z/OS Workload Manager (WLM) Update for z/OS V1.13 and V1.12

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Agenda

- Transaction Management Enhancements
  - ➤ Non Shell Enclave Server Management
  - ➤ CICS Region / Response Time Management
  - ➤ Response Time Distribution for Execution Velocity Goals

- Hiperdispatch and other relevant 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: A short review

- 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)

- Typical exploitation through DB2 and Websphere
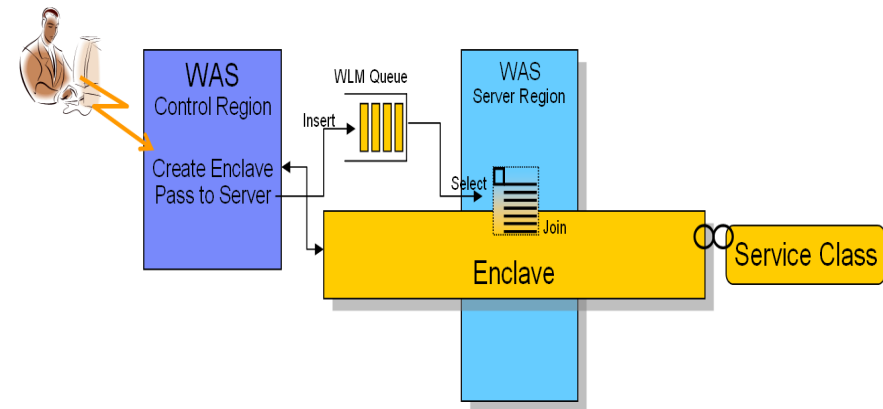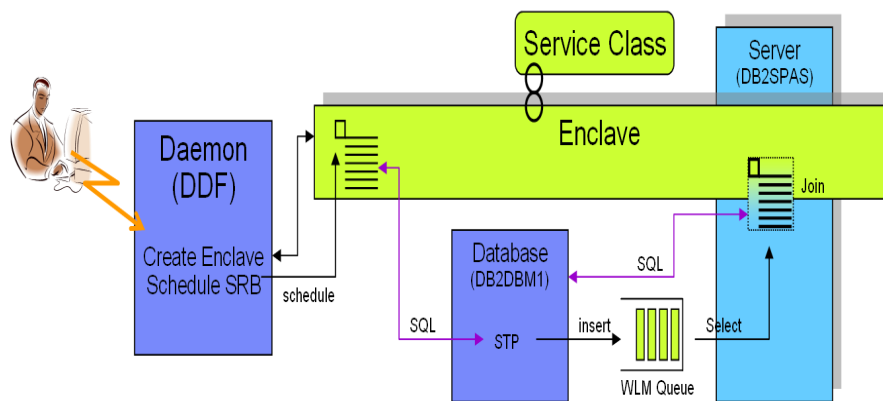
# WLM Enclave Server Management: A short review
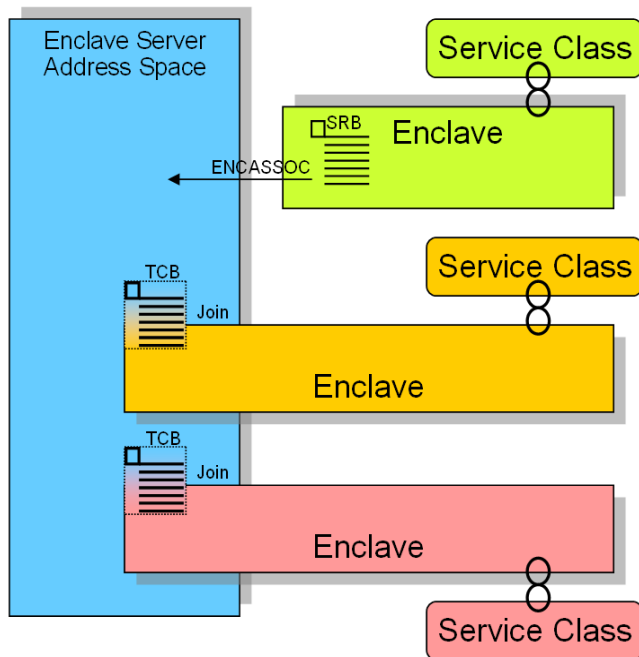
- An address space becomes an enclave server when
  - An enclave SRB issues SYSEVENT ENCASSOC
  - A TCB of the address space joins an enclave, and does not specify ENCLAVESERVER=NO (which is typically not the case)

- **Original** implementation assumed:
  - All work being executed within the address space is related to enclaves
    - Therefore no significant amount of work (TCBs) executing in such address spaces unrelated to enclaves

  - Enclave Server Management (old)
    - CPU and I/O DP is derived from service class of most important enclave
      - Hence 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 Rationale and Changes with z/OS 1.12

- However the original assumptions did not always hold true - there **are** examples of
significant work unrelated to an enclave:
  - ➢ Garbage collection for a JVM (WAS)
  - ➢ Common routines which provide service for the enclave TCBs
- Problems exist when no enclaves are running in server address spaces and the address space is swapped out

- Solution by new capability for managing non-enclave-related work.
- Controlled by new IEAOPT Parameter
  - ➢ **ManageNonEnclaveWork = {No|Yes}**
    - Yes: Work in the address space 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
- With ManageNonEnclaveWork =Yes the importance and goal of the service class for the address space is more important than it used to be. Housekeeping and address space(s) restart performed under the address space classification
- Recommendation:
  - ➢ Verify goal/importance settings for server address spaces and when acceptable specify ManageNonEnclaveWork = Yes
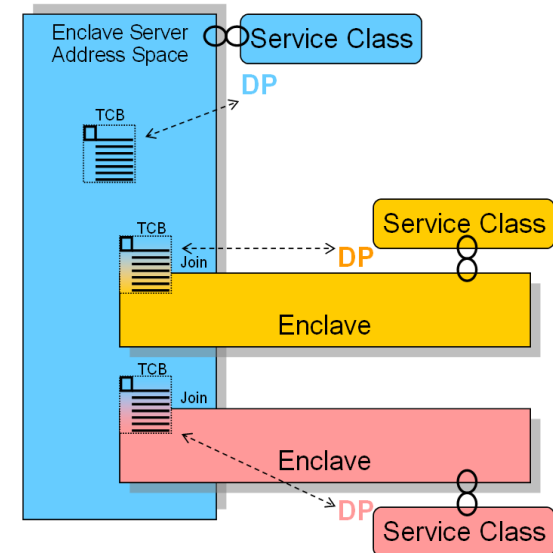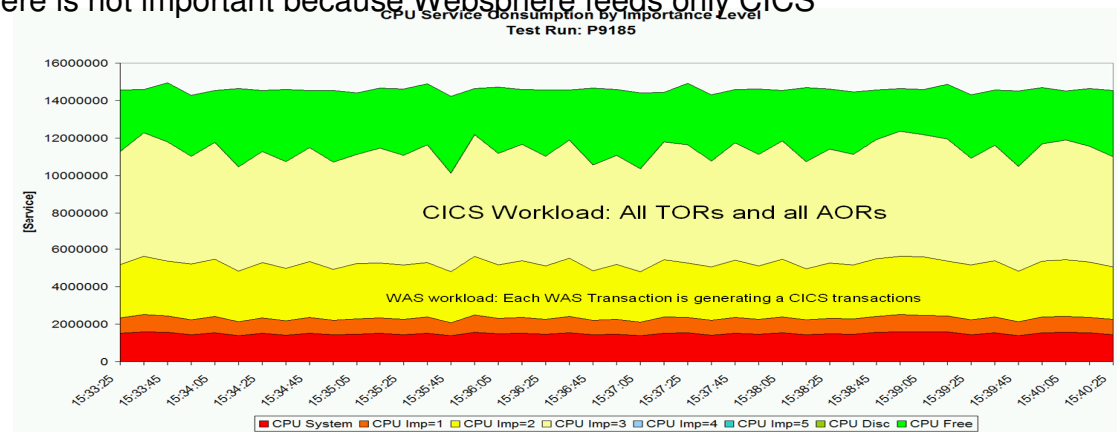
OA35428: New management option for CICS environments
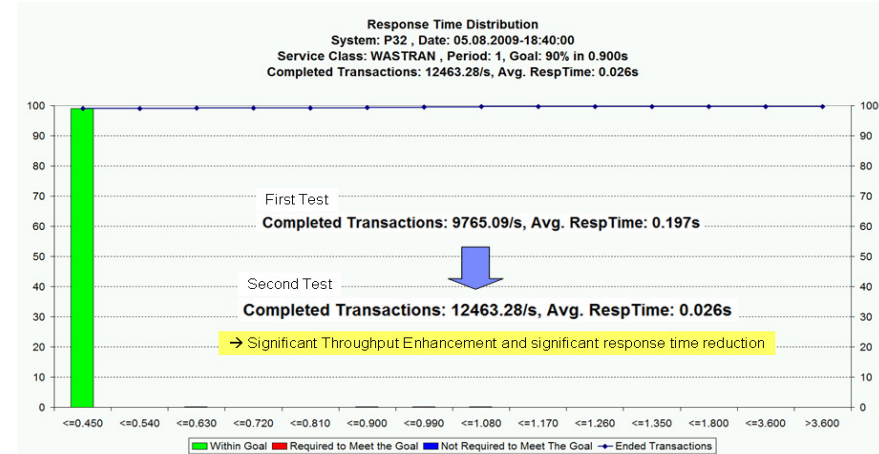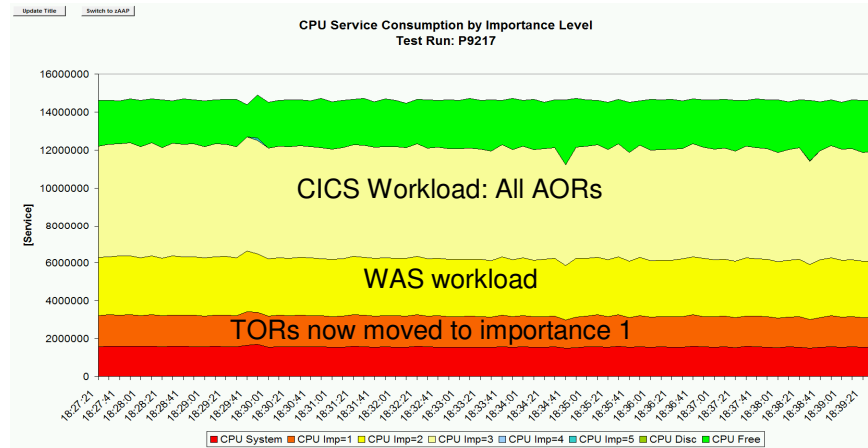## Problem scenario and analysis

