

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

[Horst Sinram](#)

IBM Germany Research & Development

August 2, 2010
Session 7777



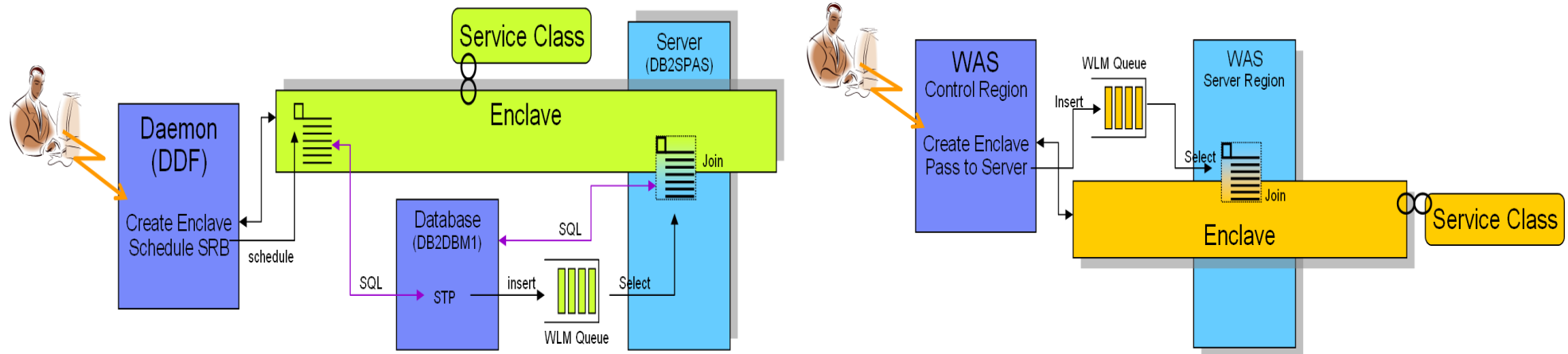
SHARE in Boston

Agenda



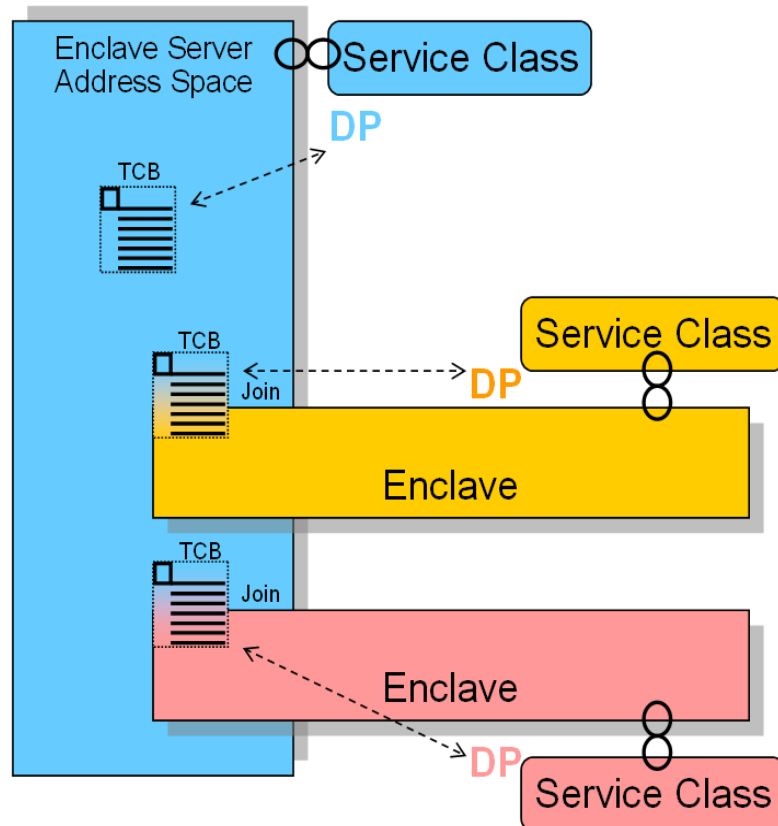
- Enclave Enhancements
 - Enclave Server Management
 - Work-Dependent Enclaves
- WLM Management
 - LDAP Support
 - Resource Group Enhancements
 - Do not always honor Skip Clock in Policy Adjustment
- WLM Reporting
 - Extend Number of Report Classes
 - Additional Group Capacity Information in RMF
- Externalized 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 Management Changes with z/OS 1.12

