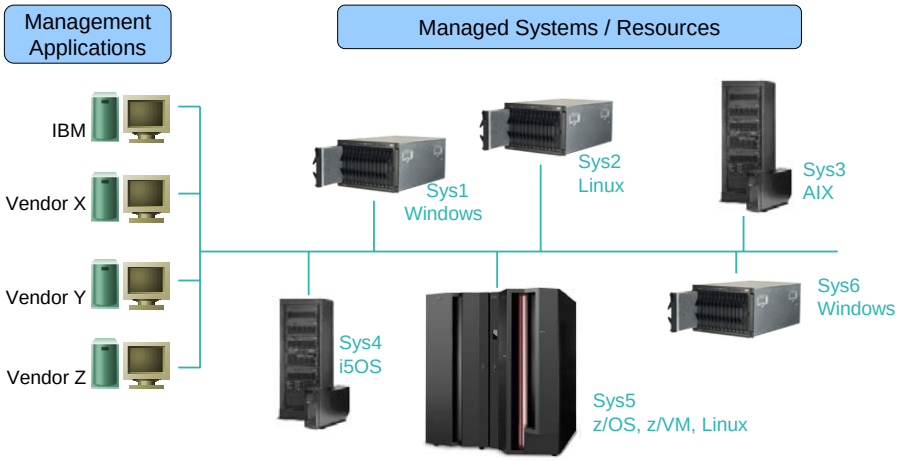
Customer Req: Unallocated Common Area

- Requirement: In the Monitor III Common Storage Report the SQA and CSA pages available at end of range are displayed. The available storage for SQA (+CSA) contains free space on pages that are not completely free.
- RMF solution: Monitor III displays the unallocated common area left value (CSA+SQA) at end of range
  - Note: ECSA and ESQA are NOT included in this count.
- Reported in STORC Mon III report

RMF Support of CIM

- **Provide a remote instrumentation interface for performance data with the following properties:**
  - Based on ***open standards*** – and not only "standards" like *XML* (or *EBCDIC* with *TCP/IP*, …), but conceptual data model standardized, so interoperable systems management applications can be developed
  - ***Common model across eServer*** platforms, so you can get the same metric on i5/OS, z/OS, Linux (on zSeries) and potentially other platforms
  - Exploit CIM server infrastructure (new z/OS base component), based on OpenPegasus project
  - ***RMF*** uses some expensive interface to gather performance data (e.g. for CF data or for volumes). Therefore, it is best practise to ***just use this data instead of gathering it again***, with high effort.

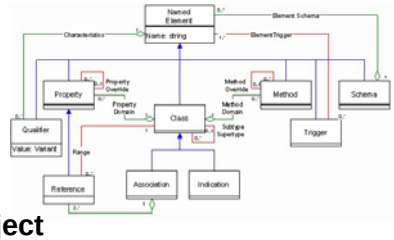
Problem to be solved



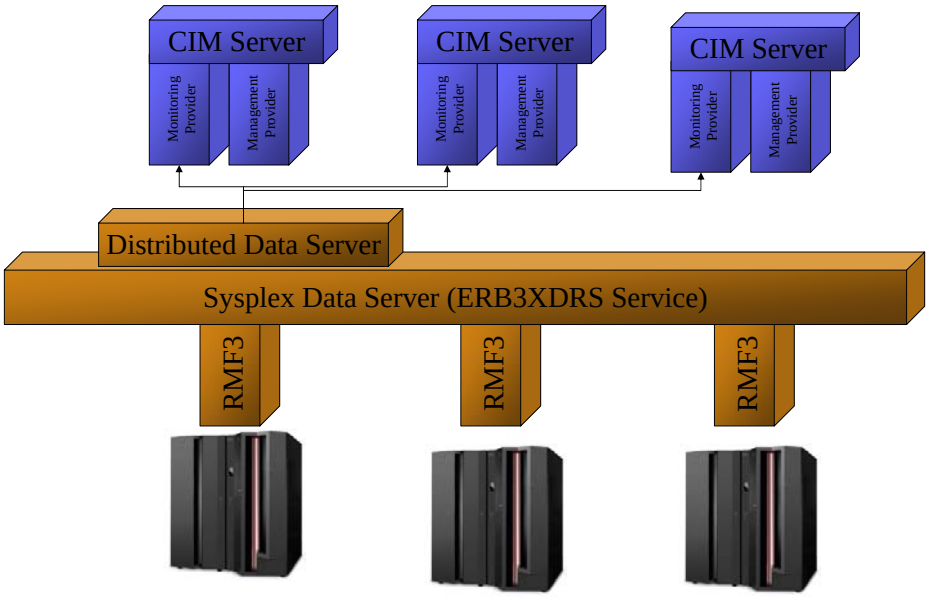
CIM / WBEM and the DMTF

- DMTF = "Distributed Management Task Force" - www.dmtf.org
- **The mission of the DMTF is to lead the development of management standards for distributed desktop, network, enterprise and internet environments. One of the goals of the DMTF is to "Promote interoperability among management solution providers"**
- CIM (Common Information Model)
  - Set of DMTF standards that define a conceptual model representing IT resources
  - In a platform-independent and technology-neutral way
- WBEM (Web Based Enterprise Management)
  - Set of DMTF standards that define protocols and interfaces for CIM
  - In a platform-independent way
  - Uses standard technology such as XML, HTTP and Web services
- CIM and WBEM together enable end-to-end multi-vendor interoperability
  - Streamlining integration of heterogeneous environments
  - Reducing cost for both providers and end users of mgmt solutions

CIM Specification



- **CIM consists of**
  - Meta Model
  - Core Schema
  - Various Schemas for specific disciplines
- **The Meta Model describes the object oriented modeling and composition features:**
  - Supports Schema, Classes, Associations,Instances, Properties, Methods,Qualifiers (Meta-Attributes)
  - Provides features like Inheritance, method override or associations
- **The Core Schema contains the essential base classes for Systems Management:**
  - ManagedElement, System, LogicalDevice, Product, Configuration, Setting,…
- **Schemas for specific disciplines, for example:**
  - Application, Device, Event, System, Network, …



Differences between CIM model and current RMF model

- **CIM uses language similar to language used in Open Systems. That means, you talk about *memory* instead of *processor storage*, with the term *storage* only used for *disk storage.***
- **RMF Monitor 3 has sysplex view of the systems, CIM has image/box view; sysplex clustering concept not yet available in CIM**
- **CIM data model: common model applicable to all kinds of server including** *Solaris, Windows, HP-UX, z/VM, z/OS, Linux, AIX, i5/OS, OpenVMS,* **etc.**
- **RMF data model: some z/OS Sysplex related resource classes like "MVS Image" with lots of associated metrics and some static attributes**

DDS Extensions

- **RMF CIM provider based on existing RMF DDS service, which is based on Sysplex Data Server and RMF Gatherer**
- **Only RMF data available in DDS is easily available to the CIM Monitoring providers**
  - Some of the metrics identified by the common eServer monitoring team were not implemented in Monitor III before, like page-in rates, average in-ready queue length, etc., so some additional metrics have been added to the DDS
- **RMF CIM provider does not externalize all DDS metrics but only a defined subset of those >600 metrics.**
  - Currently all WLM related metrics are missing

