

RMF – The Latest and Greatest

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IBM Corporation

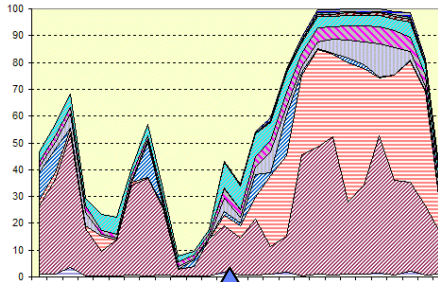
Monday, March 10, 2014

Session 15210

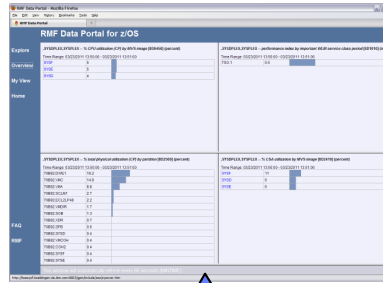


RMF Product Overview

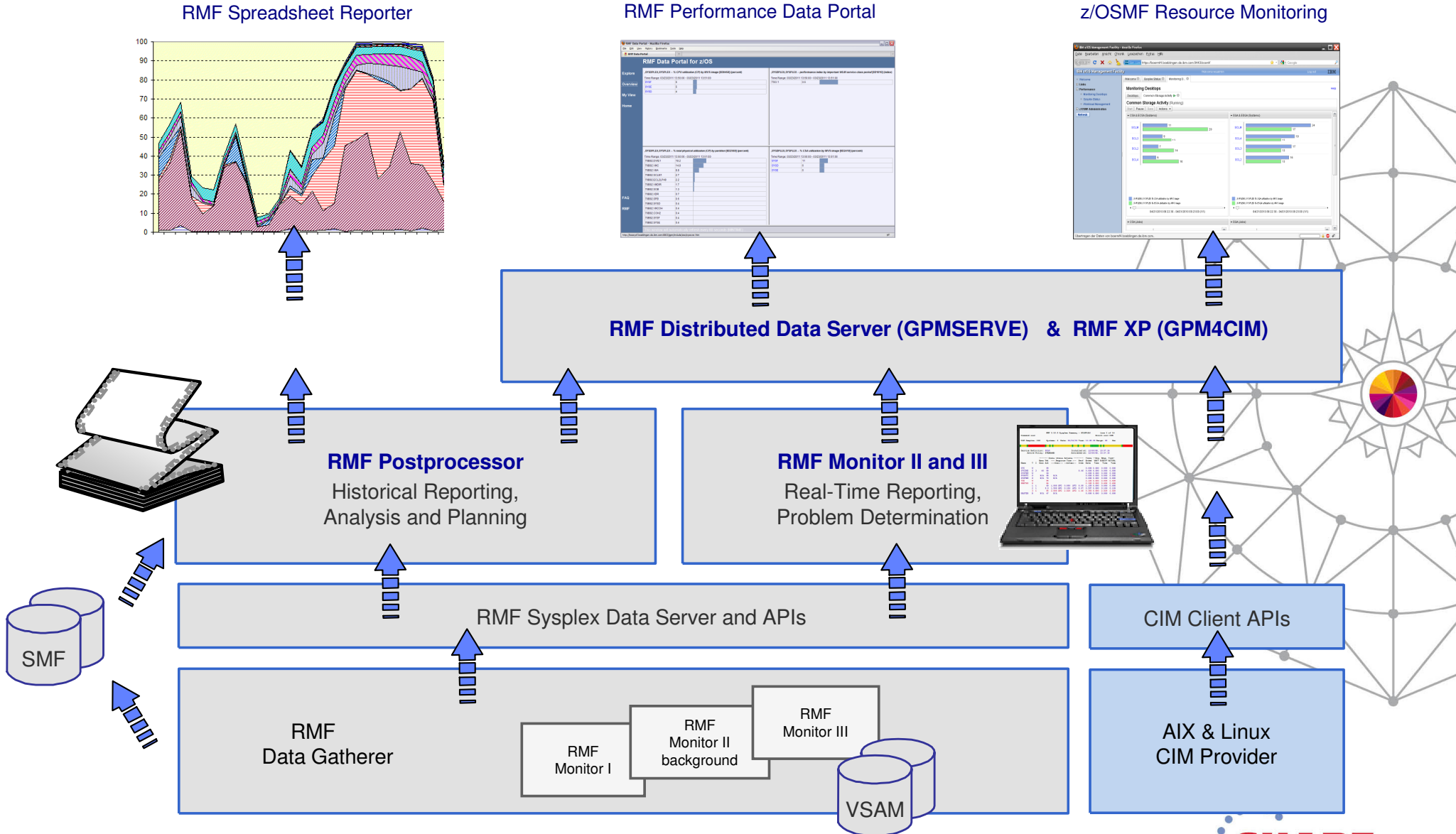
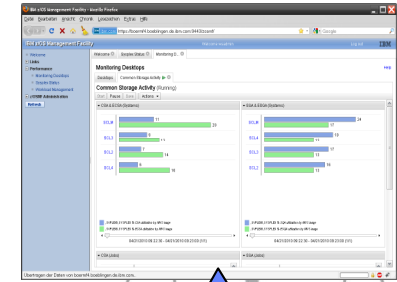
RMF Spreadsheet Reporter



RMF Performance Data Portal



z/OSMF Resource Monitoring

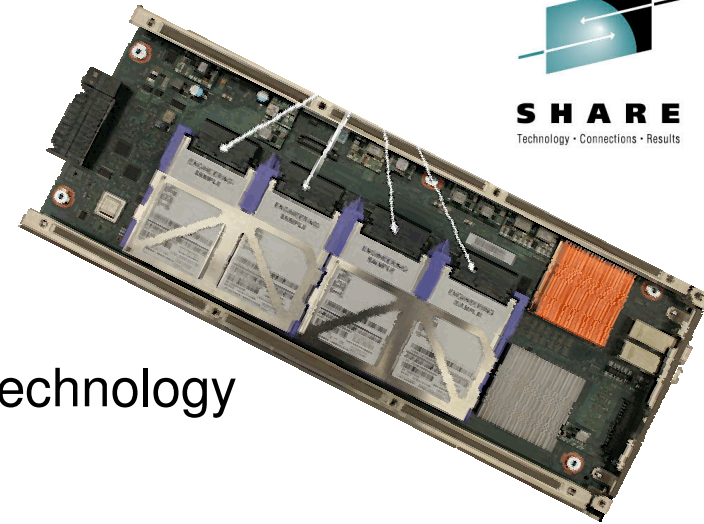


z/OS V2R1 RMF Content at a Glance

- IBM zEnterprise EC12 Support
 - ▶ Statistics for Flash Memory and Pageable Large Pages
 - ▶ z Enterprise Data Compression Express Reporting (zEDC)
 - ▶ Shared Memory Communication Reporting (SMC-R)
 - ▶ Support of I/O Interrupt Delay Time Facility
 - ▶ Extended Infiniband Link Reporting
 - ▶ Support of Crypto Express4 Card
 - ▶ Warning Track Interruption Facility Statistics
- Exploitation of System z Integrated Information Processors
 - ▶ zIIP Usage Option for Monitor III Gatherer
- Postprocessor XML formatted Reports
 - ▶ Transition to XML Format almost complete
 - ▶ Advanced Sorting and Filtering Capabilities
- z/OSMF Resource Monitoring
 - ▶ Context sensitive Application Linkage to WLM
 - ▶ Windows Support



zEC12 – Flash Express

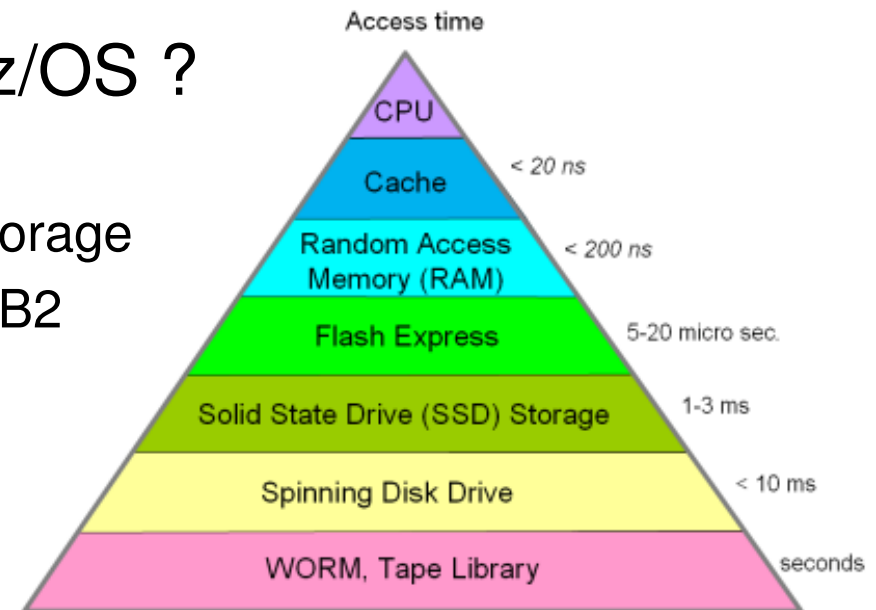


What is Flash Express?

- ▶ New memory hierarchy of the zSeries family
- ▶ Delivers tier within the fast Solid State Drive (SSD) technology
- ▶ Also denoted as Storage Class Memory (SCM)
- ▶ Integrated on PCI Express attached RAID 10 Cards
 - ⇒ Packaged as two card pair
 - ⇒ Each card holds 1.4 TB of memory per mirrored card pair
 - ⇒ Maximum value of four card pairs delivers up to 5.6 TB of memory

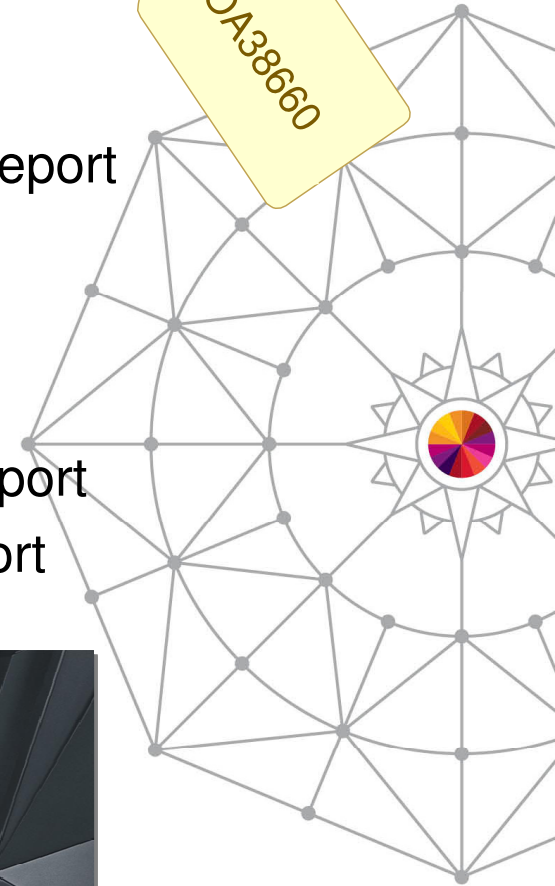
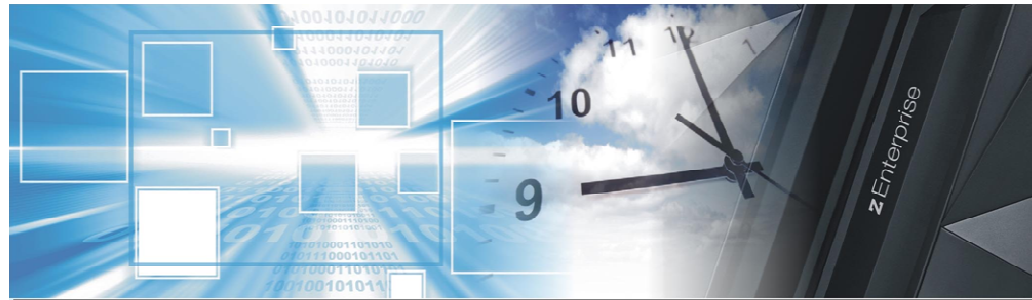
How is Flash Express exploited by z/OS ?

- ▶ Designed for improved paging performance
- ▶ Compelling addition to traditional auxiliary storage
- ▶ Supports Pageable Large Pages, e.g. with DB2 and Java workloads
- ▶ Eliminates delays from SVC or standalone dump processing



zEC12 – Flash Memory & Pageable Large Pages RMF Support

- ▶ New Storage Class Memory (SCM) statistics in
 - ⇒ RMF Postprocessor Paging Activity report
 - ⇒ RMF Postprocessor Page Data Set Activity (PAGESP) report
 - ⇒ RMF Monitor II Page Data Set Activity (PGSP) report
- ▶ New statistics for Pageable Large Pages in
 - ⇒ RMF Postprocessor Paging Activity report
 - ⇒ RMF Postprocessor Virtual Storage Activity (VSTOR) report
 - ⇒ RMF Monitor III Storage Memory Objects (STORM) report



zEC12 – Flash Memory & Pageable Large Pages

⇒ New SCM statistics in the FRAMES AND SLOT COUNTS section of the RMF Postprocessor Paging Activity report

The number of shared pages backed on SCM

SHARED FRAMES	TOTAL SLOTS	CENTRAL STORAGE		FIXED TOT	FIXED BEL	AUX DASD	AUX SCM
MIN	7,937	44	30	0	13	0	
MAX	7,937	44	30	0	13	0	
AVG	7,937	44	30	0	13	0	

LOCAL PAGE DATA SET SLOTS	TOTAL	AVAILABLE	BAD	NON-VIO	VIO
MIN	5,399,997	4,269,302	0	1,128,251	0
MAX	5,399,997	4,271,746	0	1,130,695	0
AVG	5,399,997	4,269,838	0	1,130,159	0

SCM PAGING BLOCKS	TOTAL	AVAILABLE	BAD	IN-USE
MIN	0	0	0	0
MAX	0	0	0	0
AVG	0	0	0	0

System wide statistics of 4K SCM paging blocks as: Total, Available, Unavailable and Used 4K blocks

zEC12 – Flash Memory & Pageable Large Pages...



⇒ New SCM and Large Pages statistics in the MEMORY OBJECTS section of the RMF Postprocessor Paging Activity report

PAGING ACTIVITY

OPT = IEAOPT00 LFAREA SIZE = 209715200 MEMORY OBJECTS AND HIGH VIRTUAL STORAGE FRAMES

MEMORY OBJECTS	COMMON	SHARED	1 MB
MIN	53	1	1
MAX	56	1	4
AVG	54	1	2

System wide usage of Large Frame Area (Fixed Frames) and Pageable Large Frames

1 MB FRAMES	FIXED			PAGEABLE		
	TOTAL	AVAILABLE	IN-USE	TOTAL	AVAILABLE	IN-USE
MIN	200	80	30	560	496	57
MAX	200	170	120	560	503	64
AVG	200	136	64	560	501	59

HIGH SHARED FRAMES	TOTAL
MIN	136902.1M
MAX	136902.1M
AVG	136902.1M

CENTRAL STORAGE	
MIN	206
MAX	206
AVG	206

AUX DASD	
MIN	0
MAX	0
AVG	0

AUX SCM	
MIN	0
MAX	0
AVG	0

HIGH COMMON FRAMES	TOTAL
MIN	17301504
MAX	17301504
AVG	17301504

Size of high virtual shared and common area in units of 4KB pages

AUX DASD	
MIN	0
MAX	0
AVG	0

AUX SCM	
MIN	0
MAX	0
AVG	0

Number of auxiliary storage slots used for high virtual common and shared memory pages that are backed on SCM storage

zEC12 – Flash Memory & Pageable Large Pages...