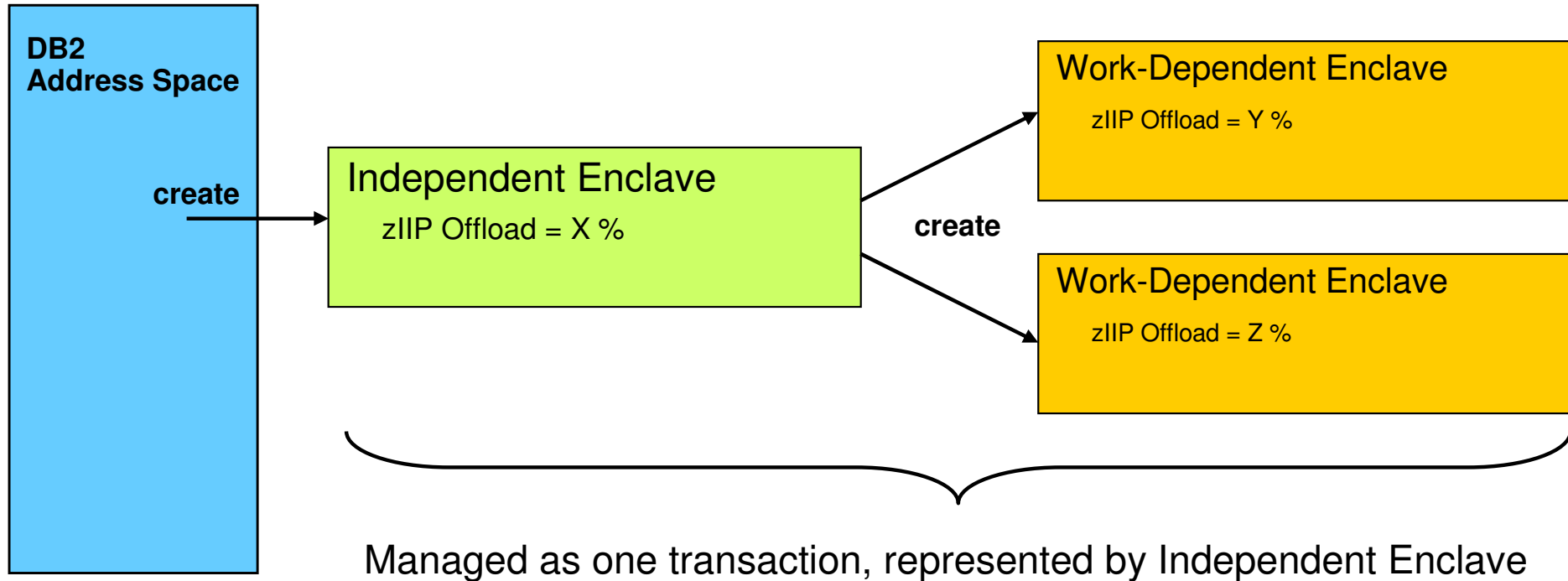


- New IEAOPT Parameter
 - ManageNonEnclaveWork = {**No**|Yes}
 - Default: No (no change to previous releases)
 - Causes everything in the address space, which is not associated to an enclave, to be managed towards the goals of the external Service Class to which the address space has been classified 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

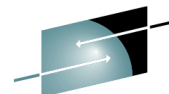
- Background
 - zIIPs allow middleware components to run a certain percentage of their work “offloaded” from regular processors
 - The offload percentage is an attribute of the enclave under which the unit of work runs
 - The offload percentage is defined by the middleware component via a (not generally 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
Current options: Subsystem Type: ALL
                  Enclave Owner:
                  Class/Group:
Enclave Attribute CLS/GRP P Goal % D X EAppl% TCPU
*SUMMARY
ENC00006 VEL_1 1 5 W 0.812 2.530
ENC00002 VEL_1 1 5 W 0.163 2.532
ENC00004 VEL_1 1 5 W 0.162 2.528
ENC00005 VEL_1 1 5 W 0.162 2.519
ENC00003 VEL_1 1 5 W 0.162 2.518
ENC00001 VEL_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)

