

# **z/OS Workload Management Update for z/OS V1.13 and V1.12**

Horst Sinram ([sinram@de.ibm.com](mailto:sinram@de.ibm.com))  
IBM Corporation

Monday, August 8, 2011  
Session 10009



# Trademarks

**The following are trademarks of the International Business Machines Corporation in the United States, other countries, or both.**

Not all common law marks used by IBM are listed on this page. Failure of a mark to appear does not mean that IBM does not use the mark nor does it mean that the product is not actively marketed or is not significant within its relevant market.

Those trademarks followed by ® are registered trademarks of IBM in the United States; all others are trademarks or common law marks of IBM in the United States.

For a complete list of IBM Trademarks, see [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml):

\* AS/400®, e business(logo)®, DBE, ESCO, eServer, FICON, IBM®, IBM (logo)®, iSeries®, MVS, OS/390®, pSeries®, RS/6000®, S/30, VM/ESA®, VSE/ESA, WebSphere®, xSeries®, z/OS®, zSeries®, z/VM®, System i, System i5, System p, System p5, System x, System z, System z9®, BladeCenter®

**The following are trademarks or registered trademarks of other companies.**

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries. Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.

IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency, which is now part of the Office of Government Commerce.

\* All other products may be trademarks or registered trademarks of their respective companies.

## Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed.

Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.

All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.

This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.

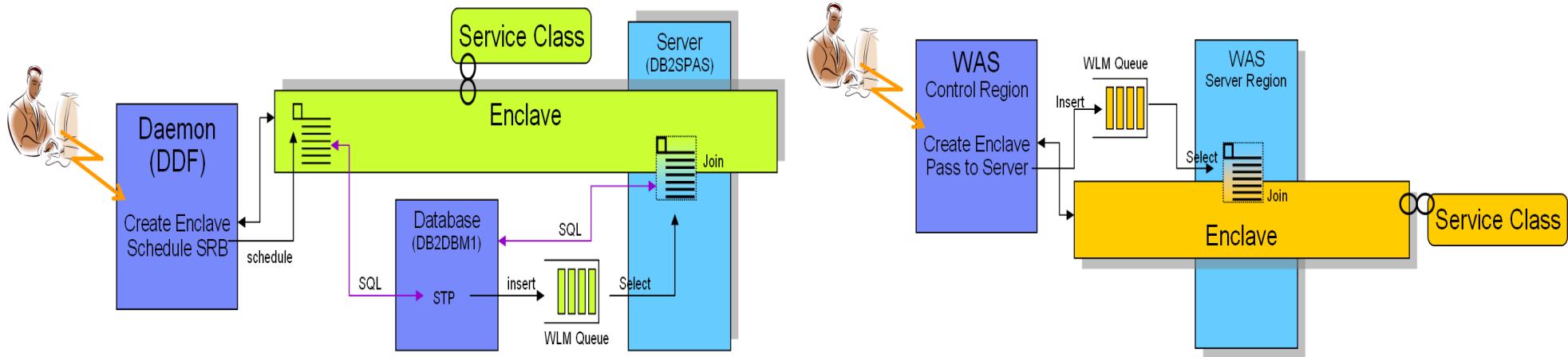


# Agenda



- Transaction Management Enhancements
  - Non Shell Enclave Server Management
  - CICS Region / Response Time Management
  - Response Time Distribution for Execution Velocity Goals
- Hiperdispatch APARs
- WLM Support for I/O Priority Manager in DS8K Series
- WLM Support for IBM zEnterprise 196
- Temporary Capacity Reporting via SYSEVENT REQLPDAT
- z/OSMF Workload Management
- WLM support for Unified Resource Manager
- Capacity Provisioning Update Summary
- WLM Tools Overview

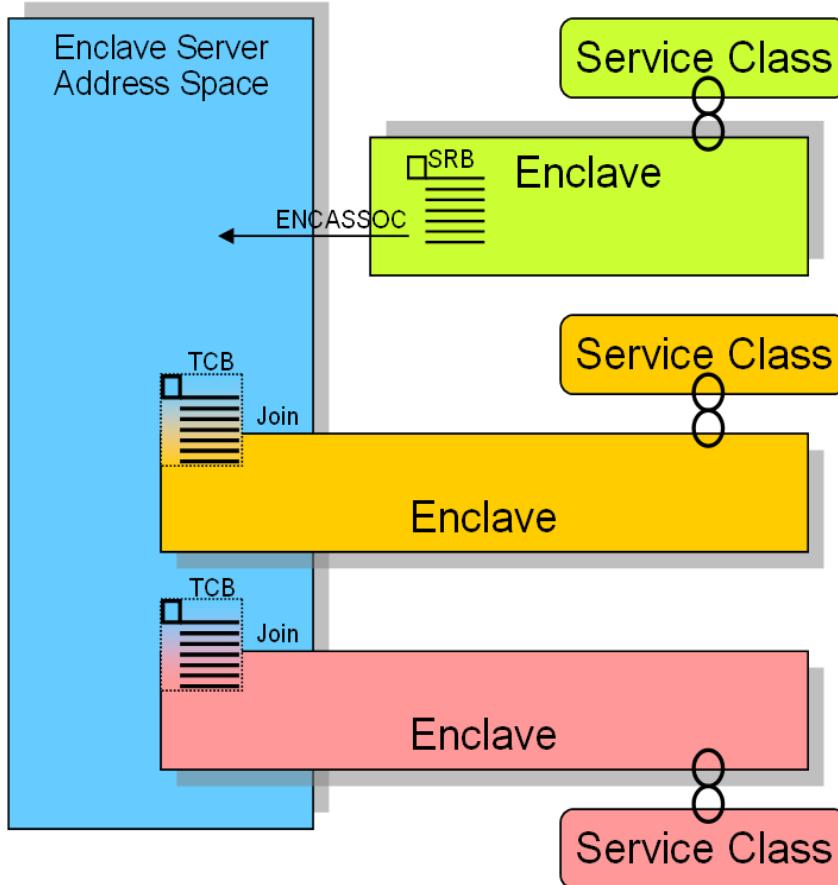
# WLM Enclaves – An Overview



- An **enclave** is a transaction that can span multiple dispatchable units (SRBs and tasks) in one or several address spaces and is reported on and managed as one unit
- The enclave is managed separately from the address spaces it runs in
  - CPU and I/O resources associated with processing the transaction represented by the enclave are managed by the transaction's performance goal
  - Storage (MPL level, paging) of the address space is managed to meet the goals of the enclaves it serves (if enclave server address space) or to the performance goal of the address space (if no server address space)

# WLM Enclave Server Address Spaces

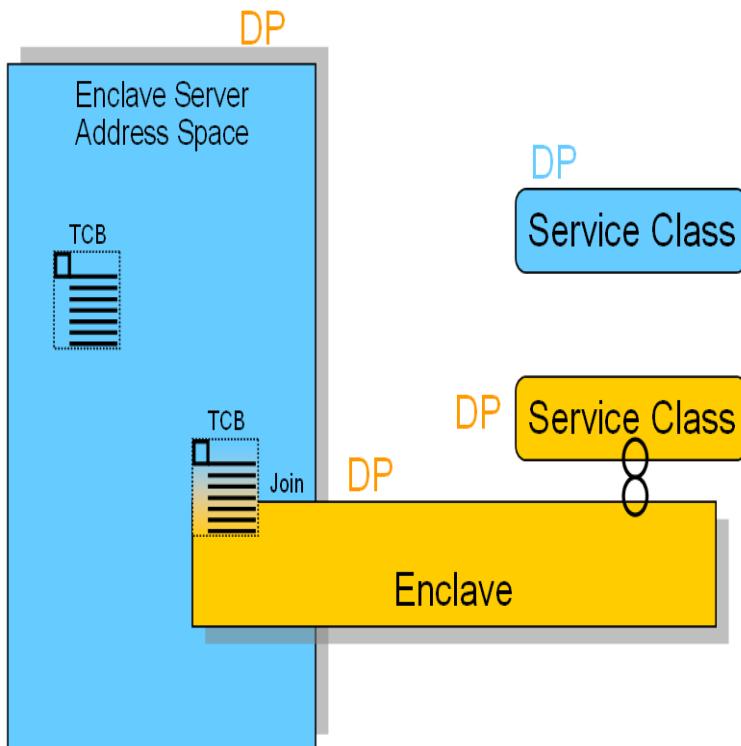
## A Short Retrospective



- An address space becomes an enclave server when
  - An enclave SRB issues SYSEVENT ENCASSOC
  - A TCB of the address space joins an enclave, and does not specify ENCLAVESERVER=NO (which is typically not the case)
- Assumption (Programming Model)
  - All work being executed within the address space is related to enclaves
  - That means
    - There is no significant amount of work (TCBs) executing in such address spaces which is not related to enclaves
- Enclave Server Management
  - CPU and I/O DP is derived from service class of most important enclave
    - Meaning: No CPU and I/O management exists for these server address spaces
  - Storage management is done to meet the served enclave's goals

# WLM Enclave Server Management

## Is There a Possible Problem?

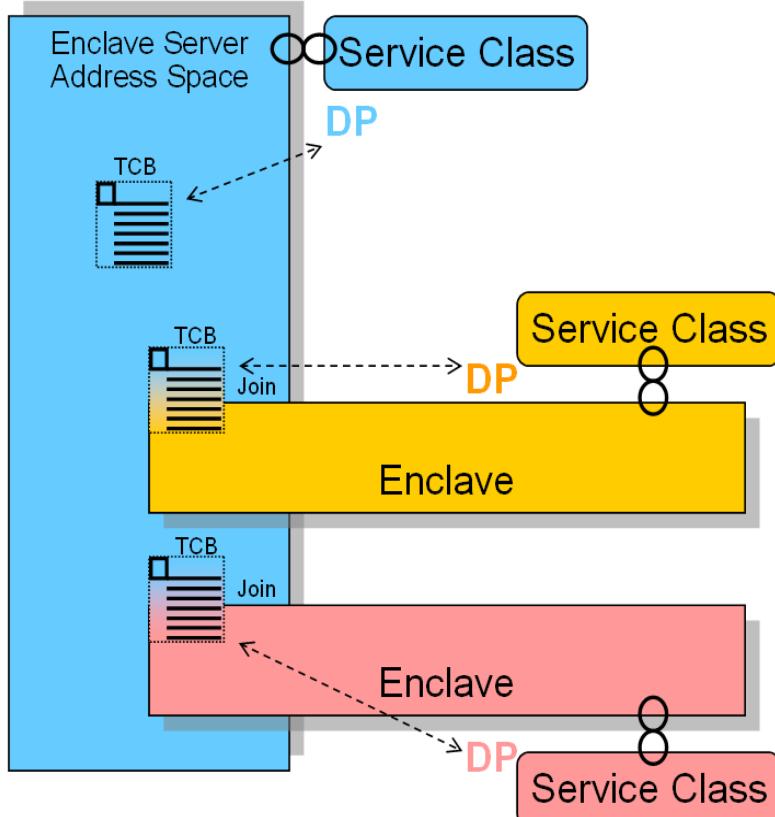


- What if the programming model does not hold true?
  - What happens if there is significant work running in TCBs not associated with enclaves?
    - Example: Garbage collection for a JVM (WAS)
    - Example: Common routines which provide service for the enclave TCBs
  - Is it sufficient to manage this work in the same way as the enclaves?
- What happens if no enclaves are running in server address spaces ?? (this applies to queue servers only)
  - And the address space is swapped out?
    - A mechanism exists to swap in the address space but this mechanism assumes that the swap in is only for a queue server task which wants to select a unit of work and then joins the enclave. If no enclave is joined, the address space is again swapped out
  - And even if the address space stays swapped in?
    - The TCBs running within the address space just stay with the DP and IOP from the last enclave being associated with the address space
    - No CPU or I/O adjustment is performed

# WLM Enclave Server Management

## Changes with z/OS 1.12

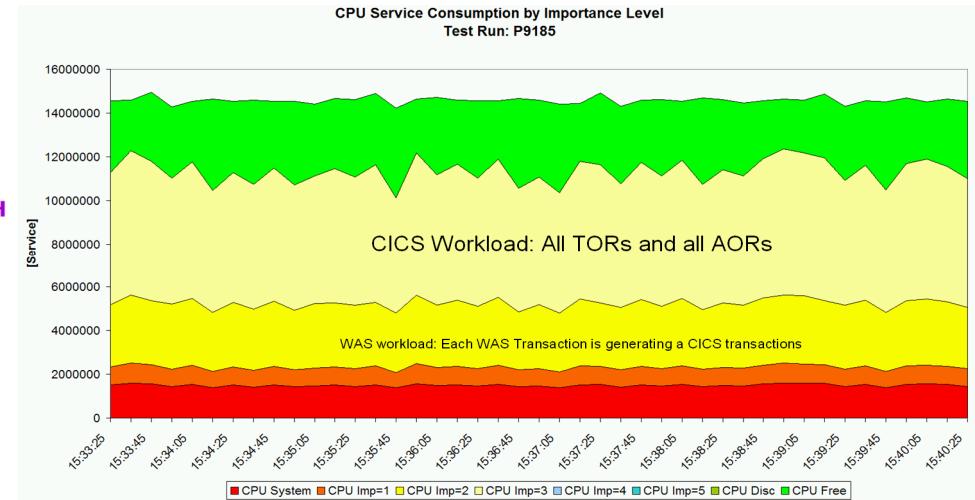
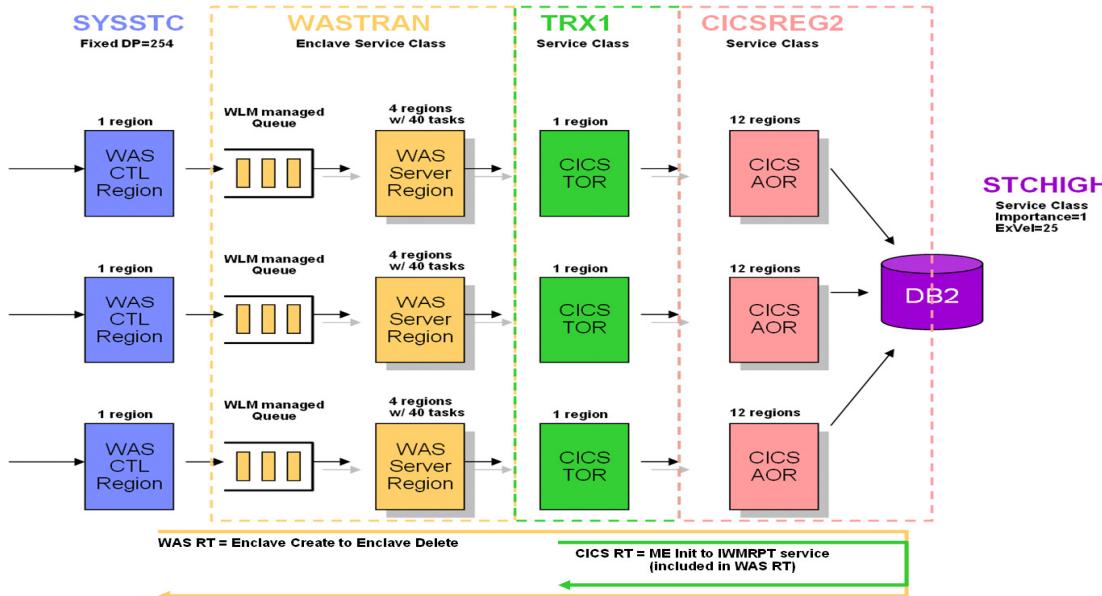
- New IEAOPT Parameter
  - **ManageNonEnclaveWork = {No|Yes}**



- Yes: Work in the address space, that is not associated to an enclave, is managed towards the goals of the external Service Class to which the address space has been classified to
- No: Non enclave work is managed based on the most important enclave
- Enclave (Queue) server address spaces in which no enclave is running will be managed as regular address spaces
- Note: With ManageNonEnclaveWork =Yes the importance and goal of the service class for the address space is more important than it used to be
  - Verify goal settings for server address spaces

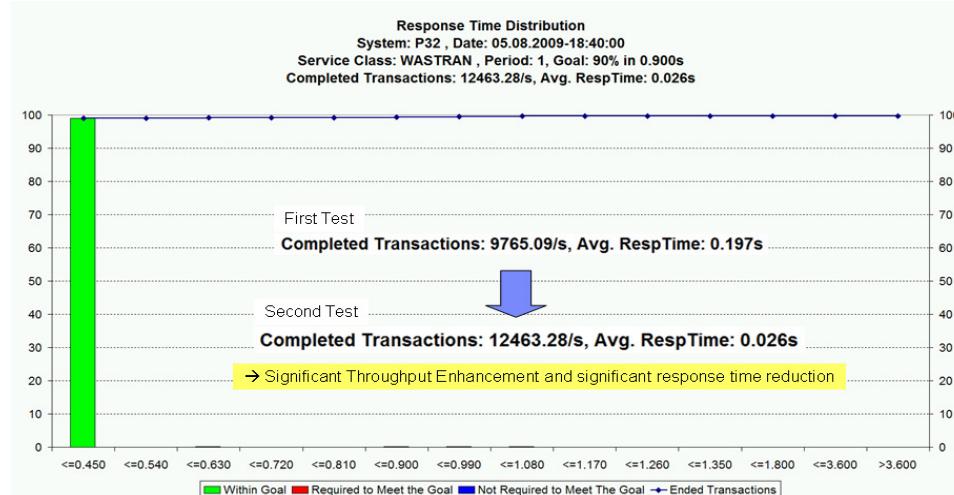
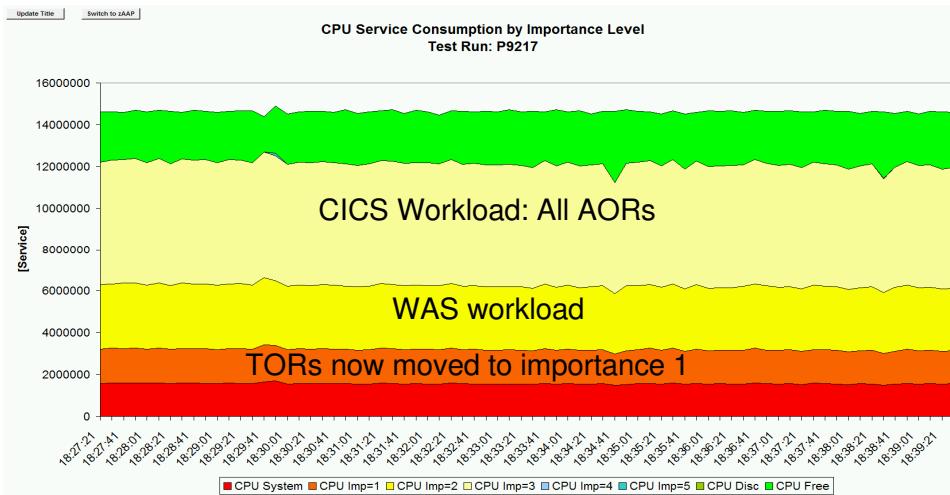
# OA35428: Runtime Environment and Problem Symptoms

