

z/OS Workload Management Update for z/OS V1.11 and V1.12

Horst Sinram

IBM Germany Research & Development

August 2, 2010

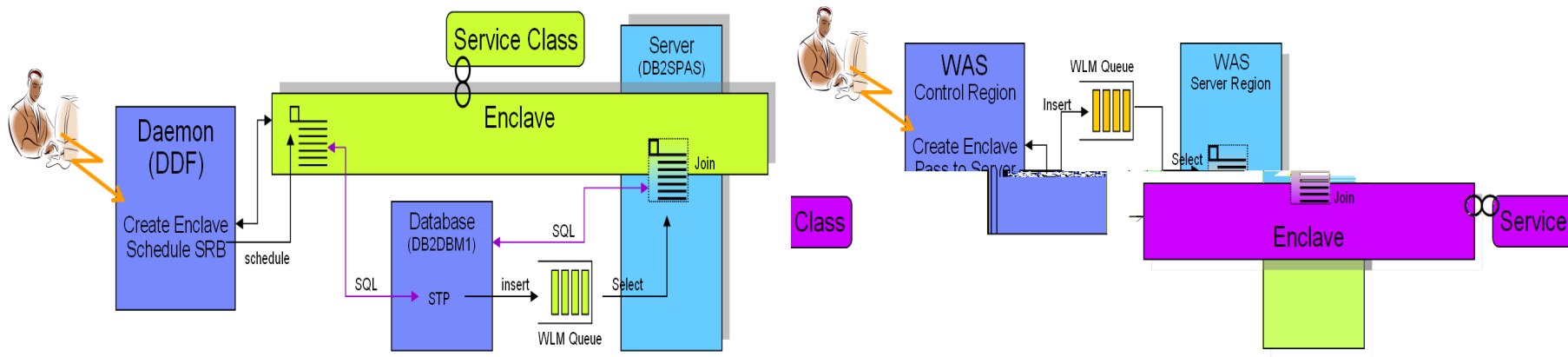


Agenda



- Enclave Enhancements
 - Enclave Server Management
 - Work-Dependent Enclaves
- WLM Management
 - LDAP Support
 - Resource Group Enhancements
 - Do not always honor Skip Clock in Policy Adjustment
- WLM Reporting
 - Extend Number of Report Classes
 - Additional Group Capacity Information in RMF
- Externalized IEAOPT Information
- Hyperdispatch APAR
- WLM support for IBM zEnterprise 196
- z/OSMF Workload Management
- WLM support for zManager
- WLM Tools Overview