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

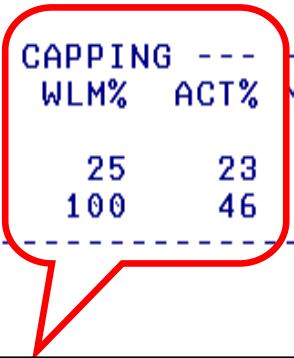
RMF z/OS 1.11 Enhancements for Group Capacity...



GROUP CAPACITY REPORT

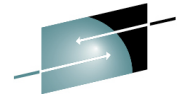
z/OS V1R11 SYSTEM ID TRX1 DATE 02/26/2009 INTERVAL 05.00.000
 RPT VERSION V1R11 RMF TIME 11.00.00 CYCLE 1.000 SECONDS

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



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

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



SHARE
Technology · Connections · Results

RMF Data Portal - Mozilla Firefox: IBM Edition

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

RMF Monitor III Data Portal for z/OS

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	CPU Type: 2097	CPU Model: 704	CPC Capacity (MSU/h): 401
Weight % of Max: 19.9	4h MSU Average: 2	Capacity Group Name: RMFGRP	Image Capacity: 60
WLM Capping %: 0.0	4h MSU Maximum: 3	Capacity Group Limit: 150	Less than 4h in Capacity Group: N
Proj Time until Capping: 14400	Proj Time until Group Capping: 14400	4h Unused Group Capacity Average: 142	CPC sequence number: 00000000001EBAE
# CP Processors: 4	# ICF+IFL+AAP Processors: 0	# AAP Processors: 1	# ICF Processors: 2
# IFL Processors: 18	# IIP processors: 1	Configured Partitions: 58	Wait Completion: NO
% Capacity Used: 7	# Dedicated CPs: 0	# Dedicated AAPs: 0	# Dedicated IIPs: 0
# Shared physical CPs: 4	# Shared physical AAPs: 1	# Shared physical IIPs: 1	Vary CPU management available: NO
WLM LPAR management enabled: YES	Physical Total % of shared CPs: 5.1	Physical Total % of shared AAPs: 0.0	Physical Total % of shared IIPs: 0.0
Physical Total % of shared ICFs: 61.1	Physical Total % of shared IFLs: 0.0		

Monitor III CPC report in Monitor III Data Portal displays the projected remaining time until image/group capping in the report header

Average available capacity for the group during last 4 hours

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	Dispatch: # Medium	Hiper Dispatch: # Low	Operating System Name	LPAR Cluster Name	Initial Weight	Mir Weight
*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										CY											
*ICFPPOOL				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