⇒ New SCM statistics RMF Postprocessor Page Data Set Activity report

```

PAGE DATA SET ACTIVITY

z/OS V1R13           SYSTEM ID TRX2           DATE 03/10/2012
                        TIME 13.00.00           INTERVAL 15.00.012
                                                CYCLE 1.000 SECONDS

NUMBER OF SAMPLES =      900           PAGE DATA SET AND SCM USAGE
-----
PAGE SPACE VOLUME DEV DEVICE SLOTS  SLOTS USED  BAD  % PAGE      V
TYPE SERIAL  NUM  TYPE  ALLOC  MIN   MAX   AVG  USE TRANS NUMBER PAGES I
PLPA TRX2PP  D406 33903 71999 16851 16851 16851 0 0.00 0.000 0 0 PAGE.VTRX2PP.PLPA
COMMON TRX2PP D406 33903 35999 34 34 34 0 0.00 0.000 0 0 PAGE.VTRX2PP.COMMON
LOCAL TRX2P1 D506 33903 593999 0 0 0 0 0.00 0.000 0 0 Y PAGE.VTRX2P1.LOCAL1
SCM N/A N/A N/A 131072 43151 43151 43151 0 0.00 0.000 0 0 N/A
    
```

System wide statistics of 4K SCM paging block usage and SCM paging activity



zEC12 – Flash Memory & Pageable Large Pages...



⇒ Statistics for Fixed Large Memory Objects in RMF Postprocessor
Virtual Storage Activity report

V I R T U A L S T O R A G E A C T I V I T Y

z/OS V2R1

SYSTEM ID SYS3
RPT VERSION V2R1 RMF

DATE 11/25/2011
TIME 05.30.00

PAGE 4
INTERVAL 14.59.996
CYCLE 1.000 SECONDS

PRIVATE AREA DETAIL

JOB NAME - JES2 MEMORY LIMIT - 20000M

MEMORY ALLOCATION IN HIGH VIRTUAL MEMORY (ABOVE 2GB)

BYTES	MIN	MAX	AVG	PEAK
PRIVATE	1.823T 05.31.52	22.41T 05.50.36	11.51T	131.8T
SHARED	485.1M 05.31.52	1822M 05.58.15	552.2M	1.333T
COMMON	885.1M 05.31.52	1.22M 05.56.15	1.2T	1.927T

MEMORY OBJECTS

PRIVATE	80 05.31.52	160 05.35.52	110
SHARED	20 05.31.52	70 05.35.52	23
COMMON	30 05.31.52	60 05.35.52	44
1 MB	20 05.31.52	70 05.35.52	25

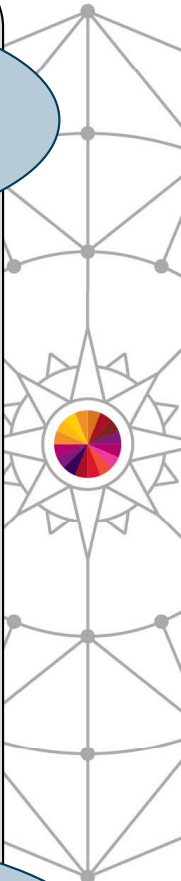
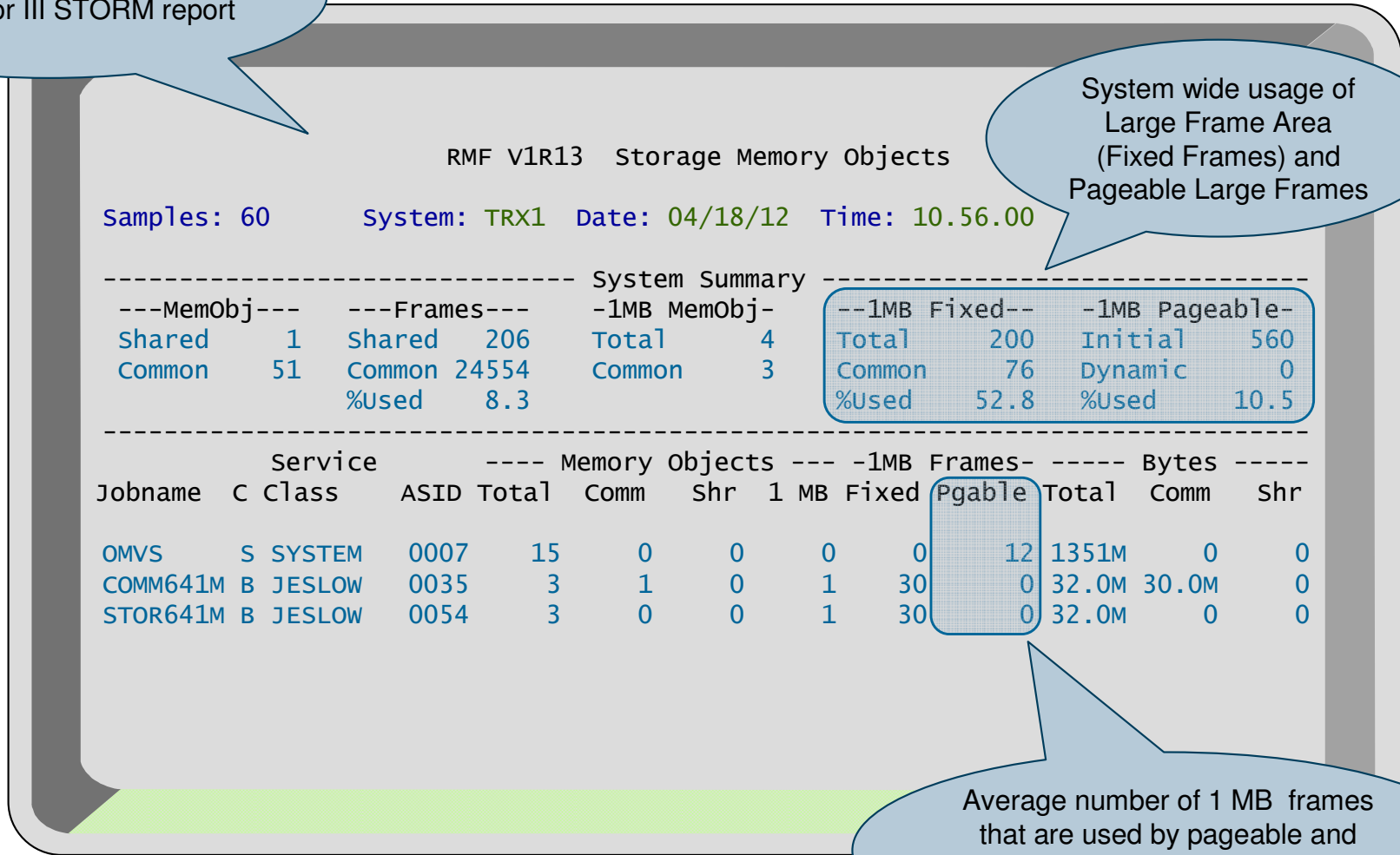
FRAMES (1 MB)

FIXED	4 05.31.52	26 05.35.52	21
PAGEABLE	4 05.31.52	26 05.35.52	21

Decomposition into
Fixed and Pageable Large Pages

zEC12 – Flash Memory & Pageable Large Pages...

New Large Page statistics in RMF Monitor III STORM report



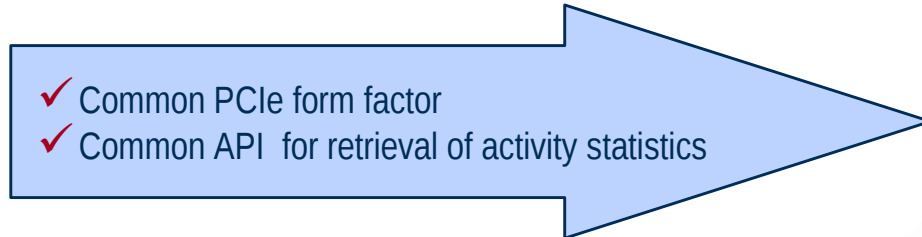
zEC12 - Data Compression Express

- ▶ The z Enterprise Data Compression (zEDC) Express offering provides a low-cost data compression to z/OS system services and applications.
- ▶ Compression can be requested on
 - ⇒ Dataset level via COMPACTION option in the SMS data class
 - ⇒ System level via COMPRESS parameter in SYS1.PARMLIB(IGDSMSxx)
- ▶ Exploiters will see the following benefits
 - ⇒ Reduced disk space
 - ⇒ Increased performance for reading and writing compressed data
- ▶ The zEDC is implemented as a Peripheral Component Interconnect Express (PCIe) device that can be installed on zEC12 GA2 and zBC12.
- ▶ The compression function is provided via FPGA firmware. Other functions (also denoted as personality) may follow.
- ▶ You can install up to eight devices in a single machine where each device is sharable by up to 15 LPARs.



zEC12 - Shared Memory Communication

- ▶ Shared Memory Communication via Remote Direct Memory Access (SMC-RDMA or SMC-R) is a zEC12 feature that provides high performance CPC to CPC communication
- ▶ SMC-R actually offers the benefits of HiperSockets across processor boundaries. It takes advantage of high speed protocols and direct memory placement of data.
- ▶ SMC-R is totally transparent to applications.
- ▶ SMC-R is implemented as a Peripheral Component Interconnect Express (PCIe) device, also denoted RoCE adapter card (RDMA over Converged Ethernet)



zEC12 - Obtain PCIe Information by Command

- ▶ Use the console command **D PCIE** for general status information

PCle Started Task

```
D PCIE
IQP022I 12.06.02 DISPLAY PCIE 970
PCIE      0013 ACTIVE
PFID  DEVICE TYPE NAME          STATUS  ASID  JOBNAME  PCHID  VFN
0001  Hardware Accelerator      ALLC    0014  FPGHWAM  0380   0001
0020  10GbE RoCE                  ALLC    00DE  VTAM     038C
0021  10GbE RoCE                  CNFG                    03B0
0011  Hardware Accelerator      ALLC    0014  FPGHWAM  05C4   0001
```

PCle Function ID

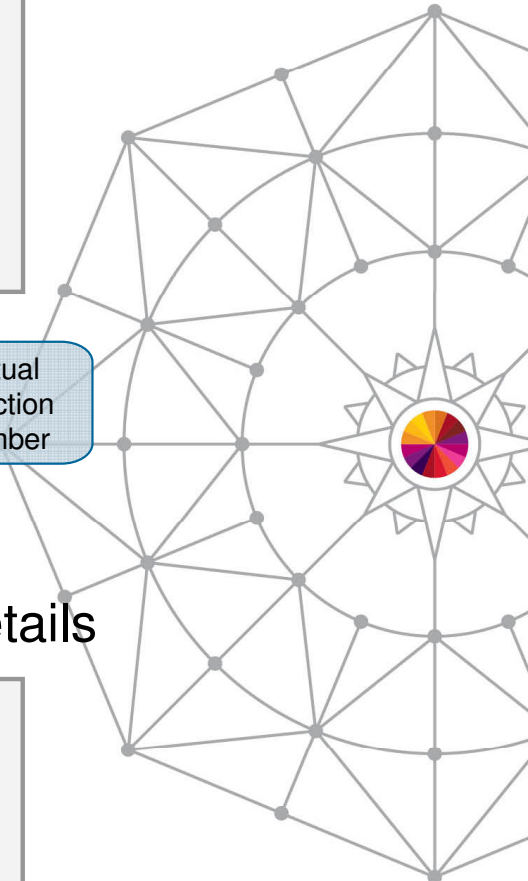
Owner Name

Physical Channel Identifier

Virtual Function Number

- ▶ Use the console command **D PCIE,PFID=xxx** for adapter details

```
D PCIE,PFID=001
IQP024I 12.10.53 DISPLAY PCIE 521
PCIE      0013 ACTIVE
PFID  DEVICE TYPE NAME          STATUS  ASID  JOBNAME  PCHID  VFN
0001  Hardware Accelerator      ALLC    0014  FPGHWAM  0380   0001
CLIENT ASIDS: NONE
Application Description: zEDC Express
Device State: Ready
Adapter Info - Relid: 000000  Arch Level: 03
                Build Date: 06/28/2013  Build Count: 03
```



zEC12 - Obtain PCIe Information via API

- IQPINFO – Obtain PCIe Information
 - The IQPINFO service provides PCIe related information, including any performance statistics
 - The service is described in *MVS Programming: Authorized Assembler Services Reference*
 - The response data area of the IQPINFO service is mapped by the macros *IQPYPERF* *PCIE Performance Data Return Area* and *IQPYPFMB* *PCIE Function Measurement Block*
- RMF Monitor III Data Gatherer collects PCIe performance statistics frequently and writes new SMF Record Type 74 Subtype 9
- The new RMF Postprocessor PCIE Activity Report provides detailed information about PCIE Express based functions. Currently supported functions are:
 - z Enterprise Data Compression (zEDC)
 - Shared Memory Communication via RDMA (SMC-R)



zEC12 - RMF Postprocessor PCIE Activity Report



RMF Postprocessor Interval Report [System Z2] : PCIE Activity Report

RMF Version : z/OS V2R1 SMF Data : z/OS V2R1
 Start : 08/13/2013-05.45.00 End : 08/13/2013-06.00.01 Interval : 15:00:000 minutes

▼ General PCIE Activity

Function ID	Function PCHID	Function Name	Function Type	Function Status	Owner Job Name	Owner Address Space ID	Function Allocation Time	PCI Load Operations Rate	PCI Store Operations Rate	PCI Store Block Operations Rate	Refresh PCI Translations Operations Rate	DMA Address Space Count	DMA Read Data Transfer Rate	DMA Write Data Transfer Rate
0001	0380	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0014	900	0	0.091	0	2.91	1		
0011	05C4	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0014	900	0	0.091	0	2.92	1		
0020	038C	10GbE RoCE	15B31003	Allocated	VTAM	00DE	900	0.889	0	0	0	1		

▼ Hardware Accelerator Activity

Function ID	Time Busy %	Request Execution Time	Std Dev for Request Execution Time	Request Queue Time	Std Dev for Request Queue Time	Request Size	Transfer Rate Total
0001	0.005	31.4	4.88	545	68.0	75.2	0.110
0011	0.004	30.7	5.35	541	93.3	74.4	0.109

▼ Hardware Accelerator Compression Activity

Function ID	Compression Request Rate	Compression Throughput	Compression Ratio	Decompression Request Rate	Decompression Throughput	Decompression Ratio	Buffer Pool Size	Buffer Pool Utilization
0001	1.46	0.088	4.11	0	0		64	0
0011	1.46	0.087	3.94	0	0		64	0

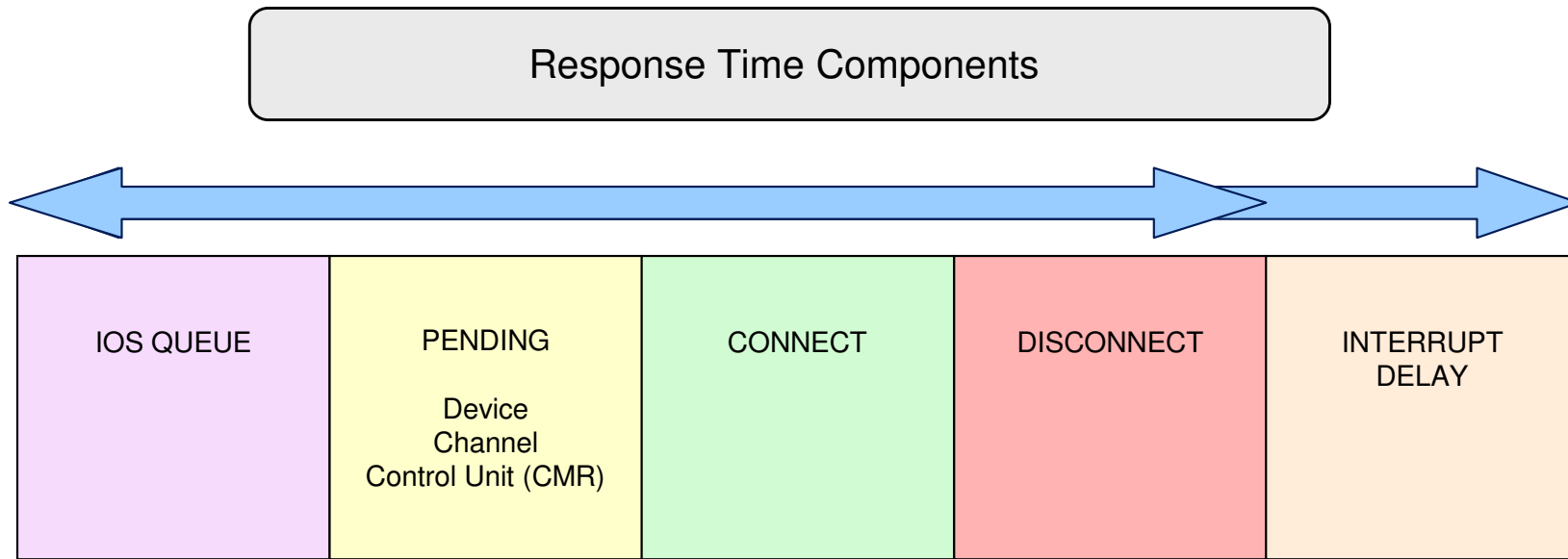
Basic PCIe Metrics, e.g. PCI Load/Store and DMA Operations