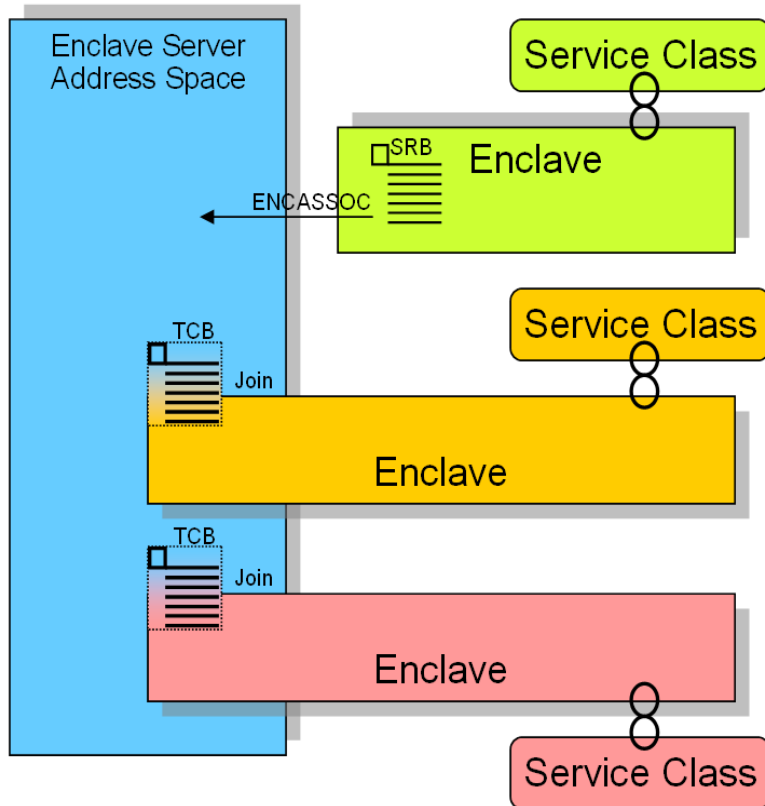
WLM Enclaves – An Overview



- 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

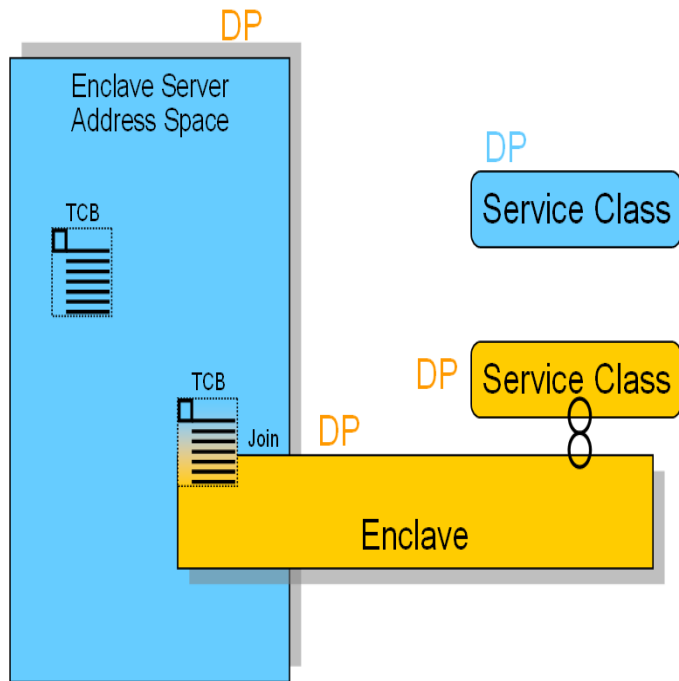
A Short Retrospective



- 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

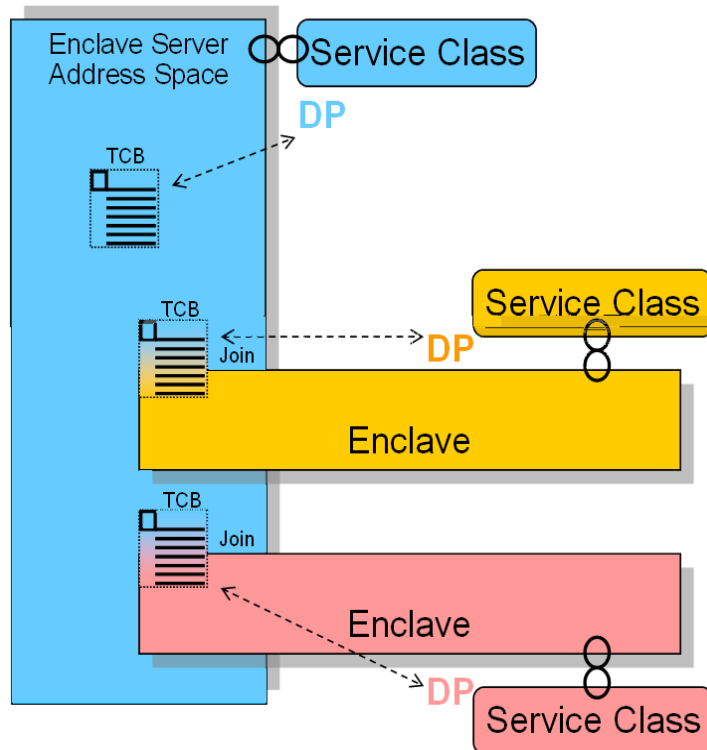
WLM Enclave Server Management

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

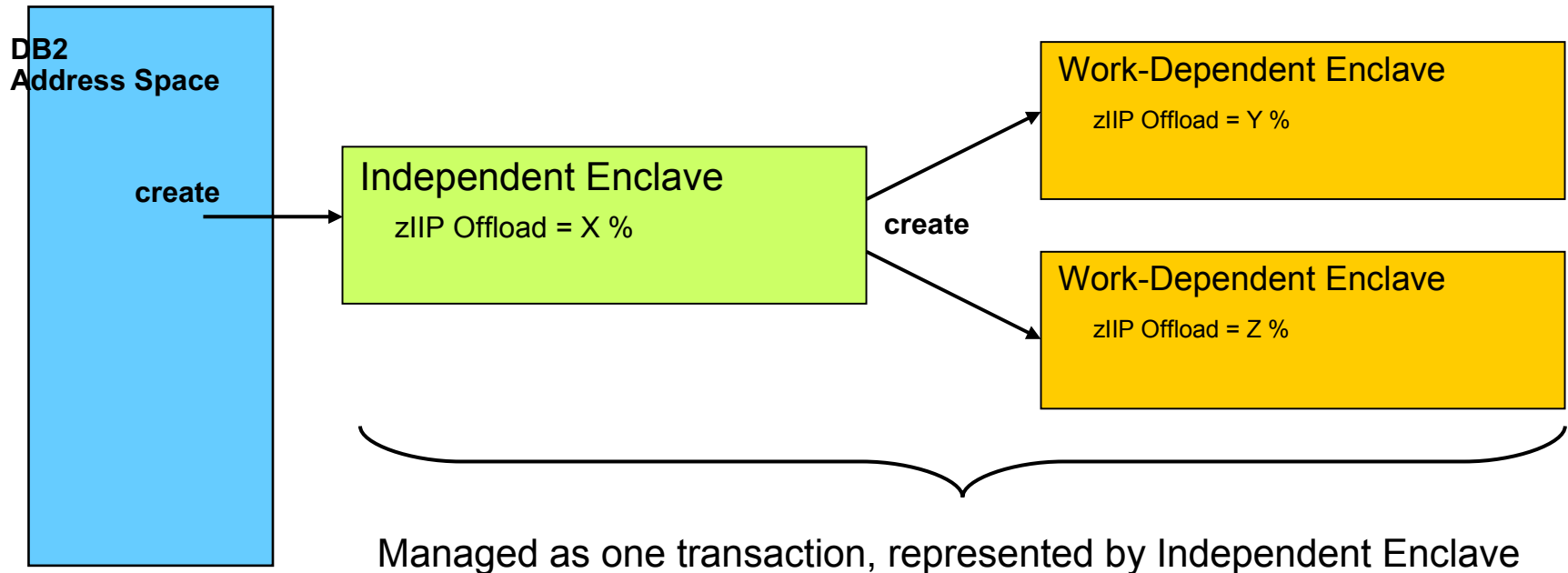


- New IEAOPT Parameter
 - ManageNonEnclaveWork = {No|Yes}
 - Default: No (no change to previous releases)
 - Causes everything in the address space, which is not associated to an enclave, to be managed towards the goals of the external Service Class to which the address space has been classified to
- Advantages
 - Enclave (Queue) server address spaces in which no enclave is running will be managed as usual address spaces
 - The importance and goal of the service class for the address space now has a meaning
- 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

Work-Dependent Enclaves

- Background
 - zIIPs allow middleware components to run a certain percentage of their work “offloaded” from regular processors
 - The offload percentage is an attribute of the enclave under which the unit of work runs
 - The offload percentage is defined by the middleware component via a (not generally published) WLM interface
- Limitations
 - It is not possible to specify different offload percentages for different units of work running under the same enclave
- Intended Use Case
 - DB2/DDF wants to specify different offload percentages for the different units of work of a parallel query,
 - AND still wants to maintain the transactional context to run the units of work under the same “SRM Transaction” (enclave)

Work-Dependent Enclaves



- Solution

Implement a new type of enclave named "Work-Dependent" as an extension of an Independent Enclave. A Work-Dependent enclave becomes part of the Independent Enclave's transaction but allows to have its own set of attributes (including zIIP offload percentage)

Work-Dependent Enclaves

Reporting in SDSF Enclave Panel and RMF Monitor III

Display	Filter	View	Print	Options	Search	Help				
SDSF ENCLAVE DISPLAY		SYS1	ALL	LINE 1-8 (8)						
COMMAND INPUT ==> █				SCROLL ==> CSR						
PREFIX=* DEST=(ALL)		OWNER=*	SYSNAME=SYS1							
NP	NAME	Status	Type	SrvClass	Per	RptClass	CPU-Time	OwnerAS	Re	
	28000000006	ACTIVE	IND	VEL_1	1	RC_2	0.00	36		
	2C000000008	ACTIVE	WDEP	VEL_1	1	RC_2	0.83	36		
	30000000007	ACTIVE	WDEP	VEL_1	1	RC_2	0.83	36		
	34000000009	ACTIVE	WDEP	VEL_1	1	RC_2	0.83	36		
	3800000000A	ACTIVE	WDEP	VEL_1	1	RC_2	0.83	36		
	3C00000000B	ACTIVE	WDEP	VEL_1	1	RC_2	0.83	36		
	24000000002	INACTIVE	DEP	SYSSTC	1	RC_0	0.00	22		
	20000000001	INACTIVE	DEP	SYSTEM	1	RC_0	0.00	7		

```

      . . . . . RMF V1R12 Enclave Report . . . . .
Command ==> █
Samples: 100      System: SYS1  Date: 02/23/10  Time: 03.06.40  R
Current options:  Subsystem Type: ALL
                  Enclave Owner:
                  Class/Group:

Enclave  Attribute  CLS/GRP  P  Goal  % D X  EAppl%  TCPU
*SUMMARY
ENC000006  VEL_1      1      1      5  W  0.163  2.530
ENC000002  VEL_1      1      1      5  W  0.163  2.532
ENC000004  VEL_1      1      1      5  W  0.162  2.528
ENC000005  VEL_1      1      1      5  W  0.162  2.519
ENC000003  VEL_1      1      1      5  W  0.162  2.518
ENC000001  VEL_1      1      1      5  W  0.000  0.007