- Problem can show up when a workload predominantly consists of a CICS workload with little displaceable other work
- Sample environment:
  - 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 could not exceed 80%
- Note: In this scenario, the presence of Websphere is not important because Websphere feeds only CICS

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

OA35428 Two possible circumventions

CPU Service Consumption by Importance Level
Test Run: P9217

CICS Workload: All AORs

WAS workload

TORs now moved to importance 1

Response Time Distribution
System: P32 , Date: 05.08.2009-18:40:00
Service Class: WASTRAN , Period: 1, Goal: 90% in 0.900s
Completed Transactions: 12463.28/s, Avg. RespTime: 0.026s

First Test
Completed Transactions: 9765.09/s, Avg. RespTime: 0.197s

Second Test
Completed Transactions: 12463.28/s, Avg. RespTime: 0.026s

→ Significant Throughput Enhancement and significant response time reduction

- Circumvention:
  - Move TORs to a service class with higher importance than AORs

    - Option 1: Exempt **all** regions from being managed by response time goals and classify TORs to a service class with higher importance than AORs.

      Disadvantage: No response time data present

    - Option 2: Exempt only AORs and move them to a service class with lower importance than the CICS service classes with response time goals.

      Disadvantage: Response time data cover only a small portion of the execution path because AORs consume much more than TORs.

OA35428: Solution concept

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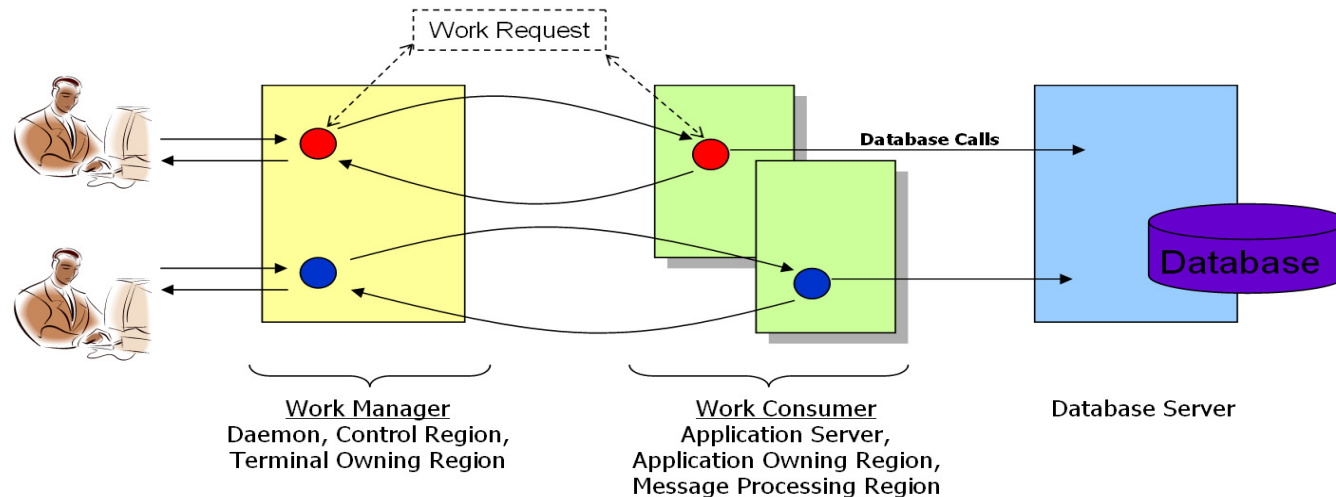
- Adjust WLM CICS management to follow "Work Manager/Consumer" model

  - 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 - needs quick access to CPU
  - An AOR is a server region which typically is much more resource intensive.
    - This is the work consumer. An AOR doesn't require the same instantaneous access to CPU than TORs

- WLM already has experience with that model:
  - 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

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Solution to solve the Work Manager/Consumer Model

- New "Manage Regions by Goals Of" option in WLM service definition: "BOTH"

  - Use option "BOTH" for TORs
    - 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
  - Stay with "Manage Regions by Goals Of Transaction" for AORs.

- 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

```
 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 ******************************
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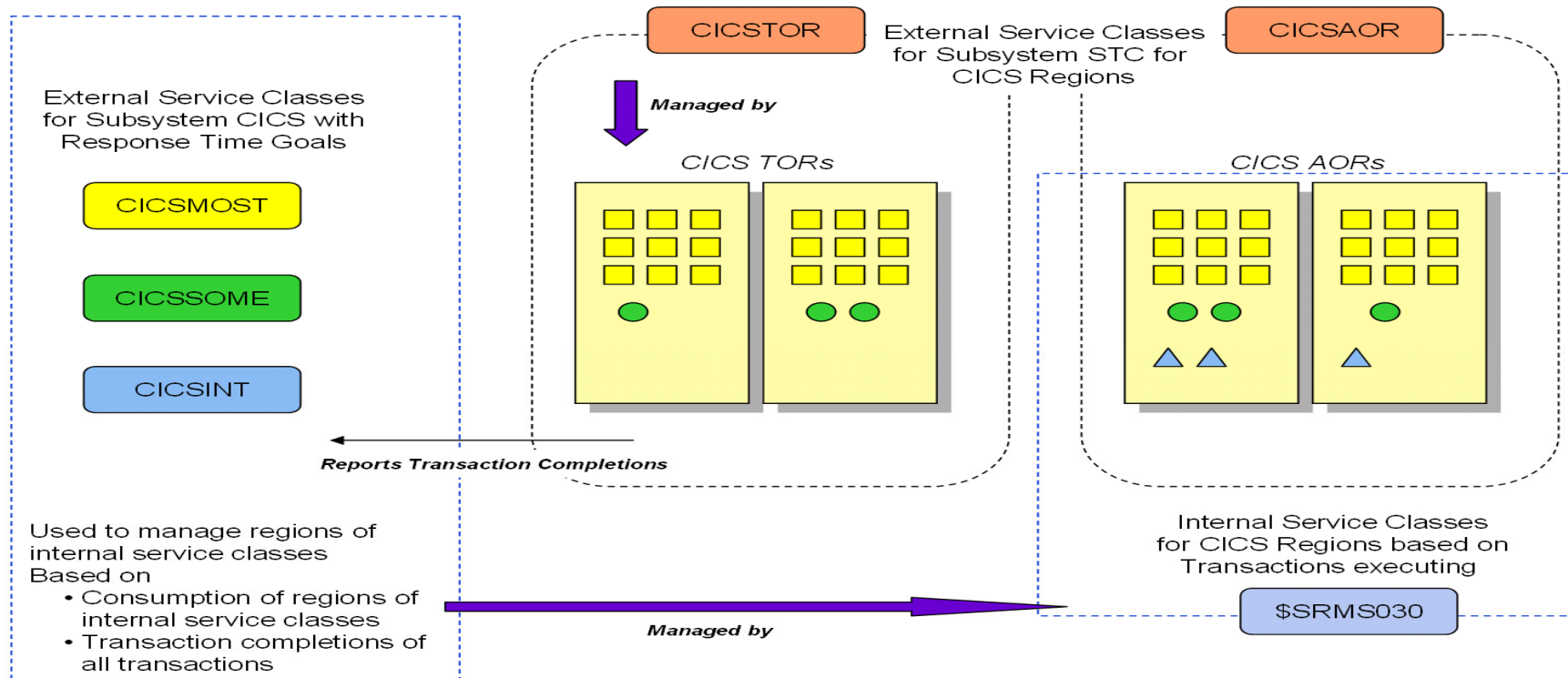
OA35428: New WLM Management Option
Structure of Service Classes

- 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

Background: WLM CICS 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 or 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
         - o 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. Especially suited for systems where CICS is the predominant workload.

- Currently WLM reporting does not provide a response time distribution (ended transactions) for workloads with velocity goals

- Sometimes it is desirable to have a response time distribution for <u>all</u> 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

- **Rationale**
  - Velocity goals do not have a „reference" response time

  - The mid-point (MP) should be set to values which matches the current workload conditions
    - Mid point may change drastically 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 $MP = M$
  - Mid point will be (re)computed after 10-70 min
    - Depending on significance of deviation

IWMWRCAA RT Distribution
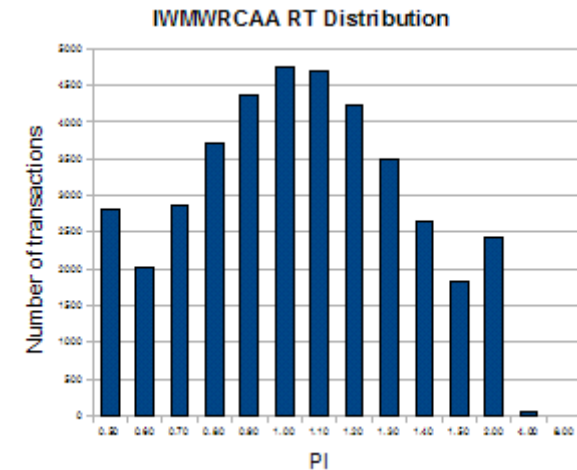
This is the ideal case:

The mid-point set by WLM is equals 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%


           ...
                            ---------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
<  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
<= 00.00.01.600      604          5       97.9      0.8           <= 00.00.02.400      604            5       97.9      0.8
>  00.00.01.600      617         13       100      2.1           >  00.00.02.400      617           13       100      2.1
```