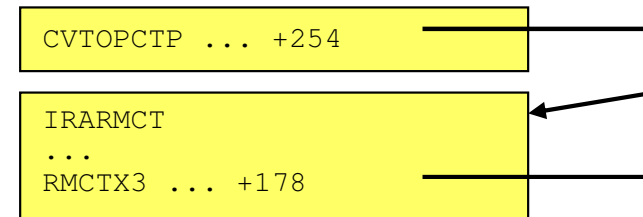
- New extension to SRM Control Table (PI) for information which is of interest for externalization
 - For example all information related to RMF's Monitor II OPT report is included in this table

```

boewlm1 - wc3270
RMF - OPT Settings
Line 1 of 29
Command ==>
Scroll ==> PAGE
CPU= 4 UIC= 65K PR= 0 System= WLM1 Total

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

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



IRARMCTZ Map

Offsets		Type/Value	Len	Name (Dim)	Description
0	(0)	STRUCTURE	0	RMCTZ	
0	(0)	CHARACTER	8	RMCTZ_NAME	control block acronym > IRARMCTZ <
8	(8)	BITSTRING	1	RMCTZ_VERSION	
9	(9)	BITSTRING	1		Rmctz version
10	(A)	SIGNED	2	RMCTZ_LENGTH	Size of RMCTZ
12	(C)	BITSTRING	1	RMCTZ_LPAR_FLAGS	
				(0)	LPAR Management flags updated by SRM.
				RMCTZ_LPARGMT_ENABLED	
				RMCTZ_LPAR_VARYCPU_ENABLED	"X80" ON if WLM LPAR Management Processing is enabled
				RMCTZ_LPAR_VARYCPU_ENABLED	"X40" ON if VARYCPU option is turned on either by default or is explicitly set to 'on'
13	(D)	CHARACTER	1	RMCTZ_FLAG1	RMCTZ Flag 1
				(0)	
				RMCTZ_ABN_OPT	
				RMCTZ_FLAG1_RSVD1	"X80" ABNORMALTERM option set
				(0)	
14	(E)	CHARACTER	1	RMCTZ_FLAG2	RMCTZ Flag 2
				(0)	
				RMCTZ_VCM_OPT	
				(0)	
				RMCTZ_VCM	"X80" 1:=VCM specified
				RMCTZ_FLAG2_RSVD1	"X40" 1:=Running in vertical CP management mode
				(0)	
				RMCTZ_FLAG2_RSVD1	"X3F" reserved

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*