```

F1=help F2=SPLIT F3=
F7=UP F8=DOWN F9=

MA c

Enclave Enhancements: Availability

Function	z/OS V1.12	z/OS V1.11	z/OS V1.10	Older Releases
Non Shell Server Management	+			
Work-dependent Enclaves	+	+	OA26104	OA26104 → z/OS 1.8

- Non Shell Server Management
 - New OPT Parameter ManageNonEnclaveWork=YES/NO.
Default is NO, meaning the function is not yet enabled
- Work-Dependent Enclaves
 - New function available with WLM APAR OA26104
 - DB2 exploitation with APAR PK76676
 - SDSF support with APAR PK74125
 - RMF support with z/OS 1.11

Agenda



- Enclave Enhancements
 - Enclave Server Management
 - Work-Dependent Enclaves
- WLM Management
 - LDAP Support
 - Resource Group Enhancements
 - Do not always honor Skip Clock in Policy Adjustment
- WLM Reporting
 - Extend Number of Report Classes
 - Additional Group Capacity Information in RMF
- Externalized IEAOPT Information
- Hyperdispatch APAR
- WLM support for IBM zEnterprise 196
- z/OSMF Workload Management
- WLM support for zManager
- WLM Tools Overview

WLM Management: LDAP Subsystem is supported

	L D A P
Accounting Information	
Collection Name	
Connection Type	
Correlation Information	
EWLM Service Class	
EWLM Transaction Class	
LU Name	
Netid	
Package Name	
Perform	
Plan Name	
Priority	
Procedure Name	
Process Name	
Scheduling Environment Name	
Subsystem Collection Name	
Subsystem Instance	●
Subsystem Parameter	
Sysplex Name	●
System Name	
Transaction Class/Job Class	
Transaction Name/Job Name	●
Userid	

- Work requests include all work processed by the z/OS LDAP server
- Supported Work Qualifiers
 - Subsystem Instance (SI)

The z/OS LDAP server's job name. Needed to distinguish between different LDAP servers
 - Transaction Name/Job Name (TN)

The z/OS LDAP server's enclave transaction name. "GENERAL" for all LDAP work that is not assigned a user-defined exception class. Any transaction name that is also defined in the configuration file of the directory server
- For further information see

z/OS IBM Tivoli Directory Server Administration and Use for z/OS (SC23-5191-XX)

System Name	
Transaction	
Class / Lib / Class	
Transaction	
Source / Sub / Name	
User	

 Not relevant anymore

Latest supported subsystems

WLM Management:

Do Not Always Honor “Skip Clock”

- What is the skip clock ?
 - If WLM cannot help a service class it sets a skip clock to not assess it in the next 3 policy adjustment cycles
 - This is done for efficiency reasons and to help other work
- Is this always a good thing to do ?
 - Usually yes!
 - But if only very few service classes miss their goals it is not beneficial to no longer assess a service class for 3 consecutive policy adjustment cycles
 - Especially when it might be possible to help the work with IRD Weight Changes. In this event the situation on another LPAR can change and might make it possible to help a service class in the next policy adjustment cycle
- Solution introduced with z/OS 1.11




The skip clock will no longer be honored if 5 or less service class periods do not meet their performance objectives.

WLM Management Availability

Function	z/OS V1.12	z/OS V1.11	z/OS V1.10	Older Releases
New Resource Groups (Type 2 and Type 3)	+	+	+	z/OS 1.8
8 digit resource group minimum and maximum (for Type 1)	+	OA29704	OA29704	
Change in skip clock processing	+	+		
LDAP Support	+	+		




Agenda

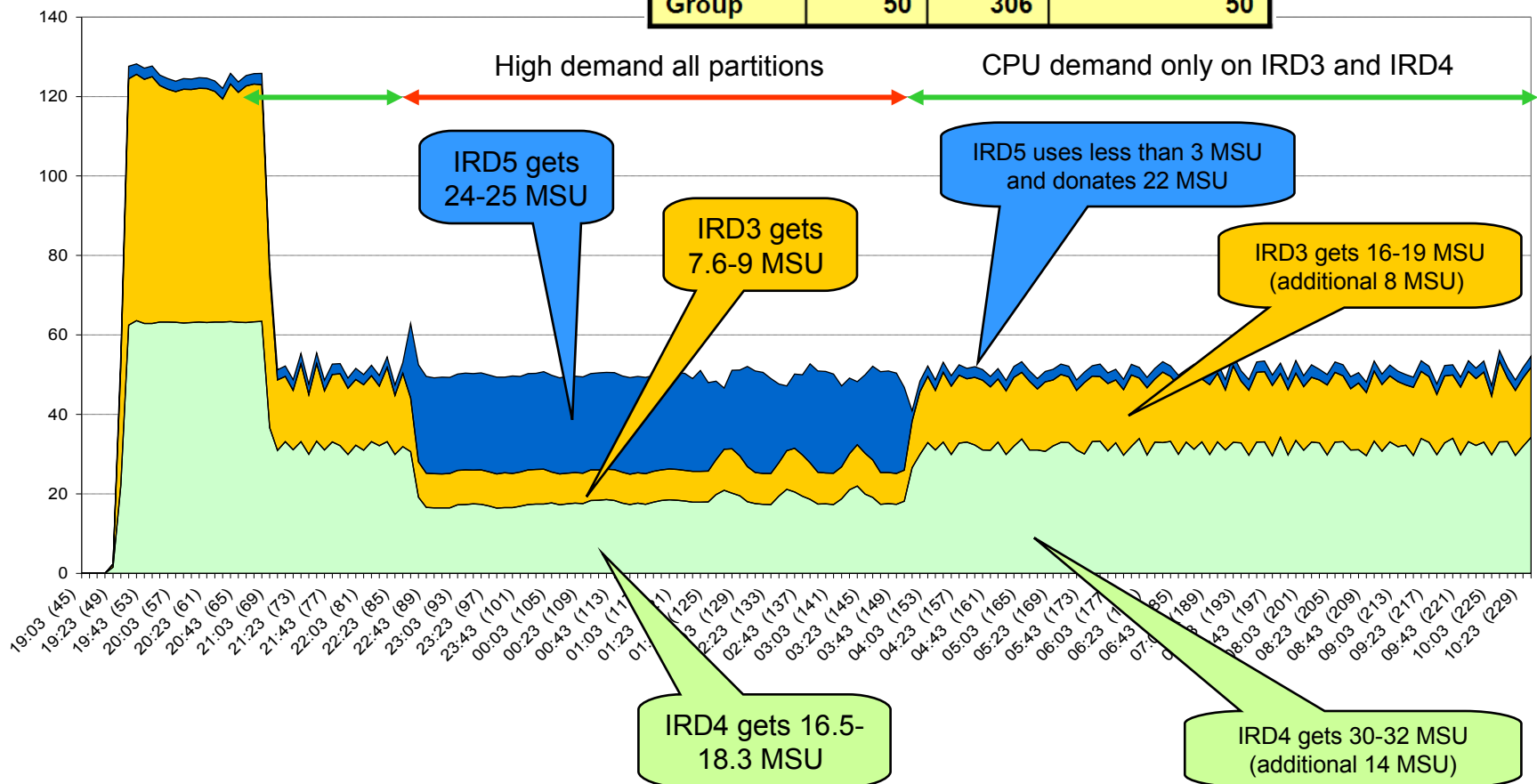
- Enclave Enhancements
 - Enclave Server Management
 - Work-Dependent Enclaves
- WLM Management
 - LDAP Support
 - Resource Group Enhancements
 - Do not always honor Skip Clock in Policy Adjustment
-  • WLM Reporting
 - Additional Group Capacity Information in RMF
 - Extend Number of Report Classes
- Externalized IEAOPT Information
- Hyperdispatch APAR
- WLM support for IBM zEnterprise 196
- z/OSMF Workload Management
- WLM support for zManager
- WLM Tools Overview