Response Time Distribution for Velocity Goals:
RMF WLMGL Enhancement

```
REPORT BY: POLICY=BASEPOL     WORKLOAD=STC_WLD     SERVICE CLASS=STCLOW     RESOURCE GROUP=*NONE     PERIOD=1 IMPORTANCE=3
                                                   CRITICAL      =NONE

-TRANSACTIONS-      TRANS-TIME HHH.MM.SS.TTT  --DASD I/O--  ---SERVICE---   SERVICE TIME   ---APPL %---   --PROMOTED--   ----STORAGE----
AVG        5.24     ACTUAL              7.753  SSCHRT   1.5  IOC     6570    CPU    7.909  CP     22.19   BLK   0.000   AVG      612.39
MPL        5.24     EXECUTION           7.198  RESP     0.3  CPU    4503K   SRB  125.182  AAPCP   0.00   ENQ   0.000   TOTAL   3208.80
ENDED       436     QUEUED                552  CONN     0.1  MSO       0    RCT    0.009  IIPCP   0.00   CRM   0.000   SHARED     0.00
END/S      0.73     R/S AFFIN             2   DISC     0.0  SRB   71278K   IIT    0.026                 LCK   0.000
#SWAPS        0     INELIGIBLE            0   Q+PEND   0.2  TOT   75788K   HST    0.000  AAP     0.00   SUP   0.000   -PAGE-IN RATES-
EXCTD         0     CONVERSION           14   IOSQ     0.0  /SEC  126314   AAP    0.000  IIP     0.00                 SINGLE     0.0
AVG ENC    0.00     STD DEV             669                              IIP    0.000                               BLOCK      0.0
REM ENC    0.00                                             ABSRPTN   24K                                            SHARED     0.0
MS ENC     0.00                                             TRX SERV  24K                                            HSP        0.0

GOAL: EXECUTION VELOCITY 90.0%     VELOCITY MIGRATION:   I/O MGMT  95.5%     INIT MGMT 42.8%

            RESPONSE TIME EX   PERF  AVG    --EXEC USING%--  -------------- EXEC DELAYS % -----------   -USING%-  --- DELAY % ---    %
SYSTEM                VEL% INDX ADRSP  CPU AAP IIP I/O  TOT CPU                                         CRY CNT  UNK IDL CRY CNT  QUI

*ALL        --N/A--  95.5  0.9   5.3  4.4 0.0 0.0 0.0  0.2 0.2                                          0.0 0.0  0.4 95 0.0 0.0  0.0
TRX1                 97.2  0.9   2.6  4.3 0.0 0.0 0.0  0.1 0.1                                          0.0 0.0  0.4 95 0.0 0.0  0.0
TRX2                 94.0  1.0   2.7  4.4 0.0 0.0 0.0  0.3 0.3                                          0.0 0.0  0.4 95 0.0 0.0  0.0

                                    ----------RESPONSE TIME DISTRIBUTIONS----------
SYSTEM: TRX1 -----INTERVAL: 14.59.995 -----MRT CHANGES:  0 ---     SYSTEM: TRX2 -----INTERVAL: 14.59.995 -----MRT CHANGES:  0 ---
   ----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
<  00.00.05.317        6            6         2.7       2.7         <  00.00.05.317        7            7         3.2       3.2
<= 00.00.06.381       45           39        20.5      17.8         <= 00.00.06.381       38           31        17.5      14.3
<= 00.00.07.444       99           54        45.2      24.7         <= 00.00.07.444       88           50        40.6      23.0
<= 00.00.08.508      152           53        69.4      24.2         <= 00.00.08.508      139           51        64.1      23.5
<= 00.00.09.571      194           42        88.6      19.2         <= 00.00.09.571      193           54        88.9      24.9
<= 00.00.10.635      219           25        100       11.4         <= 00.00.10.635      217           24        100       11.1
<= 00.00.11.698      219            0        100        0.0         <= 00.00.11.698      217            0        100        0.0
<= 00.00.12.762      219            0        100        0.0         <= 00.00.12.762      217            0        100        0.0
<= 00.00.13.825      219            0        100        0.0         <= 00.00.13.825      217            0        100        0.0
<= 00.00.14.889      219            0        100        0.0         <= 00.00.14.889      217            0        100        0.0
<= 00.00.15.952      219            0        100        0.0         <= 00.00.15.952      217            0        100        0.0
<= 00.00.21.270      219            0        100        0.0         <= 00.00.21.270      217            0        100        0.0
<= 00.00.42.540      219            0        100        0.0         <= 00.00.42.540      217            0        100        0.0
>  00.00.42.540      219            0        100        0.0         >  00.00.42.540      217            0        100        0.0
```

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)	RCAEIMID (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 **too much** from RCAEIMID for a **too long** time
	RCAEIRCT (running count)	N/A (value always 0)	Total number of RCAEIMID changes since last policy activation
	RCAEITST (timestamp of last change)	Policy activation time	Time of last RCAEIMID change or time of last policy activation
RCAEDIST	RCAEDENT	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
OA38320: Reduce Sampling Overhead (WLM address space utilization)	OA38320	OA38320	OA38320	
Enclave Server Management (Non Shell Server Management)	+	+		
CICS Region/RT Management	+	OA35428	OA35428	OA35428
RT Distribution for Execution Velocity Goals	+			

- OA23320: DB2 and CICS subsystems can create many PB/PBDE control blocks for monitoring environments. Code reduces WLM CPU consumption on z196 and z114 when many such control block exists.

- 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 and other relevant 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**

OA37736: HiperDispatch Enhancements for "Unused Capacity" IBM

- Problem addressed:
  - If a large LPAR consumes below its weight-entitlement it is possible that a low-weight LPAR unparks many Vertical Low (VL) processors
  - Therefore small LPAR could "dominate" larger LPARs because those could not unpark their VLs

- Solution:
  - HiperDipatch considers now also the "unused capacity share" for a partition to unpark VLs.
    - This share is calculated by dividing the unused capacity (guaranteed but not used) of all partitions in the CEC by the share of the partitions which can use more capacity.
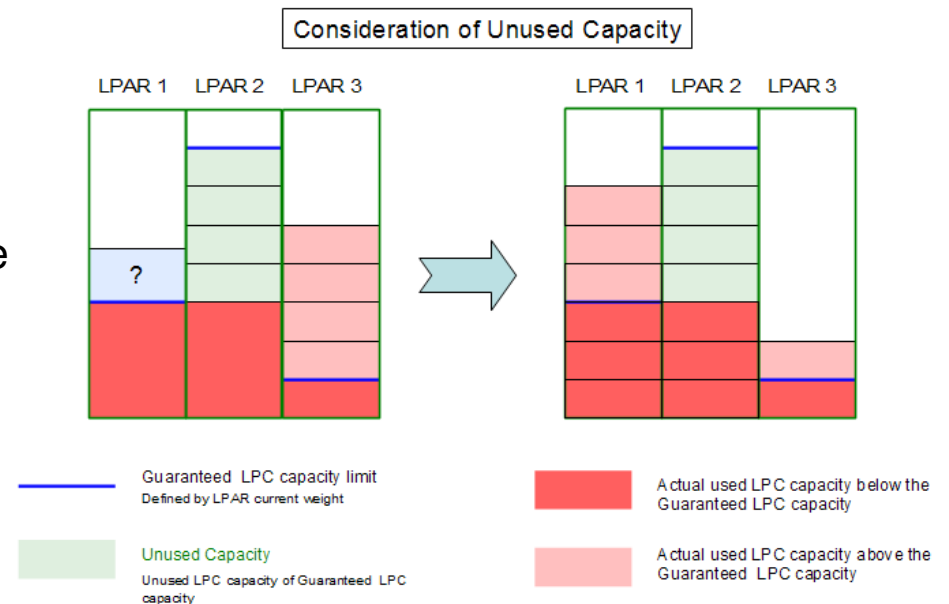
- Availability
  - OA37737 z/OS V1.12, V1.13 closed 5/2012

Consideration of Unused Capacity

	LPAR 1	LPAR 2	LPAR 3
?			