## CICS Transaction Environment (No other workload is present)



- Scenario
  - System: 2097-764, 1 LPAR only → 8 nodes with 4 High processors each
  - Workload: Websphere → CICS → DB2
    - Websphere receives work, sends it to CICS TORs which send it to AORs which execute DB2 calls
    - Classification: Websphere Imp=2 and all CICS Imp=3, managed towards response time goals
- Problem:  
**Low system throughput; relatively high response times. System utilization did not exceed 80%**
- Notes:
  - In this scenario, the presence of Websphere is not important because Websphere feeds only CICS
  - It is important that no work (such as batch) exists that could be displaced when the system gets saturated
  - Therefore the same scenario exists for environments which only run a CICS workload

# OA35428: Problem Analysis and Circumvention



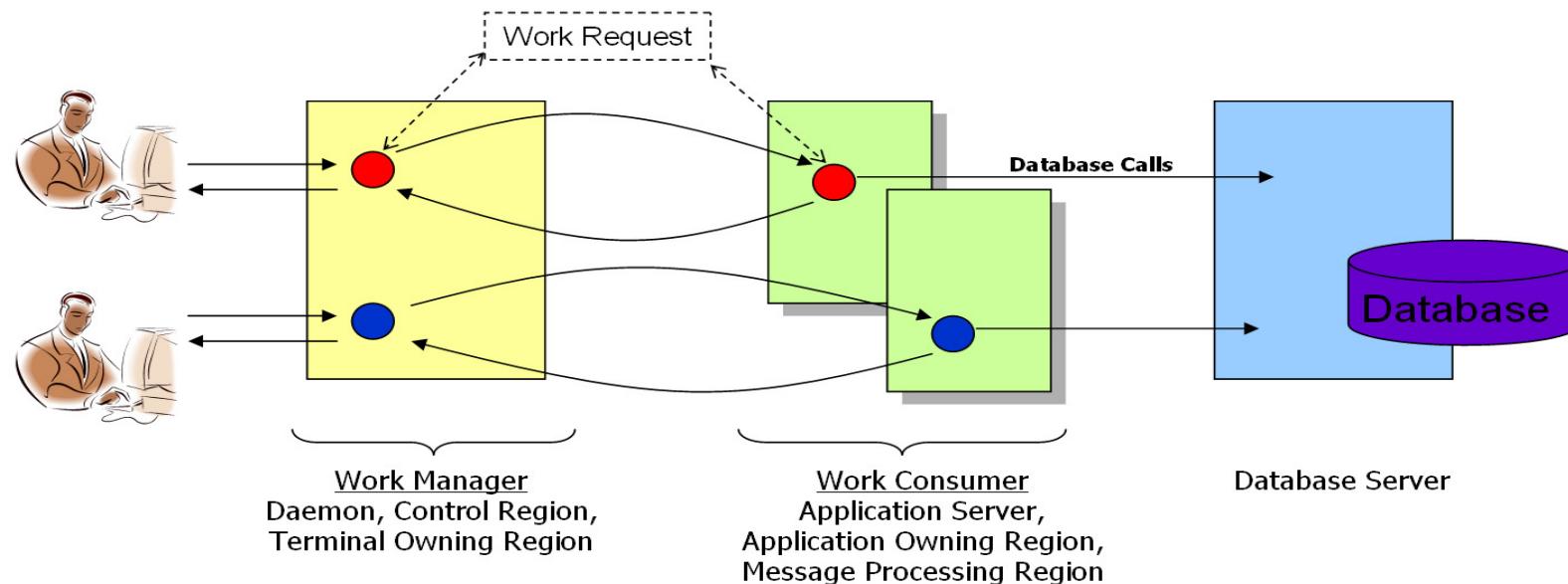
- Problem Analysis

- TORs and AORs run at the same dispatch priority
- TORs need to wait too long to receive work and return results to the caller
- AORs consume too much CPU
- Hiperdispatch can amplify the situation because it runs the work at higher utilization on nodes with typically 4 processors

- Circumvention:

- Move TORs to a service class with higher importance than AORs
- How can this be done?
  - Possibility 1: Exempt all regions from being managed by response time goals and classify TORs to a service class with higher importance than AORs
  - Possibility 2: Exempt only AORs and move them to a service class with lower importance than the CICS service classes with response time goals
- **Disadvantage**: No response time data present or only covers a small portion of the execution path because AORs consume much more than TORs.

# OA35428: Solution



- Adjust WLM management to a “Work Manager/Consumer” model
  - A TOR is a region which consumes typically little CPU and just functions as a work receiver and result sender.
    - This is the work manager
    - It needs fast access to CPU
  - An AOR is a server region which typically is much more resource intensive.
    - An AOR doesn't require the same instantaneous access to CPU than TORs
    - This is the work consumer
- WLM already has experience with such models
  - Websphere Application Server and DB2/DDF work
    - The control regions are managed towards execution velocity goals
    - The work is managed towards response time goals (via enclaves and the servers processing the enclaves are tight to their goals)
- Use the same model also for CICS work

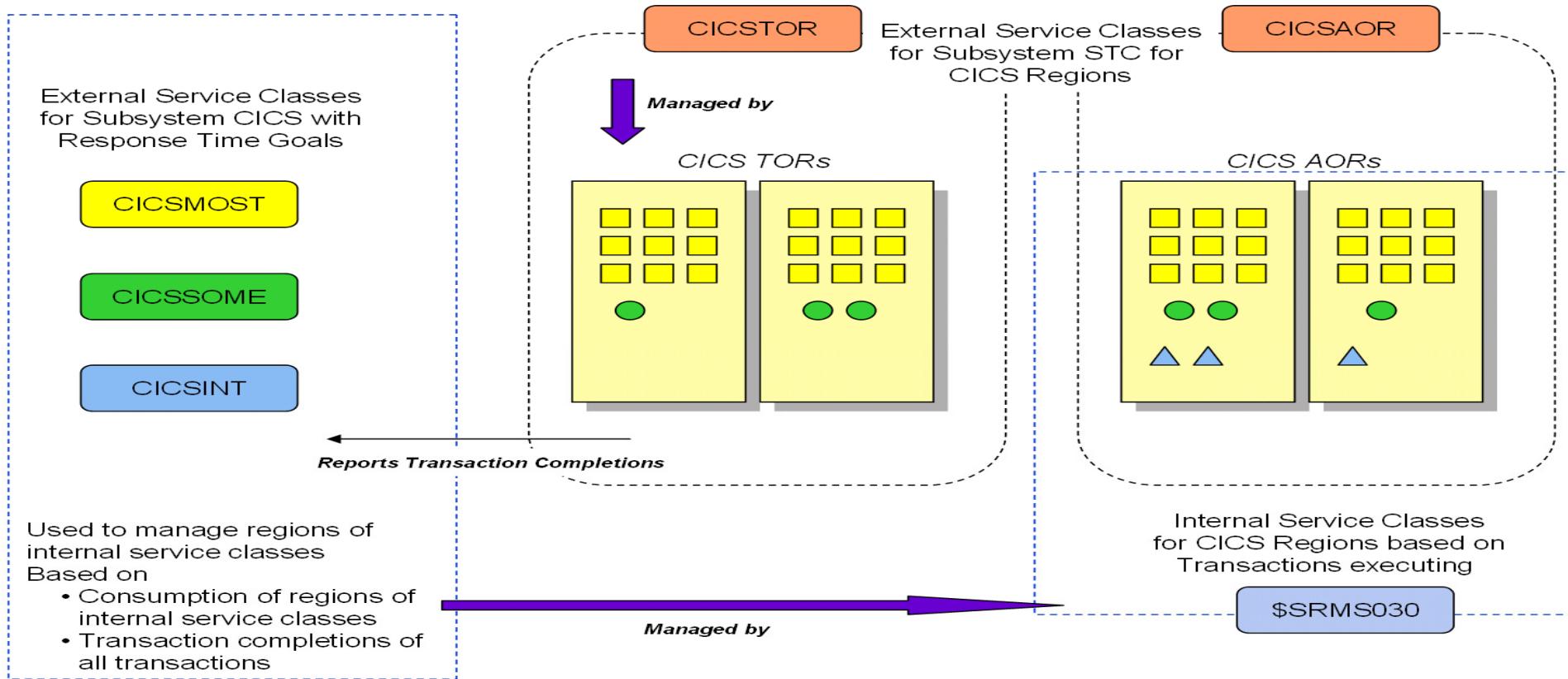
# OA35428: Enhancement of WLM Management

## Solution to solve the Work Manager/Consumer Model

- Implementation introduce a new option “BOTH”
  - Can be used to classify the CICS TOR Regions
    - For TORs:
      - *Use BOTH for “Manage Regions by Goals Of”*
      - *Define a STC service class for TORs which has a higher importance than the CICS service class with response time goals for the CICS work and AORs*
    - For AORs:
      - *Stay with TRANSACTION (default)*
- Result
  - WLM will manage the TORs towards the goals of the STC service class
  - And WLM will ensure bookkeeping of transaction completions to the correct CICS response time service class
    - The CICS transactions are managed towards CICS response time goals and the AORs are also managed towards these goals like today
    - All reporting capabilities remain as today

# OA35428: New WLM Management Option

## Structure of Service Classes



- TORs are now managed towards the goal of the service class CICSTOR
  - They still report their transaction completions for management
- AORs are still managed towards the goals of the CICS service classes and the consumption of the internal service class for the region
- Recommendation: CICSTOR should be defined at a higher importance than the CICS service classes

# OA35428: New WLM Management Option Using Option “BOTH”

- Example of using the new option “BOTH” on the classification panel

```

Subsystem-Type Xref Notes Options Help
-----
                         Modify Rules for the Subsystem Type      Row 1 to 3 of 3
Command ==> _____ Scroll ==> PAGE
Subsystem Type . : JES      Fold qualifier names? Y (Y or N)
Description . . : Batch Work

Action codes: A=After      C=Copy      M=Move      I=Insert rule
              B=Before     D=Delete row   R=Repeat    IS=Insert Sub-rule
                           <== More
-----Qualifier-----      Storage      Manage Region
Action   Type       Name      Start      Critical      Using Goals Of
      1  TN        CICSTOR*  _____      NO          BOTH
      1  TN        CICSAOR*  _____      NO          TRANSACTION
      1  TN        CICS*     _____      NO          TRANSACTION
*****
***** BOTTOM OF DATA *****
  
```

# OA35428: WLM Management Summary

## Options for managing CICS work

### 1. CICS managed by Response Time Goals

- All Regions defined as managed towards TRANSACTION goals
  - Existing Method
  - Works well for most environments
    - *Older CICS environments which do not have Multi Region Option*
    - *All environments which are not exclusively CICS workload*
    - *All environments which don't have any problem*

### 2. CICS managed by Region Goals

- If response time goals have not been defined all CICS regions are managed towards REGION goals (exempted from transaction management)
  - Existing Method
  - Works also well for most environments
    - *But: Execution velocity goals are more sensitive to hardware and software changes*
    - *Usually no transaction reporting available*
      - *This can be enabled for report classes but requires additional definitions*

### 3. CICS managed by Region and Response Time Goals

- CICS TORs defined as managed towards BOTH goals
- CICS AORs defined as managed towards TRANSACTION goals
  - New Method introduced with OA35428
  - Works well for most environments too
    - *But: Avoids disadvantages of method 2*

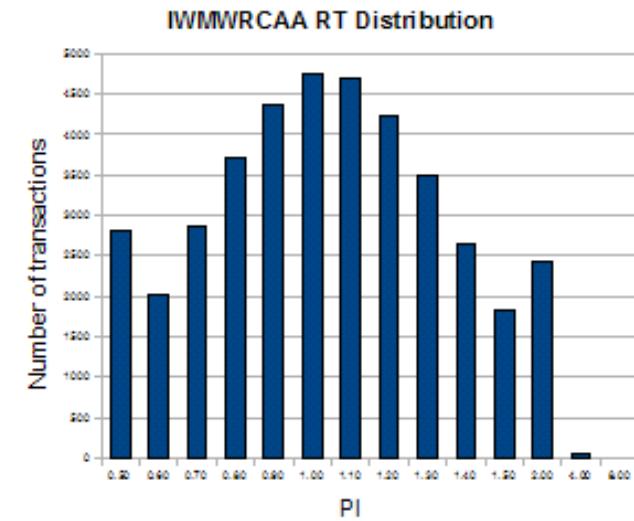
# Response Time Distribution for Velocity Goals (z/OS V1.13)

- Currently WLM reporting does not provide a response time distribution (ended transactions) for workloads with velocity goals
- But it is desirable to have a response time distribution for all transactional workloads, even if they have a velocity goal
  - More data to analyze workload behavior and to detect problems
  - Better support for migration of goal definitions to response time goals
- With z/OS V1.13
  - the IWMRCOLL answer area IWMWRCAA provides also a response time distribution for service class periods with an execution velocity goal,
  - the RMF Postprocessor Workload Activity report (WLMGL) displays the new response time distributions
  - Response Time distributions also added to SMF 99 subtype 2 data

# Response Time Distribution for Velocity Goals

## The Mid-Point Change Algorithm

- Rationale
  - Velocity goals do not have a „reference“ response time
  - The mid-point (MP) should be set to values which accurately reflect the current workload conditions
  - These conditions may drastically change from time to time, but WLM expects them to be consistent for a time long enough, so that it can compute sensible mid-point (MP) values
  
- Algorithm
  - The model behind the algorithm is a gaussian RT distribution, with  $d = M/3$  ( $M$  is the mean,  $d$  is the standard deviation). Ideal would be  $MP = M$
  - If a trx response time fulfills  $MP/3 \leq RT \leq MP*3$  counter  $C$  is decreased by a value that reflects the distance of  $RT$  to the  $MP$
  - If a trx response time does not fulfill  $MP/3 \leq RT \leq MP*3$  counter  $C$  is increased by a value that reflects the distance of  $RT$  to the  $MP$
  - If counter  $C$  becomes greater than a threshold, a new mid-point is calculated



This is the ideal case:

The mid-point set by WLM is strictly equal to the average response time ( $M$ ) of the transactions, so we get a recognizable gaussian distribution



# Response Time Distribution for Velocity Goals

## RMF WLMGL Enhancement

REPORT BY: POLICY=POLICY01 WORKLOAD=STC SERVICE CLASS=STCDEF RESOURCE GROUP=\*NONE PERIOD=1 IMPORTANCE=5  
CRITICAL =NONE

-TRANSACTIONS-		TRANS-TIME	HHH.MM.SS.TTT	--DASD	I/O--	---SERVICE---		SERVICE	TIME	---APPL %---		--PROMOTED--		----STORAGE----	
Avg	28.04	ACTUAL	16.629	SSCHRT	89.0	IOC	524944	CPU	1.453	CP	0.22	BLK	0.000	Avg	1143.34
MPL	28.04	EXECUTION	15.724	RESP	0.2	CPU	649332	SRB	0.277	AAPCP	0.00	ENQ	0.000	Total	32056.00
ENDED	2	QUEUED	904	CONN	0.1	MSO	14840	RCT	0.010	IIPCP	0.00	CRM	0.000	Shared	200.56
END/S	0.00	R/S AFFIN	0	DISC	0.0	SRB	123890	IIT	0.197			LCK	0.000		
#SWAPS	100	INELIGIBLE	0	Q+PEND	0.1	TOT	1313K	HST	0.000	AAP	0.00			-PAGE-IN RATES-	
EXCTD	0	CONVERSION	0	IOSQ	0.0	/SEC	1459	AAP	0.000	IIP	0.00			SINGLE	0.0
AVG ENC	0.00	STD DEV	0					IIP	0.000					BLOCK	0.0
REM ENC	0.00						ABSRPTN		52					SHARED	0.0
MS ENC	0.00						TRX SERV		52					HSP	0.0

GOAL: EXECUTION VELOCITY 20.0%      VELOCITY MIGRATION: I/O MGMT 88.2%      INIT MGMT 88.2%

SYSTEM	RESPONSE TIME	EX	PERF	Avg	--EXEC USING%--			EXEC DELAYS %			-USING%-			--- DELAY % ---			%		
	VEL%	INDX	ADRSP	CPU	AAP	IIP	I/O	TOT	CRY	CNT	UNK	IDL	CRY	CNT	QUI				
*ALL	--N/A--	88.2	0.2	47.0	0.0	0.0	0.0	0.2	0.0				0.0	0.0	38	62	0.0	0.0	0.0
SYSD		88.2	0.2	15.0	0.0	0.0	0.0	0.3	0.0				0.0	0.0	40	60	0.0	0.0	0.0
SYSE		88.6	0.2	17.0	0.0	0.0	0.0	0.3	0.0				0.0	0.0	35	64	0.0	0.0	0.0