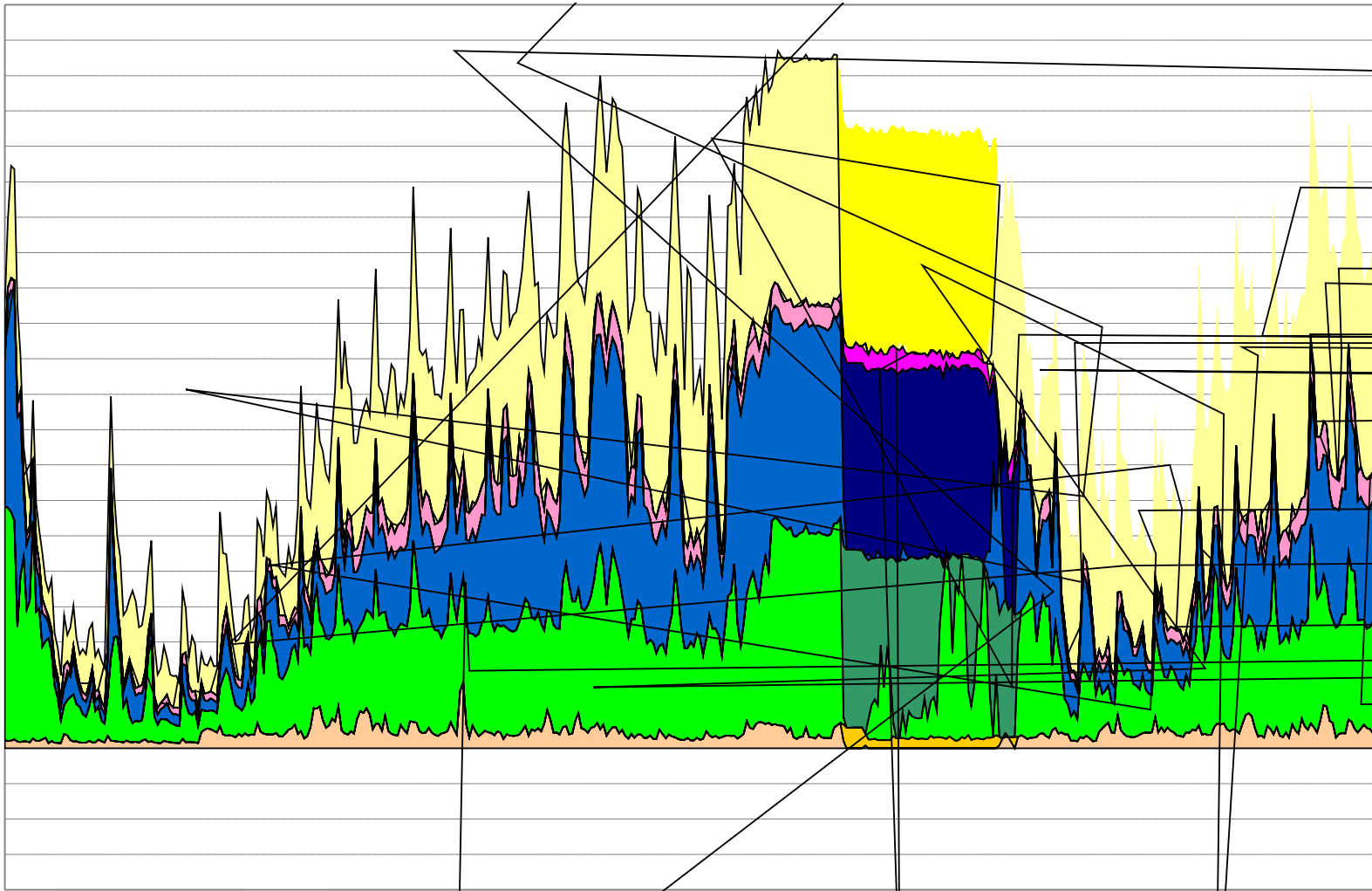
Group Capacity: Summary

- Is based on defined capacity
 - Each partition obtains information for the other partitions of the group from PR/SM
 - Calculates the group consumption and whether the group should be capped
 - If the group becomes subject to capping
 - The partition calculates whether it is above or below of its entitlement
 - If it is above its entitlement the partition must apply capping (phantom weight or cap pattern)
- The entitlement of a partition is its share based on its weight within the group (named target MSU)
 - In addition if not all partitions use their entitlement the partition can obtain unused MSUs
 - The partition can always use its target MSU value assuming the overall LPAR definitions allow it
- Group Capacity and Defined Capacity can be combined
 - The z/OS system will always honor the smaller of both capacity limits
- It is possible to define multiple capacity groups on a CEC
 - A partition can only belong to one group
- Working with IRD CPU Weight Management
 - Defined and Group Capacity work with IRD but Weight Changes are only possible for partitions which are not being capped (or subject to capping)
- Restrictions: Defined and Group Capacity
 - A partition must not be defined with dedicated processors
 - The partition must be defined with shared processors and WAIT Completion = NO
 - Initial Capping must not be defined
 - z/OS must not run as a VM guest
- PR/SM capping works within $\pm 3.6\%$ from the defined capping value

Group Capacity: Demo Scenario

Partition	Limit	Weight	Target MSU
IRD3 	n/a	52	~8.5
IRD4 	n/a	102	~16.7
IRD5 	n/a	152	~24.8
Group	50	306	50





RMF z/OS 1.11 Enhancements for Group Capacity...