Guaranteed LPC capacity limit
Defined by LPAR current weight

Unused Capacity
Unused LPC capacity of Guaranteed LPC capacity

Actual used LPC capacity below the Guaranteed LPC capacity

Actual used LPC capacity above the Guaranteed LPC capacity

OA37736 Test Scenario

- z196 with 24 CPs; 4 LPARs with 24 logical CPs
- LPAR1/2: low weight (1 VH+1 VM); LPAR2/3: high weight (9VH + 1 VM)
- Start work on LPAR1 first, then LPAR2, LPAR3, LPAR4
- Result shows that unparked VLs are reduced as high weight LPARs have demand
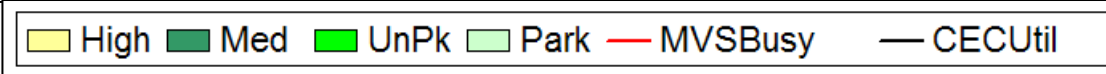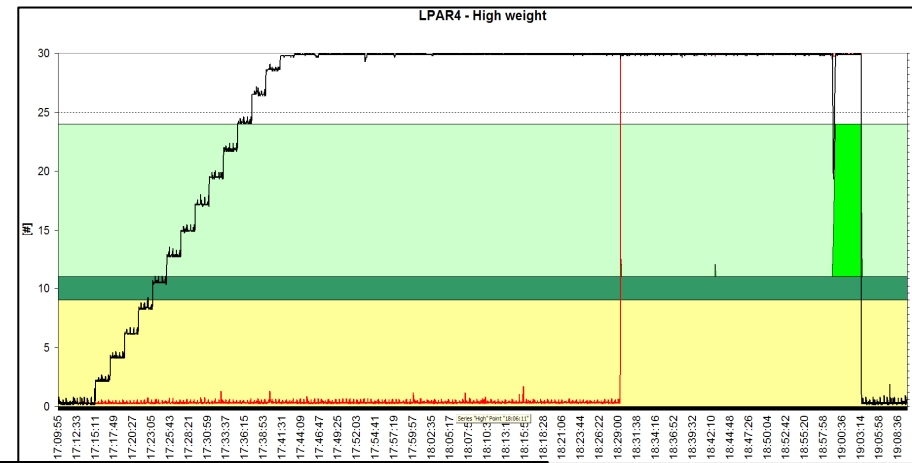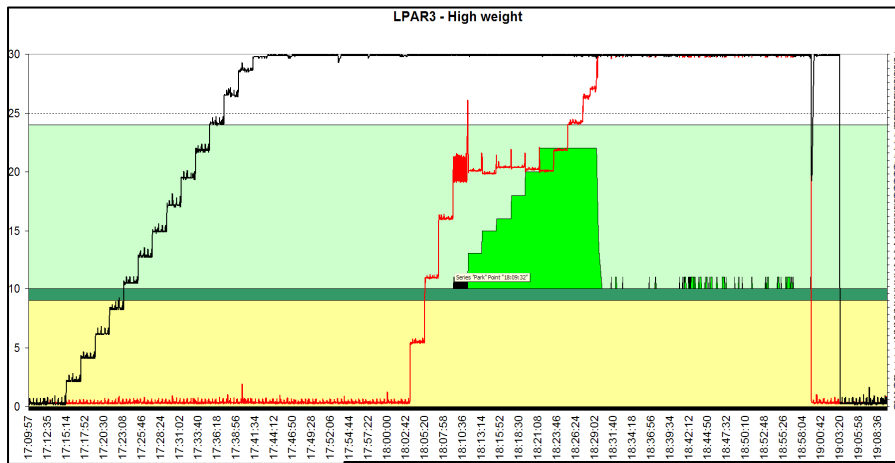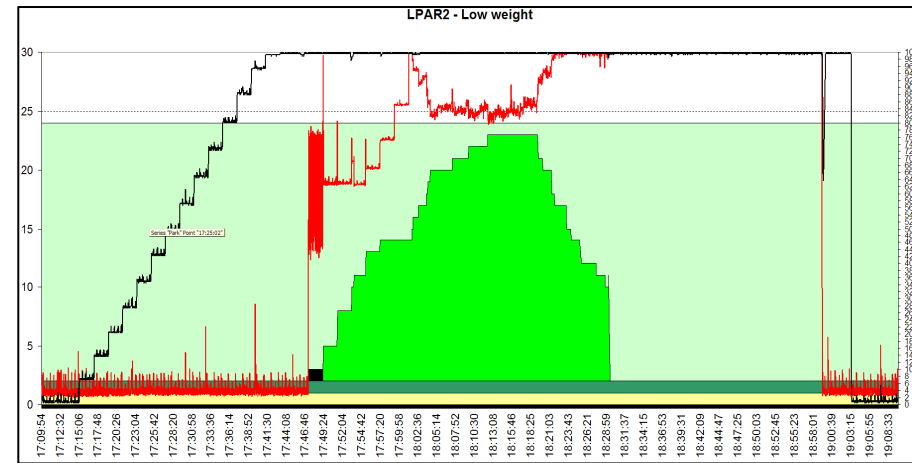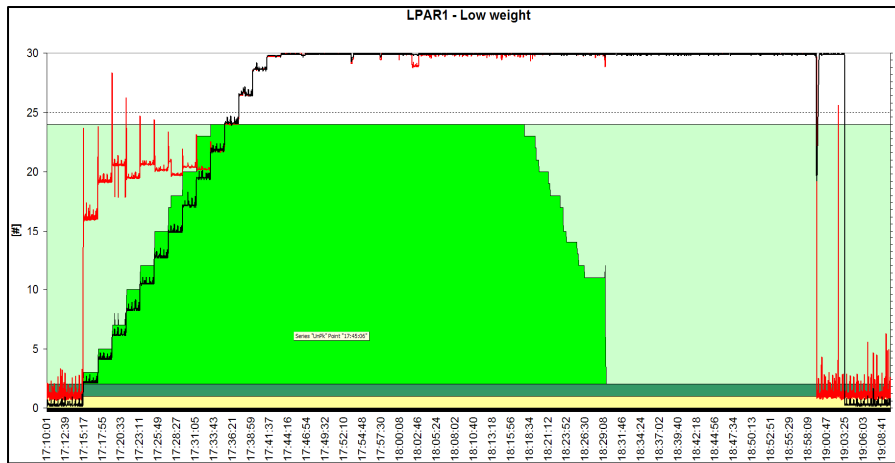
Hiperdispatch related WLM APARs

APAR	Description	Close Date	Affects
OA37736	Unused capacity enhancements	5/2012	Small plus large partitions with unused capacity.
OA36459	Modify PARK/UNPARK algorithm to become more sensitive for smaller partitions	10/2011	Smaller partitions at low CEC utilizations
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. The CPU consumption of the *PHYSICAL* partition was not included. This can lead to too many "unpark" operations under rare 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

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

OA39941: Eliminate large frame shortage critical messages

- Prior to OA39941 SRM issued critical messages
  - IRA120E LARGE FRAME SHORTAGE
  - IRA121E CRITICAL LARGE FRAME SHORTAGE
  - IRA122I LARGE FRAME SHORTAGE RELIEVED

  when the LFAREA allocation exceeded 80 or 95 percent, respectively.

- OA39941
  - eliminates these messages and introduces
    IRA137I 100% OF THE LARGE FRAME AREA IS ALLOCATED
    as informational message
  - Does no longer set the "system constrained" indication

- Recommendation
  - Check for existing automation of IRA120E/IRA121E
  - Monitor LFAREA usage
    - RMF Mon I Paging Activity report
    - RMF Mon III STORx reports
    - SMF71LRX, SMF71LRA

OA38280: Reduced Sampling Overhead

- Prior to OA38280 SRM used an IVSK instruction for sampling the "Performance Block" (PB)

- IVSK instruction more costly on IBM z196 or z114 than previously
- Resulted in increased WLM address space CPU utilization when *many* PBs had to be sampled
  - Usually only the case when many subsystem instances started, typically in test systems

- Recommendation
  - Apply PTF
  - Beyond that:
    - In some environments it may be worth while to review how many subsystems are started and require sampling of many PBs:
      - CICS (MAXTASK)
      - DB2 MSTR (1000+)
      - DBM1 (500+)

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

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- 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.
  - This feature is supported on IBM System Storage® DS8700 and DS8800 series, and requires a DS8000 licensed machine code
- 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}**
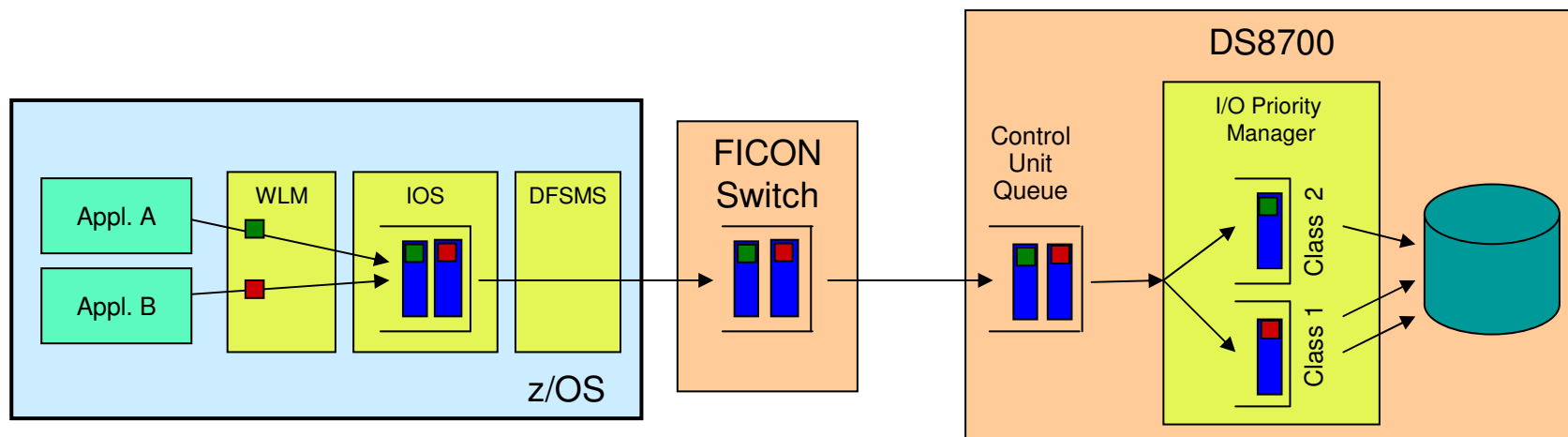
- WLM derives goal achievement data for service class periods as follows
  - Response Time goal:
    - Importance of period
    - Goal Achievment Value is derived from Performance Index (PI)
    - → Dynamic management considering goal achievement of service class
  - Velocity goal:
    - Importance of 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

Importance = 2, PI = 1.9

WLM

Performance Index	Goal Achievement Value
PI <= 0.5	1 (significantly overachieve)
0.5 < PI <= 0.7	2 (overachieve)
0.7 < PI <= 0.9	3 (slightly over achieve)
0.9 < PI < 1.4	4 (achieve)
1.4 <= PI < 2.5	5 (slightly under achieve)
2.5 <= PI < 4.5	6 (under achieve)
PI >= 4.5	7 (significantly under achieve)

I/O Priority Manager

	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	0	9	8	7	6	3	2	1
2	0	9	8	7	6	3	2	1
3	0	10	9	8	7	4	3	2
4	0	10	9	8	7	4	3	2
5	0	11	10	9	8	5	4	3
6	0	11	10	9	8	5	4	3