Temporary Capacity Reporting via SYSEVENT REQLPDAT



- **IRALPDAT new data fields**

- LPDATMODELCAPIIDENT

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

← Permanent+OOCoD + (CBU+PE)

- LPDATMODEL

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

← H/W model

- LPDATMODELPERMCAPIIDENT

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

← Permanent configuration

- LPDATMODELTEMPCAPIIDENT

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

← Permanent + OOCoD

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**

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

- **Meaning**

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

Agenda

- 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

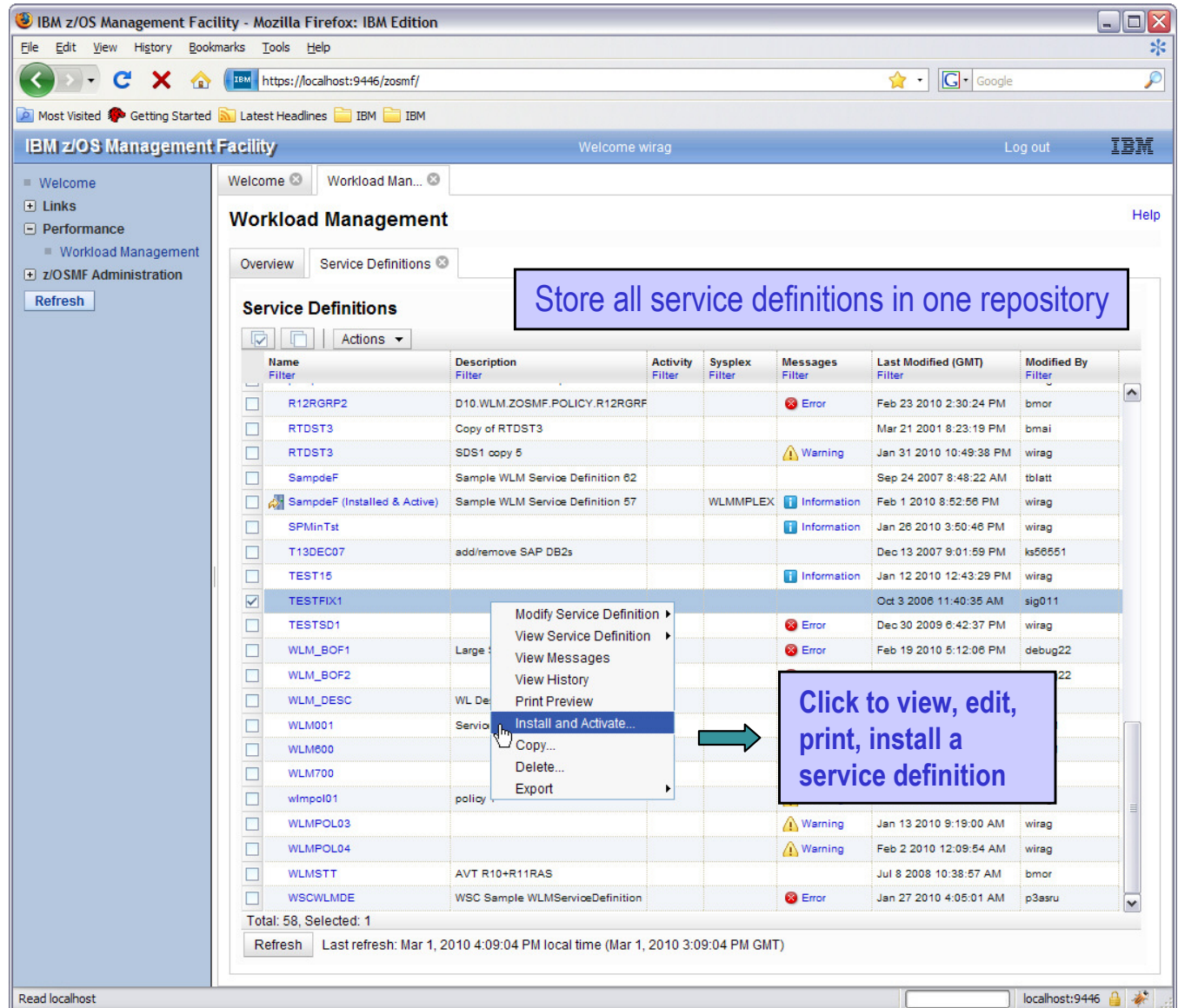
The new WLM Control Center in z/OSMF V1.12



- 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



IBM z/OS Management Facility - Mozilla Firefox: IBM Edition

https://localhost:9446/zosmf/

Welcome wirag Log out

Workload Management

Service Definitions

Store all service definitions in one repository

Name	Description	Activity	Sysplex	Messages	Last Modified (GMT)	Modified By
R12RGRP2	D10.WLM.ZOSMF.POLICY.R12RGRF			Error	Feb 23 2010 2:30:24 PM	bmor
RTDST3	Copy of RTDST3				Mar 21 2001 8:23:19 PM	bmai
RTDST3	SDS1 copy 5			Warning	Jan 31 2010 10:49:38 PM	wirag
SampleF	Sample WLM Service Definition 62				Sep 24 2007 8:48:22 AM	tblatt