### -----RESPONSE TIME DISTRIBUTIONS-----

SYSTEM: SYSD -----INTERVAL: 14.59.998 -----MRT CHANGES: 0 ---				SYSTEM: SYSE -----INTERVAL: 01.22.123 -----MRT CHANGES: 1 ---							
----TIME----		-NUMBER OF TRANSACTIONS-		----PERCENT----		----TIME----		-NUMBER OF TRANSACTIONS-		----PERCENT----	
HH.MM.SS.TTT	CUM TOTAL	IN BUCKET	CUM TOTAL	IN BUCKET	HH.MM.SS.TTT	CUM TOTAL	IN BUCKET	CUM TOTAL	IN BUCKET	CUM TOTAL	IN BUCKET
< 00.00.00.200	581	581	94.2	94.2	< 00.00.00.300	581	581	94.2	94.2		
<= 00.00.00.240	584	3	94.7	0.5	<= 00.00.00.360	584	3	94.7	0.5		
<= 00.00.00.280	586	2	95.0	0.3	<= 00.00.00.420	586	2	95.0	0.3		
<= 00.00.00.320	586	0	95.0	0.0	<= 00.00.00.480	586	0	95.0	0.0		
<= 00.00.00.360	588	2	95.3	0.3	<= 00.00.00.640	588	2	95.3	0.3		
<= 00.00.00.400	591	3	95.8	0.5	<= 00.00.00.600	591	3	95.8	0.5		
<= 00.00.00.440	592	1	95.9	0.2	<= 00.00.00.660	592	1	95.9	0.2		
<= 00.00.00.480	592	0	95.9	0.0	<= 00.00.00.720	592	0	95.9	0.0		
<= 00.00.00.520	593	1	96.1	0.2	<= 00.00.00.780	593	1	96.1	0.2		
<= 00.00.00.560	596	3	96.6	0.5	<= 00.00.00.840	596	3	96.6	0.5		
<= 00.00.00.600	596	0	96.6	0.0	<= 00.00.00.900	596	0	96.6	0.0		
<= 00.00.00.800	599	3	97.1	0.5	<= 00.00.01.200	599	3	97.1	0.5		

# Response Time Distribution for Velocity Goals

## IWMRCOLL enhancements for Service and Report Class Periods

Section	Field	Response time goals	Execution velocity goals
RCAEIHDR (RCAE period header)	<b>RCAEIMID</b> (mid-point in milliseconds)	Same as goal value (milliseconds)	0 after policy activation/refresh/IPL  New value computed when WLM detects that current workload distribution deviates <b>too much</b> from RCAEIMID for a <b>too long</b> time
	<b>RCAEIRCT</b> (running count)	N/A (value always 0)	Total number of RCAEIMID changes since last policy activation
	<b>RCAEITST</b> (timestamp of last change)	Policy activation time	Time of last RCAEIMID change or time of last policy activation
RCAEDIST	<b>RCAEIDENT</b>	No change Distribution centered around goal value	Centered around RCAEIMID Reset after each RCAEIMID change

- **RCAEIRCT**
  - Is reset to 0 after each policy activation/refresh/IPL
  - Is incremented each time the report class period becomes heterogeneous (when RCAEPLSC and RCAEPMCI are updated)
  - Is incremented each time a transaction is reported with a new mid-point/timestamp
- The 14 buckets of the report class period's response time distribution are reset to 0 when RCAEIRCT is updated
- RCAEIMID is copied from the current service class period's RCAEIMID each time the report class period's RCAEIRCT is incremented
- RCAEITST is copied from the current service class period's RCAEITST each time the report class period's RCAEIRCT is incremented

# Transaction Management Enhancements: Availability

Function	z/OS V1.13	z/OS V1.12	z/OS V1.11	z/OS V1.10
<b>Enclave Server Management (Non Shell Server Management)</b>	+	+		
<b>CICS Region/RT Management</b>	+	OA35428	OA35428	OA35428
<b>RT Distribution for Execution Velocity Goals</b>	+			

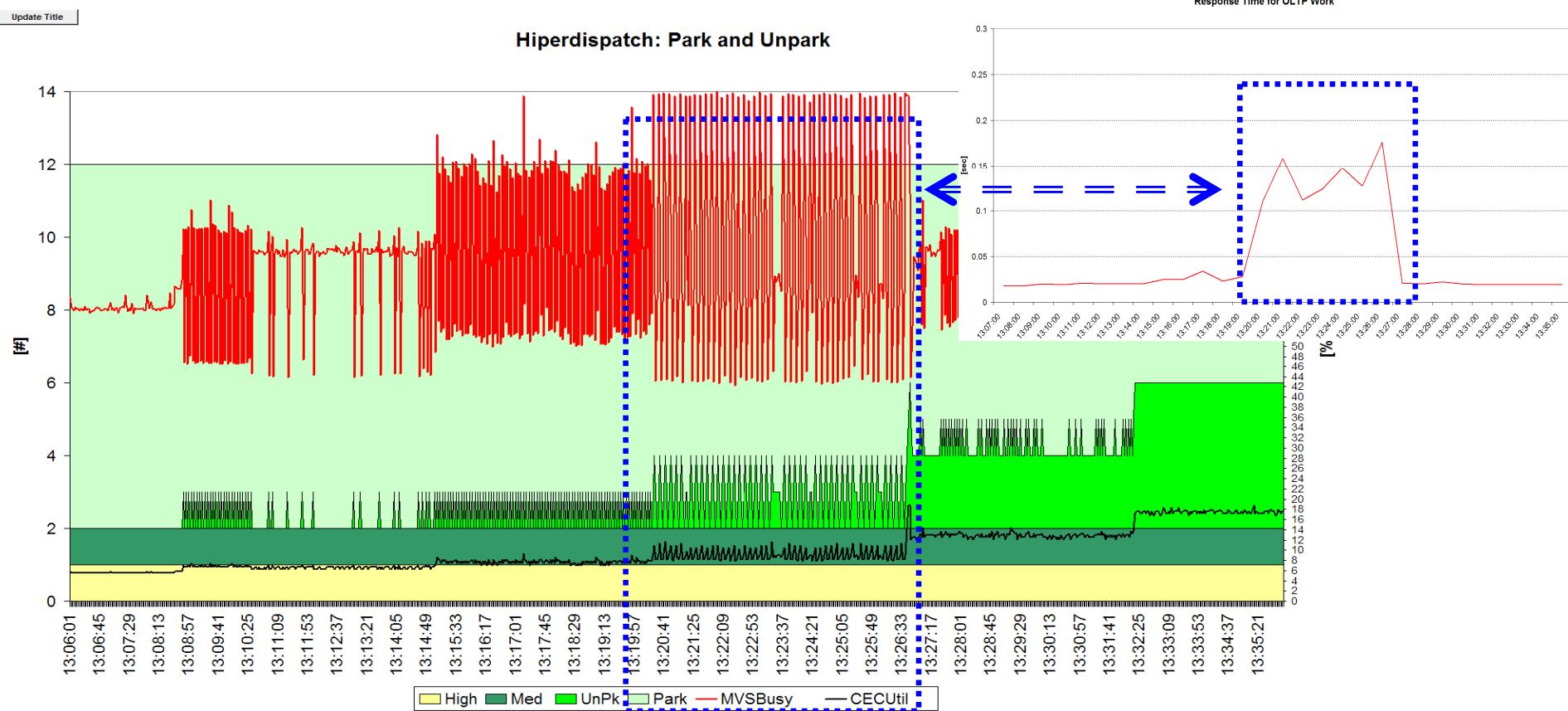
- Enclave Server Management
  - Is enabled via OPT parameter ENCLAVESERVER=YES
- CICS Region/RT Management
  - OA35248 supersedes OA34801
    - OA34801 was a temporary solution introduced for a customer to maintain response time reporting while temporarily moving from response time to region management
    - OA34801 introduced a new OPT parameter ~~REPORTCOMPLETIONS={YES|NO}~~
      - *With OA35428 and with z/OS 1.13 WLM will still accept the new OPT parameter but the reporting functionality introduced by OA34801 is no longer supported.*

# Agenda



- Transaction Management Enhancements
  - Non Shell Enclave Server Management
  - CICS Region / Response Time Management
  - Response Time Distribution for Execution Velocity Goals
- Hiperdispatch APARs
- WLM Support for I/O Priority Manager in DS8K Series
- WLM Support for IBM zEnterprise 196
- Temporary Capacity Reporting via SYSEVENT REQLPDAT
- z/OSMF Workload Management
- WLM support for Unified Resource Manager
- Capacity Provisioning Update Summary
- WLM Tools Overview

# OA36549: Problem Description



- Very constant load – especially on smaller partitions – can result in an oscillation effect of parking and unparking low processors
- Result: A significant response time increase can be observed (especially for OLTP work)

# OA36459: Items addressed

- Problems identified
  - Supervisor favors medium processors versus VL processors for dispatching work
    - This skews a WLM metric to determine when it is meaningful to park a processor
  - WLM calculates the effective usage of VM and VL processors incorrectly
    - WLM calculates the total usage and subtracts the full capacity of VH processors
      - *This assumes that VH processors are always utilized by 100%*
      - *This is especially wrong for lowly utilized CECs*
- Additional adjustments
  - No longer automatically park a processor when the used capacity is smaller than the guaranteed capacity of the partition
  - Change the park condition based on MVS Busy threshold
  - Waive most park conditions for partitions with no VH processors
  - Adjust Unpark conditions to allow earlier unpark of processors

# Hiperdispatch related WLM APARs

APAR	Description	Close Date	Affects
OA35428	Introduces new option to manage CICS environments in a work receiver/consumer model	09/2011	Installation running CICS- only workloads Can be amplified by Hiperdispatch
OA35860	Correct calculation of CEC free capacity. At the moment the CPU consumption of the *PHYSICAL* partition is not included. This can lead to too many “unpark” operations under seldom cases.	06/2011	Systems with high *PHYSICAL* time
OA35989	Correct overflow condition of CEC free capacity	05/2011	Small systems running on big CECs with very high unused capacity
OA36459	Modify PARK/UNPARK algorithm to become more sensitive for smaller partitions	10/2011	Smaller partitions at low CEC utilizations

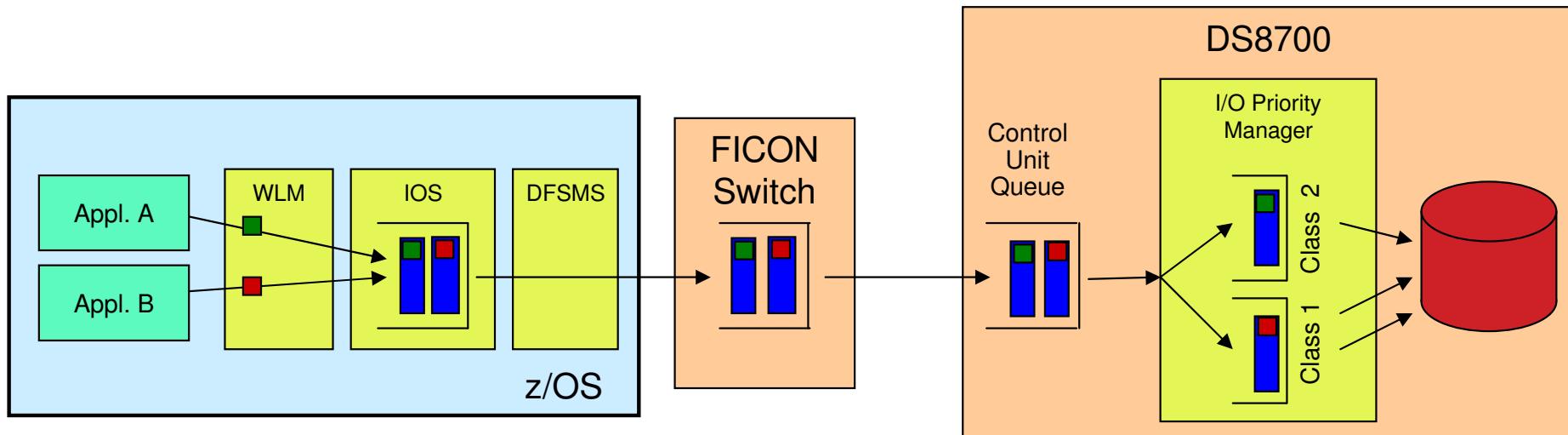
- **HIPERDISPATCH=YES**
  - **Will be the default when running z/OS 1.13 on z196 or above**
  - Older releases will still have NO as default even on z196

# Agenda

- Transaction Management Enhancements
  - Non Shell Enclave Server Management
  - CICS Region / Response Time Management
  - Response Time Distribution for Execution Velocity Goals
- Hiperdispatch APARs
-  • WLM Support for I/O Priority Manager in DS8K Series
- WLM Support for IBM zEnterprise 196
- Temporary Capacity Reporting via SYSEVENT REQLPDAT
- z/OSMF Workload Management
- WLM support for Unified Resource Manager
- Capacity Provisioning Update Summary
- WLM Tools Overview

# WLM Support for I/O Priority Manager in DS8K Series

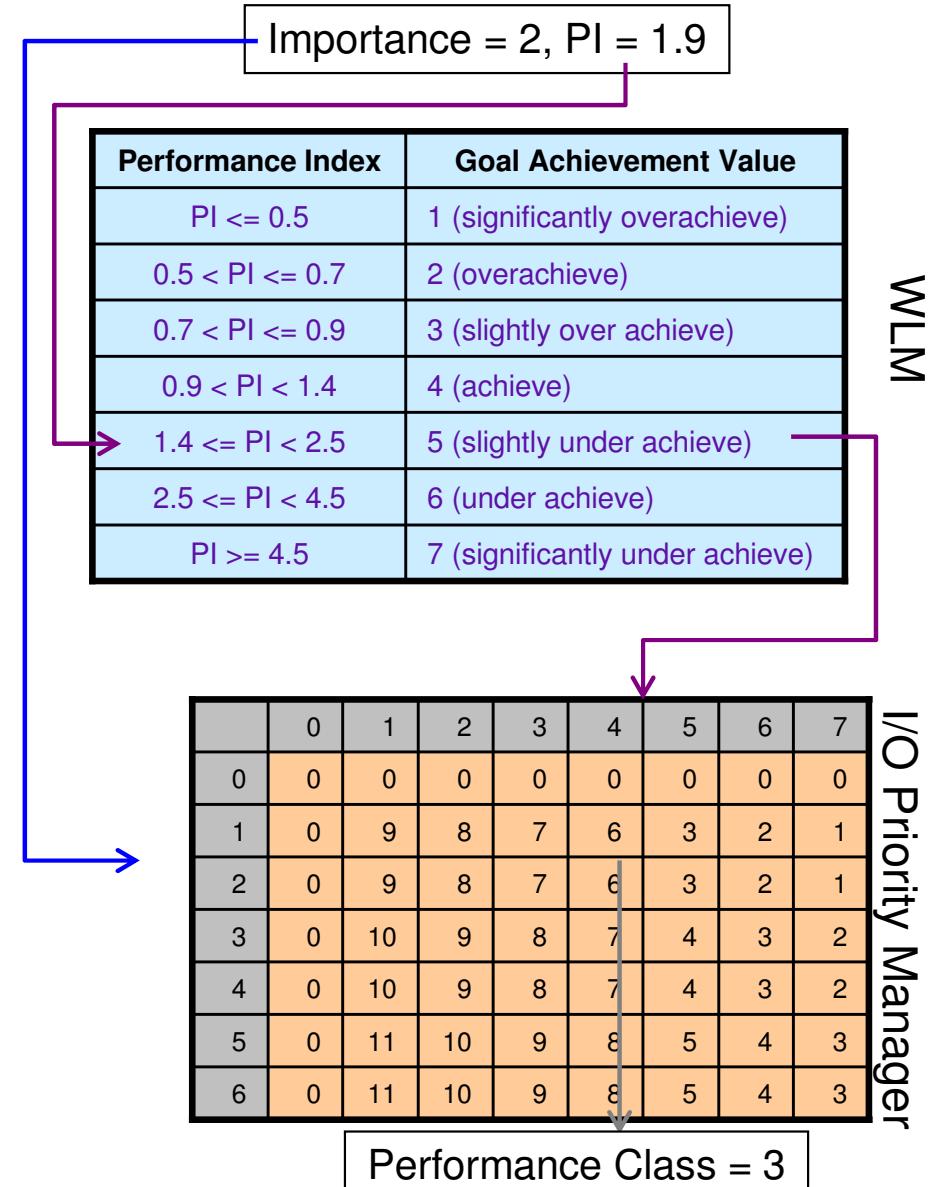
- WLM collaborates with the I/O Priority Manager in DS8700 & DS8800 storage servers.
- WLM sends I/O Priority Manager information about the goal fulfillment and importance of z/OS workloads (service classes).
- Passing these performance parameters to the storage server enables the I/O Priority Manager to determine which I/O requests are more important than others and which I/O requests need to be processed faster to fulfill the performance goals defined for the corresponding workload in z/OS.
- Using the passed information from WLM, the I/O Priority Manager throttles I/O requests of workloads which exceed their goals to help I/O requests of workloads which do not fulfill their goals.
- New IEAOPT parameter **STORAGESERVERMGT={YES|NO}**