GROUP CAPACITY REPORT

z/OS V1R11 SYSTEM ID TRX1 DATE 02/26/2009 INTERVAL 05.00.000
 RPT VERSION V1R11 RMF TIME 11.00.00 CYCLE 1.000 SECONDS

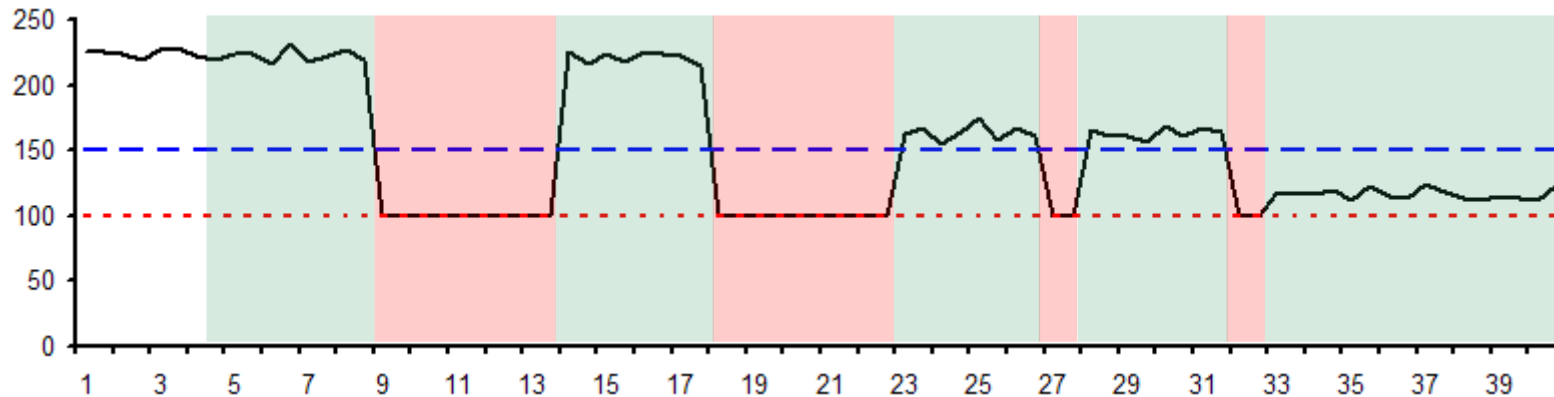
GROUP-CAPACITY NAME	LIMIT	PARTITION	SYSTEM	-- MSU -- DEF ACT	WGT	---	CAPPING WLM% ACT%	---	ENTITLEMENT - MINIMUM MAXIMUM		
RMFGRP	60	TRX1	TRX1	100	4	400	NO	25	23	40	60
	3	TRX2	TRX2	100	13	200	NO	100	46	20	60
TOTAL				17		600					

Field Heading	Meaning
CAPPING WLM%	Percentage of time when WLM considers to cap the partition
CAPPING ACT%	Percentage of time when capping actually limited the usage of processor resources for the partition

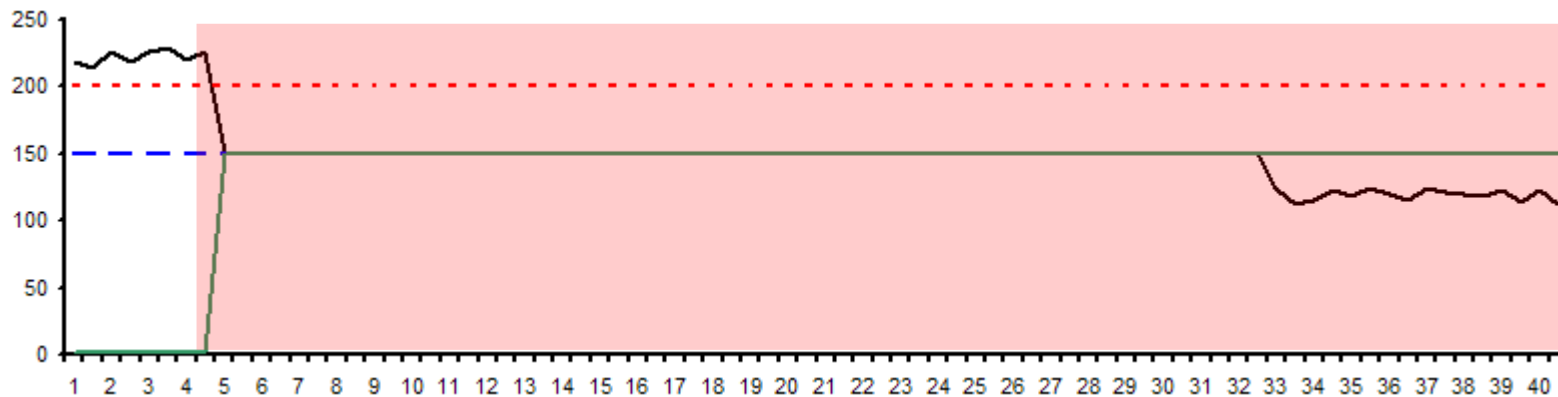
WLM Capping

Cap Pattern vs. Phantom Weight

Capping with **Cap Pattern** (when Soft Cap > MSU@LparWeight)



Capping using a **Phantom Weight** (when Soft Cap < MSU@LparWeight)



-- Soft Cap

..... MSU @ LPAR Weight

— MSU with Phantom Weight

RMF z/OS 1.11 Enhancements for Group Capacity...

Capping WLM% versus ACT%

- SMF70NSW is incremented for each sample with the WLM-capped flag ON. The flag is ON if the LPAR was capped via Diagnose 0304.
- SMF70NCA is incremented for each sample which indicates an actual-MSU-consumption below the MSU-at-weight factor
- The pricing management adjustment weight of the LPAR (aka phantom weight) is added to the total of all active-logical-partition weights to compute the fraction of processor resources that the LPAR may use (MSUatWgt)
- The actual MSU consumption of the LPAR is computed from the total dispatch time measured between two Diagnose samples
- Following calculations done in RMF:

If ActualMSU >= MSUatWeight-5% Then LPAR is actually capped

RMF z/OS 1.11 Enhancements for Group Capacity...