SampleF (Installed & Active)	Sample WLM Service Definition 57		WLMMPLEX	Information	Feb 1 2010 8:52:58 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 2006 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						
wlmpol01	policy					
WLMPOL03				Warning	Jan 13 2010 9:19:00 AM	wirag
WLMPOL04				Warning	Feb 2 2010 12:09:54 AM	wirag
WLMSTT	AVT R10+R11RAS				Jul 8 2008 10:38:57 AM	bmor
WSCWLMDE	WSC Sample WLMServiceDefinition			Error	Jan 27 2010 4:05:01 AM	p3asru

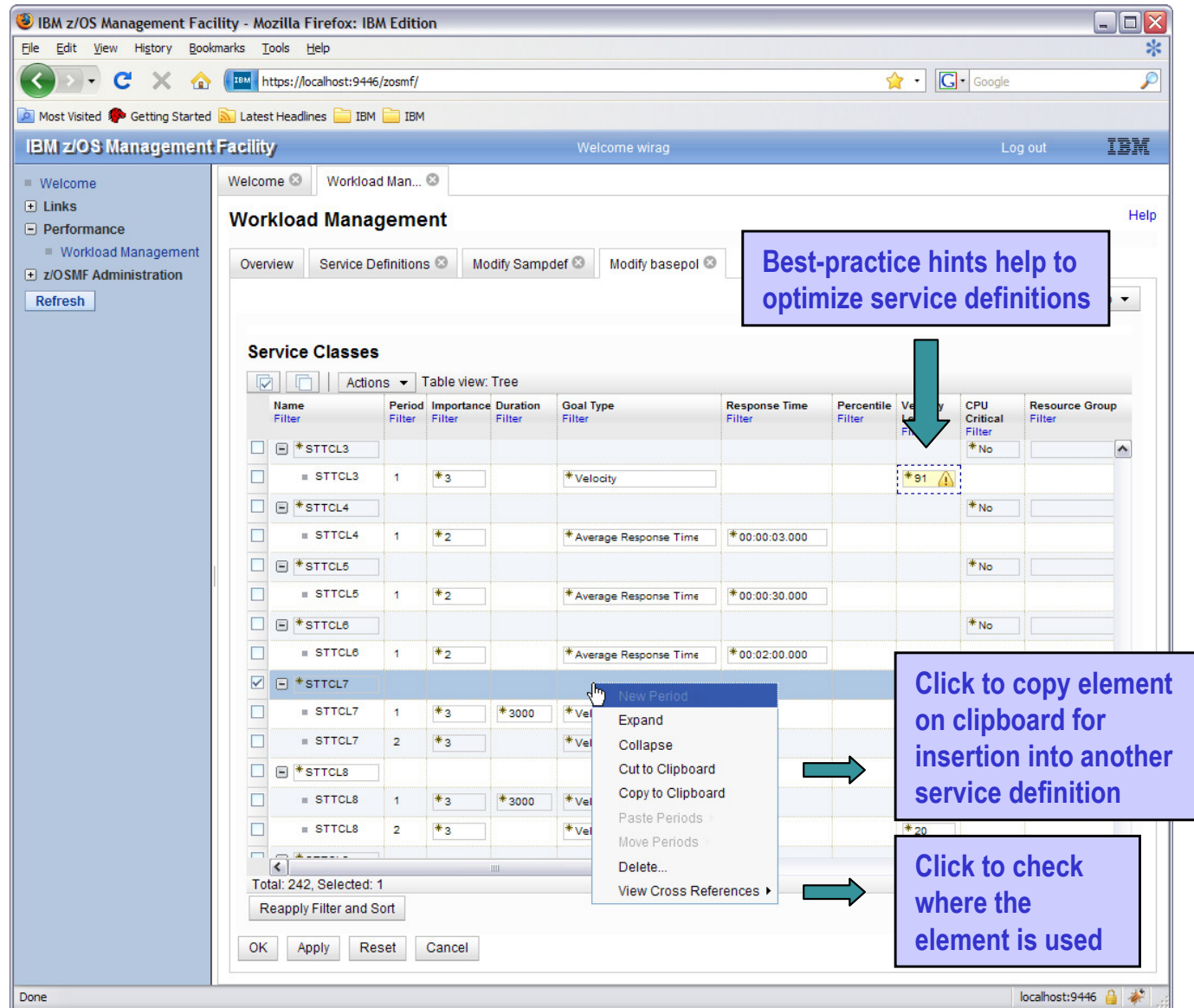
Total: 58, Selected: 1

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

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



The screenshot shows the IBM z/OSMF Workload Management interface. The main area displays a table of Service Classes. A context menu is open over the table, and several callouts provide instructions on how to use the interface features.

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

Annotations:

- Best-practice hints help to optimize service definitions:** Points to a warning icon in the Velocity column of the STTCL3 row.
- Click to copy element on clipboard for insertion into another service definition:** Points to the 'Copy to Clipboard' option in the context menu.
- Click to check where the element is used:** Points to the 'View Cross References' option in the context menu.

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

WLM support for zManager

Service Definition Enhancements for GPMP

To configure GPMP

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