Performance Class = 3
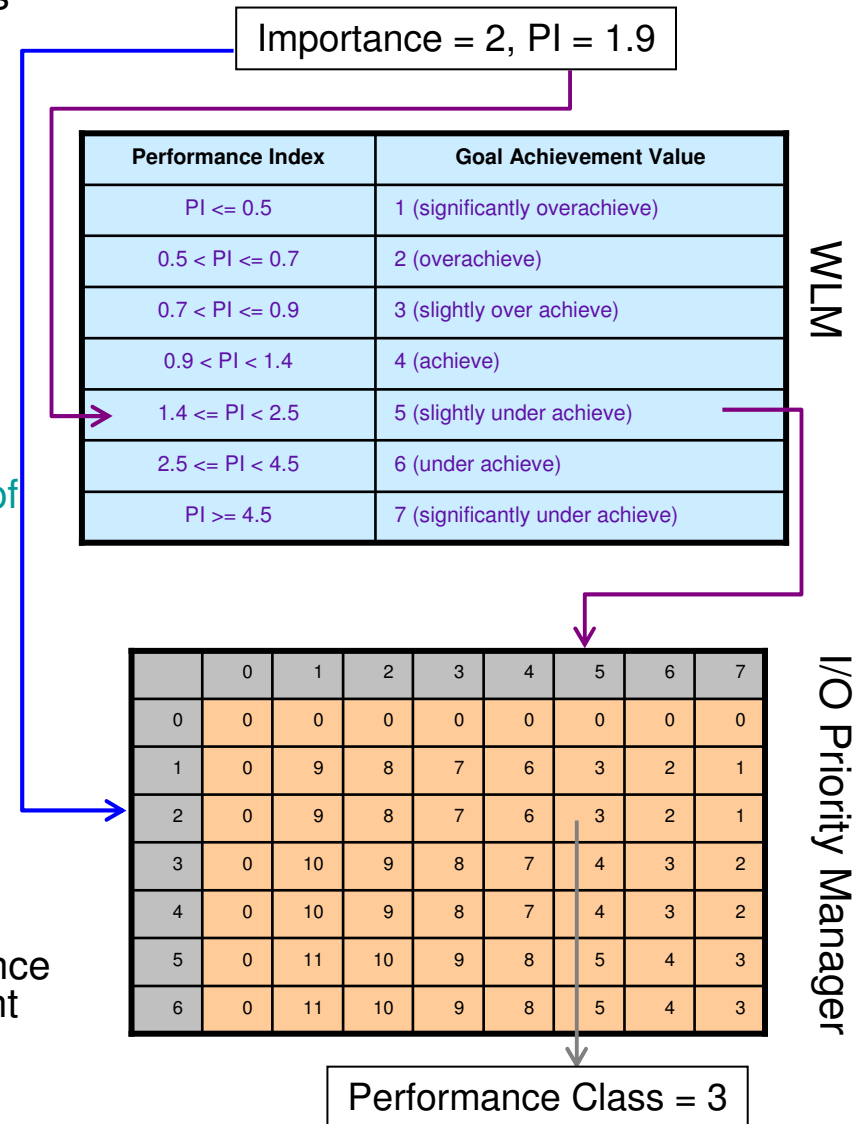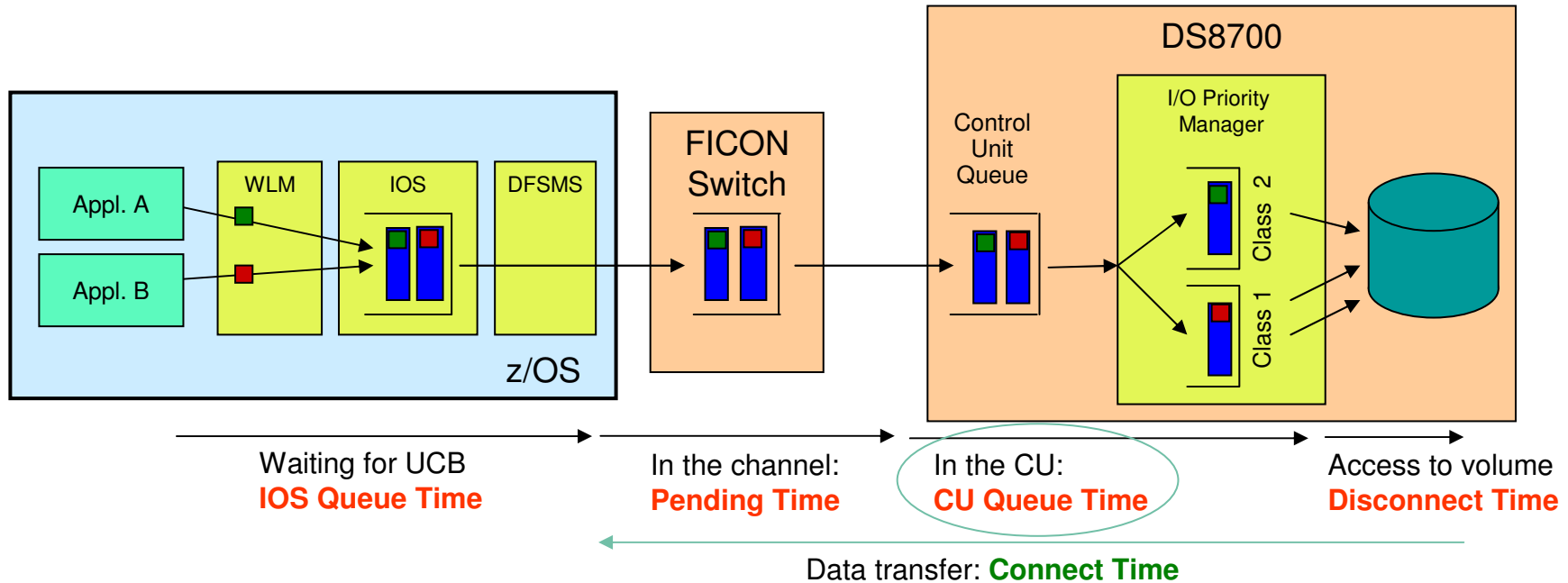
- I/O Priority Manager
  - impacts how long an I/O request has to wait for access to the **volume**
    - does **not** impact an I/O request **if it is served from the storage server cache**
  - induced throttling delays are reported as **CU Queue Time**

- 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

Test Results

- Test Environment
  - Five CPCs running z/OS V1.13 in nine LPARs
  - DS8000
  - Workloads running simultaneously
    - ATM transaction workload (CICS, IMS, DB2)
    - Middleware OLTP workloads (CICS, IMS, VSAM, DB2)
    - IMS data sharing workloads
    - CICS VSAM/RLS data sharing workload
    - CICS VSAM/NRLS workload
    - DB2 data sharing workloads
    - DB2 large storage utilization workload

- Test results were described in a white paper:
  http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP102074

IBM

WLM Support for I/O Priority Manager in DS8K Series
Test Results
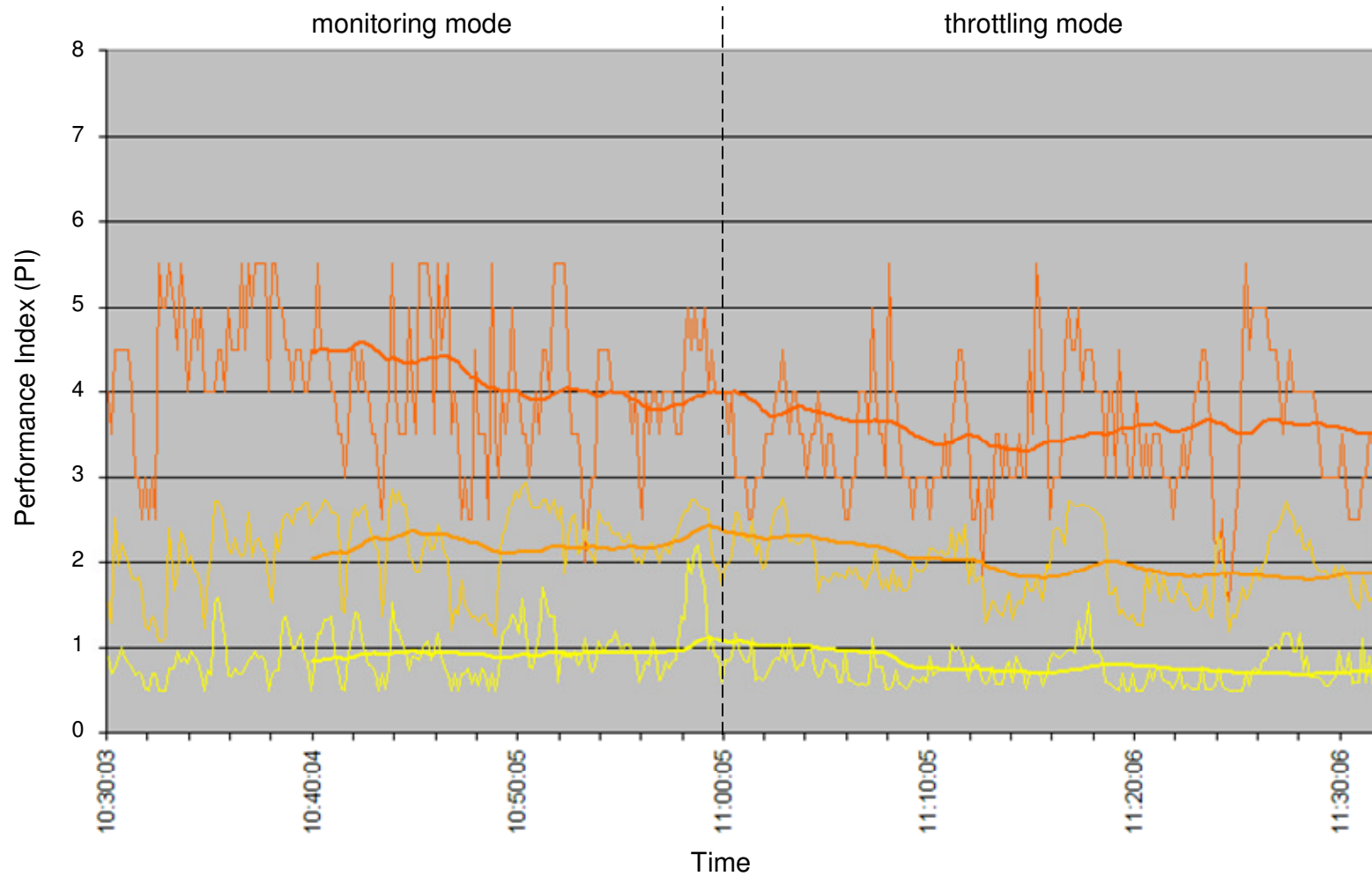
- PI of Imp 1 RT service classes improved by 10%
- PI of Imp 2 RT service classes improved by 22%
- PI of Imp 3 RT service classes improved by 23%