PARTITION DATA REPORT

z/OS V1R11				SYSTEM ID TRX1				DATE 02/26/2009				INTERVAL 05.00.000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
				RPT VERSION V1R11 RMF				TIME 11.00.00				CYCLE 1.000 SECONDS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
MVS PARTITION NAME				TRX1				NUMBER OF PHYSICAL PROCESSORS				24				GROUP NAME				RMFGRP																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
IMAGE CAPACITY				60				CP				3				LIMIT				60																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
NUMBER OF CONFIGURED PARTITIONS				58				AAP				1				AVAILABLE				43																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
WAIT COMPLETION				NO				IFL				18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
DISPATCH INTERVAL				DYNAMIC				ICF				1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
								IIP				1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
----- PARTITION DATA -----																-- LOGICAL PARTITION PROCESSOR DATA --																-- AVERAGE PROCESSOR UTILIZATION PERCENTAGES --																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
-----MSU-----																-CAPPING--																PROCESSOR-																-----DISPATCH TIME DATA-----																LOGICAL PROCESSORS																--- PHYSICAL PROCESSORS ---																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
NAME																S																WGT																DEF																ACT																DEF																WLM%																NUM																TYPE																EFFECTIVE																TOTAL																EFFECTIVE																TOTAL																LPAR																MGMT																EFFECTIVE																TOTAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
TRX1																A																400																100																4																NO																0.0																3.0																CP																00.00.11.049																00.00.11.371																1.23																1.26																0.04																1.23																1.26																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
H05LP45																A																10																0																2																NO																0.0																2																CP																00.00.04.720																00.00.05.690																0.79																0.95																0.11																0.52																0.63																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
TRX2CFA																A																100																0																1																YES																0.0																1																CP																00.00.02.958																00.00.03.078																0.99																1.03																0.01																0.33																0.34																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
H05LP59																A																100																0																1																NO																0.0																3																CP																00.00.02.700																00.00.03.501																0.30																0.39																0.09																0.30																0.39																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
H05LP60																A																10																0																9																NO																0.0																2																CP																00.00.23.742																00.00.26.331																3.96																4.39																0.29																2.64																2.93																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
TRX2																A																200																100																13																NO																0.0																3.0																CP																00.00.37.219																00.00.37.721																4.14																4.19																0.06																4.14																4.19																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
PHYSICAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

Field Heading	Meaning
AVAILABLE	Long-term average of CPU service units which would be allowed by the limit of the capacity group but are not used by its members. If the value is negative, this capacity group is subject to capping.

RMF z/OS 1.11 Enhancements for Group Capacity...

RMF Data Portal - Mozilla Firefox - IBM Edition

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

http://boetrx2.boeblingen.de.ibm.com:8803/

IBM Internal Help Ho... IBM Standard Softwa... Search the Web with ... IBM BluePages

RMF Monitor III Data Portal for z/OS

Explore Overview My View Home

RMF Report [TRX2,MVS_IMAGE] : CPC (Central Processor Complex)

Time Range: 03/18/2009 08:46:00 - 03/18/2009 08:47:00

Partition Name: TRX2

Weight % of Max: 19.9

WLM Capping %: 0.0

Proj Time until Capping: 14400

CP Processors: 4

IFL Processors: 18

% Capacity Used: 7

Shared physical CPs: 4

WLM LPAR management enabled: YES

Physical Total % of shared ICFs: 61.1

CPU Type: 2097

4h MSU Average: 2

4h MSU Maximum: 3

Proj Time until Group Capping: 14400

ICF+IFL+AAP Processors: 0

IIP processors: 1

Dedicated CPs: 0

Shared physical AAPs: 1

Physical Total % of shared CPs: 5.1

Physical Total % of shared IFLs: 0.0

CPU Model: 704

Capacity Group Name: RMFGRP

Capacity Group Limit: 150

4h Unused Group Capacity Average: 142

AAP Processors: 1

Configured Partitions: 58

Dedicated AAPs: 0

Shared physical IIPs: 1

Physical Total % of shared AAPs: 0.0

CPC Capacity (MSU/h): 401

Image Capacity: 60

Less than 4h in Capacity Group: N

CPC sequence number: 000000000001EBAE

ICF Processors: 2

Wait Completion: NO

Dedicated IIPs: 0

Vary CPU management available: NO

Physical Total % of shared IIPs: 0.0

Average available capacity for the group during last 4 hours

i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	
LPAR Name	Defined MSU/h	Actual MSU/h	Capping Option	# Logical Processors Online	Logical Effective %	Logical Total %	LPAR Mgmt %	Physical Effective %	Physical Total %	Line Type	# Online Processors Shared	# Online Processors Dedicated	Current LPAR Weight	Logical Processor Share %	Hiper Dispatch: # High	Hiper Dispatch: # Medium	Hiper Dispatch: # Low	Operating System Name	LPAR Cluster Name	Initial Weight	Mir
*CP				14.0			2.5	4.8	7.3	CS	14	0	820								
H05LP45	0	1	NO	2.0	0.4	0.5	0.1	0.2	0.3	CP	2	0	10	2.4	N/A	N/A	N/A	BOEH0545			
H05LP59	0	1	NO	3.0	0.3	0.4	0.1	0.2	0.3	CP	3	0	100	16.2	N/A	N/A	N/A	BOEH0559			
H05LP60	0	8	NO	2.0	3.8	4.1	0.2	1.9	2.1	CP	2	0	10	2.4	N/A	N/A	N/A	BOEH0560			
TRX1	50	4	NO	3.0	1.2	1.3	0.0	0.9	1.0	CP	3	0	415	51.2	1	2	0	TRX1	TRX1PLEX	400	9
TRX2	60	4	NO	3.0	1.3	1.4	0.0	1.0	1.0	CP	3	0	185	90.2	0	1	2	TRX2	TRX1PLEX	200	9
TRX2CFA	0	2	YES	1.0	2.1	2.1	0.0	0.5	0.5	CP	1	0	100	48.7	N/A	N/A	N/A				
PHYSICAL							2.2		2.2	CY											
*ICFPOOL				1.0			1.4	56.8	58.2	IS	198	1	0								

Group Capacity: Availability

Function	z/OS V1.12 as previewed 2/2010	z/OS V1.11	z/OS V1.10	Earlier Releases
Group Capacity plus OA24096 Enhancements	+	+	OA24096 OA23230	OA24096 OA23230 (z/OS 1.8)
RMF Reporting Enhancements for Group Capacity	+	+		
z/OS Capacity Provisioning	+	+	OA20824	

- OA24096
 - Changes the behavior when then group limit is changed according to the behavior for an individual defined capacity limit
- OA23230
 - Corrects a storage overlay which will occurs when SMF 99 data is collected and a partition is dynamically activated via HCD
- Short Comings of the existing Group Capacity Report
 - Reporting was not sufficient to understand capping of partitions within a group
 - Resolved with z/OS 1.8 RMF Reporting Enhancements
- Related z/OS Functions
 - z/OS Capacity Provisioning allows to activate additional CPU capacity via OOCoD in a controlled manner.