```

File Utilities Notes Options
-----
Functionality LEVEL025 Def... WLM Appl LEVEL025
Command ==>

Definition data set . . . : none

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

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

After GPMP settings defined, functionality level changes to 25

```

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

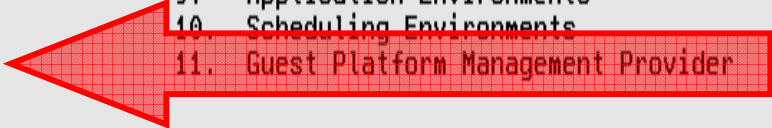
Guest Platform Management Provider activation: 2
1. NO
2. YES

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

```
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 system and GPMP status information, enter:

D WLM,SYSTEMS,GPMP

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

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

多谢

Simplified Chinese

Danke

German

Bedankt

Dutch

Grazie

Italian

Merci

French

நன்றி

Tamil

ありがとうございました

Japanese

감사합니다

Korean

WLM Tools: A Summary

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

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

WLM Tools

Service Definition Editor

WLM Service Definition Editor - D:\SAMPLESD.xml

File Edit Options Help

local

Classification Groups Classifications Service Parameter Application Environments Scheduling Environments

Service Definition Resource Groups Workloads Service Policies Report Classes

Name	ServiceClasses	Period	Goal	Im...	Duration	ResponseTime	Perce...	Level	ResourceGr...	CPU...	Description
WKLDASC											ALL APPC Transaction
WKLDASC	A3V30STD								GBATCH20	No	ASCH default Service Class
WKLDASC	A3V30STD	1	Velocity	2	500			10			
WKLDASC	A3V30STD	2	Velocity	2	-			8			
WKLTJK											All Batch Jobs
WKLTJK	B4V10STD								-	No	Batch Standard VEL 10 IMP 4
WKLTJK	B4V10STD		Velocity	4	-			10			
WKLTJK	B4V20STD								-	No	Batch Standard VEL 20 IMP 4
WKLTJK	B4V20STD	1	Velocity	4	1000			20			
WKLTJK	B4V20STD	2	Velocity	4	-			10			
WKLDTSO											ALL TSO USERIDS
WKLDTSO	T2335DEV								-	No	Developer (Standard) TSO
WKLDTSO	T2335DEV		PercentileResponseTime	2	2500	00:00:02.000	98				
WKLDTSO	T2335DEV		AverageResponseTime	3	300000	00:00:20.000	95				
WKLDTSO	T2335DEV		PercentileResponseTime	5	-			10			
WKLDTSO	T2335DEV								-	No	Production TSO Helpers
WKLDTSO	T2335DEV		PercentileResponseTime	2	2000	00:00:01.000	99				
WKLDTSO	T2335DEV		PercentileResponseTime	2	10000	00:00:00.000	99				

used by:
Classification : JES

Insert
Insert Before
Insert After
Replace by
Copy
Cut
Delete

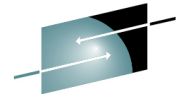
No	Description	Element
1	Importance value can not be null	Workload "WKLTJK"/ServiceClass "B4V20STD"/Velocity (#1)
2	WLM may not distinguish between periods with equal importance and only slightly different velocity levels	Workload "WKLDASC"/ServiceClass "A3V30STD"

Help Error

Ok

WLM Tools

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



SHARE
Technology · Connections · Results

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

WLM Tools

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

```

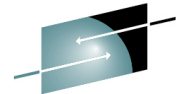
boewlm1 - wc3270
RMF - OPT Settings
Line 1 of 29
Command ==>
Scroll ==> PAGE
CPU= 4    UIC= 65K PR= 0    System= WLM1 Total

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

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

WLM Tools

WLMOPT – WLM Application Environment Viewer



```
Command ==>                               Scroll ==> PAGE
Application Environment Monitor
Selection: >HELP< >SAVE< >OVW< >ALL< \AE=SYSBATCH
System: AQFT      Sysplex: MCLXCF01  Version: z/OS 011100  Time: 06:22:27

ApplEnv_ Type SubName_ WMAS Del Dyn NQ QLen Str Hav Unb Trm Min_ Max_ ICnt
SYSBATCH JES  JES2      0031 No  No  3   0   0  12  0   0   0   0   0

WorkQue_ Del Wnt Hav ICnt QueIn_ QueOut QueLen QueTot_ Act_ Idl_
WLMLONG  No   7  7   0   0     0     0     0     4   3
WLMSHORT No   3  3   0   0     0     0     0     2   0
COMBUILD No   2  2   0   0     0     0     0     1   1

SvAS Binding_ Ter Opr Btc Dem Have Jobname
0043 WLMLONG  No  No  Yes No  1 BCNDEV
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
```