WLM Support for I/O Priority Manager in DS8K Series
Test Results
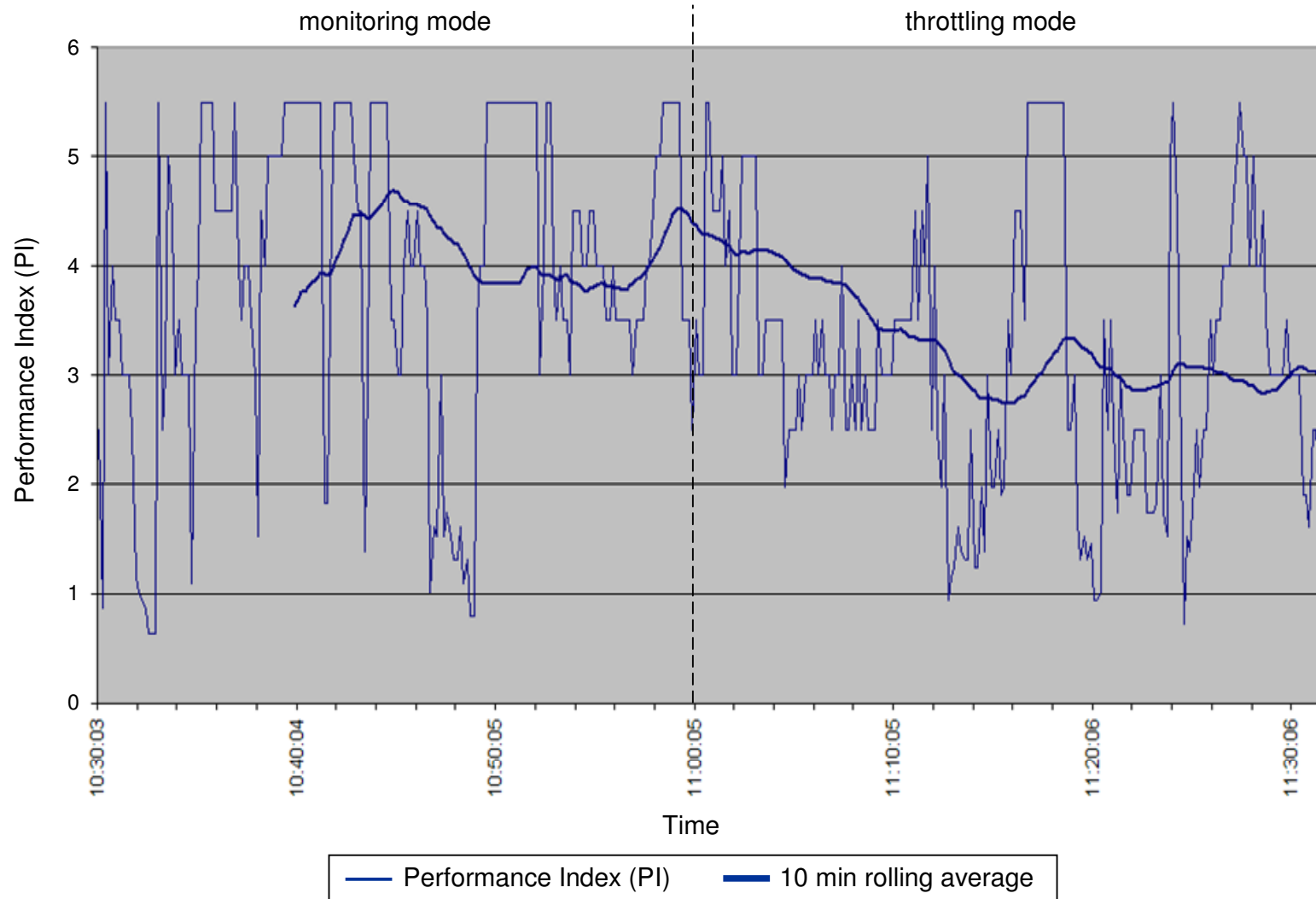
- PI of CICS service class improved from 4.3 to 3.0
- Achieved response time reduced from 800ms to 570ms

WLM Support for I/O Priority Manager in DS8K Series
Test Results
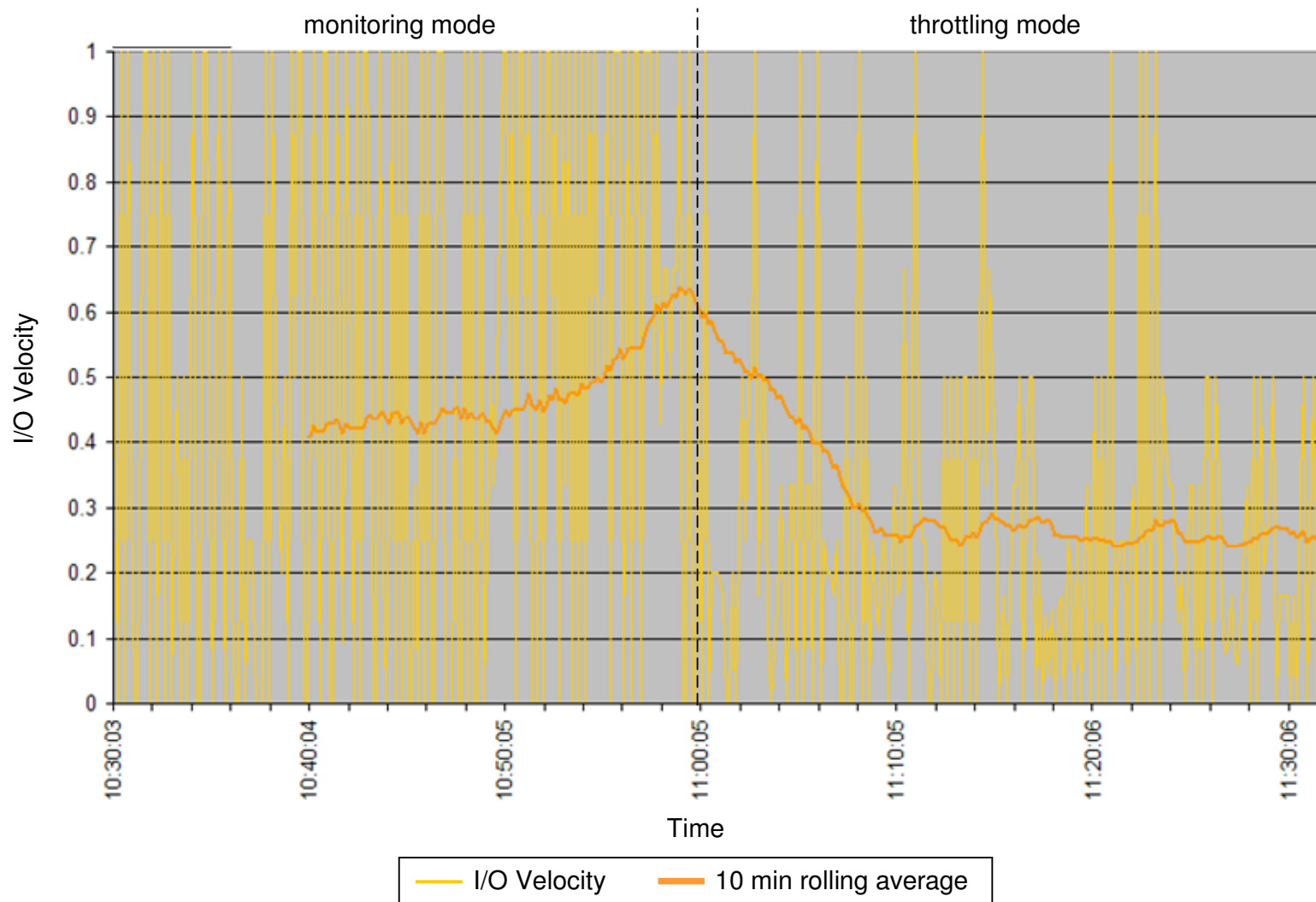
- PI of Velocity service class STCI2V40 stayed in same range
- But the I/O velocity decreased from 0.63 to 0.27

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
WLM Support for I/O Priority Manager in DS8000 series	OA32298	OA32298	OA32298	

- WLM Support for I/O Priority Manager
    - Has to be enabled via OPT parameter STORAGESERVERMGT=YES
    - Default is STORAGESERVERMGT=NO
    - Only active when WLM policy specifies I/O Priority Management = YES

- The I/O Priority Manager feature is associated with DS8K R6.1.5

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

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- 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

IBM

- 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.

- IBM

- 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)

- Sysevent QVS: (IRAQVS and IWMQVS.H)
  QVSCECCapacityStatus 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

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.

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

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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
New message IWM064I API enhancements	+	OA30968	OA30968	OA30968	
New MSU computation	+	OA30968	OA30968	OA30968	OA30968
New Programming Interface (IRARMCTZ)	+	+	OA31201	OA31201	

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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.