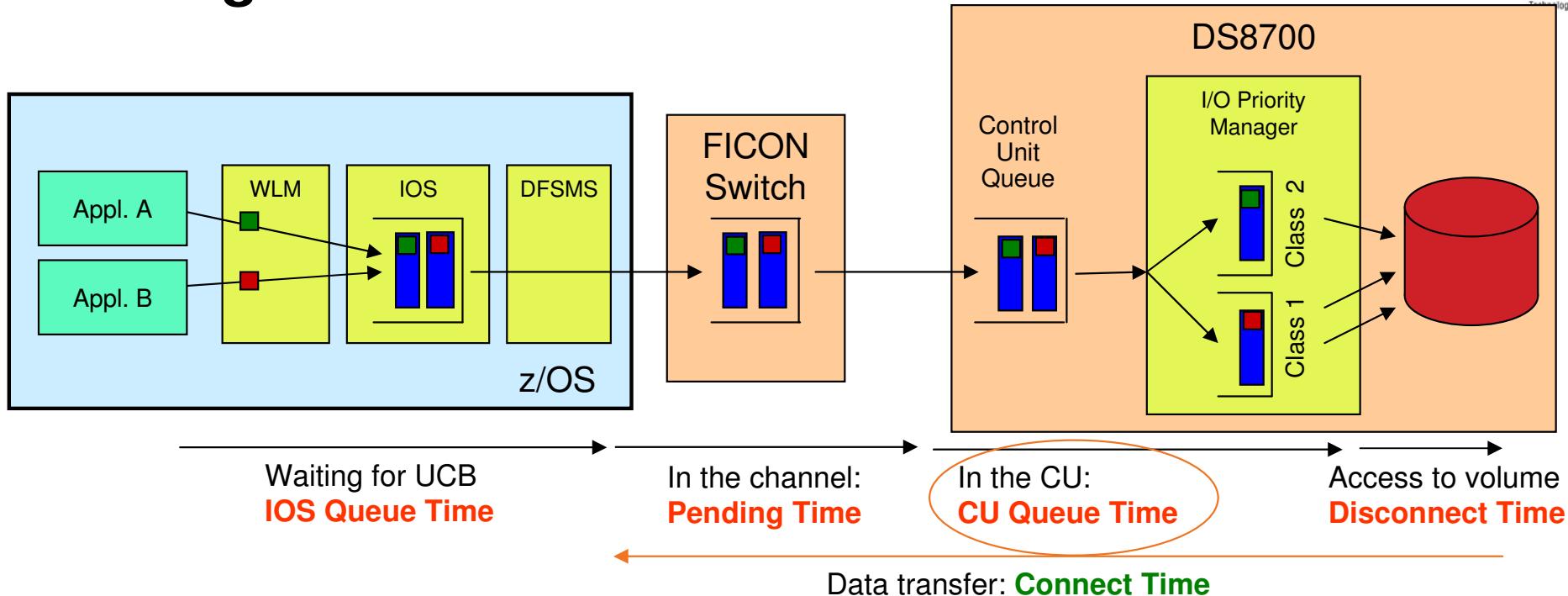
# WLM Support for I/O Priority Manager in DS8K Series

## Goal Achievement Data

- WLM derives goal achievement data for service class periods as follows
  - Response Time goal:
    - Importance of period
    - Goal Achievement Value is derived from Performance Index (PI)
  - **Dynamic management considering goal achievement of service class**
- Velocity goal:
  - Importance of period
  - Velocity level
- **Static management considering specified goal of service class**
- System service classes
  - Importance: 0
  - Goal Achievement Value: 0 (no monitor)
- **No management**
- Discretionary goal:
  - Importance: 6
  - Goal Achievement Value: 1
- **Static management considering goal type**
- I/O Priority Manager assigns I/O request a Performance Class corresponding to the passed Goal Achievement Data
- Each Performance Class is associated with a certain maximum throttling level



# WLM Support for I/O Priority Manager in DS8K Series Throttling



- I/O Priority Manager
  - impacts how long an I/O request has to wait for access to the **volume**
    - does **not** impact an I/O request **if it is served from the storage server cache**
  - induced throttling delays are reported as **CU Queue Time**
- WLM excludes CU Queue Time when calculating I/O delays for service class periods with velocity goal to avoid oscillations of the performance index
  - If **WLM support for I/O Priority Manager** is turned on, you may have to adjust the velocity goals if you have significant CU Queue Times in your environment

# WLM Support for I/O Priority Manager in DS8K Series Availability



Function	z/OS V1.13	z/OS V1.12	z/OS V1.11	Older Releases
<b>WLM Support for I/O Priority Manager in DS8000 series</b>	OA32298	OA32298	OA32298	

- The I/O Priority Manager feature is associated with DS8K R6.1.5 and is not available externally until Sept 30, 2011

# Agenda

- Transaction Management Enhancements
  - Non Shell Enclave Server Management
  - CICS Region / Response Time Management
  - Response Time Distribution for Execution Velocity Goals
- Hiperdispatch APARs
- WLM Support for I/O Priority Manager in DS8K Series
- WLM Support for IBM zEnterprise 196
- Temporary Capacity Reporting via SYSEVENT REQLPDAT
- z/OSMF Workload Management
- WLM support for Unified Resource Manager
- Capacity Provisioning Update Summary
- WLM Tools Overview

# WLM Support for IBM zEnterprise 196

- IBM zEnterprise 196 (z196)
  - STSI instruction no longer returns the alternate CPU capability
    - CPU adjustment factors are now calculated based on the Model Capacity Ratings by the machine
  - Supplies additional information about speed change
  - Speed changes may occur due to model changes (*capacity level*), or to physical processor tact (*cycle steering*)
- WLM
  - uses the new MSU values to calculate pricing adjustment factors
  - introduces message IWM064I to explain the reason for a processor speed change
  - makes new HW information available via public data areas IRARCT, IRARMCT, IRARMCTZ and via SYSEVENT QVS

# WLM Support for IBM zEnterprise 196

## New Message IWM064I

- Existing Message:

IWM063I WLM POLICY WAS REFRESHED DUE TO A PROCESSOR SPEED CHANGE

- Depending on the reason for the speed change one of the following messages will be issued on *when running on z196 or later hardware*:

- IWM064I THE SYSTEM IS RUNNING AT NOMINAL CAPACITY.
- IWM064I THE SYSTEM IS RUNNING AT NOMINAL CAPACITY; MODEL CONVERSION OCCURRED.
- IWM064I THE SYSTEM IS RUNNING WITH REDUCED CAPACITY BECAUSE OF A MANUAL CONTROL SETTING.
- IMM064I THE SYSTEM IS RUNNING WITH REDUCED CAPACITY BECAUSE OF A MACHINE EXCEPTION CONDITION.
- IWM064I THE SYSTEM IS RUNNING WITH REDUCED CAPACITY BECAUSE OF A NON-EXCEPTION MACHINE CONDITION.
- IWM064I THE SYSTEM IS RUNNING WITH REDUCED CAPACITY BECAUSE OF AN EXCEPTION CONDITION EXTERNAL TO THE MACHINE.

# WLM Support for IBM zEnterprise 196

## Speed Values and MSU calculation

- RCTPCPUA
  - Existing adjustment factor for software pricing
  - Based on STSI alternate capacity value and alternate capacity MP factor table
  - Only valid value for all systems prior to z196 (z10, z9, etc...)
  - Does not allow to depict all possible MSU values precise enough
  - Still contained and updated for compatibility reasons for newer processors
- RCTPCPUA\_actual and RCTPCPUA\_Scaling
  - New adjustment factor for software pricing
  - Based on new STSI information for software pricing
  - Only valid for all new systems (z196 and future)
  - Allows to depict any possible MSU value
- RCTPCPU\_nominal and RCTPCPUA\_Scaling
  - Represents the capacity the system may have
  - If this deviates from RCTPCPUA\_actual/RCTPCPUA\_scaling then the actual system runs with reduced capacity

$$\text{MSU(old)} = \frac{57600 \bullet \# \text{cps}}{\text{RCTPCPUA}}; \quad \text{MSU(new)} = \frac{57600 \bullet \# \text{cps} \bullet \text{RCTPCPUA\_scaling}}{\text{RCTPCPUA\_actual}}$$

# WLM Support for IBM zEnterprise 196

## Extended Data Areas

- IRARCT
  - RCTPCPUA; RCTPCPUA\_actual; RCTPCPUA\_nominal; RCTPCPUA\_scaling
    - See previous chart
- IRARMCTZ
  - RMCTZ\_Capacity\_Change\_Time
    - Time when the capacity was last changed
  - RMCTZ\_Capacity\_Adjustment\_Indication
    - When zero, the indication is not reported. When in the range 1-99, some amount of reduction is indicated. When 100, the machine is operating at its normal capacity. Primary CPUs and all secondary-type CPUs are similarly affected
  - RMCTZ\_Capacity\_Change\_Reason
    - Indicates the reason which is associated with the present value contained in RMCTZ\_Capacity\_Adjustment\_Indication
  - RMCTZ\_CAI\_IPL
    - Capacity adjustment indication at IPL
  - RMCTZ\_CCR\_IPL
    - Capacity change reason at IPL
  - RMCTZ\_nominal\_CPMP
    - Nominal CPU adjustment factor (similar to RMCTCPMP but for nominal speed)

# WLM Support for IBM zEnterprise 196

## Changed APIs

- Sysevent QVS: (IRAQVS and IWMQVS.H) QVSCECCCapacityStatus (possible values):

Constant	Mnemonic	Description
0	QvsCecCapStatUndef	QvsCecCapacityStatus is undefined (not supported by hardware)
1	QvsCecCapStatNominal	Machine is running at nominal capacity
2	QvsCecCapStatRedIntentional	Machine is running with reduced capacity due to a manual control setting. (e.g. power saving mode, customer initiated)
3	QvsCecCapStatRedMachEx	Machine is running with reduced capacity due to a machine exception condition (e.g. cooling problem)
4	QvsCecCapStatRed MachNonEx	Machine is running with reduced capacity due to a machine non-exception condition (e.g. firmware update)
5	QvsCecCapStatRed EnvCond	Machine is running with reduced capacity due to an exception condition external to the machine (e.g. ambient temperature exceeded specified maximum)

- IWMRCOLL

- IWMWRCAA

- RCAAADJCCPU CPU adjustment factor
    - RCAAADJCCPUNOM Nominal CPU adjustment factor
    - RCAAADJCCEC CEC adjustment factor

# WLM Support for IBM zEnterprise 196

## SMF70 Enhancements



SMF record type 70 subtype 1 (CPU Activity) – CPU control section				
Offset	Name	Length	Format	Description
204 xCC	SMF70NCR	4	Binary	Nominal model-capacity rating in MSU/hour. When non-zero, this value is associated with the nominal model capacity as identified in field SMF70MDL. When field SMF70CAI contains a value of 100, this value equals the value in field SMF70MCR.
208 xD0	SMF70NPR	4	Binary	Nominal permanent model-capacity rating. When non-zero, this value is associated with the nominal permanent model capacity as identified in field SMF70MPC. When field SMF70CAI contains a value of 100, this value equals the value in field SMF70MPR.
212 xD4	SMF70NTR	4	Binary	Nominal temporary model-capacity rating. When non-zero, this value is associated with the nominal temporary model capacity as identified in field SMF70MTC. When field SMF70CAI contains a value of 100, this value equals the value in field SMF70MTR.
216 xD8	SMF70CAI	1	Binary	Capacity-adjustment indication. When zero, the indication is not reported. When in the range from 1 to 99, some amount of reduction is indicated. When 100, the machine is operating at its normal capacity. Temporary capacity changes that affect machine performance (for example, CBU or OOCoD) are not included.
217 xD9	SMF70CCR	1	Binary	Capacity-change reason. Valid if SMF70CAI is non-zero. When 0, no capacity change took place. When 1, the capacity change is due to the setting of a manual control. When greater than 1, the capacity change is due to an internal machine condition or due to an external machine exception.



# WLM Support for IBM zEnterprise 196 SMF72 Enhancements

SMF record type 72 subtype 3 (Workload Activity) – Workload manager control section

Offset	Name	Length	Format	Description
172 xAC	R723MADJ	4	Binary	Adjustment factor for CPU rate
248 xF8	R723NADJ	4	Binary	Nominal adjustment factor for CPU rate

# WLM Support for IBM zEnterprise 196

## SMF 30 Enhancements

194	C2	SMF30_Capacity_Change_Cnt	2	binary	The number of processor capacity changes that occurred since the previous interval or event interval. This number will be greater than 1 when the number of processor capacity changes exceeded the number specified in the MAXEVENTINTRECS parmlib option.										
196	C4	SMF30_RCTPCPUA_Actual	4	binary	Physical CPU adjustment factor (this is the adjustment factor for converting CPU time to equivalent service, in basic-mode with all processors online). Based on model capacity rating.										
200	C8	SMF30_RCTPCPUA_Nominal	4	binary	Physical CPU adjustment factor (this is the adjustment factor for converting CPU time to equivalent service in basic-mode with all processors online). Based on nominal model capacity rating.										
204	CC	SMF30_RCTPCPUA_scaling_factor	4	binary	Scaling factor for SMF30_RCTPCPUA_actual and SMF30_RCTPCPUA_nominal.										
208	D0	SMF30_Capacity_Adjustment_Ind	1	binary	When: 0 The indication is not reported. 1-99 Some amount of reduction is indicated. 100 The machine is operating in normal capacity.										
					Primary CPUs and all secondary-type CPUs are similarly affected.										
209	D1	SMF30_Capacity_Change_Rsn	1	binary	Indicates the reason that is associated with the present value contained in SMF30_Capacity_Adjustment_Ind. The bit values of this field correspond to those described in RMCTZ_Capacity_Adjustment_Indication of the IRARMCTZ mapping macro. (See <i>MVS Data Areas</i> . )										
210	D2	SMF30_Capacity_Flags	1	binary	Processor capacity flags.  <table> <thead> <tr> <th>Bit</th> <th>Meaning When Set</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>SMF30_Event_Driven_Intvl_Rec   <b>Meaning:</b> When on, indicates that the current interval record was generated as a result of an event, rather than as a result of standard interval expiration based on time.</td> </tr> <tr> <td>1</td> <td>SMF30_RQSVSUS_Err   <b>Meaning:</b> When on, indicates that an error occurred while collecting the data for SMF30SUS following a change in processor capacity. If this bit is found to be on when the record is being written, an additional attempt to collect the data from SRM is made. If that attempt is successful, the data is filled in at that time and the SMF30PIN error bit will be off.</td> </tr> <tr> <td>2</td> <td>SMF30_Capacity_Data_err   <b>Meaning:</b> When on, indicates that error occurred while collecting the processor capacity data, therefore the following fields are unreliable:           <ul style="list-style-type: none"> <li>• SMF30_RCTPCPUA_Actual</li> <li>• SMF30_RCTPCPUA_Nominal</li> <li>• SMF30_RCTPCPUA_scaling_factor</li> <li>• SMF30_Capacity_Adjustment_Ind</li> <li>• SMF30_Capacity_Change_Rsn</li> </ul>           SMF30_PCD_Rsvd_Exists         </td> </tr> <tr> <td>3</td> <td>SMF30_PCD_Rsvd_Exists   <b>Meaning:</b> When on, indicates records generated on systems running z/OS V1R7 through z/OS V1R9. When off, this bit indicates records generated on systems running z/OS V1R10 and later.</td> </tr> </tbody> </table>	Bit	Meaning When Set	0	SMF30_Event_Driven_Intvl_Rec  <b>Meaning:</b> When on, indicates that the current interval record was generated as a result of an event, rather than as a result of standard interval expiration based on time.	1	SMF30_RQSVSUS_Err  <b>Meaning:</b> When on, indicates that an error occurred while collecting the data for SMF30SUS following a change in processor capacity. If this bit is found to be on when the record is being written, an additional attempt to collect the data from SRM is made. If that attempt is successful, the data is filled in at that time and the SMF30PIN error bit will be off.	2	SMF30_Capacity_Data_err  <b>Meaning:</b> When on, indicates that error occurred while collecting the processor capacity data, therefore the following fields are unreliable: <ul style="list-style-type: none"> <li>• SMF30_RCTPCPUA_Actual</li> <li>• SMF30_RCTPCPUA_Nominal</li> <li>• SMF30_RCTPCPUA_scaling_factor</li> <li>• SMF30_Capacity_Adjustment_Ind</li> <li>• SMF30_Capacity_Change_Rsn</li> </ul> SMF30_PCD_Rsvd_Exists	3	SMF30_PCD_Rsvd_Exists  <b>Meaning:</b> When on, indicates records generated on systems running z/OS V1R7 through z/OS V1R9. When off, this bit indicates records generated on systems running z/OS V1R10 and later.
Bit	Meaning When Set														
0	SMF30_Event_Driven_Intvl_Rec  <b>Meaning:</b> When on, indicates that the current interval record was generated as a result of an event, rather than as a result of standard interval expiration based on time.														
1	SMF30_RQSVSUS_Err  <b>Meaning:</b> When on, indicates that an error occurred while collecting the data for SMF30SUS following a change in processor capacity. If this bit is found to be on when the record is being written, an additional attempt to collect the data from SRM is made. If that attempt is successful, the data is filled in at that time and the SMF30PIN error bit will be off.														
2	SMF30_Capacity_Data_err  <b>Meaning:</b> When on, indicates that error occurred while collecting the processor capacity data, therefore the following fields are unreliable: <ul style="list-style-type: none"> <li>• SMF30_RCTPCPUA_Actual</li> <li>• SMF30_RCTPCPUA_Nominal</li> <li>• SMF30_RCTPCPUA_scaling_factor</li> <li>• SMF30_Capacity_Adjustment_Ind</li> <li>• SMF30_Capacity_Change_Rsn</li> </ul> SMF30_PCD_Rsvd_Exists														
3	SMF30_PCD_Rsvd_Exists  <b>Meaning:</b> When on, indicates records generated on systems running z/OS V1R7 through z/OS V1R9. When off, this bit indicates records generated on systems running z/OS V1R10 and later.														