Common Request Statistics across all Personalities (Compression and future Personalities)

Compression related Statistics



zEC12 – I/O Interrupt Delay Time



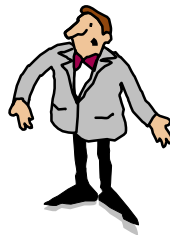
- ▶ Interrupt Delay time measures the time between when the I/O completes and z/OS issues the TSCH instruction to retrieve the results.
- ▶ How long does it take for z/OS to see and process the interrupt after I/O completes ?



zEC12 – I/O Interrupt Delay Time



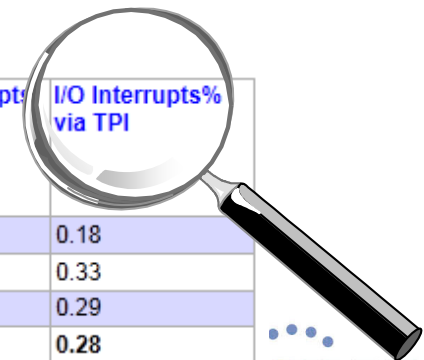
- ▶ I/O interrupt delay time (aka I/O elongation) occurs when an I/O is delayed due to
 - 🚦 a non-dispatched logical processor
 - 🚦 the lack of an interrupt enabled CP
- ▶ I/O interrupt delay time is NOT included in the I/O response time
- ▶ I/O interrupt delay time could NOT be measured in the past



▼ CPU Activity

CPU : 2817 Model : 729 H/W Model : M32 Sequence Code : 00000000000E3206 HiperDispatch : NO
 CPC Capacity : 2780 Change Reason : NONE

CPU Number	CPU Type	Time% Online	Time% LPAR Busy	Time% MVS Busy	Time% Parked	LOG PROC Share%	HiperDispatch Priority	I/O Interrupts Rate	I/O Interrupts% via TPI
0	CP	100.00	1.60	1.57	-----	31.9		1.87	0.18
1	CP	100.00	1.14	1.12	-----	31.9		2.69	0.33
2	CP	100.00	0.85	0.83	-----	31.9		2.72	0.29
TOTAL/AVERAGE	CP		1.20	1.18		95.7		7.27	0.28



zEC12 – I/O Interrupt Delay Time



- ▶ New field AVG INT DLY in RMF Postprocessor Device Activity report.
- ▶ Caution: Interrupt Delay Time is not included in AVG RESP Time



D I R E C T A C C E S S D E V I C E A C T I V I T Y

z/OS V1R13 SYSTEM ID TRX2 DATE 11/23/2011 INTERVAL 14.59.998
RPT VERSION V1R13 RMF TIME 12.30.00 CYCLE 1.000 SECONDS

TOTAL SAMPLES = 900 IODF = 01 CR-DATE: 11/15/2011 CR-TIME: 07.33.54 ACT: POR

STORAGE GROUP	DEV NUM	DEVICE TYPE	NUMBER OF CYL	VOLUME SERIAL	PAV	LCU	DEVICE ACTIVITY RATE	AVG RESP TIME	AVG IOSQ TIME	AVG CMR DLY	AVG DB DLY	AVG INT DLY	AVG PEND TIME	AVG DISC TIME	AVG CONN TIME
XTEST	2208	33903	3339	TRXSX9	1	0032	0.001	.384	.000	.128	.000	.123	.256	.000	.128
XTEST	2209	33903	3339	TRXSXA	1	0032	0.001	.256	.000	.000	.000	.135	.256	.000	.000
	220A	33909	10017	TRXT01	1	0032	0.000	.000	.000	.000	.000	.000	.000	.000	.000
	220B	33909	10017	TRXT02	1	0032	0.000	.000	.000	.000	.000	.000	.000	.000	.000



zEC12 – Enhanced CF Link Reporting

- ▶ In a System z environment different types of coupling links can be used to connect a Coupling Facility (CF) to the operating system.
- ▶ Each coupling link type has effect on link performance, response times and coupling overheads.
- ▶ For configurations covering large distances, the time spent on the link can be the largest part of the response time.

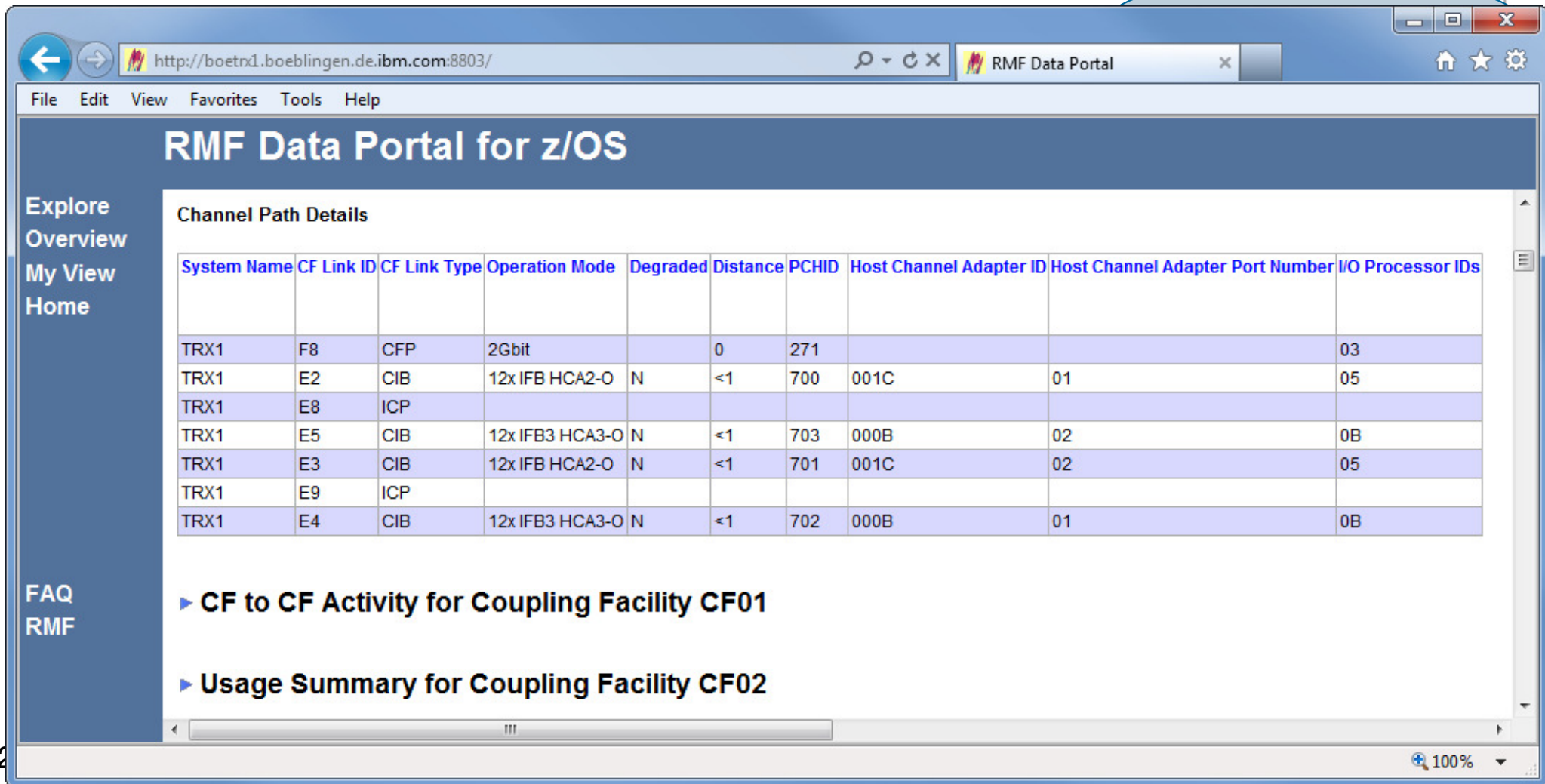


Type	Description	CHPID Type	Link Rate	Distance
ISC-3	InterSystem Channel-3	CFP (CF Peer)	2 Gbps	10 km unrepeated (6.2 miles) 100 km repeated
PSIFB	12x IB-DDR Parallel Sysplex InfiniBand 12x IB-SDR Parallel Sysplex InfiniBand	CIB (Coupling over Infiniband)	6 GBps 3 GBps (When connected to a System z9 EC or System z9 BC)	150 meters (492 feet)
PSIFB-LR	1x IB-SDR Parallel Sysplex InfiniBand – Long Reach Double data rate (1 x IB-DDR) is supported if connected to a System z qualified DWDM supporting DDR.	CIB (Coupling over Infiniband)	2.5 Gbps 5.0 Gbps	10 km unrepeated (6.2.miles) 100 km repeated
IC	Internal Coupling Channel	ICP (Internal CF Peer)	Internal speeds	n/a

zEC12 – Enhanced CF Link Reporting

RMF Postprocessor Coupling Facility Activity Report:

⇒ New CHANNEL PATH DETAILS in Subchannel Activity Section



The screenshot displays the RMF Data Portal for z/OS web interface. The browser address bar shows the URL <http://boetrx1.boeblingen.de.ibm.com:8803/>. The page title is "RMF Data Portal for z/OS".

The main content area is titled "Channel Path Details" and contains a table with the following columns: System Name, CF Link ID, CF Link Type, Operation Mode, Degraded, Distance, PCHID, Host Channel Adapter ID, Host Channel Adapter Port Number, and I/O Processor IDs.

System Name	CF Link ID	CF Link Type	Operation Mode	Degraded	Distance	PCHID	Host Channel Adapter ID	Host Channel Adapter Port Number	I/O Processor IDs
TRX1	F8	CFP	2Gbit		0	271			03
TRX1	E2	CIB	12x IFB HCA2-O	N	<1	700	001C	01	05
TRX1	E8	ICP							
TRX1	E5	CIB	12x IFB3 HCA3-O	N	<1	703	000B	02	0B
TRX1	E3	CIB	12x IFB HCA2-O	N	<1	701	001C	02	05
TRX1	E9	ICP							
TRX1	E4	CIB	12x IFB3 HCA3-O	N	<1	702	000B	01	0B

Below the table, there are two expandable sections:

- ▶ **CF to CF Activity for Coupling Facility CF01**
- ▶ **Usage Summary for Coupling Facility CF02**

The left sidebar contains navigation links: Explore, Overview, My View, Home, FAQ, and RMF. The bottom right corner shows a zoom level of 100%.

zEC12 – Enhanced CF Link Reporting...

RMF Postprocessor Coupling Facility Activity Report:

⇒ New CHANNEL PATH DETAILS in CF to CF Activity Section

COUPLING FACILITY NAME = X5CFP87

CF TO CF ACTIVITY

PEER CF	# REQ TOTAL AVG/SEC	-- CF LINKS --		REQUESTS				# REQ	# REQ	TIME(MIC) STD_DEV	# REQ	TIME(MIC) STD_DEV	# REQ	TIME(MIC) STD_DEV
		TYPE	USE	#	-SERVICE AVG	TIME(MIC) STD_DEV	#							
X5CFH89	243089 270.1	CFP	2	SYNC	243089	18.6	4.9	SYNC	0	0.0	0.0	0.0	0.0	0.0
X5CFR89	34647K 38497	CIB	6	SYNC	34647K	12.4	4.0	SYNC	83	8.4	9.0	0.0	0.0	0.0

Channel path details for CF to CF links of type CIB or CFP:

- Operation mode
- Degraded status
- Link distance

CHANNEL PATH DETAILS

PEER CF	ID	TYPE	OPERATION MODE	DEGRADED	DISTANCE
X5CFH89	02	CFP	2GBIT		0
X5CFH89	03	CFP	2GBIT		0
X5CFR89	D0	CIB	12X IFB HCA3-0	N	<1
X5CFR89	D1	CIB	12X IFB HCA3-0	N	<1
X5CFR89	D2	CIB	12X IFB HCA3-0	N	<1
X5CFR89	D3	CIB	12X IFB HCA3-0	N	<1
X5CFR89	E0	CIB	12X IFB3 HCA3-0	Y	<1
X5CFR89	E1	CIB	12X IFB3 HCA3-0	Y	<1

zEC12 – Enhanced CF Link Reporting...

RMF Monitor III CFSYS Report:
Channel Paths Details Pop-up

RMF Coupling Facility - Subchannels and Paths

Press Enter to return to the Report panel.

Details for System : TRX1
Coupling Facility : CF01

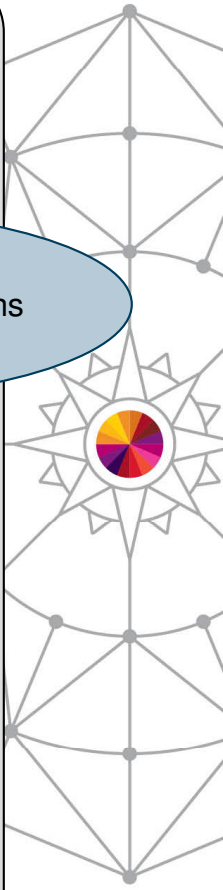
Subchannels Generated : 149
In Use : 49
Max : 49

Channel Path Details:

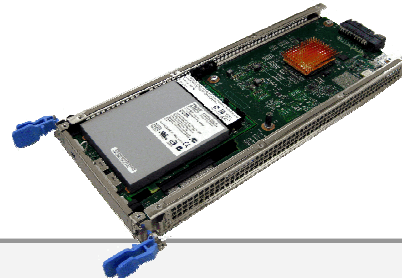
ID	Type	Operation Mode	Deg	Distance	PCHID	---HCA---	ID	Port	--IOP IDs--
E2	CIB	12x IFB	HCA2-O	N	<1	0700	001C	01	05
E3	CIB	12x IFB	HCA2-O	N	<1	0701	001C	02	05
E4	CIB	12x IFB3	HCA3-O	N	<1	0702	000B	01	0B
E5	CIB	12x IFB3	HCA3-O	N	<1	0703	000B	02	0B
E8	ICP								
E9	ICP								
F8	CFP	2Gbit			0	0271			03

More: +

Scrollable List
of all available Channel Paths
to Coupling Facility



zEC12 - Support of Crypto Express4 Card



CRYPTO HARDWARE ACTIVITY

z/OS V1R13

SYSTEM ID SYSF
RPT VERSION V1R13 RMF

DATE 11/29/2011
TIME 16.00.00

All measurements available for Crypto Express4 Card

----- CRYPTOGRAPHIC COPROCESSOR -----

----- TOTAL -----					KEY-GEN
TYPE	ID	RATE	EXEC TIME	UTIL%	RATE
CEX2C	0	0.00	0.000	0.0	0.00
	1	2.16	295.9	63.9	2.14
CEX3C	2	0.00	0.000	0.0	0.00
CEX4C	4	2.15	227.8	48.9	2.15

----- CRYPTOGRAPHIC ACCELERATOR -----

----- TOTAL -----					-- ME-FORMAT RSA OPERATIONS --				-- CRT-FORMAT RSA OPERATIONS --		
TYPE	ID	RATE	EXEC TIME	UTIL%	KEY	RATE	EXEC TIME	UTIL%	RATE	EXEC TIME	UTIL%
CEX2A	3	766.9	0.434	33.3	1024	362.4	0.521	18.9	369.5	0.183	6.8
					2048	0.00	0.000	0.0	34.99	2.175	7.6
CEX4A	5	998.9	0.365	36.5	1024	246.4	0.534	13.2	554.3	0.205	11.3
					2048	0.00	0.000	0.0	83.16	0.689	5.7
					4096	0.00	0.000	0.0	115.1	0.547	6.3

----- ICSF SERVICES -----

	----- ENCRYPTION -----			----- DECRYPTION -----			----- MAC -----		----- HASH -----			----- PIN -----	
	SDES	TDES	AES	SDES	TDES	AES	GENERATE	VERIFY	SHA-256	SHA-512	TRANSLATE	VERIFY	
RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SIZE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00



zEC12 - Warning Track Interruption Facility Statistics



- ▶ In a PR/SM™ environment the LPAR hypervisor assigns physical engines to logical engines accordingly to the weighting factors of the partitions.
- ▶ Once the time slice for a logical engine is expired the currently executing work is suspended until a physical engine is assigned to the logical engine again.
- ▶ The Warning Track Interruption Facility notifies the operating system that PR/SM™ will undispatch a certain logical processor within the next 50 microseconds (grace period).
- ▶ z/OS is now able to save status for the running unit of work and re-dispatch the work unit on a different logical processor within the grace period.
- ▶ z/OS now signals to PR/SM that the logical processor can be undispatched.
- ▶ Warning Track processing is only supported in HyperDispatch=YES environments.
- ▶ A high benefit can be achieved for Vertical Medium and Low (VM/VL) processors that have a smaller capacity share guaranteed by PR/SM

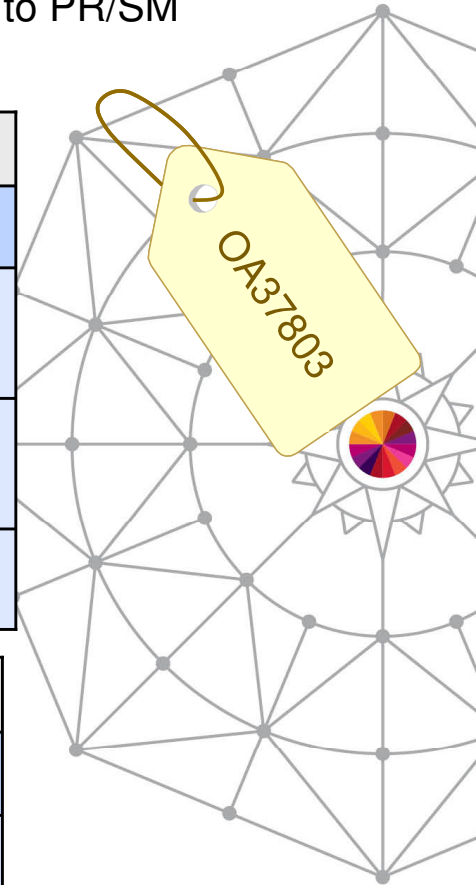


zEC12 - Warning Track Interruption Facility Statistics...