  ➢ LPDATMODEL

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

  ➢ LPDATMODELPERMCAPIDENT

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

  ➢ LPDATMODELTEMPCAPIDENT

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

Permanent+OOCoD + (CBU+PE)

H/W model

Permanent configuration

Permanent + OOCoD

Temporary Capacity Reporting via SYSEVENT REQLPDAT

- **IRALPDAT new data fields**
  - ➢ LPDATMODELCAPRATING `◁ Permanent+OOCoD + (CBU+PE)`
    - ▪ 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 `◁ Permanent configuration`
    - ▪ When non-zero, an unsigned integer ("MSU rating") as identified by the model-permanent-capacity identifier
  - ➢ LPDATMODELTEMPCAPRATING `◁ Permanent + OOCoD`
    - ▪ When non-zero, an unsigned integer ("MSU rating") as identified by the model-temporary-capacity identifier.

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z/OSMF Workload Management
The new WLM Control Center in z/OSMF V1.12 and V1.13

- 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 loosing 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

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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

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Agenda

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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
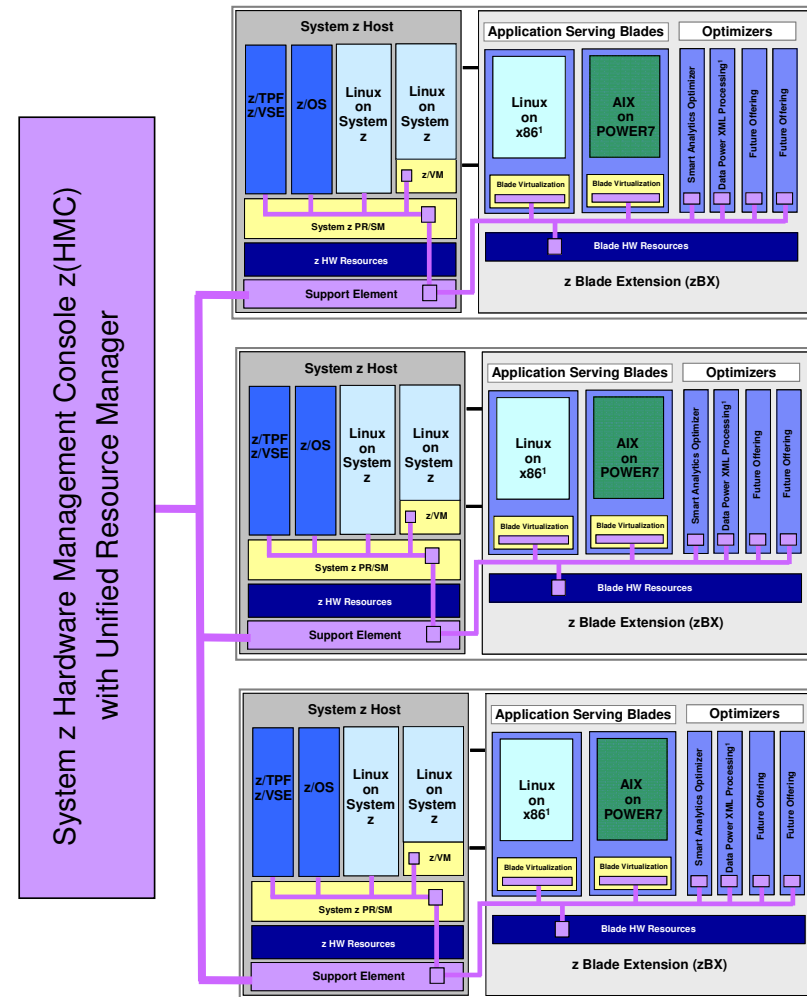
zEnterprise Platform Performance Manager

- 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

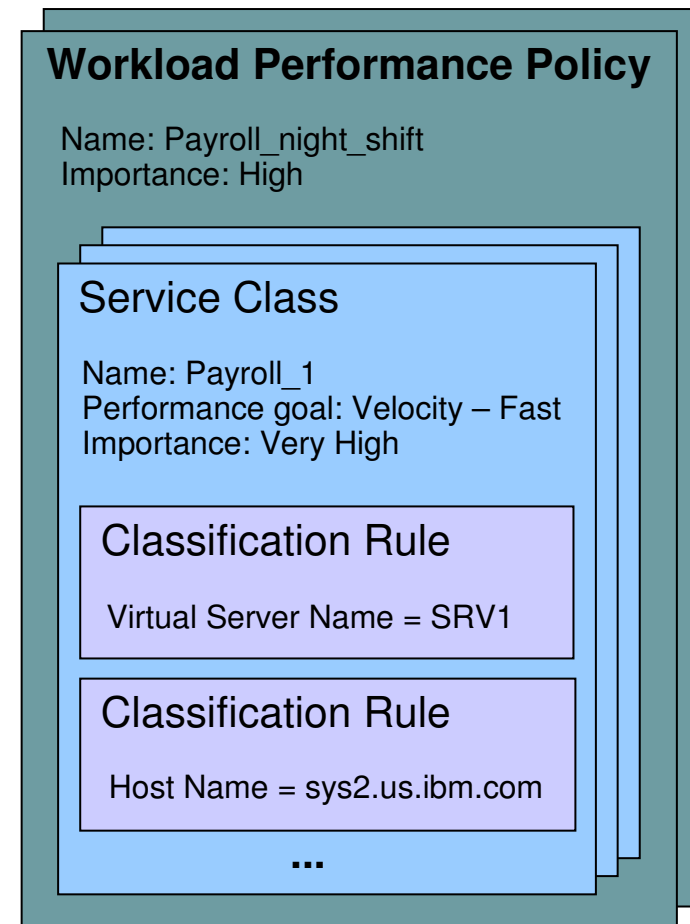# zEnterprise Platform Performance Manager
Resource management based on understanding of overall workload flow
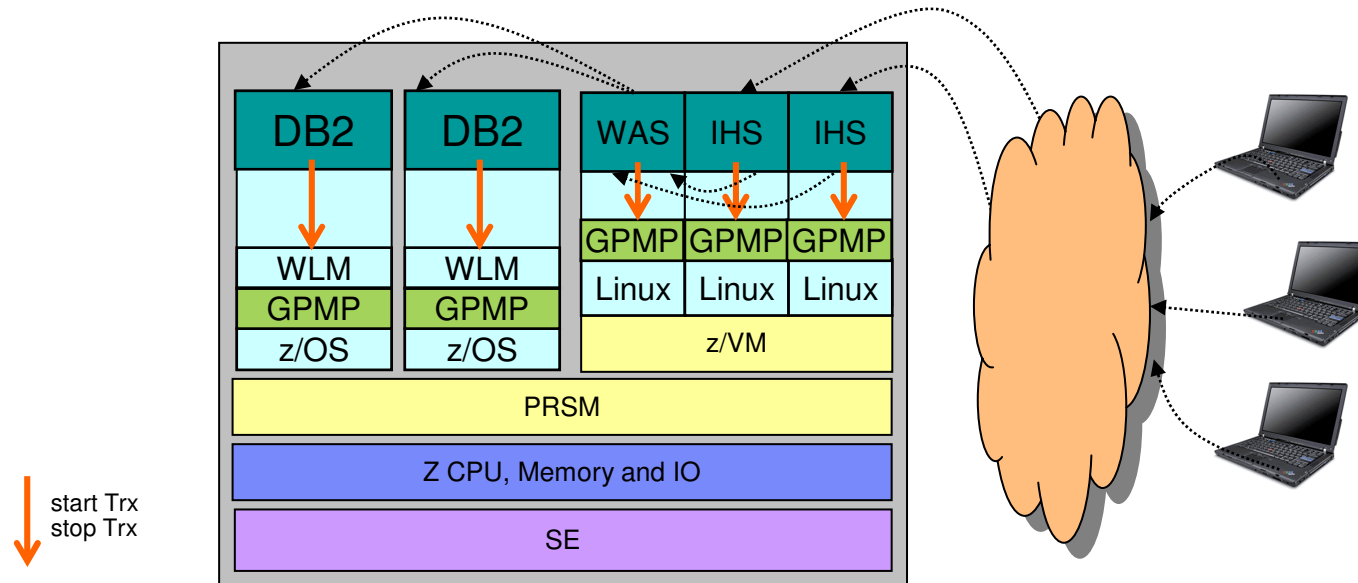
- Applications / middleware has to be instrumented with ARM – Application Response Measurement (Open Group Standard) to collect transaction statistics
  - Enables to monitor the flow of transactions
  - Enables to monitor transaction response times and processing statistics

- 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

IBM

- Defines performance goals for virtual servers in a workload
  - Conceptually like a 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

Workload Performance Policy

Name: Payroll_night_shift
Importance: High

Service Class

Name: Payroll_1
Performance goal: Velocity – Fast
Importance: Very High

Classification Rule

Virtual Server Name = SRV1

Classification Rule

Host Name = sys2.us.ibm.com

...