# WLM Support for IBM zEnterprise 196

## SMF 89 Enhancements



178	B2	SMF89_Capacity_Change_Cnt	2	binary	The number of processor capacity changes that occurred since the previous interval or event interval. This number will be greater than 1 when the number of processor capacity changes exceeded the number specified in the MAXEVENTINTRECS parmlib option.																
180	B4	SMF89_RCTPCPUA_Actual	4	binary	Physical CPU adjustment factor (this is the adjustment factor for converting CPU time to equivalent service in basic-mode with all processors online). Based on model capacity rating.																
184	B8	SMF89_RCTPCPUA_Nominal	4	binary	Physical CPU adjustment factor (this is the adjustment factor for converting CPU time to equivalent service in basic-mode with all processors online). Based on nominal model capacity rating.																
188	BC	SMF89_RCTPCPUA_scaling_factor	4	binary	Scaling factor for SMF89_RCTPCPUA_Actual and SMF89_RCTPCPUA_Nominal.																
192	C0	SMF89_Capacity_Adjustment_Ind	1	binary	<p>When:</p> <ul style="list-style-type: none"> <li>0      The indication is not reported.</li> <li>1-99    Some amount of reduction is indicated.</li> <li>100     The machine is operating in normal capacity.</li> </ul> <p>Primary CPUs and all secondary-type CPUs are similarly affected</p>																
193	C1	SMF89_Capacity_Change_Rsn	1	binary	Indicates the reason that is associated with the present value contained in SMF89_Capacity_Adjustment_Ind. The bit values of this field correspond to those described in RMCTZ_Capacity_Adjustment_Indication of the IRARMCTZ mapping macro. (See <i>MVS Data Areas</i> .)																
194	C2	SMF89_Capacity_Flags	1	binary	<p>Processor capacity flags.</p> <table> <thead> <tr> <th>Bit</th> <th>Meaning When Set</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>SMF89_Event_Driven_Interval_Rec</td> </tr> <tr> <td></td> <td><b>Meaning:</b> When on, indicates that the current record was generated as a result of an event, rather than as a result of a standard interval expiration based on time.</td> </tr> <tr> <td>1</td> <td>SMF89_Capacity_Data_err</td> </tr> <tr> <td></td> <td><b>Meaning:</b> When on, indicates that error occurred while collecting the processor capacity data, therefore the following fields are unreliable:</td> </tr> <tr> <td></td> <td> <ul style="list-style-type: none"> <li>• SMF89_RCTPCPUA_Actual</li> <li>• SMF89_RCTPCPUA_Nominal</li> <li>• SMF89_RCTPCPUA_scaling_factor</li> <li>• SMF89_Capacity_Adjustment_Ind</li> <li>• SMF89_Capacity_Change_Rsn</li> </ul> </td> </tr> <tr> <td>2</td> <td>SMF89_PCD_Rsvd_Exists</td> </tr> <tr> <td></td> <td><b>Meaning:</b> When on, indicates records generated on systems running z/OS V1R7 through z/OS V1R9. When off, indicates records generated on systems running z/OS V1R10 and later.</td> </tr> </tbody> </table>	Bit	Meaning When Set	0	SMF89_Event_Driven_Interval_Rec		<b>Meaning:</b> When on, indicates that the current record was generated as a result of an event, rather than as a result of a standard interval expiration based on time.	1	SMF89_Capacity_Data_err		<b>Meaning:</b> When on, indicates that error occurred while collecting the processor capacity data, therefore the following fields are unreliable:		<ul style="list-style-type: none"> <li>• SMF89_RCTPCPUA_Actual</li> <li>• SMF89_RCTPCPUA_Nominal</li> <li>• SMF89_RCTPCPUA_scaling_factor</li> <li>• SMF89_Capacity_Adjustment_Ind</li> <li>• SMF89_Capacity_Change_Rsn</li> </ul>	2	SMF89_PCD_Rsvd_Exists		<b>Meaning:</b> When on, indicates records generated on systems running z/OS V1R7 through z/OS V1R9. When off, indicates records generated on systems running z/OS V1R10 and later.
Bit	Meaning When Set																				
0	SMF89_Event_Driven_Interval_Rec																				
	<b>Meaning:</b> When on, indicates that the current record was generated as a result of an event, rather than as a result of a standard interval expiration based on time.																				
1	SMF89_Capacity_Data_err																				
	<b>Meaning:</b> When on, indicates that error occurred while collecting the processor capacity data, therefore the following fields are unreliable:																				
	<ul style="list-style-type: none"> <li>• SMF89_RCTPCPUA_Actual</li> <li>• SMF89_RCTPCPUA_Nominal</li> <li>• SMF89_RCTPCPUA_scaling_factor</li> <li>• SMF89_Capacity_Adjustment_Ind</li> <li>• SMF89_Capacity_Change_Rsn</li> </ul>																				
2	SMF89_PCD_Rsvd_Exists																				
	<b>Meaning:</b> When on, indicates records generated on systems running z/OS V1R7 through z/OS V1R9. When off, indicates records generated on systems running z/OS V1R10 and later.																				

# WLM Support for IBM zEnterprise 196: Availability

Function	z/OS V1.13	z/OS V1.12	z/OS V1.11	z/OS V1.10	z/OS V1.9
<b>New message IWM064I API enhancements</b>	+	OA30968	OA30968	OA30968	
<b>New MSU computation</b>	+	OA30968	OA30968	OA30968	OA30968
<b>New Programming Interface (IRARMCTZ)</b>	+	+	OA31201	OA31201	

# Agenda

- Transaction Management Enhancements
  - Non Shell Enclave Server Management
  - CICS Region / Response Time Management
  - Response Time Distribution for Execution Velocity Goals
- Hiperdispatch APARs
- WLM Support for I/O Priority Manager in DS8K Series
- WLM Support for IBM zEnterprise 196
- Temporary Capacity Reporting via SYSEVENT REQLPDAT
- z/OSMF Workload Management
- WLM support for Unified Resource Manager
- Capacity Provisioning Update Summary
- WLM Tools Overview

# Temporary Capacity Reporting via SYSEVENT REQLPDAT

- **SYSEVENT REQLPDAT** was changed to return capacity information about IBM z10 (and later) capacity settings:
  - permanent capacity information
    - *The base capacity of the machine*
  - temporary capacity data
    - *Replacement Capacity:*  
*Capacity Backup (CBU), or Planned Event (CPE)*
    - *Additional Capacity: On/Off Capacity on Demand (OOCoD)*
    - *The differentiation is relevant for potential license cost or entitlement impact*

# Temporary Capacity Reporting via SYSEVENT REQLPDAT

- **IRALPDAT new data fields**

- LPDATMODELCAPIDENT

- The 16-character EBCDIC model-capacity identifier of the configuration.

Permanent+OOCoD + (CBU+PE)

- LPDATMODEL

- The 16-character EBCDIC model identifier of the configuration. If not valid, field LPDatModelCapIdnt represents both the model-capacity identifier and the model.

H/W model

- LPDATMODELPERMCAPIDENT

- The 16-character EBCDIC model-permanent capacity identifier of the configuration.

Permanent configuration

- LPDATMODELTEMPCAPIDENT

- The 16-character EBCDIC model-temporary capacity identifier of the configuration.

Permanent + OOCoD

# Temporary Capacity Reporting via SYSEVENT REQLPDAT

- **IRALPDAT new data fields**

- LPDATMODELCAPRATING
  - When non-zero, an unsigned integer (“MSU rating”) as identified by the model-capacity identifier. There is no formal description of the algorithm used to generate this integer.
- LPDATMODELPERMCAPRATING
  - When non-zero, an unsigned integer (“MSU rating”) as identified by the model-permanent-capacity identifier
- LPDATMODELTEMPCAPRATING
  - When non-zero, an unsigned integer (“MSU rating”) as identified by the model-temporary-capacity identifier.

Permanent+OOCoD + (CBU+PE)

Permanent configuration

Permanent + OOCoD

# REQLPDAT Sample with Active Temporary Capacity

- **Example output**

```
LPDatModelCapIdent      : 714
LPDatModel               : E26
LPDatModelPermCapIdent   : 709
LPDatModelTempCapIdent   : 711
LPDatModelCapRating      : 00000473
LPDatModelPermCapRating  : 00000324
LPDatModelTempCapRating  : 000003B0
```

- **Meaning**

- The base model is 709
- This model has active OOCoD capacity
  - It temporarily has a capacity like a model 711
- This model also has active CBU capacity
  - In total it temporarily has a capacity like a model 714

# Agenda

- Transaction Management Enhancements
  - Non Shell Enclave Server Management
  - CICS Region / Response Time Management
  - Response Time Distribution for Execution Velocity Goals
- Hiperdispatch APARs
- WLM Support for I/O Priority Manager in DS8K Series
- WLM Support for IBM zEnterprise 196
- Temporary Capacity Reporting via SYSEVENT REQLPDAT
- z/OSMF Workload Management
  - WLM support for Unified Resource Manager
  - Capacity Provisioning Update Summary
  - WLM Tools Overview



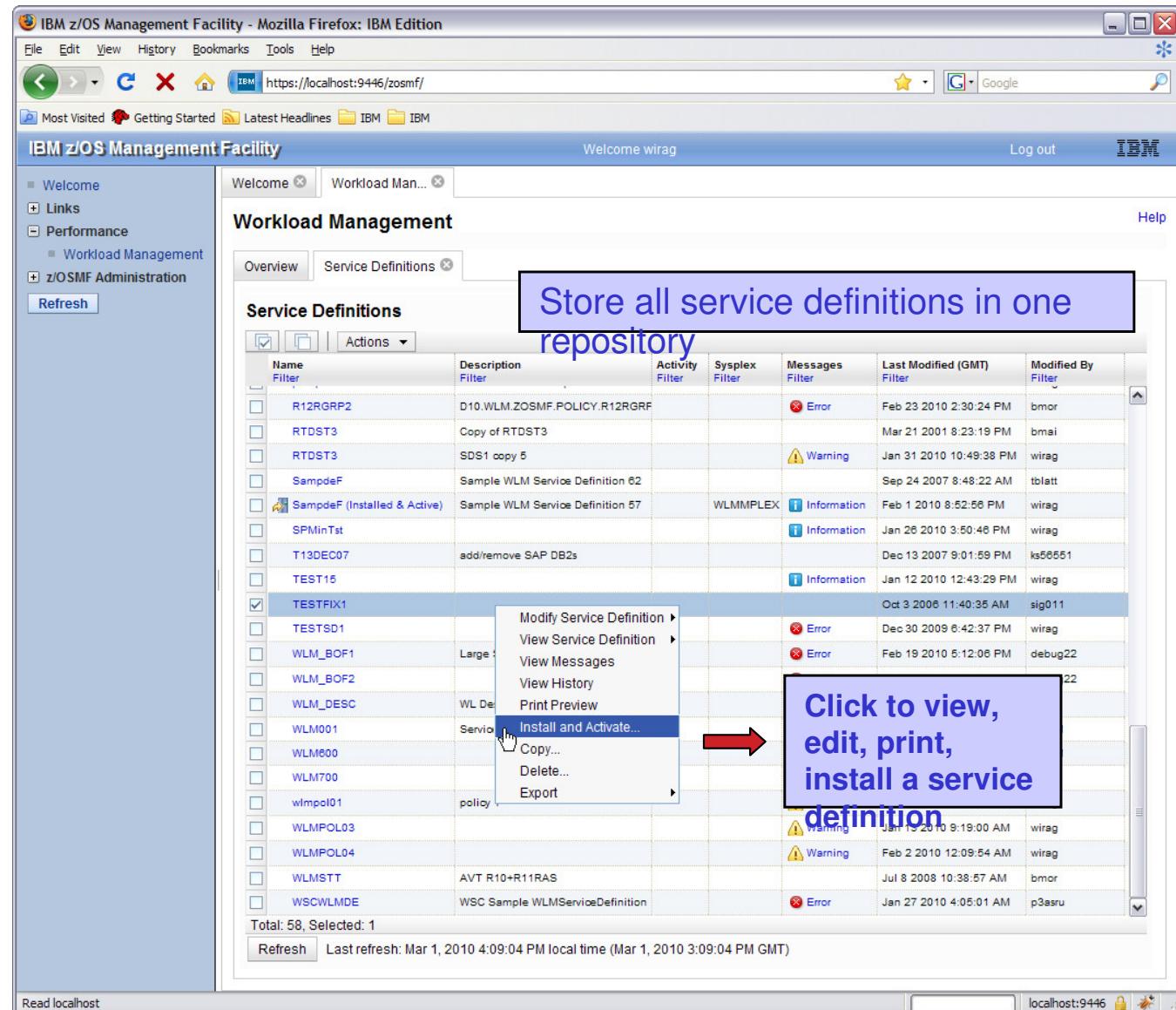
# z/OSMF Workload Management

## The new WLM Control Center in z/OSMF V1.12

- Policy editor
  - Simplified creation and editing of WLM policies supported by **best practice checks**
  - Support for review and investigation of WLM policies
- Policy repository
  - WLM policies are stored in a repository integrated in the z/OSMF file system
  - Policies can be exported to the local workstation or a host data set as well as imported from a file or a host data set
  - Policies or best-practice recommendations can be printed for further study
  - Integrated operation history makes manual tracking superfluous
- Installation and activation of WLM policies
- Monitoring of the WLM status in the sysplex
- Administration and operation tasks can be performed simultaneously
  - Simplified migration: Policy elements can be copied from one service definition to another
  - Simplified operation: You can start to edit a policy, interrupt the editing to activate a policy, and then continue with the editing without losing the context
- z/OSMF Workload Management synchronizes automatically with z/OS WLM
- Different authorization levels: View, Install, Modify (V1.13)

# z/OSMF Workload Management Service Definition Repository

- Integrated repository for service definitions
- Service definitions can be
  - Imported
  - Exported
  - Printed
  - Viewed or edited
  - Created or Copied
  - Installed on the sysplex
- Indications
  - If service definition is installed and active
  - If service definitions are being viewed or edited
  - If messages exist for a service definition



The screenshot shows the IBM z/OS Management Facility interface. The main window displays a list of Service Definitions. A context menu is open over the row for 'TESTFIX1'. The menu includes options like 'Modify Service Definition', 'View Service Definition', 'View Messages', 'View History', 'Print Preview', 'Install and Activate...', 'Copy...', 'Delete...', and 'Export'. A large callout box highlights the 'Install and Activate...' option with the text 'Click to view, edit, print, install a service definition'.

Name	Description	Activity Filter	Sysplex Filter	Messages Filter	Last Modified (GMT)	Modified By Filter
R12RGRP2	D10.WLM.ZOSMF.POLICY.R12RGRF			Error	Feb 23 2010 2:30:24 PM	bmor
RTDST3	Copy of RTDST3				Mar 21 2001 8:23:19 PM	bmai
RTDST3	SDS1 copy 5			Warning	Jan 31 2010 10:49:38 PM	wirag
SampleF	Sample WLM Service Definition 62				Sep 24 2007 8:48:22 AM	tblett
SampleF (Installed & Active)	Sample WLM Service Definition 57	WLMMPLEX	Information	Feb 1 2010 8:52:56 PM	wirag	
SPMinTst			Information	Jan 26 2010 3:50:46 PM	wirag	
T13DEC07	add/remove SAP DB2s				Dec 13 2007 9:01:59 PM	ks56651
TEST15			Information	Jan 12 2010 12:43:29 PM	wirag	
TESTFIX1					Oct 3 2008 11:40:35 AM	sig011
TESTSD1				Error	Dec 30 2009 6:42:37 PM	wirag
WLM_BOF1		Large		Error	Feb 19 2010 5:12:06 PM	debug22
WLM_BOF2						
WLM_DESC		WL Desc				
WLM001						
WLM600						
WLM700						
wlmpol01						
WLMPOL03						
WLMPOL04						
WLMSTT	AVT R10+R11RAS				Jul 8 2008 10:38:57 AM	bmor
WSCWLMD	WSC Sample WLMServiceDefinition			Error	Jan 27 2010 4:05:01 AM	p3asru

Total: 58, Selected: 1

Refresh Last refresh: Mar 1, 2010 4:09:04 PM local time (Mar 1, 2010 3:09:04 GMT)

localhost:9446

# z/OSMF Workload Management

## Editing Service Definitions



- Simplified creation, modification and review of service definitions
  - Policy elements are presented in tables
  - Tables can be filtered and sorted
  - Direct editing of policy elements within tables
  - Best-practice hints are displayed automatically while specifying policy elements
  - Several service definitions can be opened simultaneously
  - Cut, Copy, Paste of policy elements between service definitions

Best-practice hints help to optimize service definitions

Click to copy element on clipboard for insertion into another service

Click to check where the element is used

Name Filter	Period Filter	Importance Filter	Duration Filter	Goal Type Filter	Response Time Filter	Percentile Filter	Velocity Filter	CPU Critical Filter	Resource Group Filter
* STTCL3	1	*3		*Velocity			*91	*No	
* STTCL4	1	*2		*Average Response Time	*00:00:30.000			*No	
* STTCL5	1	*2		*Average Response Time	*00:00:30.000			*No	
* STTCL6	1	*2		*Average Response Time	*00:02:00.000			*No	
STTCL7	1	*3	*3000	*Velocity			New Period		
STTCL7	2	*3		*Velocity			Expand		
* STTCL8							Collapse		
STTCL8	1	*3	*3000	*Velocity			Cut to Clipboard		
STTCL8	2	*3		*Velocity			Copy to Clipboard		