- ▶ RMF keeps track of the number of times PR/SM issued a warning-track interruption to a logical processor and z/OS was able/unable to return the logical processor within the grace period.
- ▶ RMF measures the amount of time in microseconds that a processor was yielded to PR/SM due to Warning-track processing.

SMF record type 70 subtype 1 (CPU Activity) – CPU data section				
Offset	Name	Length	Format	Description
80 x50	SMF70WTS	4	Binary	The number of times PR/SM issued a warning-track interruption to a logical processor and z/OS was able to return the logical processor within the grace period.
84 x54	SMF70WTU	4	Binary	The number of times PR/SM issued a warning-track interruption to a logical processor and z/OS was unable to return the logical processor within the grace period.
88 x58	SMF70WTI	4	Binary	Amount of time in microseconds that a logical processor was yielded to PR/SM due to Warning Track processing.



RMF Postprocessor Overview Conditions		
Name	Qualifier	Description
WTRKCP (WTRKAAP) (WTRKIIP)	cpu-id	The percentage of times PR/SM issued a warning-track interruption to a processor and z/OS was able to return it to PR/SM within the grace period.
WTRKTCP (WTRKTAAP) (WTRKTIIP)	cpu-id	Time in microseconds that a purpose processor was yielded to PR/SM due to Warning Track processing.



RMF Monitor III zIIP Exploitation

- ▶ With z/OS V2R1 RMF, the Monitor III Data Gatherer (RMFGAT) can partially offload work to zIIP processors
- ▶ By default the RMF Monitor III Data Gatherer (RMFGAT) is enabled for zIIP exploitation
- ▶ When at least one zIIP processor is online for an LPAR, RMFGAT is partially offloading work to this processor without any further user interaction
- ▶ The RMFGAT zIIP exploitation can be controlled initially by means of the new Monitor III parmlib option ZIIPUSE

```
SYNC(00)          /* MINTIME SYNCHRONIZATION          */
SYSOUT(A)         /* MESSAGES TO SYSOUT CLASS A       */
WSTOR(32)        /* SIZE OF INSTORAGE BUFFER (IN MB)  */
ZIIPUSE          /* PARTIAL USE OF zIIP ENGINES     */
IOSUB            /* I/O SUBSYSTEM GATHERING ACTIVE    */
CFDETAIL         /* COUPLING FACILITY DETAILS        */
CACHE            /* ACTIVATE CACHE GATHERING         */
VSAMRLS         /* ACTIVATE VSAM RLS GATHERING      */
OPD             /* ACTIVATE OMVS PROCESS DATA GATHERING */
```

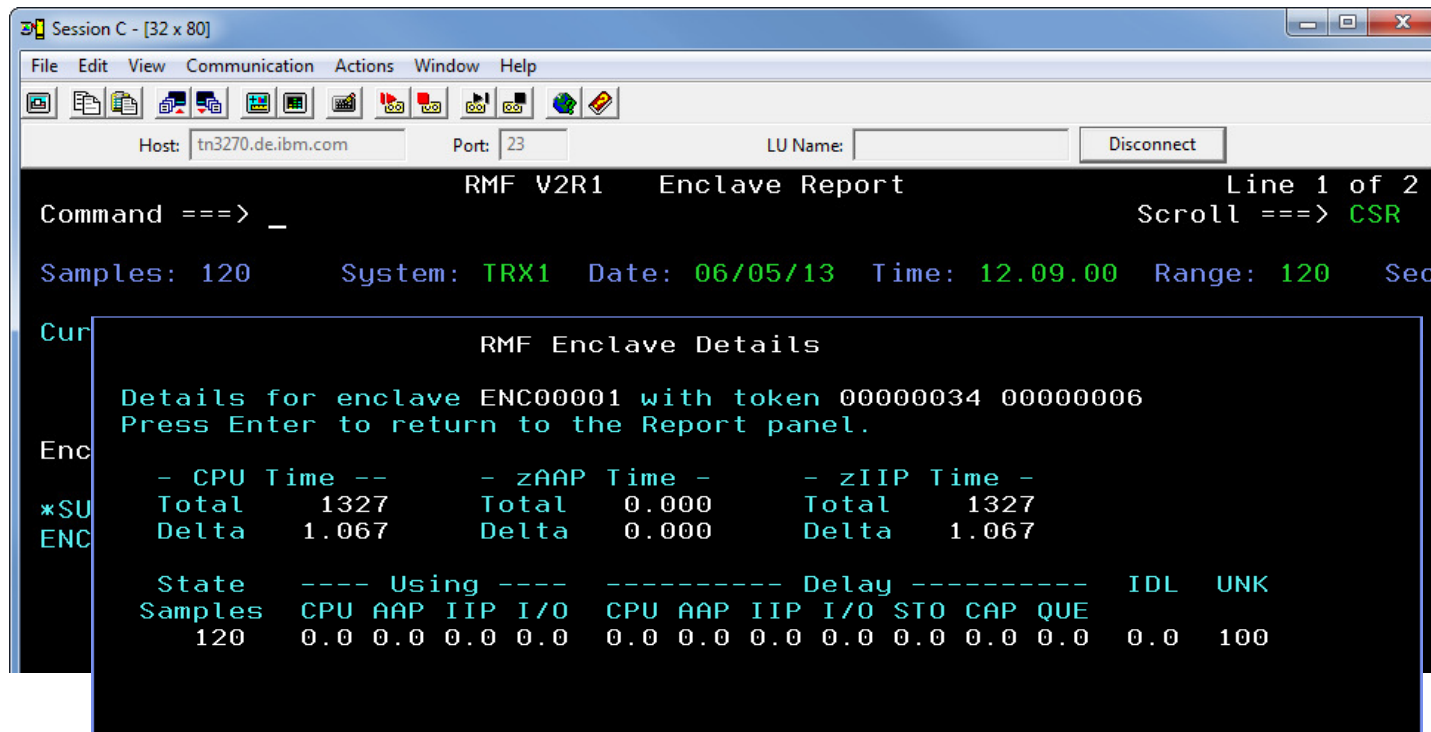


New Option
ZIIPUSE

- ▶ The RMFGAT zIIP exploitation can be activated/deactivated dynamically by means of the following command: F RMF,F III,ZIIPUSE/NOZIIPUSE

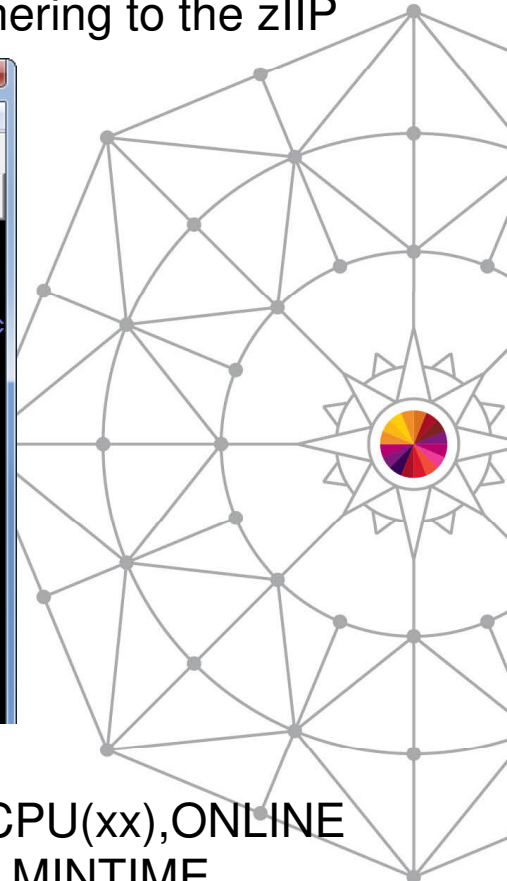
RMF Monitor III zIIP Exploitation...

- ▶ When at least one zIIP processor is recognized by the Monitor III gatherer, RMFGAT will schedule an Enclave SRB and offloads the Coupling Facility gathering to the zIIP



```
Session C - [32 x 80]
File Edit View Communication Actions Window Help
Host: tn3270.de.ibm.com Port: 23 LU Name: Disconnect
RMF V2R1 Enclave Report Line 1 of 2
Command ==> _ Scroll ==> CSR
Samples: 120 System: TRX1 Date: 06/05/13 Time: 12.09.00 Range: 120 Sec
Cur RMF Enclave Details
Enc Details for enclave ENC00001 with token 00000034 00000006
Press Enter to return to the Report panel.
*SU - CPU Time -- - zAAP Time - - zIIP Time -
ENC Total 1327 Total 0.000 Total 1327
Delta 1.067 Delta 0.000 Delta 1.067
State ---- Using ---- ----- Delay ----- IDL UNK
Samples CPU AAP IIP I/O CPU AAP IIP I/O STO CAP QUE
120 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 100
```

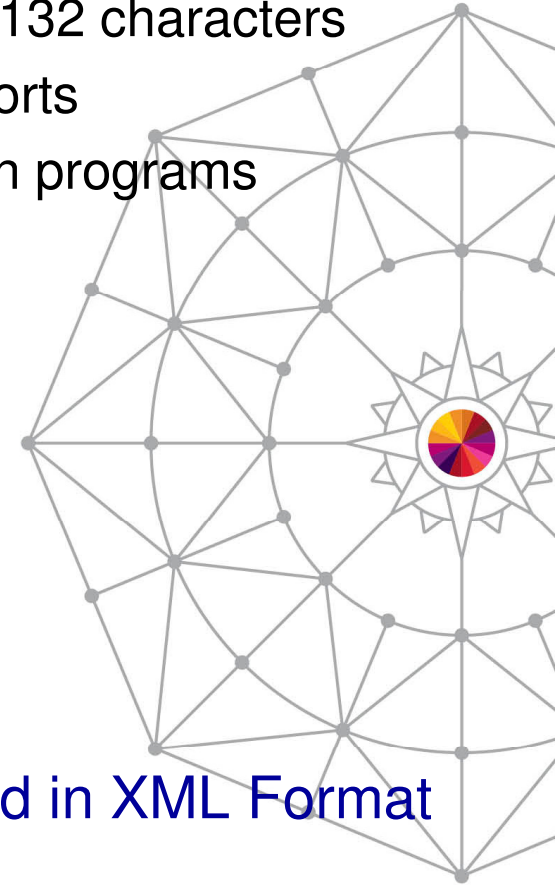
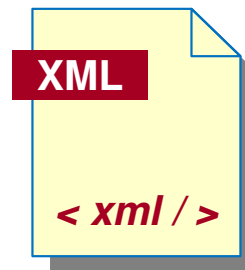
- ▶ In case the zIIP processor is activated dynamically by the CONFIG CPU(xx),ONLINE command, RMFGAT can exploit this processor starting with the next MINTIME
- ▶ Installations without Coupling Facilities (e.g. Monoplex) won't see significant RMFGAT zIIP activity



Postprocessor XML Formatted Reports

Rationale:

- ▶ RMF Postprocessor reports are limited to a page width of 132 characters
- ▶ No state-of-the-art display capability of Postprocessor reports
- ▶ No easy access to RMF Postprocessor data for application programs
 - ⇒ cumbersome to parse the text output
 - ⇒ each report has its own layout



RMF Postprocessor reports can now be generated in XML Format

Postprocessor XML Formatted Reports...

z/OS V1R11 RMF	z/OS V1R12 RMF	z/OS V1R13 RMF	z/OS V2R1 RMF
CPU Activity CRYPTO Activity FICON Director Activity ESS Disk Systems Activity OMVS Kernel Activity report OVERVIEW Report	DEVICE Activity WORKLOAD Activity	PAGING Activity SDELAY (XML only)	CACHE Subsystem Activity CF Activity CHANNEL Path Activity ENQUEUE Activity HFS Statistics IOQ Activity PCIE Activity (XML-only) PAGESP Activity SDEVICE Activity report VSTOR Activity XCF Activity

- ▶ Summary and Exception reports as well as interval reports based on data collected by a Monitor II background session are not available in XML format
- ▶ The XML format is the preferred RMF Postprocessor Report format for the future
- ▶ The XML Format supersedes the Text format. New Reports might not be implemented in Text format

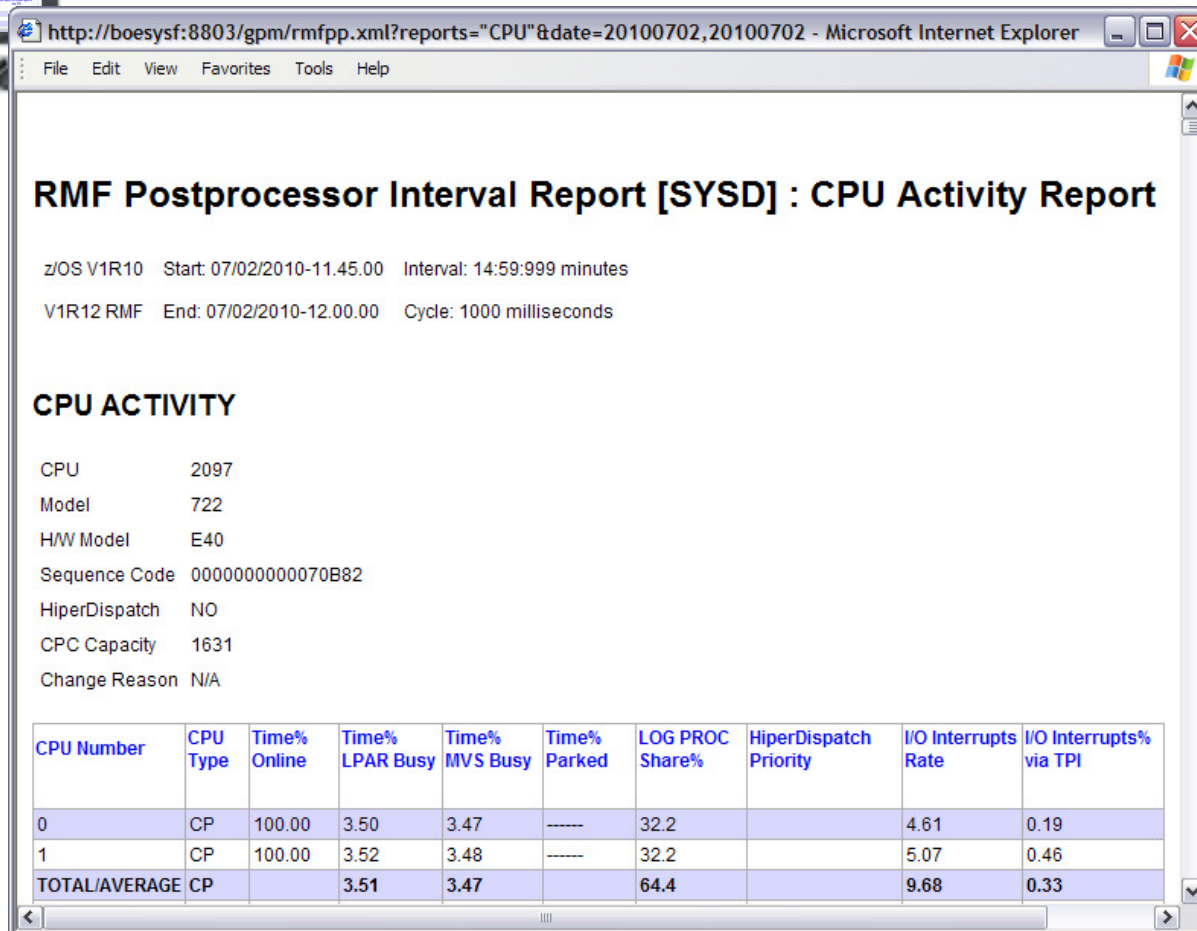
Postprocessor XML Formatted Reports...