WLM Reporting: Extend Number of Report Classes

- The WLM-supported maximum on the number of defined report classes (999) has become insufficient for large installations
- Solution
 - Extend number of report classes in multiple steps:
 - First Step (z/OS 1.11):
 - Extend to 2047 Report Classes
 - Expand internal data structures to be able to deal with 4095 report classes
- Remarks
 - New WLM functionality level in z/OS 1.11: LEVEL023
 - For Service Definitions in XML format, the corresponding XML namespace is *<http://www.ibm.com/xmlns/prod/zwlm/2009/09/ServiceDefinition.xsd>*

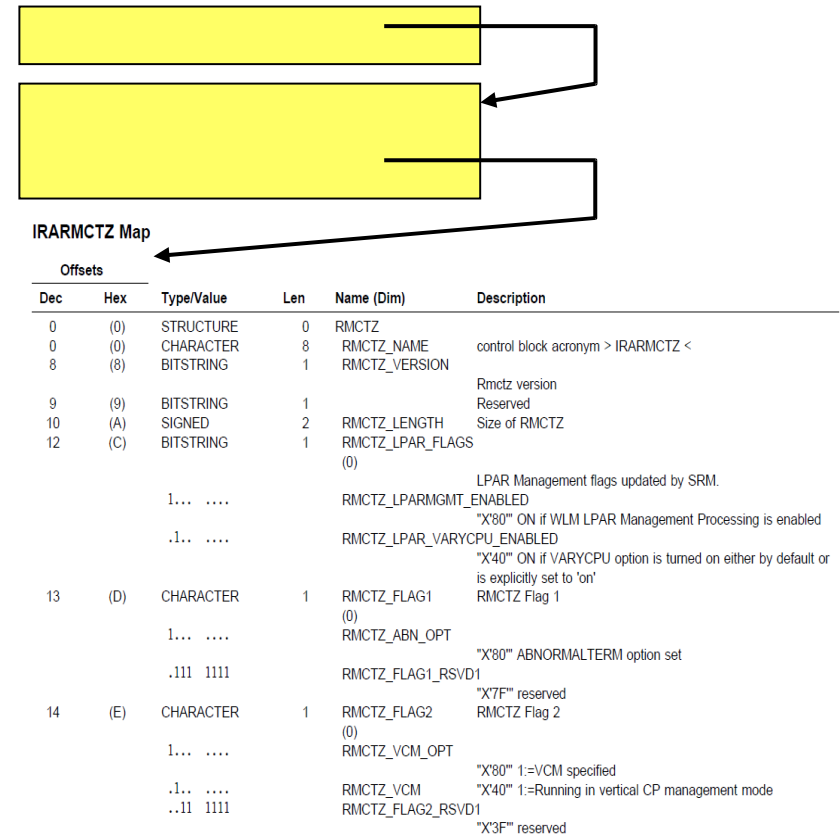
Extended Number of Report Classes Availability

Function	z/OS V1.12	z/OS V1.11	z/OS V1.10	Older Releases
2047 Report Classes	+	+		

New Programming Interface for Monitors

Control Block: IRARMCTZ

- New extension to SRM Control Table (PI) for information which is of interest for externalization
 - For example all information related to RMF's Monitor II OPT report is included in this table

[illegible]

New Programming Interface for Monitors: Availability

Control Block: IRARMCTZ

Function	z/OS V1.12 <small>as previewed 2/2010</small>	z/OS V1.11	z/OS V1.10	Earlier Releases
RMF Monitor II OPT Display	+	+		
WLMOPT Tool (bundled with WLMQUE Tool)	No longer extended <small>Still bundled with WLMQUE but on z/OS 1.10 level</small>		+	Since z/OS 1.8
IRARMCTZ	+	OA31201	OA31201	

- RMF Monitor II OPT Display
 - Replaces WLMOPT Tool
 - Bundled with WLMQUE Tool but no longer extended (remains on z/OS 1.10 level)
 - WLMQUE Tool is still valid (see also WLM Tools summary)
- New data interface for Monitors
 - Introduced with z/OS 1.12, Rollback to z/OS 1.10

Hiperdispatch: WLM APARs

APAR	Description	Close Date	Remark
OA31733	Corrects calculation of capacity for medium processors	04/2010	Affects larger configurations

Agenda

- Enclave Enhancements
 - Enclave Server Management
 - Work-Dependent Enclaves
- WLM Management
 - LDAP Support
 - Resource Group Enhancements
 - Do not always honor Skip Clock in Policy Adjustment
- WLM Reporting
 - Additional Group Capacity Information in RMF
 - Extend Number of Report Classes
- Externalized IEAOPT Information
- Hyperdispatch APAR
- WLM support for IBM zEnterprise 196
- z/OSMF Workload Management
- WLM support for zManager
- 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
 - CSRSI does no longer provide alternate CPU capability
 - Supplies additional information about speed changes
- 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 Pricing Adjustment Factors

- z196 provides MSU values instead of the alternate CPU capability together with MP factors table as base for pricing factors
- WLM uses the new MSU values to calculate pricing adjustment factors on z196
 - Add more granular new pricing adjustment factors RCTPCPUA_actual and RCTPCPUA_nominal plus a scaling factor RCTCPCPUA_scaling_factor
 - Maintain existing RCTPCPUA for compatibility
- Values are also available in SMF30 and SMF89
 - SMF30_RCTPCPUA_xxxxxx, SMF30_Capacity_F...
 - SMF89_RCTPCPUA_xxxxxx

WLM Support for IBM zEnterprise 196

New Message IWM064I

- Depending on the reason for the speed change one of the following message accompanies
IWM063I WLM POLICY WAS REFRESHED DUE TO A PROCESSOR SPEED CHANGE
 - 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

Enhanced API

- Query Virtual Server interface can be used to query a server's capacity status
 - Called by Sysevent QVS (assembler interface) or IWMQVS (C interface)
- The Output is mapped by IRAQVS (assembler mapping) or IWMQVS.H (C header file)
 - New data field QvsCecCapacityStatus has been added to indicate if the machine is running at nominal or reduced capacity
 - Version QvsVer has been incremented to QvsVer2

WLM Support for IBM zEnterprise 196

Extended Data Areas

- **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)
- **IRARCT**
- **IWMWRCAA**
 - RCAAADJCCPU CPU adjustment factor
 - RCAAADJCCPUNOM nominal CPU adjustment factor
 - RCAAADJCCEC CEC adjustment factor

WLM Support for IBM zEnterprise 196

Availability

Function	z/OS V1.12	z/OS V1.11	z/OS V1.10	z/OS V1.9
New message, API enhancements	OA30968	OA30968	OA30968	
Support for new MSU computation/reporting	OA30968	OA30968	OA30968	OA30968

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*

Overview

■ IRALPDAT new data fields

- LPDATMODELCAPRATING

- When non-zero, an unsigned integer whose value is associated with the model capacity as identified by the model-capacity identifier. There is no formal description of the algorithm used to generate this integer.

Permanent+OOCoD + (CBU+PE)

- LPDATMODELPERMCAPRATING

- When non-zero, an unsigned integer whose value is associated with the model-permanent capacity as identified by the model-permanent- capacity identifier

Permanent configuration

- LPDATMODELTEMPCAPRATING

- When non-zero, an unsigned integer whose value is associated with the model-temporary capacity as identified by the model-temporary- capacity identifier.