# **z/OSMF Workload Management**

## **The new WLM Control Center in z/OSMF V1.12**

A complete overview is presented in session 10012

*Manage your Workloads and Performance with z/OSMF*  
*Thursday, August 11, 2011: 3:00 PM – 4:00 PM*

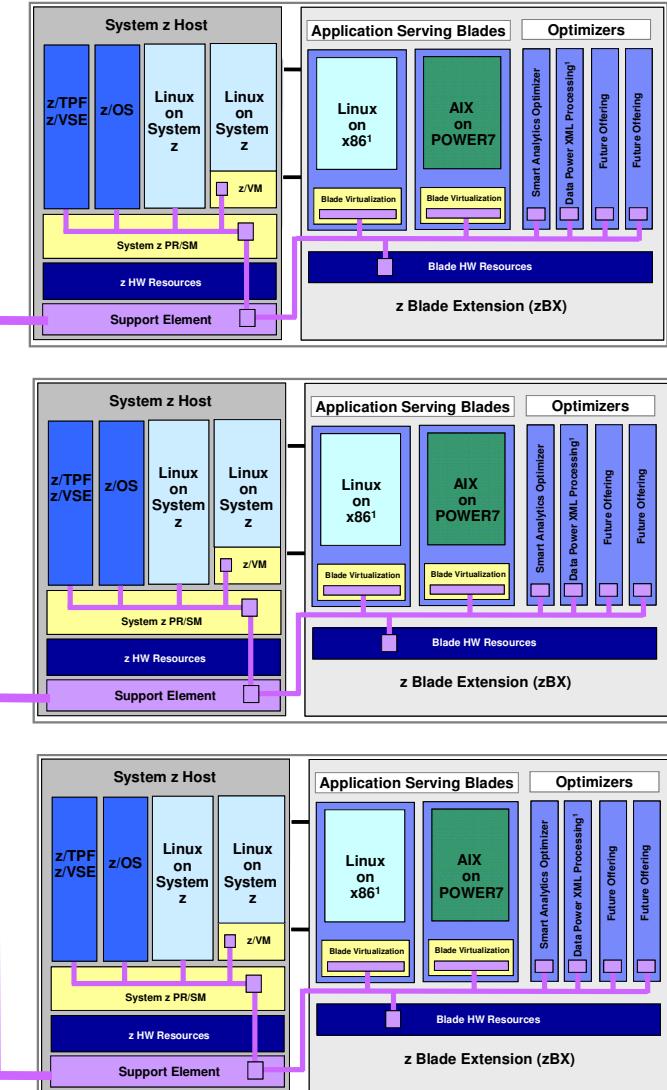
# Agenda

- Transaction Management Enhancements
  - Non Shell Enclave Server Management
  - CICS Region / Response Time Management
  - Response Time Distribution for Execution Velocity Goals
- Hiperdispatch APARs
- WLM Support for I/O Priority Manager in DS8K Series
- WLM Support for IBM zEnterprise 196
- Temporary Capacity Reporting via SYSEVENT REQLPDAT
- z/OSMF Workload Management
- WLM support for Unified Resource Manager
- Capacity Provisioning Update Summary
- WLM Tools Overview

# zEnterprise Ensembles

- Ensemble
  - A zEnterprise Ensemble is a collection of zEnterprise Nodes managed as a single virtualized pool of server resources
    - Native LPAR and z/VM Virtual Images
    - Power VM Virtual images
    - IBM Smart Analytics Optimizer for DB2
  - A zEnterprise Node can be a member of at most one Ensemble
- zEnterprise Unified Resource Manager
  - allows for the management and optimization of a zEnterprise Ensemble as a single resource pool
  - System z Hardware Management Console (HMC) is management console
  - Ensemble-wide scope of responsibility

System z Hardware Management Console z(HMC)  
with Unified Resource Manager



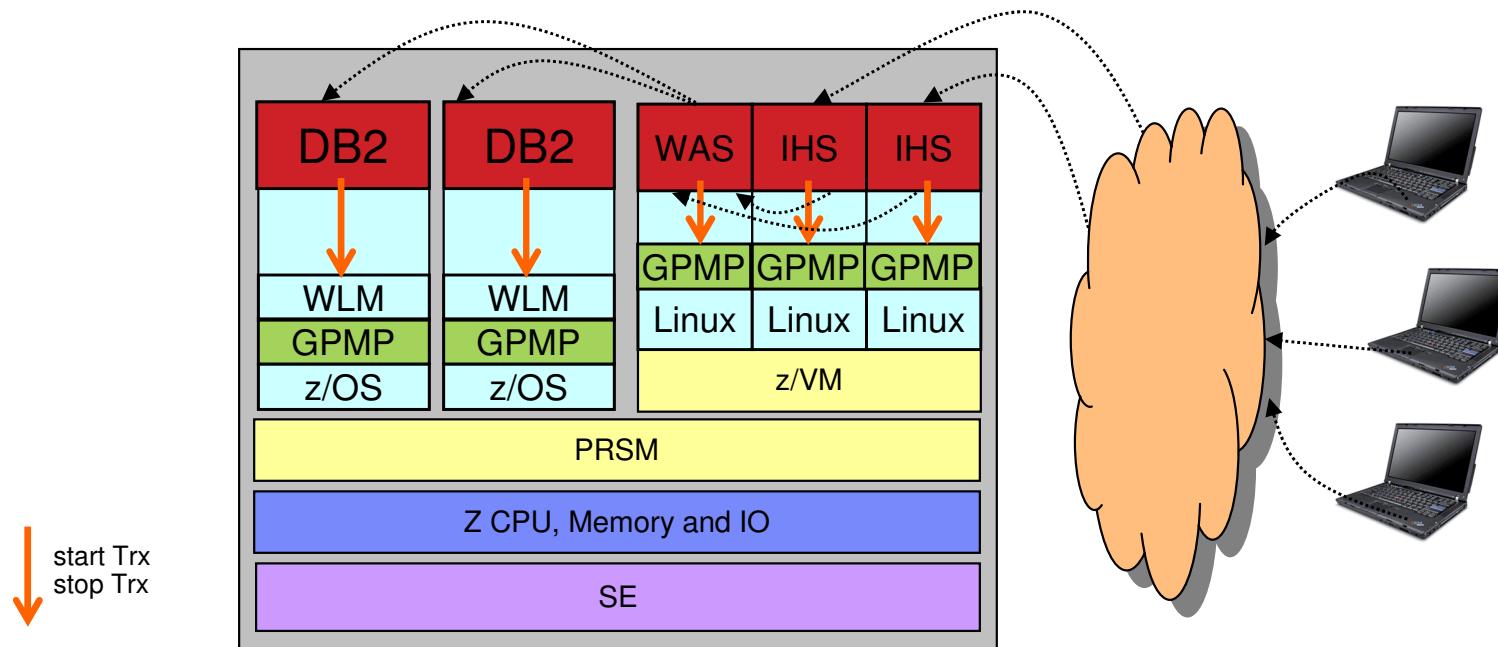
# **zEnterprise Platform Performance Manager**



- Platform management component responsible for goal-oriented resource monitoring, management, and reporting across the zEnterprise Ensemble
  - Core component responsible for definition and implementation of goal-oriented management policy
  - Workload monitoring and reporting based on management policy
  - Extend goal oriented approach of z/OS WLM to platform managed resources
  - Orchestration of autonomic management of resources across virtual servers
    - Provide Intelligent Resource Director like function across the zEnterprise
    - Management functions will evolve over time
  - Pushes management directives to the Support Element, Hypervisors, and OS agents as required across the zEnterprise
- Integration of HMC console support
  - Integrated UI for monitoring, display of workload topology relationships, status alerts, etc.
  - Definition of Performance Management Goals and Policy Administration
- Functionality integrated into the zEnterprise Unified Resource Manager
  - Code structured and packaged as System z firmware
  - Inter-Component communication over trusted internal platform management network

# zEnterprise Platform Performance Manager

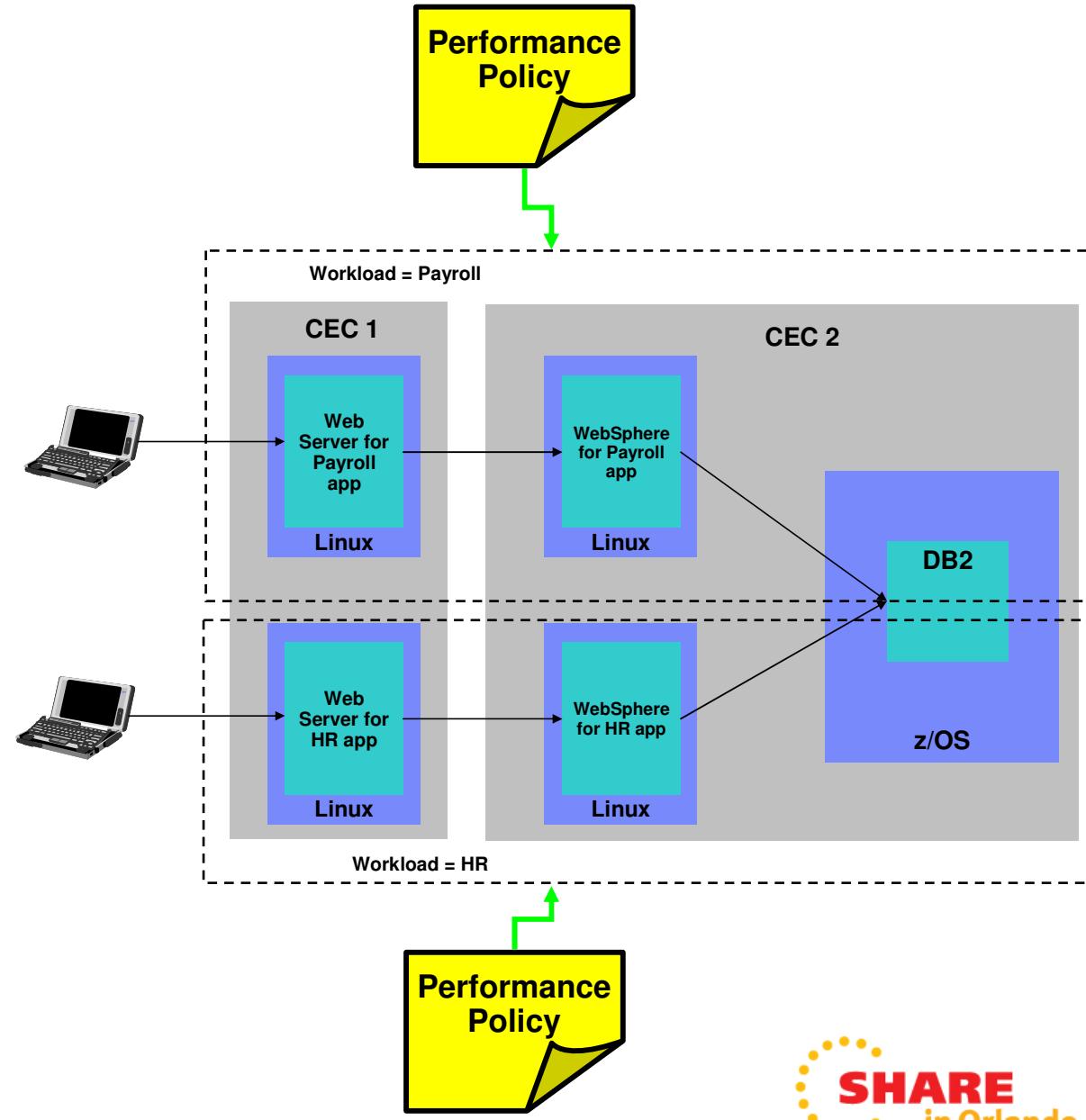
## Resource management based on understanding of overall workload flow



- Applications / middleware has to be instrumented with ARM – Application Response Measurement (Open Group Standard) to collect transaction statistics
  - Enables to monitor the flow of transactions
  - Enables to monitor transaction response times and processing statistics
- OS Agent – guest platform management provider (GPMP)
  - is required to identify individual units of work
  - collects data about processes / address spaces and transactions
  - passes data to Platform Performance Manager
  - On z/OS the data is collected by WLM

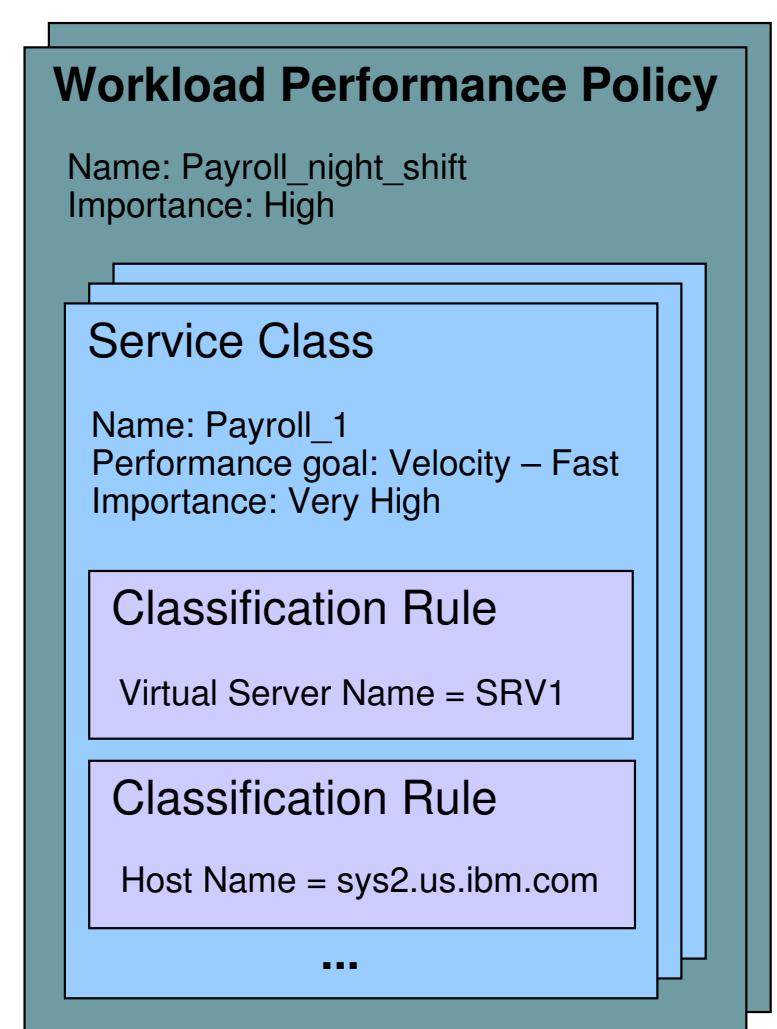
# Unified Resource Manager Platform Workload Definition

- A Platform Workload is a grouping mechanism and “management view” of virtual servers and optimizers supporting a business application
- Provides the context within which associated platform resources are presented, monitored, reported, and managed
- Management policies are associated to Platform Workload
  - Currently supports Performance Policy



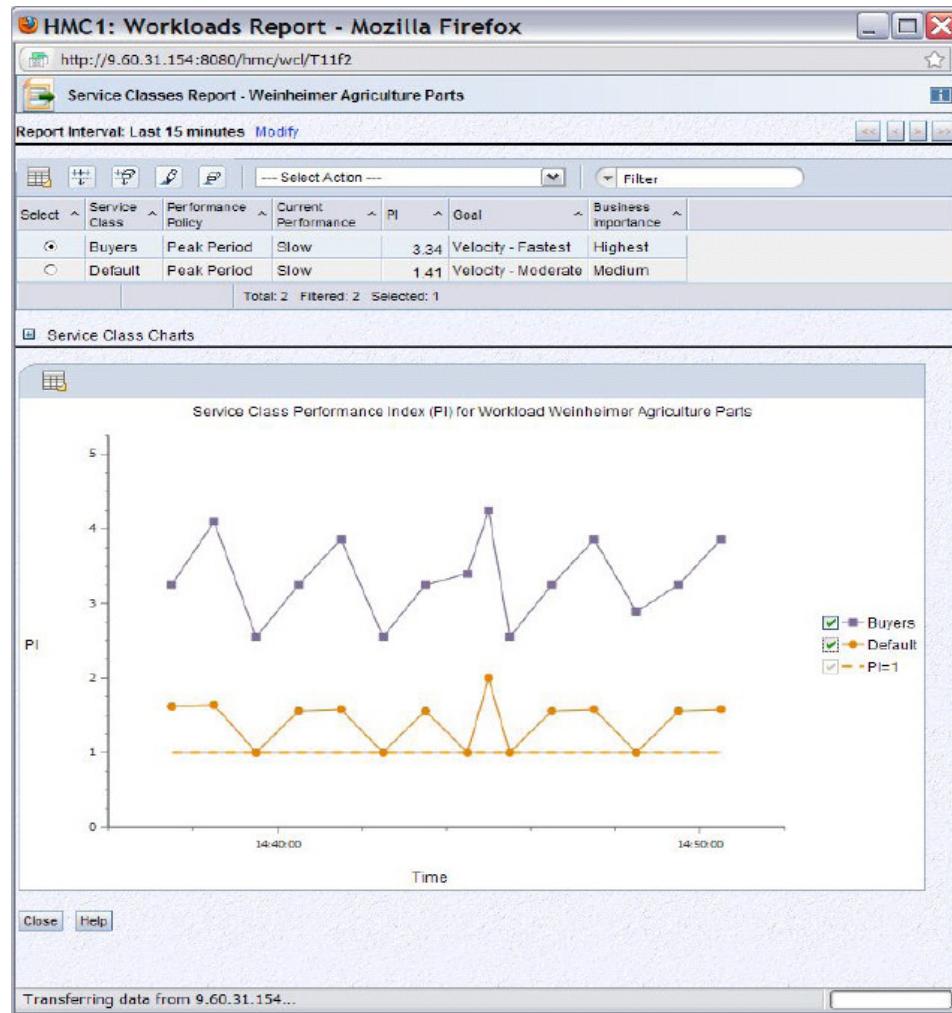
# Unified Resource Manager Workload Performance Policy