- ▶ The generation of Postprocessor reports in XML format is controlled by the new ddnames XPRPTS, XPXSRPTS and XPOVWRPT
- ▶ If the XML output is routed to permanent data sets rather than to SYSOUT, define the data set with RECFM=VB and LRECL between 256 and 8192. Specify an appropriate BLKSIZE.

ddname	Contents	Allocations	Notes
XPRPTS	Combined single-system report in XML format	One ddname for one data set to contain all single system reports for each interval during the session.	There is no dynamic allocation of this ddname, you have to define it explicitly if you want to get all reports in XML format into one data set or output class. If you define this ddname, no MFRnnnnn files are created. If you define this ddname and PPRPTS, no XML output in file XPRPTS is created.
XPOVWRPT	Combined Overview report in XML format	One ddname for one data set to contain all overview reports for each system included in the input data.	There is no dynamic allocation of this ddname, you have to define it explicitly if you want to get all overview reports in XML format into one data set or output class. If you define this ddname, no PPORPnnn files are created.
XPXSRPTS	Combined sysplex-wide report in XML format	One ddname for one data set to contain all sysplex reports for each interval included in the input data.	There is no dynamic allocation of this ddname, you have to define it explicitly if you want to get all reports in XML format into one data set or output class. If you define this ddname, no MFRnnnnn files are created. If you define this ddname and PPXSRPTS, no XML output in file XPXSRPTS is created.

HTTP API to access Postprocessor XML Reports

- ▶ Web browser can be used as Postprocessor Data Portal
- ▶ All RMF Postprocessor XML formatted reports supported
- ▶ Application programs can use Distributed Data Server (DDS) HTTP API to retrieve RMF Postprocessor XML reports



http://boesysf:8803/gpm/rmfpp.xml?reports="CPU"&date=20100702,20100702 - Microsoft Internet Explorer

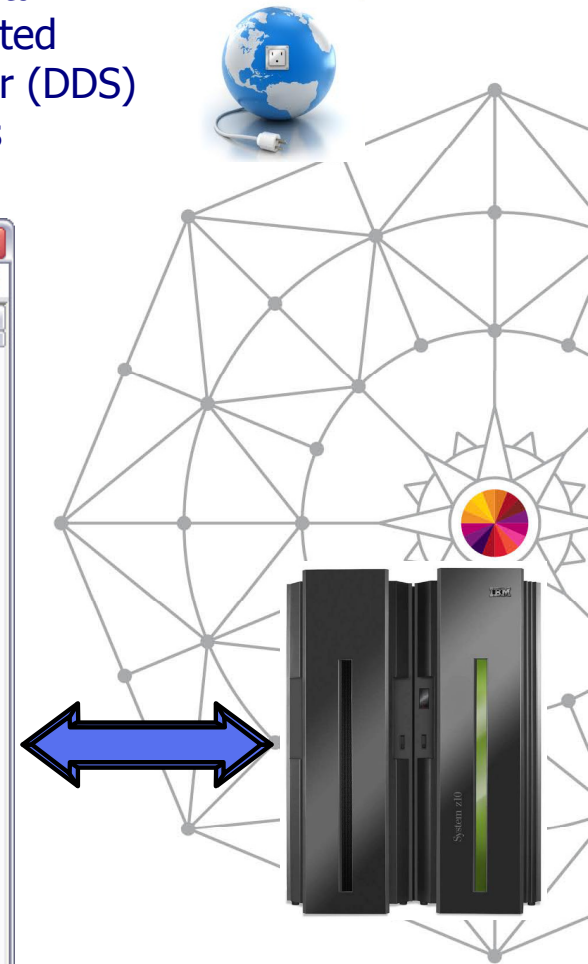
RMF Postprocessor Interval Report [SYSD] : CPU Activity Report

z/OS V1R10 Start: 07/02/2010-11.45.00 Interval: 14:59:999 minutes
V1R12 RMF End: 07/02/2010-12.00.00 Cycle: 1000 milliseconds

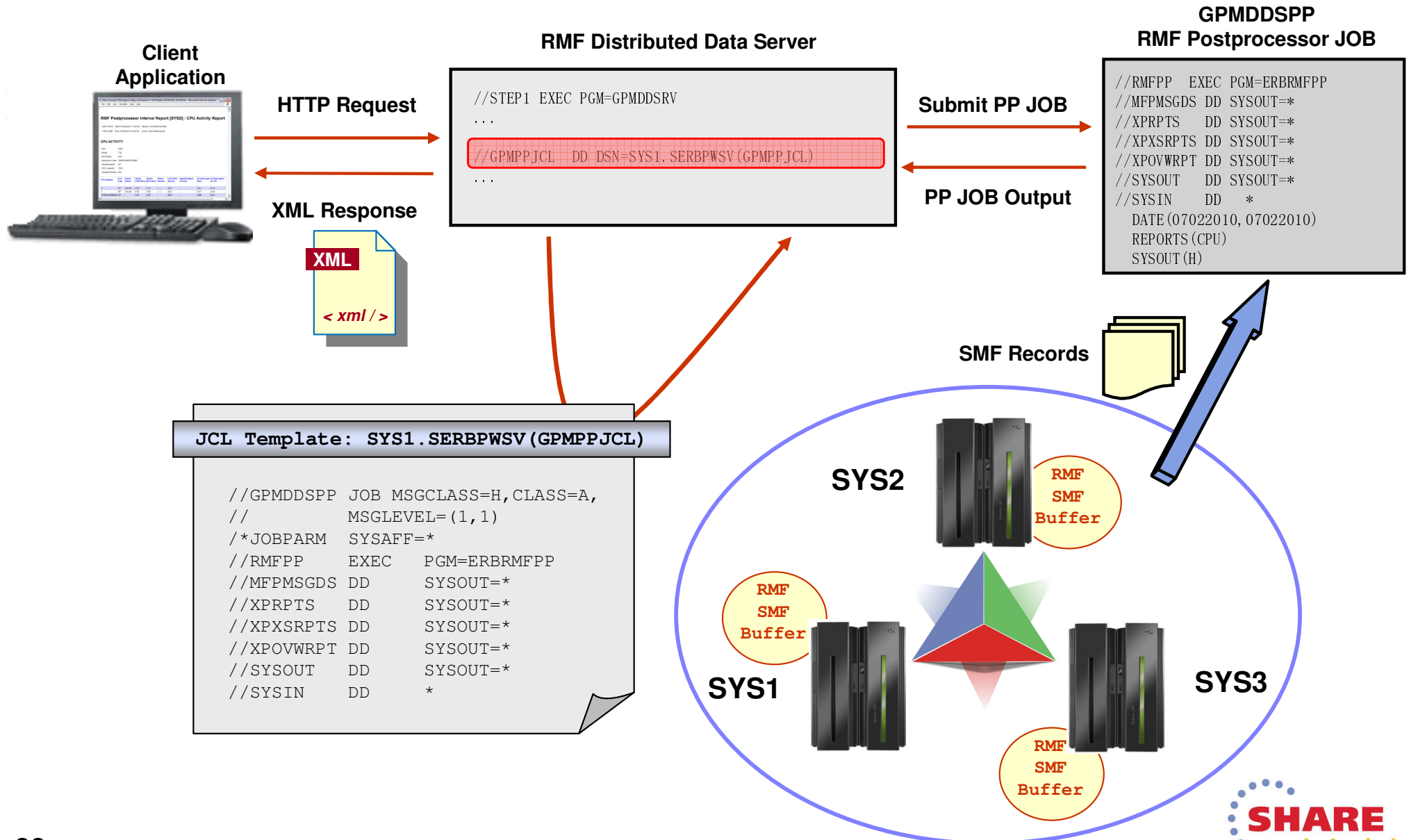
CPU ACTIVITY

CPU 2097
Model 722
H/W Model E40
Sequence Code 000000000070B82
HiperDispatch NO
CPC Capacity 1631
Change Reason N/A

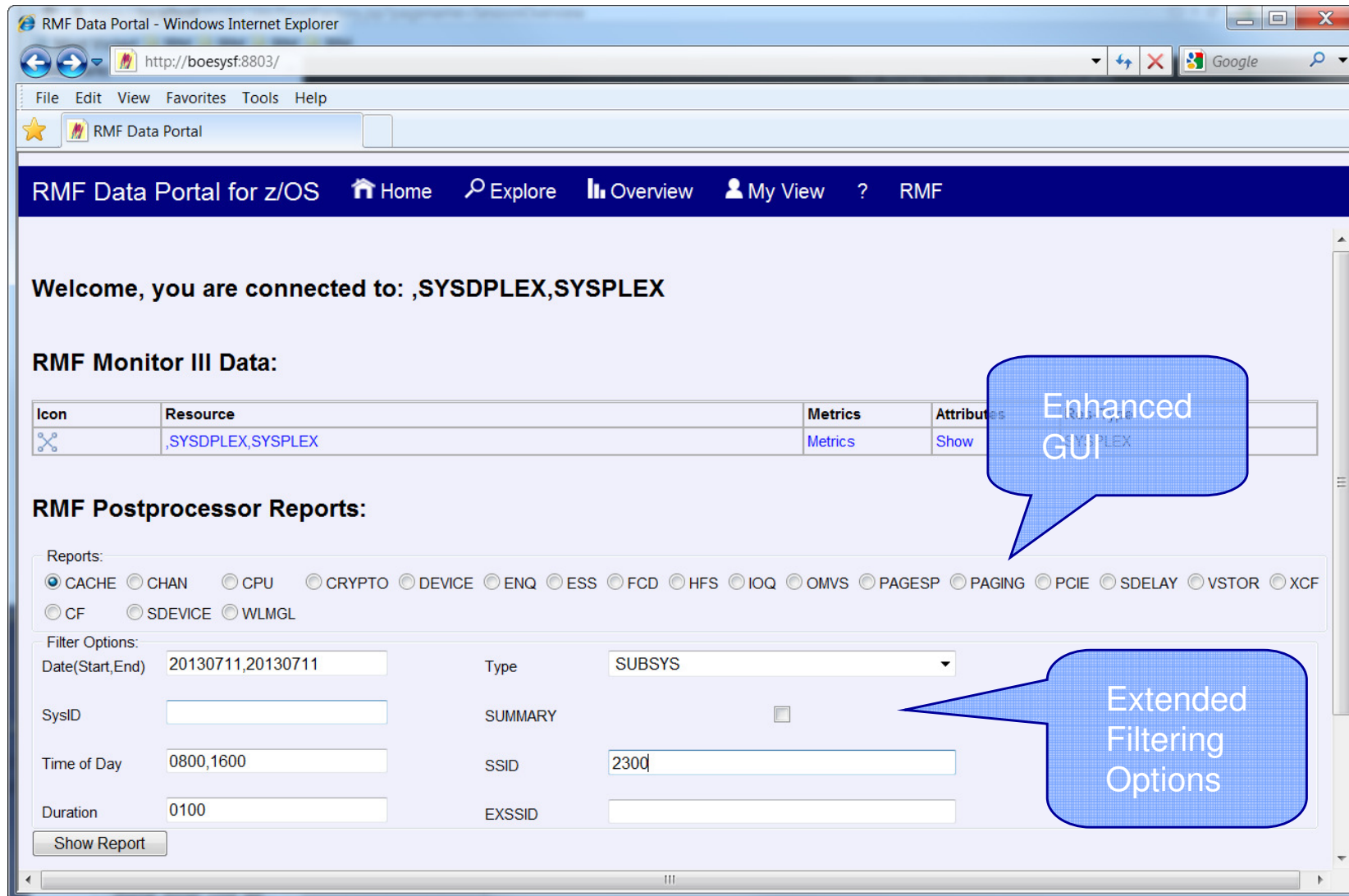
CPU Number	CPU Type	Time% Online	Time% LPAR Busy	Time% MVS Busy	Time% Parked	LOG PROC Share%	HiperDispatch Priority	I/O Interrupts Rate	I/O Interrupts% via TPI
0	CP	100.00	3.50	3.47	-----	32.2		4.61	0.19
1	CP	100.00	3.52	3.48	-----	32.2		5.07	0.46
TOTAL/AVERAGE		CP	3.51	3.47		64.4		9.68	0.33



HTTP API to access Historical Data...




Postprocessor XML Formatted Reports...



RMF Data Portal for z/OS Home Explore Overview My View ? RMF

Welcome, you are connected to: ,SYSDPLEX,SYSPLEX

RMF Monitor III Data:

Icon	Resource	Metrics	Attributes
	,SYSDPLEX,SYSPLEX	Metrics	Show

RMF Postprocessor Reports:

Reports:

CACHE CHAN CPU CRYPTO DEVICE ENQ ESS FCD HFS IOQ OMVS PAGESP PAGING PCIE SDELAY VSTOR XCF

CF SDEVICE WLMGL

Filter Options:

Date(Start_End) Type

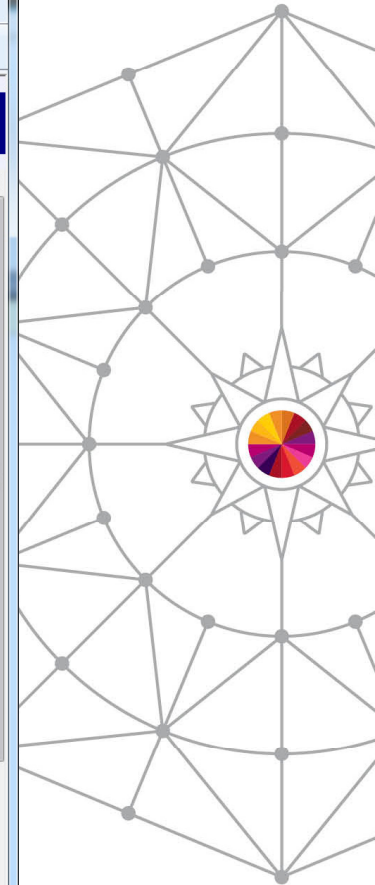
SysID

Time of Day SUMMARY

Duration SSID

EXSSID

Show Report



Postprocessor XML Formatted Reports...