- 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

- 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

```
          --------Qualifier-------              -------Class-------
Action    Type        Name      Start           Service      Report
                                        DEFAULTS: _____
          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

After GPMP settings defined, functionality level changes to 25

```
 File  Utilities  Notes  Optio
-----------------------------------                    ----------------
Functionality LEVEL025         Def            WLM Appl LEVEL025
Command ===> _____

Definition data set . . : none

Definition name . . . . . MYDEF01   (Required)
Description . . . . . . . Production 01

Select one of the
following options. . . . . 11_  1.  Policies
                                2.  Workloads
                                3.  Resource Groups
                                4.  Service Classes
                                5.  Classification Groups
                                6.  Classification Rules
                                7.  Report Classes
                                8.  Service Coefficients/Options
                                9.  Application Environments
                               10.  Scheduling Environments
                               11.  Guest Platform Management Provider
```

```
 GPMP-Settings  Notes  Options  Help
-----------------------------------------------------
           Guest Platform Management Provider (GPMP) Settings
Command ===> _____

Guest Platform Management Provider activation: 2   1.  NO
                                                   2.  YES

Names of systems to be excluded:

SYS04       SYS09       _____
_____      _____      _____
_____      _____      _____
_____      _____
```
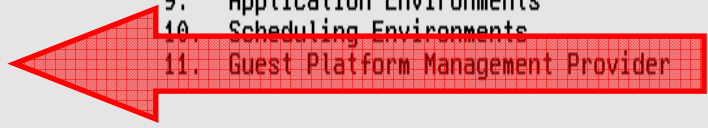
Specifies whether you want to start the GPMP address space automatically when a WLM policy is activated

Specifies the systems in the sysplex on which the GPMP should not be started automatically

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

- 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)

- 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:        LEVEL025
   WLM FUNCTIONALITY LEVEL: LEVEL025
   WLM CDS FORMAT LEVEL:     FORMAT 3
   STRUCTURE SYSZWLM_WORKUNIT STATUS: CONNECTED
   STRUCTURE SYSZWLM_EBAE2097 STATUS: CONNECTED
   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=HVEMCA ASID=0032
   GPMP POLICY IS ACTIVE
   NUMBER OF REGISTERED PROCESSES=3, APPLICATIONS=1
```

To display system and GPMP status information, enter:

D WLM,SYSTEMS,GPMP

To display whether ARM is enabled or disabled, enter:

D WLM,AM

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- 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 <u>not</u> 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
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

- Previously CPM increased capacity in small increments
  - On full speed models it would have usually added one processor at a time
- Now CPM supports primary and secondary activation quantum
  - Primary quantum added for first activation on a given CPC
  - Secondary added on subsequent activations
  - Definition is made 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

z/OS V1.13: Recurring time conditions

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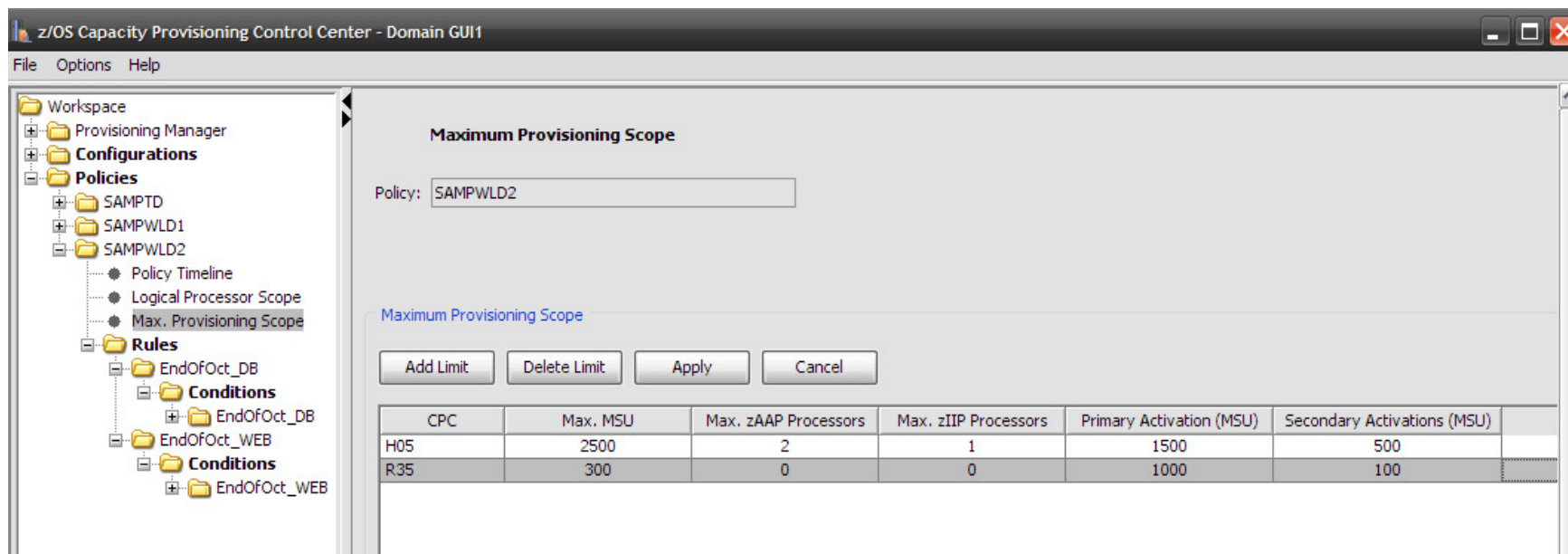
- Previously the CPM policy supported only fixed time intervals
  - Defined by start date/time and end date/time
- Starting with z/OS 1.13 CPM plans to support (weekly) recurring time conditions
  - Defined by start date, end date, start time, end time and day of week to which it applies
  - Plan to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

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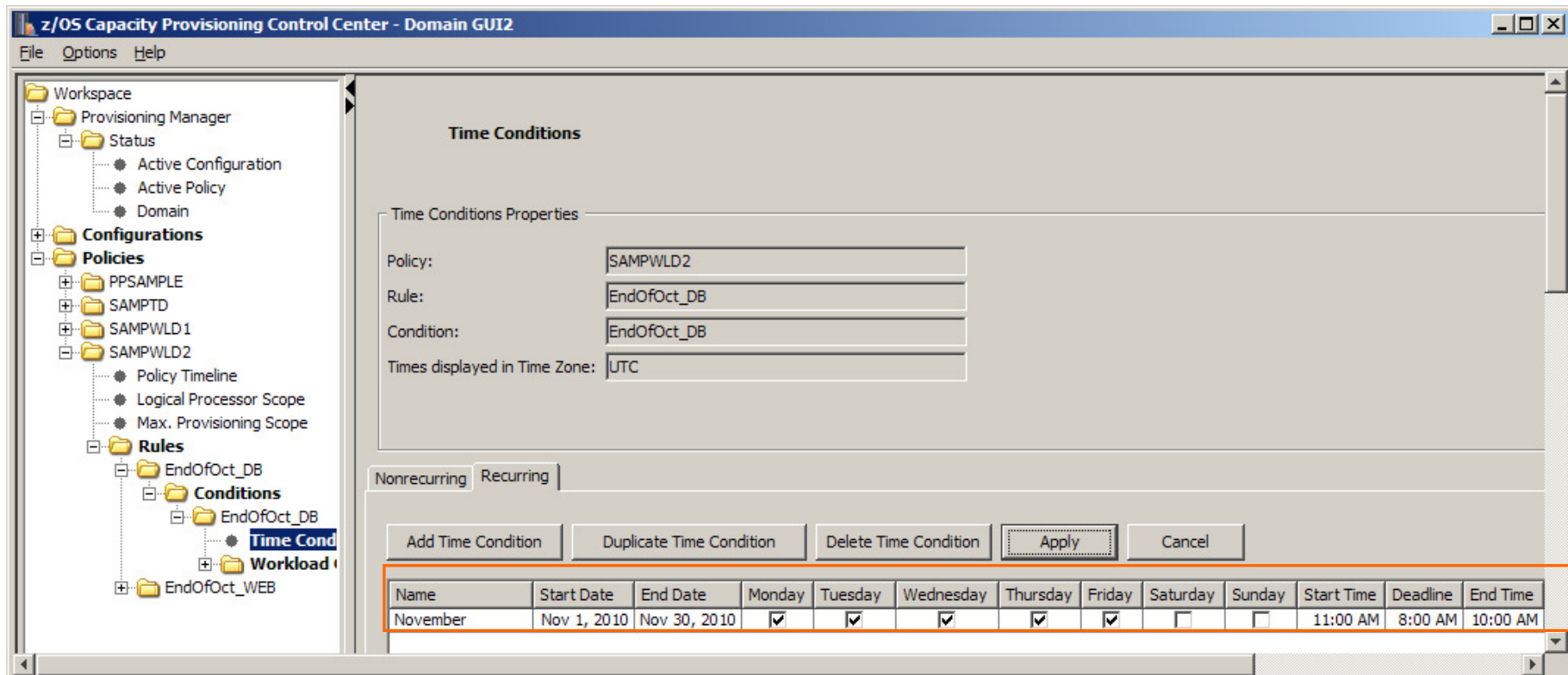
Capacity Provisioning Support of
zEnterprise 196 Static Power Save Mode

- 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

IBM

z/OS (CPM) release / Function	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	

z/OSMF release / Function	V1.13	V1.12	V1.11	V1.10	V1.9
CPM Status Monitoring	+				

+: Support integrated into release base

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Gracias
Spanish

Thank You
English

شكراً
Arabic

Obrigado
Brazilian Portuguese

多谢
Simplified Chinese

Danke
German

Bedankt
Dutch

Grazie
Italian

Merci
French

நன்றி
Tamil

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**	**Allows to create, modify, retrieve and install WLM service definitions**	**Java program on workstation**	**YES!! Available**
WLMQUE	**Application Environment Viewer**	**Allows to monitor WLM Application Environments**	**ISPF Tool**	**YES!! Available**
WLMOPT	OPT Display	Display WLM/SRM OPT Parameters	IPF Tool	**No!!** Obsoleted by RMF in z/OS V1.11

These tools are located on the z/OS WLM homepage:
http://www.ibm.com/servers/eserver/zseries/zos/wlm/tools/

Phased out.
Superseded by z/OSMF WLM task.

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

```
.   Command ===>                                   Scroll ===> PAGE      .
.                          WLM OPT Settings                   >SAVE<     .
.   System: AQFT        Version: z/OS 011100   OPT: FT   Time: not issued .
.   OPT-Parameter:           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 Spedifies if CPs may help zAAPs    .
.   IIPHONORPRIORITY                   Yes Spedifies 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)

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                                       .
.                                                                               .
```

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Dutch

Grazie
Italian

Merci
French

நன்றி
Tamil

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