- Defines performance goals for virtual servers in a workload
  - Conceptually similar to simplified z/OS WLM Policy
- Provides basis for monitoring and management of platform resources used by virtual servers in a Workload
- Workload to performance policy relationship:
  - A Workload can have multiple performance policies associated with it
  - Single policy is active at a given time
  - Can dynamically change the policy that is active
    - Through the UI
    - Through a timed based schedule
      - *Example: Day shift policy / night shift policy*



# Unified Resource Manager Workload Based Monitoring and Reporting

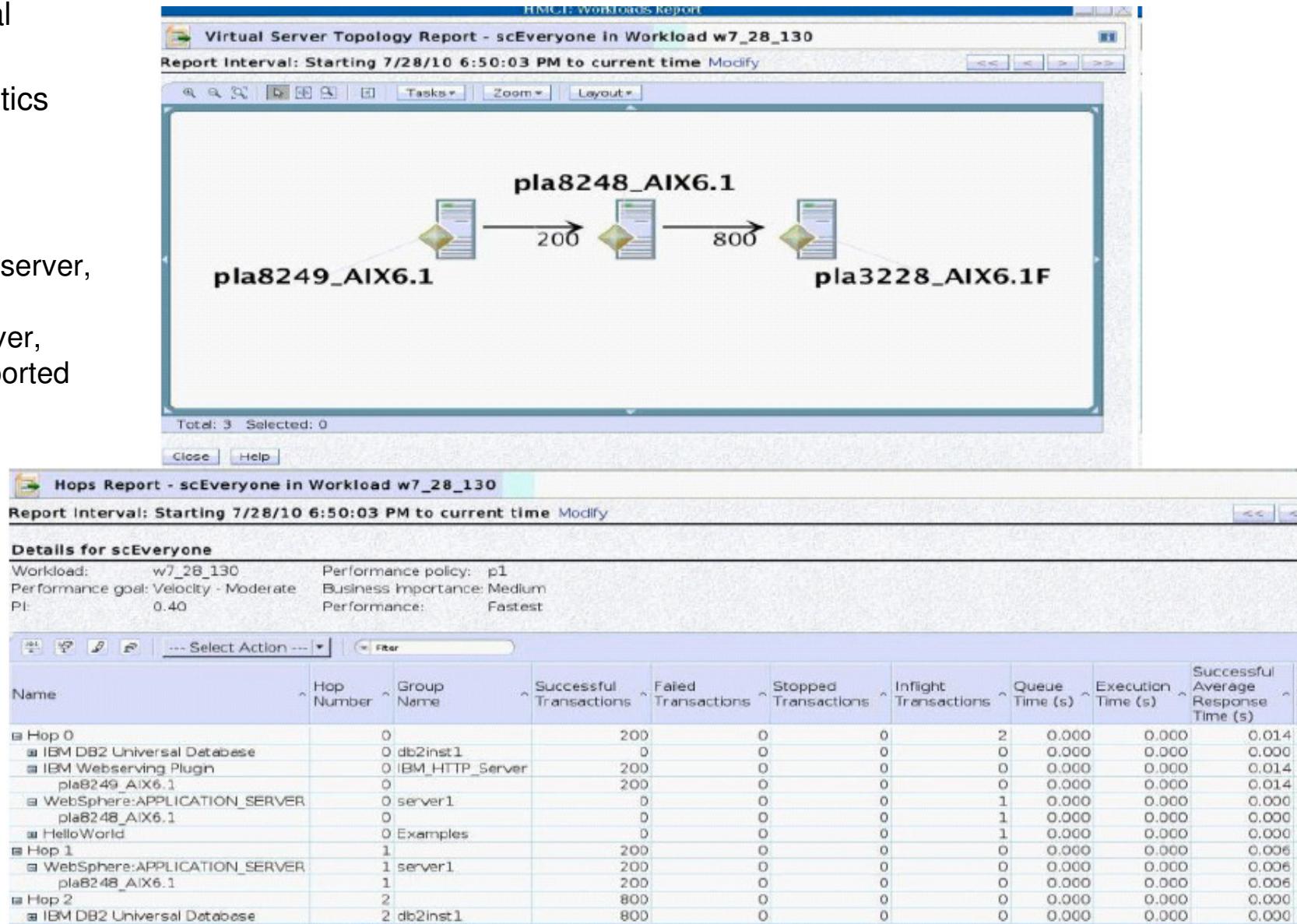
- Provide reporting capability that shows usage of platform resources in a Workload context with a zEnterprise Ensemble scope
  - Across virtual servers and optimizers supporting the Workload
- Workload goal vs. actual reporting
- Drill down from overall Workload “performance health” view to contributions of individual virtual server / optimizers
- Graphical views
  - Topology, trending graphs, etc.
- Links to system activity displays to show hardware utilization views
- Reporting limited to platform level resources, not trying to replace tools that report on intra-OS resources and performance



# Unified Resource Manager – Transaction Topology and Hops Report



- Topology of virtual servers
- Transaction statistics
- Requires ARM-instrumented middleware
  - E.g. IBM HTTP server, WebSphere Application Server, DB2 on all supported platforms



# WLM support for Unified Resource Manager

- The *guest platform management provider* (GPMP) is the interface between the Unified Resource Manager and the z/OS Workload Manager
- GPMP
  - passes to WLM information about the platform wide performance goals of workloads in which the z/OS is participating
  - sends data provided by WLM to the HMC for platform performance monitoring
    - Server configuration and high level performance statistics collected on z/OS
    - Aggregated transaction response time and resource data for the ARM-instrumented applications
- WLM
  - supports GPMP configuration and management by new WLM service definition options, commands, and messages
  - manages the GPMP address space (start, stop, and restart)
  - displays GPMP status information
  - collects and aggregates performance measurements for GPMP

# WLM support for Unified Resource Manager Service Definition Enhancements for GPMP

- z/OS V1R12 introduces WLM functionality level LEVEL025 to support Unified Resource Manager and GPMP
- Unified Resource Manager Service Classes can be classified to WLM service and report classes by specifying classification rules for subsystem EWLM
  - ~~Work qualifier ETC (EWLM transaction class name)~~ is no longer supported
  - Work qualifier type ESC (EWLM service class name) is used to correlate Unified Resource Manager service classes with WLM service or report classes

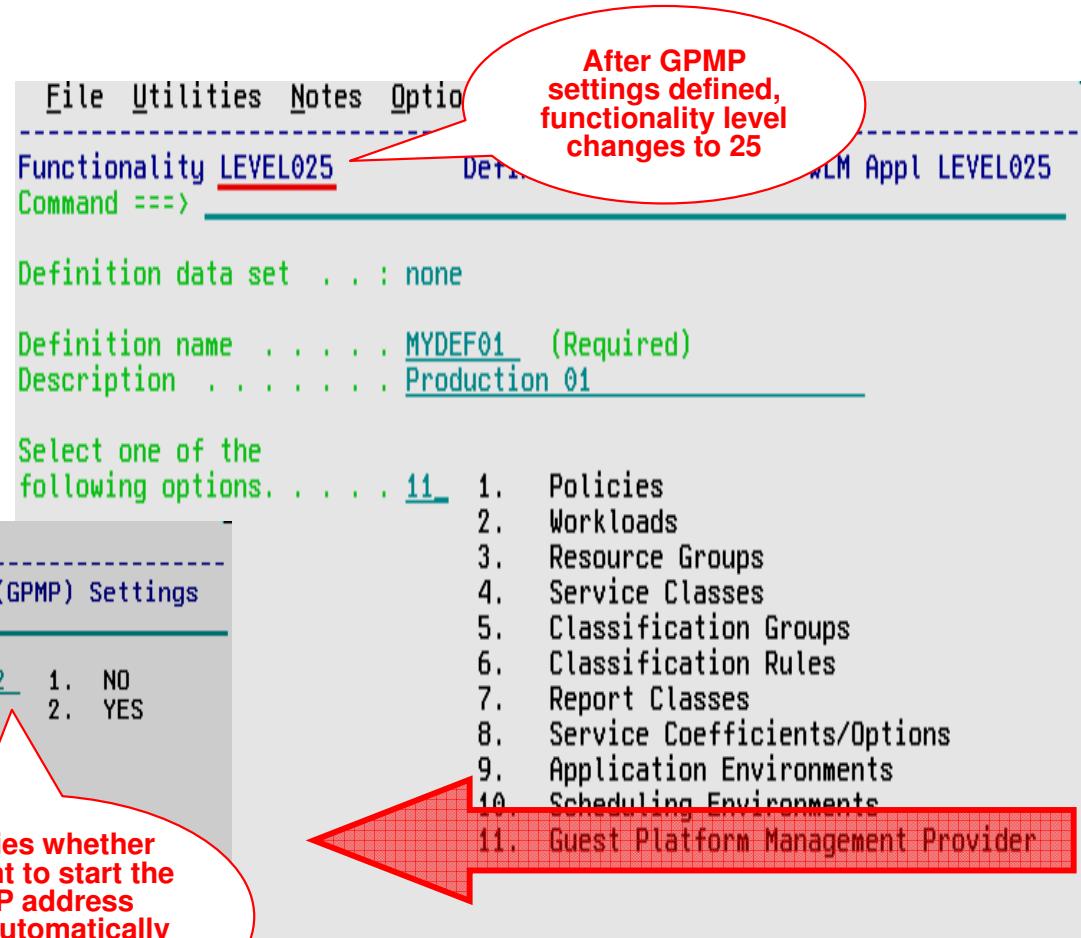
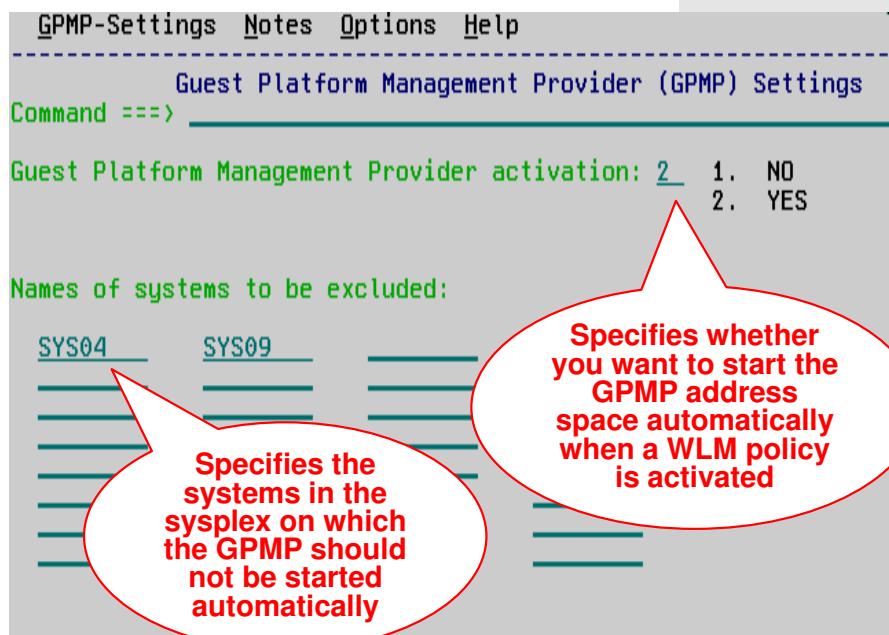
Action	Type	-----Qualifier-----	Name	Start	DEFAULTS:	-----Class-----	Service	Report
1	ESC		Booking					
2	ESC		System	9				
3	ESC		GoldServ	15				
4	ESC		ice	23	SERVCLS3			

- Although z/OS V1R12 simply disregards ETC classification rules, you have to delete them the next time you modify the EWLM subsystem type classification rules
  - Message **IWMAM726 ETC is not a recognized qualifier type** is displayed when pressing F3=Exit
  - Rows with ETC rules have to be deleted before F3 becomes successful

# WLM support for Unified Resource Manager Service Definition Enhancements for GPMP

## To configure GPMP

- 1) Select option 11 on the Definition Menu
- 2) Specify Guest Platform Management Provider settings



# WLM support for Unified Resource Manager GPMP Configuration and Management

- On **policy activation**
  - WLM checks whether the service definition has valid GPMP settings
  - If activate=yes and system name not specified on excluded-list, GPMP is started automatically
- Also, you can use the **MODIFY WLM** command
  - To start the GPMP on a system
  - To stop the GPMP on a system
  - Intended for recovery actions. Recommended is to manage GPMP through WLM
- Once you stopped the GPMP manually, the GPMP switches into “manual mode”. It is not automatically restarted even if a WLM policy with a valid GPMP configuration gets activated
  - Status maintained until next IPL

# WLM support for Unified Resource Manager

## GPMP related Commands

- Use the **MODIFY WLM,GPMP** command to start, stop, and modify the guest platform management provider:
  - **F WLM,GPMP,START**
    - Indicates that you want to start the GPMP

```
16.55.59 WLMG          f wlm, gpmp, start
16.55.59 WLMG STC00752 $HASP373 HVEMCA    STARTED
16.55.59 WLMG STC00752 IEF403I HVEMCA - STARTED - TIME=16.55.59
```

- **F WLM,GPMP,STOP**
  - Indicates that WLM stops the currently active GPMP instance

```
17.03.39 WLMG          f wlm, gpmp, stop
17.03.39 WLMG STC00753 IEF404I HVEMCA - ENDED - TIME=17.03.39
17.03.39 WLMG STC00753 $HASP395 HVEMCA    ENDED
```

- **F WLM,GPMP,TRACE=NONE|LOW|MEDIUM|HIGH,DEST=FILE|MEMORY**
  - Enables you to change the GPMP internal tracing level “on the fly” and to change the destination of the trace (file or memory)

# WLM support for Unified Resource Manager GPMP related Commands

- DISPLAY WLM command extensions:

```
IWM025I 11.42.45 WLM DISPLAY 231
ACTIVE WORKLOAD MANAGEMENT SERVICE POLICY NAME: BASEPOL
ACTIVATED: 2010/02/18 AT: 12:57:55 BY: BMAI      FROM: TRX2
DESCRIPTION: Base policy for system test
RELATED SERVICE DEFINITION NAME: Ralfpol
INSTALLED: 2010/02/18 AT: 12:57:48 BY: BMAI      FROM: TRX2
WLM VERSION LEVEL:      LEVEL 025
WLM FUNCTIONALITY LEVEL: LEVEL 025
WLM CDS FORMAT LEVEL:    FORMAT 3
STRUCTURE SYS2WLM_WORKUNIT STATUS: CONNECTED
STRUCTURE SYS2WLM_EBAE2097 STATUS: CONNECTED
```

To display system and GPMP status information, enter:

**D WLM,SYSTEMS,GPMP**

**STATE OF GUEST PLATFORM MANAGEMENT PROVIDER (GPMP): ACTIVE**

*SYSNAME*	*MODE*	*POLICY*	*WORKLOAD MANAGEMENT STATUS*
TRX1	GOAL	BASEPOL	ACTIVE
TRX2	GOAL	BASEPOL	ACTIVE

**\*SYSNAME\* \*GPMP STATUS\***

TRX1	INACTIVE
TRX2	ACTIVE

```
IWM075I 11.45.43 WLM DISPLAY 233
```

ARM SERVICES ARE ENABLED
GUEST PLATFORM MANAGEMENT PROVIDER JOBNAME=HUEMCA ASID=0032
GPMP POLICY IS ACTIVE
NUMBER OF REGISTERED PROCESSES=3, APPLICATIONS=1

To display whether ARM is enabled or disabled, enter:

**D WLM,AM**

# WLM support for Unified Resource Manager

## GPMP related Commands

- The existing **MODIFY WLM,AM=DISABLE|ENABLE** command is not changed, but the logic for DISABLE/ENABLE changed in the following way:
  - Disabling ARM (Application Response Measurement) will terminate a running GPMP
  - Manually starting the GPMP (using the MODIFY WLM,GPMP,START command) when ARM is disabled will result in message IWM078E
  - Activating a WLM policy that contains valid GPMP settings will not result in the start of a GPMP instance, if ARM is disabled
  - The state of the GPMP will be displayed as “DISABLED”, if ARM is disabled
  - If ARM is enabled again, the state of the GPMP will change to “STOPPED”. To start the GPMP again, it has to be started manually

# WLM support for Unified Resource Manager GPMP Installation

- GPMP must be authorized to run as a trusted started task
- Sample job HVEENV provided in SYS1.SAMPLIB to
  - define the GPMP security setup (see STEP01)
  - configure the execution environment for the GPMP (see STEP02)
- Modify following variables according to your specific environment:

Variable	Description
DATA_ROOT	Directory on UNIX where the GPMP stores the configuration and diagnostics data
JREBIN_ROOT	Directory on UNIX where the Java executable is located
LOGFILE_ROOT	Directory where the GPMP startup related diagnostics messages will be stored
MCA_USER	The user created in STEP01 of the JCL. It is recommended to keep HVEMCA1 as the user name.
MCA_GROUP	The group created in STEP01 of the JCL. It is recommended to keep HVEMCA as the group name.
MCA_JAVADUMPS	Optional USS directory where GPMP Java, Heap, SNAP, CEE dumps will be created
ENV_PROFILE	The UNIX profile to be used by the GPMP. This should contain environmental information, for example, TimeZone, Locale.