RMF Data Portal - Windows Internet Explorer

http://boesysf.8803/

File Edit View Favorites Tools Help

RMF Data Portal

RMF Data Portal for z/OS Home Explore Overview My View ? RMF

Report Data Selection:

- 07/11/2013-15.29.36 SYSE
- 07/11/2013-15.29.36 S4
- 07/11/2013-15.30.10 SYSF
- 07/11/2013-15.44.36 SYSE

Show all Report Data Reset Sorting

RMF Postprocessor Interval Report [System SYSE] : CPU Activity Report

RMF Version : z/OS V2R1 SMF Data : z/OS V1R13
Start : 07/11/2013-15.29.36 End : 07/11/2013-15.44.36 Interval : 15:00:00 minutes Cycle : 1000 milliseconds

▼ CPU Activity

CPU : 2817 Model : 729 H/W Model : M32 Sequence Code : 00000000000E3206 HiperDispatch : YES CPC Capacity : 2780 Change Reason : NONE

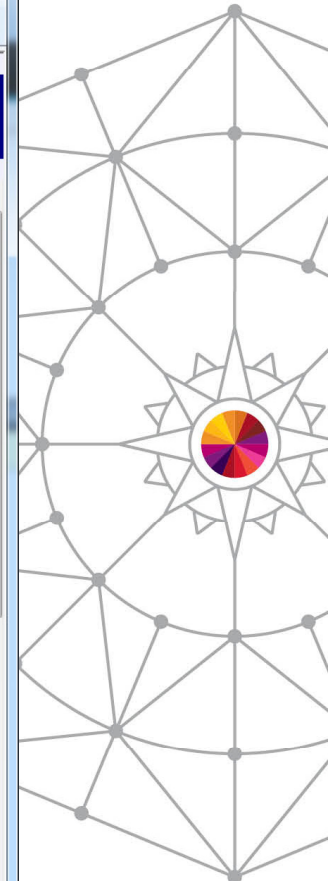
CPU Number	CPU Type	Time% Online	Time% LPAR Busy	Time% MVS Busy	Time% Parked	LOG PROC Share%	HiperDispatch Priority	I/O Interrupts Rate	I/O Interrupts% via TPI
0	CP	100.00	2.45	2.39	0.00	53.4	MED	11.13	4.56
1	CP	100.00	0.00	-----	100.00	0.0	LOW	0.00	0.00
2	CP	100.00	0.26	0.26	0.00	0.0	LOW	0.00	0.00
TOTAL/AVERAGE CP			0.90	1.32		53.4		11.13	4.56
4	IIP	100.00	0.00	0.00	0.00	18.7	MED		
TOTAL/AVERAGE IIP			0.00	0.00		18.7			

System Address Space Analysis

Type	Number of Address Spaces: MIN	Number of Address Spaces: MAX	Number of Address Spaces: AVG
IN Queue	57	60	57.2
IN READY Queue	0	1	0.0
OUT READY Queue	0	0	0.0
OUT WAIT Queue	0	0	0.0
LOGICAL OUT READY Queue	0	0	0.0

Select Intervals

Expand/Collapse Sections



Postprocessor XML Formatted Reports...




The RMF Data Portal is currently limited to the SMF Buffer of the RMF Sysplex Data Server.
No SMF Dump Data Sets can be specified

```
//SHARAnnX JOB (DE03141, ,), 'SHARAnn', CLASS=A, USER=SHARAnn,
//          MSGCLASS=H, MSGLEVEL=(1, 1), NOTIFY=SHARAnn
// *
//XMLPP    PROC REPORT=
//RMFPP    EXEC PGM=ERBRMFPP, COND=(4, LT, GETSMF)
//MFPINPUT DD DISP=(OLD, PASS), DSN=*.RMFSORT.SORTOUT
//MFPMSGDS DD SYSOUT=*
//XPRPTS   DD PATH='/sharelab/sharann/xmlpp/&REPORT..xml',
//          PATHOPTS=(OWRONLY, OCREAT, OTRUNC),
//          PATHMODE=(SIRUSR, SIWUSR, SIRGRP), FILEDATA=TEXT
//XPXSRPTS DD PATH='/sharelab/sharann/xmlpp/&REPORT..xml',
//          PATHOPTS=(OWRONLY, OCREAT, OTRUNC),
//          PATHMODE=(SIRUSR, SIWUSR, SIRGRP), FILEDATA=TEXT
//          PEND
//PPCPU    EXEC PROC=XMLPP, REPORT=CPU
//RMFPP.SYSIN DD *
//          REPORTS(CPU)
//PPWLMGL  EXEC PROC=XMLPP, REPORT=WLMGL
//RMFPP.SYSIN DD *
//          SYSRPTS(WLMGL(SCPER, POLICY))
//
```

Execute the Postprocessor JCL
and redirect the output to any
HFS directory

Postprocessor XML Report Access via IBM HTTP Server

 RMF Postprocessor Reports:
Everywhere and Anytime



- ✓ Instant Access to all Reports
- ✓ No Maintenance of raw Data Archives

z/OSMF Application Linking (Resource Monitoring & WLM)

- ▶ The definitions of Workload Management determine the performance behavior of the systems.
- ▶ Resource Monitoring visualizes the performance behavior.
- ▶ Link z/OSMF WLM and RM to each other:
 - ⇒ When you work with WLM service definitions:
Jump to Resource Monitoring to visualize the resulting performance.
 - ⇒ When you detect abnormal metric values in Resource Monitoring:
Jump to Workload Management to look at the service definition.
- ▶ Performance metrics can be viewed more easily in context with the active service definition/policy and vice versa.



From WLM Status to RM System Status



Welcome x Workload Man... x

Workload Management Help

Overview WLM Status x

WLM Status for Sysplex ZMF1PLEX from System ZMF2

Active Service Policy [\(View performance of active policy\)](#)

Name: STANDARD
 Description: BB default policy 1
 Activated: Jan 29, 2013 3:14:59 PM GMT
 Activated by: jbau from system ZMF2
 Related service definition: DEFAULT
 Functionality level: 4
 Installed: Jan 29, 2013 3:14:59 PM GMT
 Installed by: jbau from system ZMF2

Systems [\(View performance of systems\)](#)

Actions Search

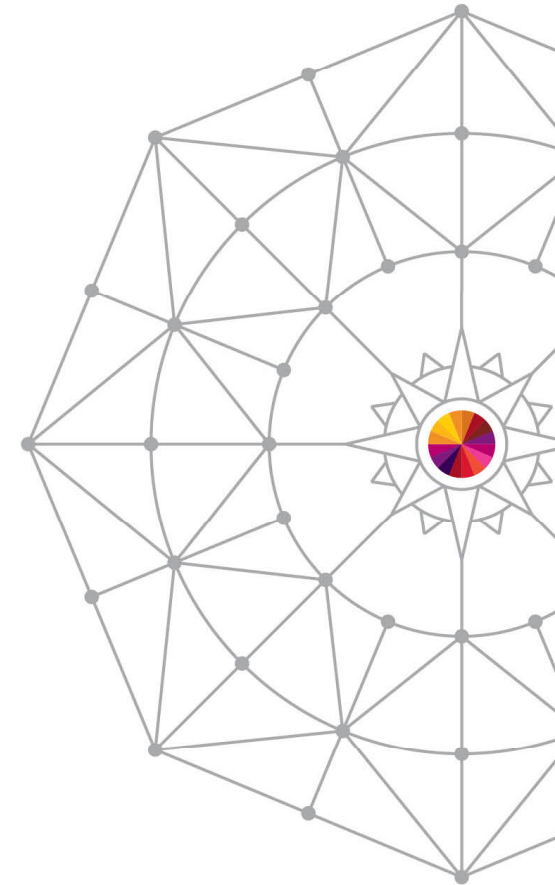
Name	Used Service Policy	Activated (GMT)	WLM Status	GPMP Status	WLM Version Level	CD Level
Filter	Filter	Filter	Filter	Filter	Filter	Filter
ZMF1	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable		
ZMF2	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable	25	3
ZMF3	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable		
ZMF4	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable		
ZMF5	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable		

Total: 5

Installed Service Definition

Name: DEFAULT
 Description: BB default WLM policy - test
 Installed: Jan 29, 2013 3:14:59 PM GMT
 Installed by: jbau from system ZMF2

Automatic refresh Last refresh: Jan 30, 2013 11:13:10 AM local time (Jan 30, 2013 10:13:10 AM GMT)



RM System Status



Welcome x Workload Man... x System Status x Help

System Status

Use this page to quickly assess the performance of the workloads running on the sysplexes in your installation. You can also use this page to define the target systems for the sysplexes and AIX or Linux system complexes that you want to monitor in the Resource Monitoring task.

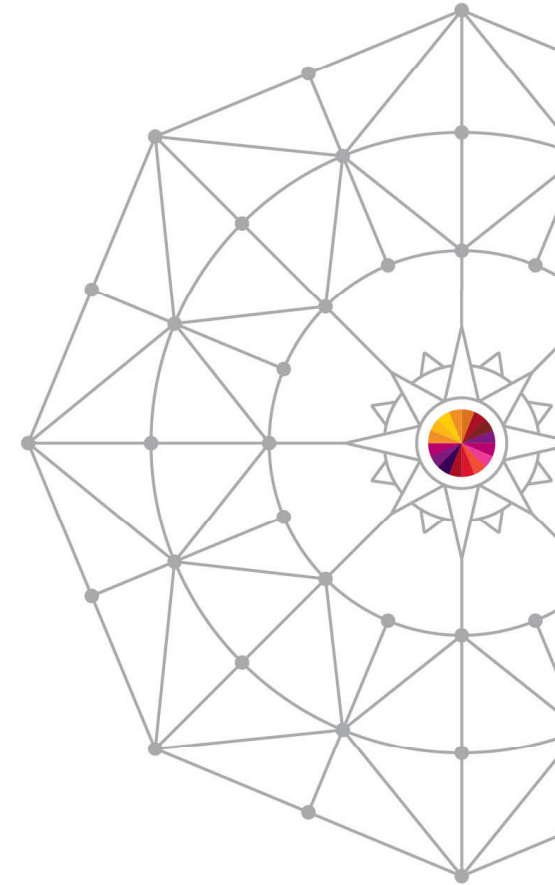
Resources

Resource	System Type	Connectivity	Performance Index Status	Related Service Definition	Active WLM Policy
Filter	Filter	Filter	Filter	Filter	Filter
<input checked="" type="checkbox"/> LOCALPLEX	z/OS	Connected	⚠️ PI > 1 for unimportant periods	DEFAULT	STANDARD
<input type="checkbox"/> SCLMPLEX	z/OS	Connected	✅ PI <= 1 for all periods	Default	STANDARD
<input type="checkbox"/> SYSPLEX	z/OS	Connected	✅ PI <= 1 for all periods	SYSTEMS2	STANDARD
<input type="checkbox"/> IRDPLEX	z/OS	Error			

Total: 4, Selected: 1

Last refresh: Jan 30, 2013 11:18:00 AM local time (Jan 30, 2013 10:18:00 AM GMT)

Automatic refresh



From RM System Status

Welcome x Workload Man... x System Status x

Help

System Status

Use this page to quickly assess the performance of the workloads running on the sysplexes in your installation. You can also use this page to define the target systems for the sysplexes and AIX or Linux system complexes that you want to monitor in the Resource Monitoring task.

Resources

Resource	System Type	Connectivity	Performance Index Status	Related Service Definition	Active WLM Policy
Filter	Filter	Filter	Filter	Filter	Filter
<input checked="" type="checkbox"/> LOCALPLEX	z/OS	Connected	PI > 1 for unimportant periods	DEFAULT	STANDARD
<input type="checkbox"/> SCLMPLEX		Connected	PI <= 1 for all periods	Default	STANDARD
<input type="checkbox"/> SYSPLEX			PI <= 1 for all periods	SYSTEMS2	STANDARD
<input type="checkbox"/> IRDPLEX	z/OS				

Actions: Actions ▾

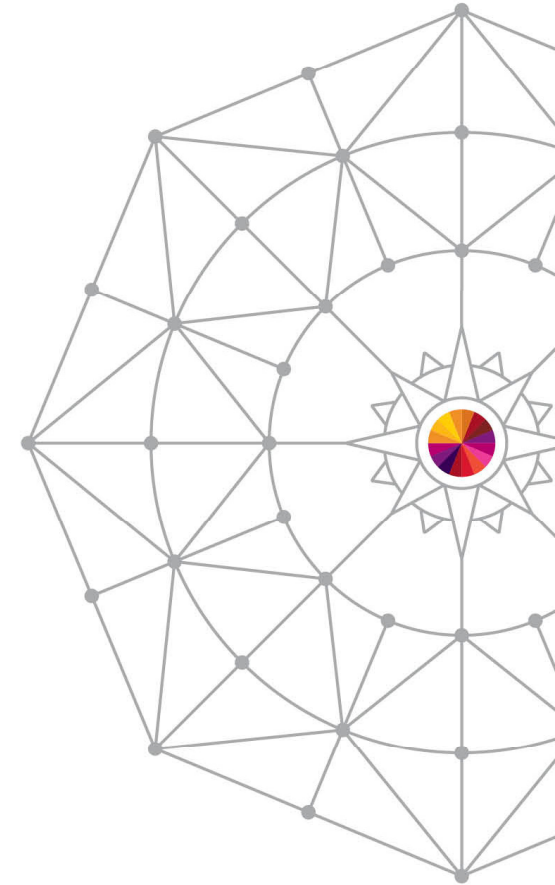
Context menu for LOCALPLEX:

- Modify Entry
- Remove Entry
- View
 - Performance Index Details
 - Active WLM Service Definition
 - Active WLM Policy
 - WLM Status

Total: 4, Selected: 1

Refresh Last refresh: Jan 30, 2013 11:20:04 AM local time (Jan 30, 2013 10:20:04 AM GMT)

Automatic refresh



From RM System Status

Welcome x Workload Man... x System Status x Help

System Status

Use this page to quickly assess the performance of the workloads running on the sysplexes in your installation. You can also use this page to define the target systems for the sysplexes and AIX or Linux system complexes that you want to monitor in the Resource Monitoring task.

Resources

Resource	System Type	Connectivity	Performance Index Status	Related Service Definition	Active WLM Policy
<input checked="" type="checkbox"/> LOCALPLEX	z/OS	Connected	⚠️ PI > 1 for unimportant periods	DEFAULT	STANDARD
<input type="checkbox"/> SCLMPLEX		Connected	✅ PI <= 1 for all periods	Default	STANDARD
<input type="checkbox"/> SYSPLEX			✅ PI <= 1 for all periods	SYSTEMS2	STANDARD
<input type="checkbox"/> IRDPLEX	z/OS				

Resource Monitoring

Dashboards Performance Index - LOCALPLEX x

Performance Index - LOCALPLEX (Running)

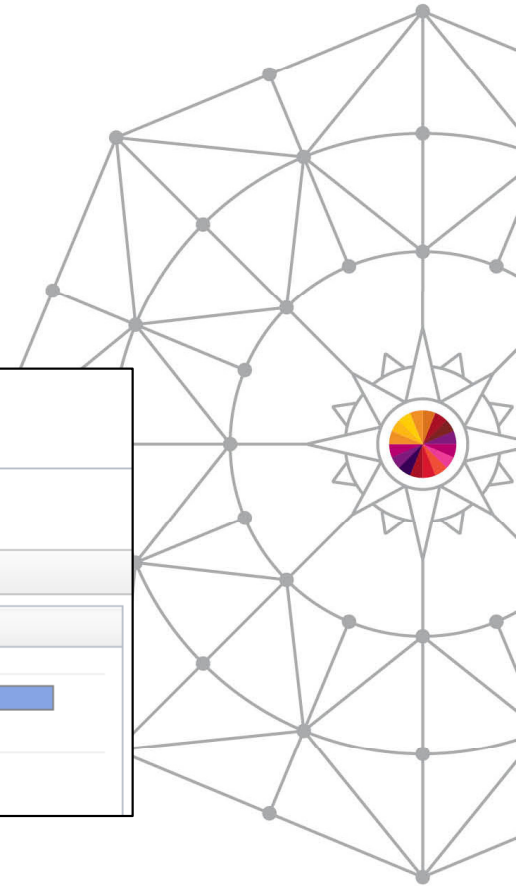
Start Pause Save Actions

Important Service Class Periods		Service Class Periods	
PRDTSO.1	0	STCCMD.1	0.67
		PRDTSO.1	0

Total: 4, Selected: 1

Refresh Last refresh: Jan 30, 2013 11:20:04 AM local time (Jan 30, 2013 10:20:04 AM GMT)

Automatic refresh



From RM System Status

Welcome x Workload Man... x System Status x

Help

System Status

Use this page to quickly assess the performance of the workloads running on the sysplexes in your installation. You can also use this page to define the target systems for the sysplexes and AIX or Linux system complexes that you want to monitor in the Resource Monitoring task.