Permanent + OOCoD

REQLPDAT Sample with Active Temporary Capacity

▪ Example output

▪ 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

- Enclave Enhancements
 - Enclave Server Management
 - Work-Dependent Enclaves
- WLM Management
 - LDAP Support
 - Resource Group Enhancements
 - Do not always honor Skip Clock in Policy Adjustment
- WLM Reporting
 - Additional Group Capacity Information in RMF
 - Extend Number of Report Classes
- Externalized IEAOPT Information
- Hyperdispatch APAR
- WLM support for IBM zEnterprise 196
- z/OSMF Workload Management
- WLM support for zManager
- 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

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

Store all service definitions in one repository

Name	Description	Filter	Filter	Filter	Filter	Filter	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	bmair
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	tblatt
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	ks56551
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 De						
WLM001	Service						
WLM000							
WLM700							
WLM0101	policy						
WLM0103							
WLM0104							
WLM0105							
WLM0106							
WLM0107							
WLM0108							
WLM0109							
WLM0110							
WLM0111							
WLM0112							
WLM0113							
WLM0114							
WLM0115							
WLM0116							
WLM0117							
WLM0118							
WLM0119							
WLM0120							
WLM0121							
WLM0122							
WLM0123							
WLM0124							
WLM0125							
WLM0126							
WLM0127							
WLM0128							
WLM0129							
WLM0130							
WLM0131							
WLM0132							
WLM0133							
WLM0134							
WLM0135							
WLM0136							
WLM0137							
WLM0138							
WLM0139							
WLM0140							
WLM0141							
WLM0142							
WLM0143							
WLM0144							
WLM0145							
WLM0146							
WLM0147							
WLM0148							
WLM0149							
WLM0150							
WLM0151							
WLM0152							
WLM0153							
WLM0154							
WLM0155							
WLM0156							
WLM0157							
WLM0158							
WLM0159							
WLM0160							
WLM0161							
WLM0162							
WLM0163							
WLM0164							
WLM0165							
WLM0166							
WLM0167							
WLM0168							
WLM0169							
WLM0170							
WLM0171							
WLM0172							
WLM0173							
WLM0174							
WLM0175							
WLM0176							
WLM0177							
WLM0178							
WLM0179							
WLM0180							
WLM0181							
WLM0182							
WLM0183							
WLM0184							
WLM0185							
WLM0186							
WLM0187							
WLM0188							
WLM0189							
WLM0190							
WLM0191							
WLM0192							
WLM0193							
WLM0194							
WLM0195							
WLM0196							
WLM0197							
WLM0198							
WLM0199							
WLM0200							

Click to view, edit, print, install a service definition

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 definition check where the element is used

Name	Period	Importance	Duration	Goal Type	Response Time	Percentile	Velocity	CPU Critical	Resource Group
*STTCL3								No	
STTCL3	1	*3		Velocity			*91	No	
*STTCL4								No	
STTCL4	1	*2		Average Response Time	*00:00:03.000			No	
*STTCL5								No	
STTCL5	1	*2		Average Response Time	*00:00:30.000			No	
*STTCL6								No	
STTCL6	1	*2		Average Response Time	*00:02:00.000			No	
*STTCL7									
STTCL7	1	*3	*3000	Velocity					
STTCL7	2	*3		Velocity					
*STTCL8									
STTCL8	1	*3	*3000	Velocity					
STTCL8	2	*3		Velocity					

Total: 242, Selected: 1
Reapply Filter and Sort

OK Apply Reset Cancel

z/OSMF Workload Management

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

A complete overview is presented in session

Manage your Workloads and Performance with z/OSMF

Tuesday, 4:30 PM-5:30 PM

WLM support for zManager

Introduction

- The zEnterprise Unified Resource Manager (zManager) introduced with z196 provides zEnterprise platform management
- zManager enables you to install, monitor, manage, optimize, diagnose, and service resources and workloads from a single point of control while extending System z qualities of service across the entire infrastructure
- zManager is controlled by a platform workload management policy:
 - Specified at the HMC
 - Defines Workloads which are groups of partitions or virtual servers that support the same business application(s)
 - (not to be confused with Workloads defined in the WLM policy)
 - Defines Service Classes with platform wide performance goals of Workloads
- The *guest platform management provider* (GPMP) is the interface between the zManager and the z/OS Workload Manager

WLM support for zManager

GPMP – WLM Interaction

- 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 zManager

Service Definition Enhancements for GPMP

- z/OS V1R12 introduces WLM functionality level LEVEL025 to support zManager and GPMP
- zManager 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 zManager service classes with WLM service or report classes

Action		-----Qualifier-----			-----Class-----	
		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

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

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

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

WLM support for zManager

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 zManager

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 zManager

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: 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

To display system and GPMP status information, enter:

D WLM,SYSTEMS,GPMP

```
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 zManager

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 IWM078I
 - 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 zManager

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 zManager

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

धन्यवाद

Hindi

多謝

Traditional Chinese

ขอบพระคุณ

Thai

Спасибо

Russian

Gracias

Spanish

Thank You

English

Obrigado

Brazilian Portuguese

شكراً

Arabic

Grazie

Italian

多谢

Simplified Chinese

Danke

German

Bedankt

Dutch

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

<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		Report Classes	
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					
WKLTIK											All Batch Jobs		
WKLTIK	B4V10STD							-	No		Batch Standard VEL 10 IMP 4		
WKLTIK	B4V10STD		Velocity		4 -			10					
WKLTIK	B4V20STD							-	No		Batch Standard VEL 20 IMP 4		
WKLTIK	B4V20STD	1	Velocity		4 1000			20					
WKLTIK	B4V20STD	2	Velocity		-			10					
WKLDTSO											ALL TSO USERIDS		
WKLDTSO	T2335DEV							-	No		Developer (Standard) TSO		
WKLDTSO	T23		PrecentileResponseTime		2 2500	00:00:02.000	98						
WKLDTSO	T23		AverageResponseTime		3 300000	00:00:20.000	95						
WKLDTSO	T23		PercentileResponseTime		5 -			10					
WKLDTSO	T23							-	No		Production TSO Helpers		
WKLDTSO	T23		PrecentileResponseTime		2 2000	00:00:01.000	99						
WKLDTSO	T23		PrecentileResponseTime		2 10000	00:00:02.000	99						

used by: Classification: JES

Insert
Insert Before
Insert After
Replace by
Copy
Cut
Delete

No	Description	Element
1	Importance value can not be null	Workload "WKLTIK"/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                                >SAVE<
.
. WLM OPT Settings
. 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    Specifies if CPs may help zAAPs
. IIPHONORPRIORITY  Yes    Specifies if CPs may help zIIPs
. INITIMP           0,FE    INITIMP value and DP for initiators
. MCCAFC TH         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
. RMPITQM           1000    SRM invocation interval
. STORAGENS DP      Yes    Set Non-swappable AS non dispatchable
. STORAGEW TOR      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)

[illegible]

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  0  4  3
WLMSHORT No  3  3  0  0  0  0  0  0  2  0
COMBUILD No  2  2  0  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

```