- Run the JCL from an authorized user with UID=0
- STEP01 must be modified when running GPMP in a SECLABEL environment
  - Example provided in Chapter 15 of the WLM Planning Guide

# WLM support for Unified Resource Manager

## Prerequisites

- Hardware
  - z196 with zEnterprise Unified Resource Manager
  - Guest platform management provider on z/OS cannot be started on pre-z196 servers
    - If started on pre-z196 servers, message  
**IWM078E GUEST PLATFORM MANAGEMENT PROVIDER CANNOT BE STARTED, FUNCTION NOT AVAILABLE**  
is issued on the console
- Software
  - z/OS V1R12 and OA30928
  - For z/OS V1R10 and V1R11: OA30928

# Agenda

- Transaction Management Enhancements
  - Non Shell Enclave Server Management
  - CICS Region / Response Time Management
  - Response Time Distribution for Execution Velocity Goals
- Hiperdispatch APARs
- WLM Support for I/O Priority Manager in DS8K Series
- WLM Support for IBM zEnterprise 196
- Temporary Capacity Reporting via SYSEVENT REQLPDAT
- z/OSMF Workload Management
- WLM support for Unified Resource Manager
- Capacity Provisioning Update Summary
- WLM Tools Overview

# Capacity Provisioning Enhancements in z/OS V1.13



- Capacity Provisioning management enhancements
  - **Provisioning increments** allow for faster or more aggressive provisioning
  - **Recurring time condition** support allows to define recurring time windows
    - Allows to avoid ENABLE and DISABLE commands
  - Statement of Direction to withdraw support for the SNMP
    - z/OS BCPii is the recommend protocol
- Control Center Enhancements
  - Support the 32- and 64-bit versions of Microsoft Windows 7 Professional Edition
- **New with z/OSMF V1.13:**
  - Capacity Provisioning monitoring task



# z/OS V1.13: Primary and secondary capacity quantum



- Up to z/OS 1.12 CPM increases capacity in small increments
  - On full speed models adding one processor at a time
- Starting with z/OS 1.13 CPM plans to support primary and secondary activation quantum
  - Primary quantum added for first activation on a given CPC
  - Secondary added on subsequent activations
  - Defined on “Maximum Provisioning Scope” Panels.
    - Only general purpose capacity supports primary and secondary quantum at this time.
  - Retrofit to z/OS V1.11, V1.12

The screenshot shows the z/OS Capacity Provisioning Control Center interface. The left pane is a tree view of the workspace, showing categories like Provisioning Manager, Configurations, Policies, and Rules. Under Policies, there are three entries: SAMPTD, SAMPWLD1, and SAMPWLD2. SAMPWLD2 is expanded, showing sub-items: Policy Timeline, Logical Processor Scope, Max. Provisioning Scope, and Rules. The Rules section contains two entries: EndOfOct\_DB and EndOfOct\_WEB, each with its own Conditions folder. The main pane displays the "Maximum Provisioning Scope" configuration for the SAMPWLD2 policy. It includes a table with columns for CPC, Max. MSU, Max. zAAP Processors, Max. zIIP Processors, Primary Activation (MSU), and Secondary Activations (MSU). Two rows are present: one for CPC H05 with values 2500, 2, 1, 1500, and 500; and another for CPC R35 with values 300, 0, 0, 1000, and 100.

CPC	Max. MSU	Max. zAAP Processors	Max. zIIP Processors	Primary Activation (MSU)	Secondary Activations (MSU)
H05	2500	2	1	1500	500
R35	300	0	0	1000	100

# z/OS V1.13: Recurring time conditions



- Previously the CPM policy supported only fixed time intervals
  - Defined by start date/time and end date/time
- Starting with z/OS 1.13 CPM plans to support (weekly) recurring time conditions
  - Defined by start date, end date, start time, end time and day of week to which it applies
  - Plan to retrofit to z/OS V1.11, V1.12

The screenshot shows the z/OS Capacity Provisioning Control Center - Domain GUI2 interface. The left pane is a tree view of the workspace, showing categories like Workspace, Provisioning Manager, Configurations, Policies, and Rules. Under Policies, there are several entries including SAMPWLD2, which is currently selected. The main pane displays the 'Time Conditions' dialog box. In the 'Time Conditions Properties' section, the Policy is set to 'SAMPWLD2', the Rule is 'EndOfOct\_DB', and the Condition is also 'EndOfOct\_DB'. The 'Times displayed in Time Zone:' field is set to 'UTC'. Below this, there are two tabs: 'Nonrecurring' (selected) and 'Recurring'. Under the 'Nonrecurring' tab, there are buttons for 'Add Time Condition', 'Duplicate Time Condition', and 'Delete Time Condition', along with 'Apply' and 'Cancel' buttons. A table below lists a single non-recurring time condition: November, from Nov 1, 2010 to Nov 30, 2010, with specific days of the week checked (Monday, Tuesday, Wednesday, Friday). The table columns include Name, Start Date, End Date, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, Start Time, Deadline, and End Time.

Name	Start Date	End Date	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Start Time	Deadline	End Time
November	Nov 1, 2010	Nov 30, 2010	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11:00 AM	8:00 AM	10:00 AM				

# Capacity Provisioning Support of zEnterprise 196 Static Power Save Mode



- Commands to disable or enable static power save mode:

## Syntax

```
► ┌─ DISABLE ── POWERSAVE ── CPC=name ──  
D ─ PS
```

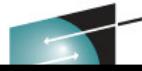
```
► ┌─ ENABLE ── POWERSAVE ── CPC=name ──  
E ─ PS
```

- Existing reports are extended to report on power-save capability, and whether power-save mode can currently be enabled

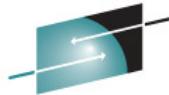
```
CPC R35 with record * is enabled (default enabled)  
CPC is matched with serial 000020089F25 since 07/23/2010 13:32:13  
Hardware is of type 2817 with model M49  
Current model is 722 with 2119 MSU, 1 zAAPs, and 1 zIIPs  
No usable OOCoD record available  
Power save mode is enabled
```

- If power-save mode cannot be re-enabled in current period: “Power save mode is disabled and not allowed”
- For CPCs supporting static power save mode the Provisioning Manager will not consider adding capacity based on the active policy while in power save mode
  - Already activated temporary capacity may be deactivated
  - ACTIVATE RESOURCE and DEACTIVATE RESOURCE commands are not affected by power save mode.
- Requires Automate version of the zEnterprise Unified Resource Management suite
  - CPC Power Saving setting must be “Custom”
  - Also see “Controlling IBM zEnterprise 196 Static Power Save Mode via MVS Capacity Provisioning Manager (CPM)” at <http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101869>

# Capacity Provisioning New Function Overview



<i>z/OS (CPM) release</i>	V1.13	V1.12	V1.11	V1.10	V1.9
<i>Function</i>					
<i>z/OSMF release</i>	V1.13	V1.12	V1.11	V1.10	V1.9
Capacity increments Recurring time conditions	+	OA35284	OA35284	OA35284 Toleration-only	
CPCC Windows 7 support	+				
z196 Static Power Save Mode	+	OA30433	OA30433	OA30433	OA30433 Toleration-only
Samples for security definitions (CIM, CPM, z/OSMF)	+	+ (OA32854)			
Control Center reporting enhancements, Windows Vista™ support	+	+			
CICS/IMS transaction classes support	+	+	OA29641	OA29641	
RMF provider can locate DDS dynamically	+	+	OA31118	OA31118	
z/OS BCPII Support and Logical Processor Mgmt	+	+	+	OA25426 OA24945	
<i>z/OSMF release</i>	V1.13	V1.12	V1.11	V1.10	V1.9
CPM Status Monitoring	+				



धन्यवाद

Hindi

多謝

Traditional Chinese

ຫວັງຈີນ

Thai

Спасибо

Russian

شُكْرًا

Arabic

Grazie

Italian

பொன்னி

Tamil

多謝

Simplified Chinese

Danke

German

Bedankt

Dutch

Merci

French

ありがとうございました

Japanese

감사합니다

Korean

# WLM Tools: A Summary

Tool	Name	Description	Content	Support
SVDEF	Service Definition Formatter	Uses output from WLM Administrative Administration to display content of service definition in a workstation spreadsheet	Excel/workstation	Not updated anymore but still available on WLM Tools page
WSE	Service Definition Editor	<b>Allows to create, modify, retrieve and install WLM service definitions</b>	Java program on workstation	<b>YES!! Available</b>
WLMQUE	Application Environment Viewer	<b>Allows to monitor WLM Application Environments</b>	ISPF Tool	<b>YES!! Available</b>
WLMOPT	OPT Display	Display WLM/SRM OPT Parameters	IPF Tool	<b>No!!</b> <b>Obsoleted by RMF in z/OS V1.11</b>

<http://www-03.ibm.com/servers/eserver/zseries/zos/wlm/tools/>

# WLM Tools

## Service Definition Editor

WLM Service Definition Editor - D:\SAMPLESD.xml

File Edit Options Help

local ▾

Classification Groups		Classifications		Service Parameter		Application Environments		Scheduling Environments			
Service Definition		Resource Groups		Workloads		Service Policies		Report Classes			
Name	ServiceClasses	Period	Goal	Im...	Duration	ResponseTime	Perce...	Level	ResourceGr...	CPU...	Description
WKLDASC											All APPC Transaction
WKLDASC	A3V30STD								GBATCH20	No	ASCH default Service Class
WKLDASC	A3V30STD	1	Velocity	2	500			10			
WKLDASC	A3V30STD	2	Velocity	2	-			8			
WKLTKJ											All Batch Jobs
WKLTKJ	B4V10STD								-	No	Batch Standard VEL 10 IMP 4
WKLTKJ	B4V1 used by: Classification : JES		Velocity	4	-			10			
WKLTKJ	B4V20STD								-	No	Batch Standard VEL 20 IMP 4
WKLTKJ	B4V20STD	1	Velocity	4	1000			20			
WKLTKJ	B4V20STD	2	Velocity	1	-			10			
WKLDTSO											All TSO USERIDS
WKLDTSO	T2335DEV								-	No	Developer (Standard) TSO
WKLDTSO	T23	Insert	PrecentileResponseTime	2	2500	00:00:02.000	98				
WKLDTSO	T23	Insert Before	AverageResponseTime	3	300000	00:00:20.000	95				
WKLDTSO	T23	Insert After	PercentileResponseTime	5	-			10			
WKLDTSO	T23	Replace by							-	No	Production TSO Helpers
WKLDTSO	T23	Copy	PrecentileResponseTime	2	2000	00:00:01.000	99				
WKLDTSO	T23	Cut	PrecentileResponseTime	2	10000	00:00:02.000	99				
WKLDTSO	T23	Delete	PrecentileResponseTime	2	10000	00:00:02.000	99				
No		Description				Element					
1		Importance value can not be null				Workload "WKLTKJ"/ServiceClass "B4V20STD"/Velocity (#1)					
2		WLM may not distinguish between periods with equal importance and only slightly different velocity levels				Workload "WKLDASC"/ServiceClass "A3V30STD"					
Help Error											
Ok											

# WLM Tools

## Display WLM/SRM OPT Parameter (WLM Tool, supported up to R10)

```

. Command ==>                               Scroll ==> PAGE      .
. System: AQFT     WLM OPT Settings          >SAVE<      .
. OPT-Parameter:   Version: z/OS 011100  OPT: FT  Time: not issued
.                           Value:           Description:
. ABNORMALTERM          Yes Abnormal term. used in routing rec.
. BLWLTRPCT             5 CPU cap. to promote blocked work
. BLWLINTHD             20 Time blocked work waits for help
. CCCAWMT               3200,3200 AWM time value (defined, used)
. ZAAPAWMT              3200,3200 AWM time value for zAAPs (def, used)
. ZIIPAWMT              3200,3200 AWM time value for zIIPs (def, used)
. CNTCLIST              No Clist commands count individually
. CPENABLE              10,30 LOW,HI thresh for % TPI int. x 100
. DVIO                  Yes Specifies w/ directed VIO is active
. ERV                   1000,E6 Enq res. CPU Service and DP
. HIPERDISPATCH         Yes,Yes Hiperdispatch value(inOPT, Running)
. IFAHONORPRIORITY      Yes Specifies if CPs may help zAAPs
. IIIPHONORPRIORITY     Yes Specifies if CPs may help zIIPs
. INITIMP               0,FE INITIMP value and DP for initiators
. MCCAFCTH              400,800 LOW,HIGH central threshold
. MCCFXEPR              92 % of storage fixed within first 16MB
. MCCFXTPR              80 % of online storage fixed
. PROJECTCPU            No CPU projection for zAAPs and zIIPs
. RCCFXTT               66,72 Low,High Logical MPL threshold
. RCCFXET                82,88 Low,High Physical MPL threshold
. RMPTTOM                1000 SRM invocation interval
. STORAGENSDP          Yes Set Non-swappable AS non dispatchable
. STORAGEWTOR          Yes Issue IRA221D and IRA421D
. IRA405I                46,32,32 IRA405I warning level: 16M,2G,Tot
. VARYCPU                No VARYCPU is enabled
. VARYCPUMIN             1 VARYCPUMIN value
. WASROUTINGLEVEL        0 WebSphere Routing Level
.
.
```

# WLM Tools

## Display WLM/SRM OPT Parameter (RMF Monitor II OPT Report)

boewlm1 - wc3270

RMF - OPT Settings Line 1 of 29  
 Command ==> **■** Scroll ==> PAGE

CPU= 4 UIC= 65K PR= 0 System= WLM1 Total

OPT: 00 Time: N/A

-- Parameter --	-- Default --	-- Value --	Unit	Description
ABNORMALTERM	Yes	Yes	Y/N	Abnormal terminations in routing
BLWLINTHD	20	20	sec	Time blocked work waits for help
BLWLTRPCT	5	5	0/00	CPU cap. to promote blocked work
CCCAWM	12000	12000	usec	Alternate wait management time
ZAAPAWMT	12000	12000	usec	AWM time value for zAAPs
ZIIPAWMT	12000	12000	usec	AWM time value for zIIPs
CNTCLIST	No	No	Y/N	Clist commands count individually
CPENABLE	10, 30 0, 0	10, 30	%	Threshold for TPI (low,high)
DVIO	Yes	Yes	Y/N	Directed VIO is active
ERV	500	500	/CB SU	Enqueue residency CPU Service/DP
HIPERDISPATCH	No	No	Y/N	Hiperdispatch is desired/active
IFAHONORPRIORITY	Yes	Yes	Y/N	Allows CPs to help zAAPs
IIPHONORPRIORITY	Yes	Yes	Y/N	Allows CPs to help zIIPs
INITIMP	0	0	/FE #	INITIMP value/DP for initiators
IRA405I	70, 50, 50	70, 50, 50	%	Fixed storage of <16M,16M-2G, tot
MAXPROMOTETIME	6	6	*10s	Holder allowed to run promoted
MCCAFCTH	400, 800	400, 800	#	Threshold for storage (low,ok)
MCCFXEPR	92	92	%	Fixed storage threshold < 16 MB
MCCFXTPR	80	80	%	Fixed online storage threshold
PROJECTCPU	No	No	Y/N	CPU projection for zAAPs, zIIPs
RCCFXET	82, 88	82, 88	%	Physical MPL threshold (low,high)
RCCFXTT	66, 72	66, 72	%	Logical MPL threshold (low,high)
RMPTTOM	1000 3000	3000	msec	SRM invocation interval
RTPIFACTOR	100	100	%	PI affects server routing weights
STORAGE NSWDP	Yes	Yes	Y/N	Sets non-swap, ASID non-dispatch.
STORAGEWTOR	Yes	Yes	Y/N	WTOR to cancel AS in shortage
VARYCPU	Yes	Yes	Y/N	VARYCPU is enabled
VARYCPUMIN	1	1	#	VARYCPUMIN value
WASROUTINGLEVEL	0	0	#	WebSphere routing level

F1=HELP F2=SPLIT F3=END F4=RETURN F5=RFIND F6=SORT  
 F7=UP F8=DOWN F9=SWAP lis F10=LEFT T F11=RIGHT IPY\$1C09 F12=RETRIEVE  
 4B X 002/015

# WLM Tools

## WLMOPT – WLM Application Environment Viewer

```

. Command ===>                               Scroll ===> PAGE
.                                         Application Environment Monitor
. Selection: >HELP< >SAVE< >OVW< >ALL< \AE=SYSBATCH
. System: AQFT      Sysplex: MCLXCF01 Version: z/OS 011100 Time: 06:22:27
.
. ApplEnv_ Type SubName_ WMAS Del Dyn NQ QLen Str Hav Unb Trm Min_ Max_ ICnt
. SYSBATCH JES   JES2    0031 No  No   3    0   0  12  0   0   0   0   0
.
. WorkQue_ Del Wnt Hav ICnt QueIn_ QueOut QueLen QueTot_ Act_ Idl_
. WLMLONG  No   7   7   0     0     0     0     0     4   3
. WLMSHORT No   3   3   0     0     0     0     0     2   0
. COMBUILD No   2   2   0     0     0     0     0     1   1
.
. SvAS Binding_ Ter Opr Btc Dem Have Jobname
. 0043 WLMLONG No  No Yes No   1 BCNDEVD
. 0175 WLMLONG No  No Yes No   1 ALLAEBS.2.SEAS.2.JBNI
. 0166 WLMLONG No  No Yes No   1 SERV9956
. 0165 WLMLONG No  No Yes No   1 SERV9955
. 015A COMBUILD No  No Yes No   1 C90SPACE
. 0150 WLMLONG No  No Yes No   1 INIT
. 0202 WLMLONG No  No Yes No   1 INIT
. 0152 COMBUILD No  No Yes No   1 INIT
. 0229 WLMSHORT No  No Yes No   1 BMGX1$
. 0119 WLMLONG No  No Yes No   1 INIT
. 0050 WLMSHORT No  No Yes No   1 ALLAEBS.2.SEAS.11.JBNI
. 01A5 WLMSHORT No  No Yes No   1 INIT
.
.
```