Resources

Resource	System Type	Connectivity	Performance Index Status	Related Service Definition	Active WLM Policy
<input checked="" type="checkbox"/> LOCALPLEX	z/OS	Connected	⚠️ PI > 1 for unimportant periods	DEFAULT	STANDARD
<input type="checkbox"/> SCLMPLEX		Connected	✅ PI <= 1 for all periods	Default	STANDARD
<input type="checkbox"/> SYSPLEX			✅ PI <= 1 for all periods	SYSTEMS2	STANDARD
<input type="checkbox"/> IRDPLEX	z/OS				

Actions: Modify Entry, Remove Entry, View

View menu options: Performance Index Details, Active WLM Service Definition, Active WLM Policy, WLM Status

Resource Monitoring

Workload Management

Workload Management

Overview | WLM Status x | View DEFAULT x

Service Policies > Properties This service definition is installed and policy STANDARD is active

Properties for Active Service Policy

Service policy name: STANDARD **Description:** BB default policy 1

Service Class Overrides | Resource Group Overrides

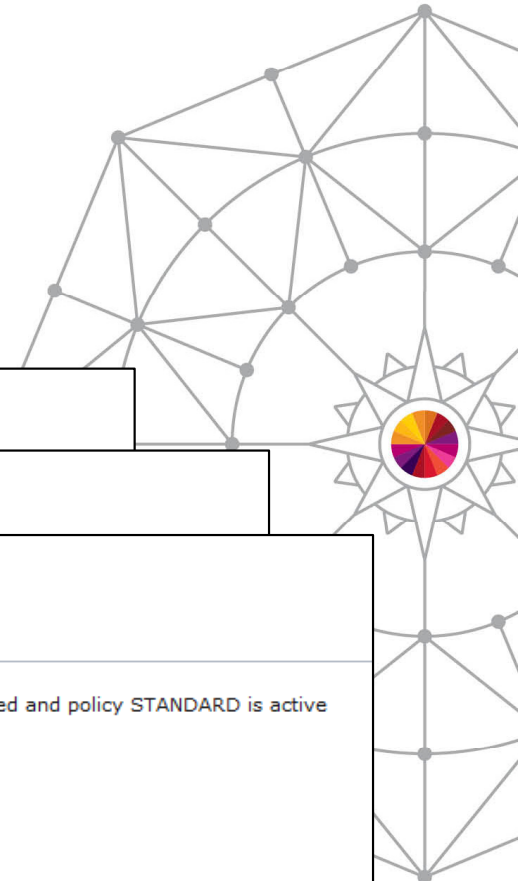
Table view: Tree

Service Class	Period	Importance	Duration	Goal Type	Resp Goal
Filter	Filter	Filter	Filter	Filter	Filter

Total: 4, Selected: 1

Refresh Last refresh: Jan 30, 2013 11:20:04 AM local time (Jan 30, 2013 10:20:04 AM local time)

Automatic refresh



From WLM to RM Dashboard (Service Classes)



Welcome x Workload Man... x

Workload Management Help

Overview WLM Status x

WLM Status for Sysplex ZMF1PLEX from System ZMF2

Active Service Policy [\(View performance of active policy\)](#)

Name: STANDARD
 Description: BB default policy 1
 Activated: Jan 29, 2013 3:14:59 PM GMT
 Activated by: jbau from system ZMF2
 Related service definition: DEFAULT
 Functionality level: 4
 Installed: Jan 29, 2013 3:14:59 PM GMT
 Installed by: jbau from system ZMF2

Systems [\(View performance of systems\)](#)

Actions Search

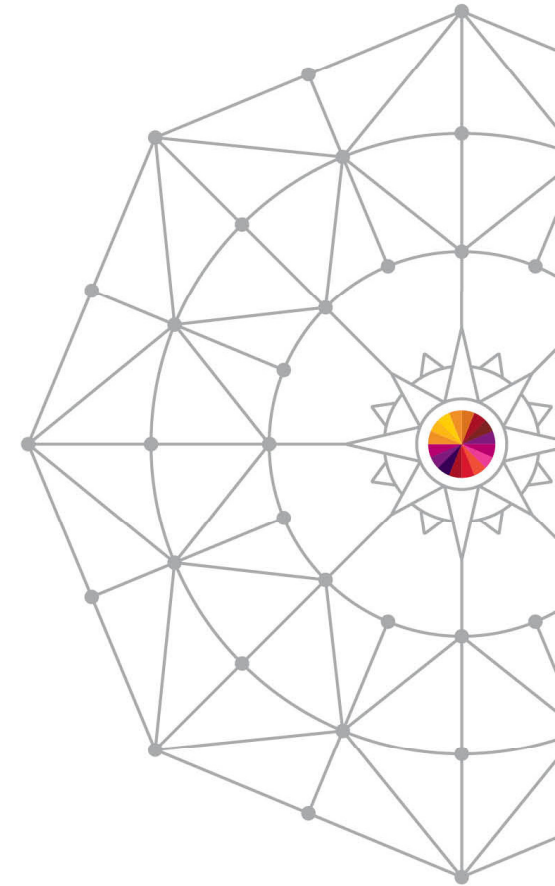
Name	Used Service Policy	Activated (GMT)	WLM Status	GPMP Status	WLM Version Level	CD Level
Filter	Filter	Filter	Filter	Filter	Filter	Filter
ZMF1	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable		
ZMF2	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable	25	3
ZMF3	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable		
ZMF4	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable		
ZMF5	STANDARD	Jan 29, 2013 3:14:59 PM	Active	Unavailable		

Total: 5

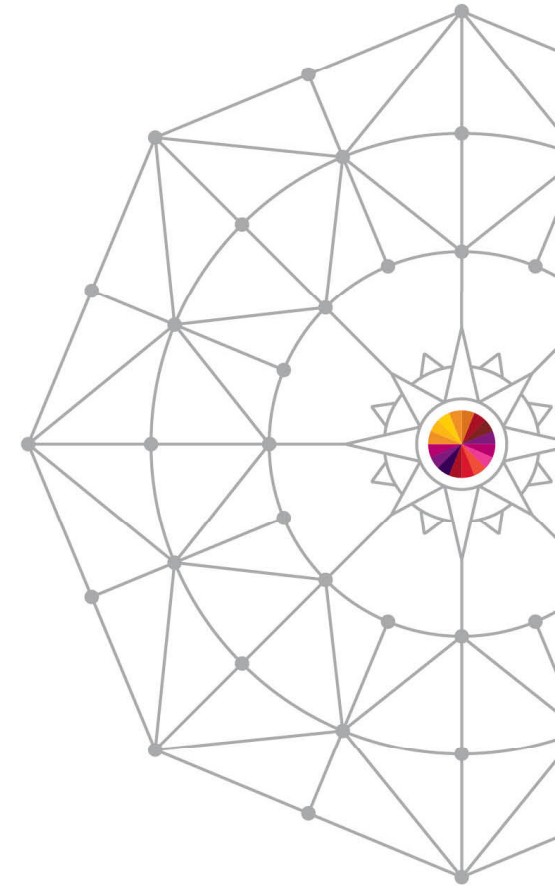
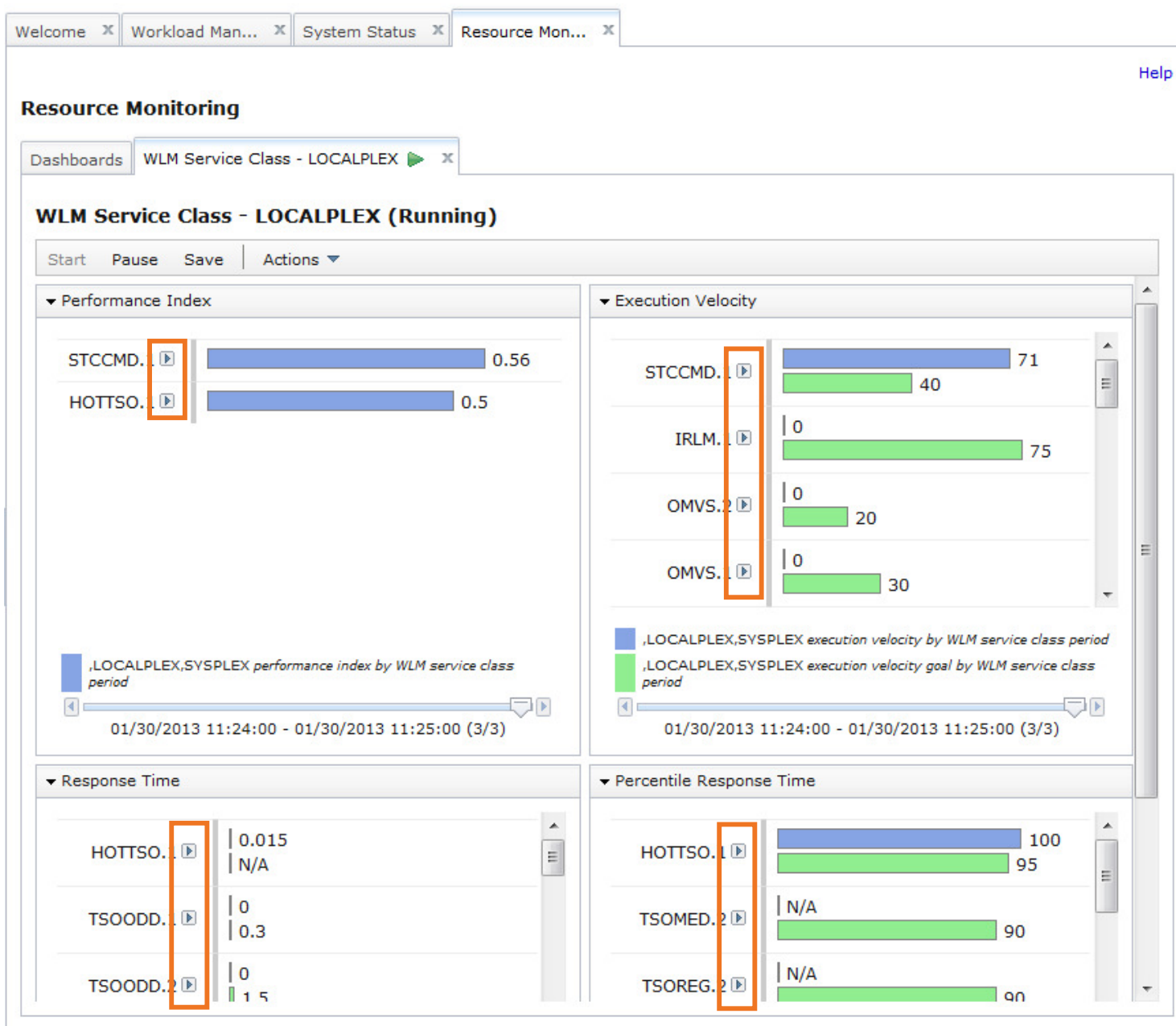
Installed Service Definition

Name: DEFAULT
 Description: BB default WLM policy - test
 Installed: Jan 29, 2013 3:14:59 PM GMT
 Installed by: jbau from system ZMF2

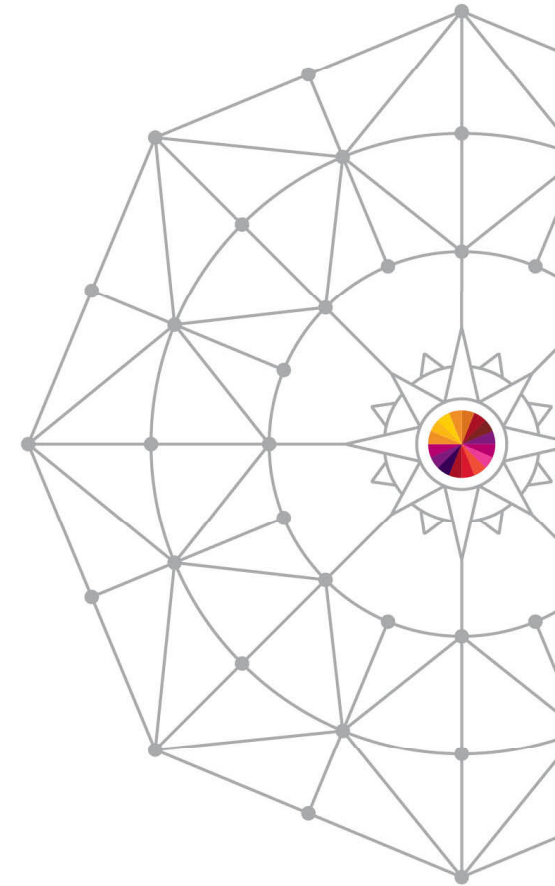
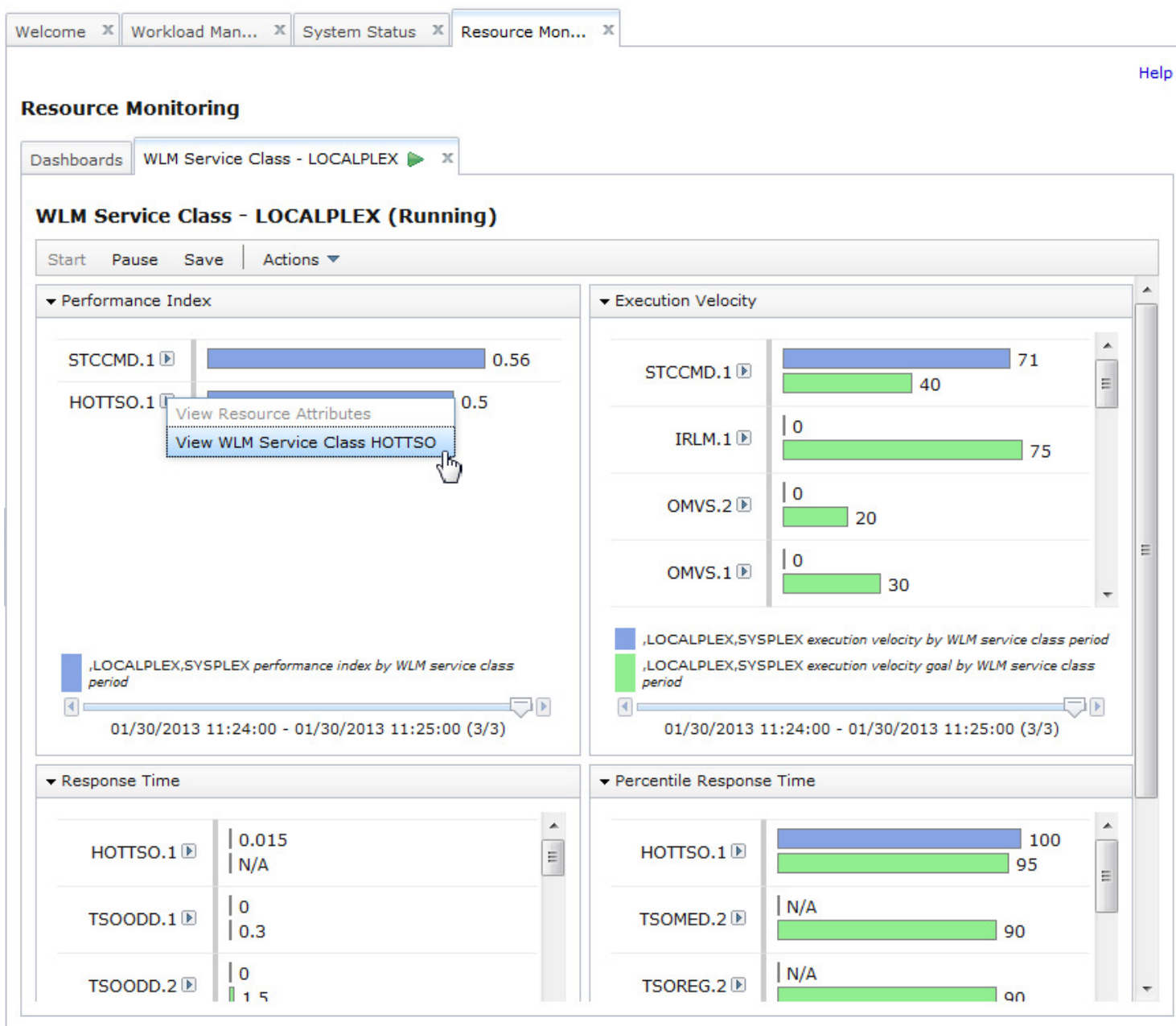
Automatic refresh Last refresh: Jan 30, 2013 11:13:10 AM local time (Jan 30, 2013 10:13:10 AM GMT)



RM Dashboard – WLM Service Class Performance



From RM Dashboard to WLM Service Classes



WLM Service Classes

Welcome x Workload Man... x System Status x Resource Mon... x

Workload Management Help

Overview WLM Status x View DEFAULT x

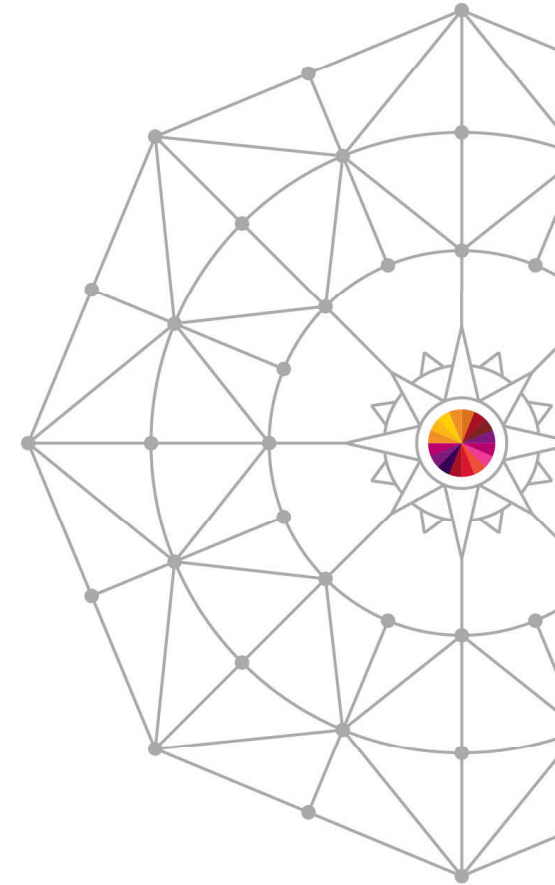
This service definition is installed and policy STANDARD is active Notes Switch To v

Service Classes

Actions Table view: Tree Search

Name	Period	Imports	Durati	Goal Type	Response Time Goal (hh:mm:ss.ttt)	Percent Goal	Velocity Goal	CPU Critical	Resource Group	Workload
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
<input type="checkbox"/> + BATCH1								No		BATCH1
<input type="checkbox"/> + BATCH2								No		BATCH2
<input type="checkbox"/> + BATCHHI								No		BATCHHI
<input type="checkbox"/> + BATCHLOV								No		BATCHLOV
<input type="checkbox"/> + BATCHMED								No		BATCHMED
<input type="checkbox"/> + BATCHRSP								No		BATCHRSP
<input type="checkbox"/> + DISCRET								No		DISCRET
<input checked="" type="checkbox"/> - HOTTSO								No	REGTSO	TSO
<input checked="" type="checkbox"/> ■ HOTTSO	1	1		Percentile Response Time	00:00:00.500	95			REGTSO	TSO
<input type="checkbox"/> + IRLM								No		IRLM
<input type="checkbox"/> + OE								No	REGTSO	OMVS
<input type="checkbox"/> + OMVS								No		OMVS
<input type="checkbox"/> + OMVSKERN								No		OMVSKERN
<input type="checkbox"/> + PRDTSO								No	REGTSO	TSO
<input type="checkbox"/> + STCCMD								No	REGSTC	STC
<input type="checkbox"/> + STCLO								No	BATCHVEL	STC
<input type="checkbox"/> + STCSYS								No	HIGHPRTY	STC
<input type="checkbox"/> + STORPROC								No		STORPROC
<input type="checkbox"/> + TSOEVEN								No		TSOEVEN

Total: 62, Selected: 1



From WLM to RM Dashboard (Workloads)

Welcome x Workload Man... x System Status x Resource Mon... x

Workload Management Help

Overview WLM Status x Modify DEFAULT x

This service definition is installed and policy STANDARD is active Notes Switch To

Workloads

Actions Search

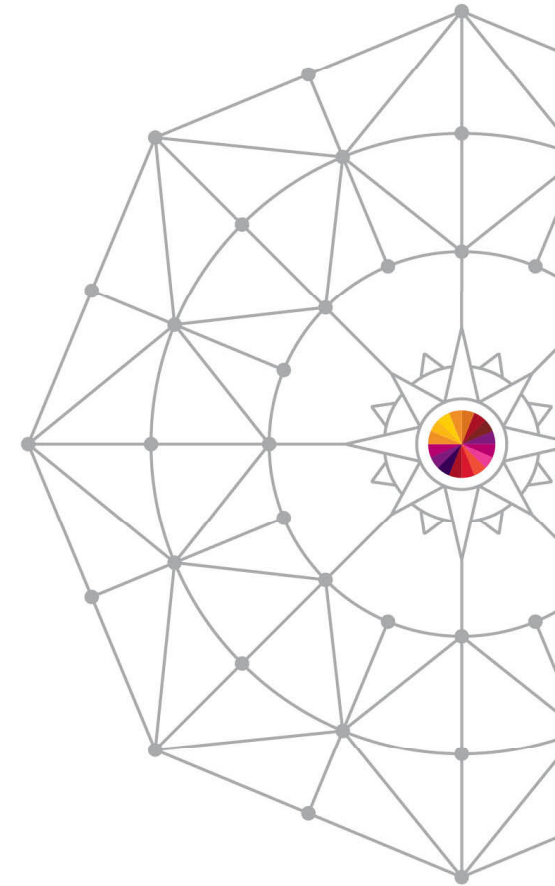
Name	Messages	Last Modified (GMT)	Modified By
<input type="checkbox"/> * APPC		Mar 30, 2011 2:31:17 PM	debug1
<input type="checkbox"/> * BATCH		Oct 16, 1998 11:58:16 AM	tage
<input type="checkbox"/> * CICS		Oct 16, 1998 11:58:30 AM	tage
<input type="checkbox"/> * OMVS		Oct 16, 1998 12:01:03 PM	tage
<input type="checkbox"/> * STC		Oct 16, 1998 12:01:45 PM	tage
<input checked="" type="checkbox"/> * TSO		Oct 16, 1998 12:01:52 PM	tage

Total: 6, Selected: 1

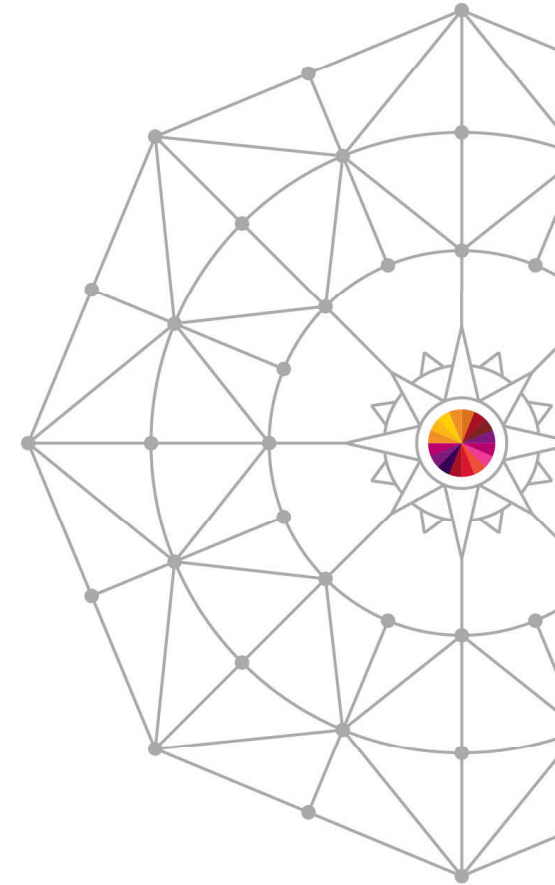
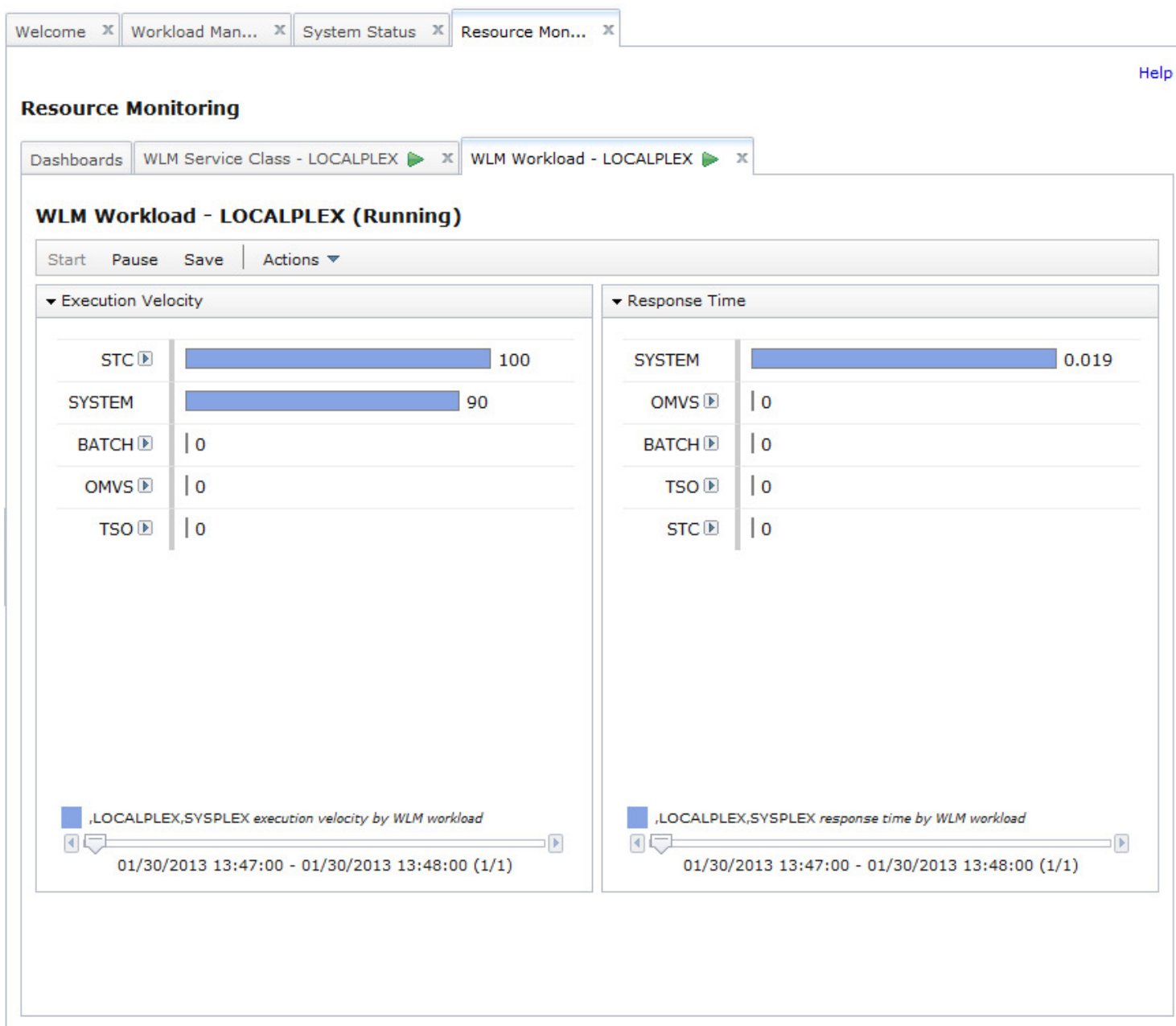
Reapply Filter and Sort

OK Apply Reset Cancel

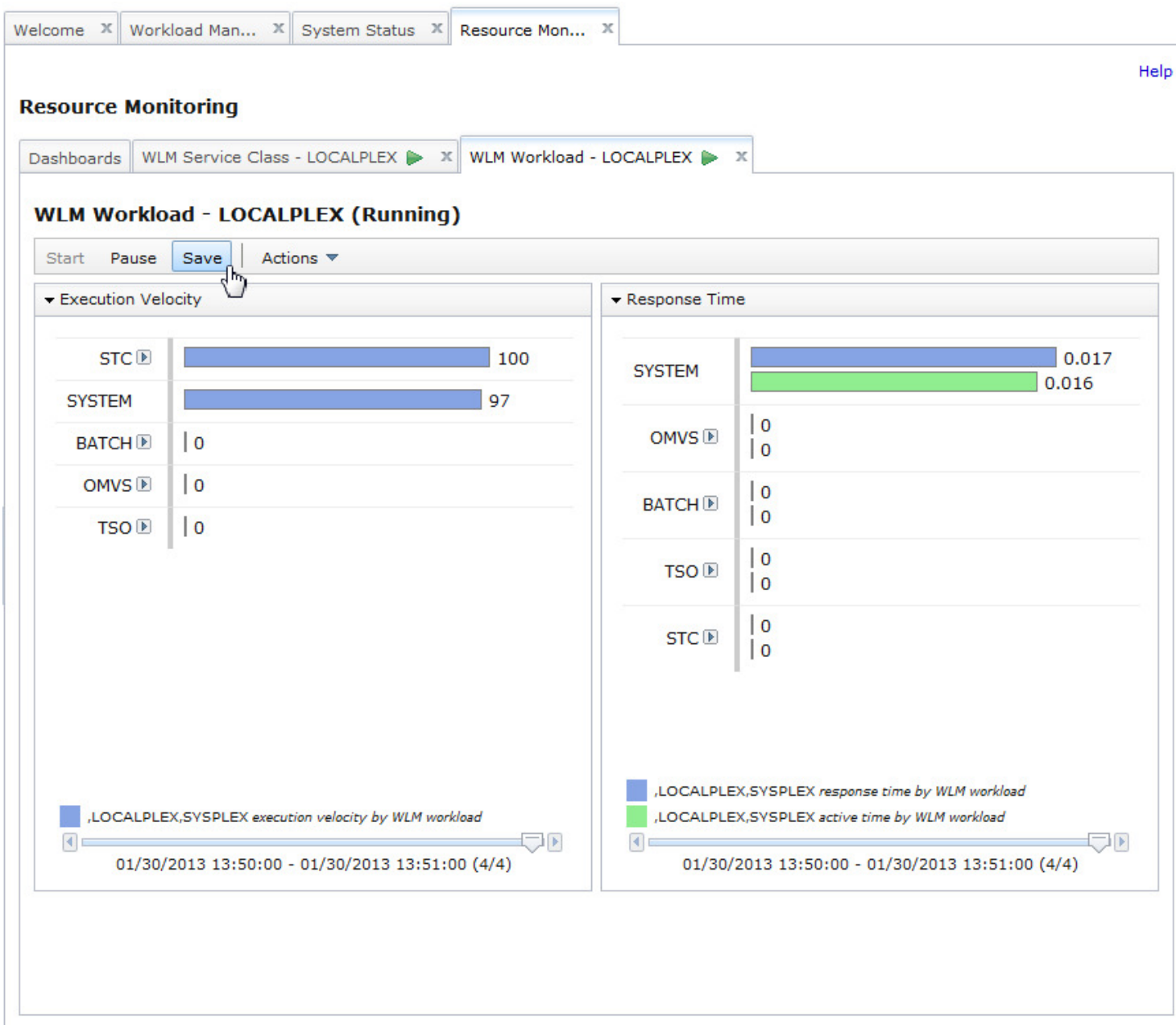
Context menu options: Cut to Clipboard, Copy to Clipboard, Delete..., View Cross References, View Messages, View Performance of Selected, New..., Paste, View Performance of All, Select All, Deselect All, Configure Columns..., Modify Filters..., Hide Filter Row, Clear Filters, Modify Sort..., Clear Sorts, Clear Search.



RM Dashboard – WLM Workload Performance



Customization and Persistence



The screenshot shows a web application interface for Resource Monitoring. At the top, there are tabs for 'Welcome', 'Workload Man...', 'System Status', and 'Resource Mon...'. Below this is a 'Resource Monitoring' section with a 'Help' link. Underneath, there are dashboard tabs for 'WLM Service Class - LOCALPLEX' and 'WLM Workload - LOCALPLEX'. The main content area is titled 'WLM Workload - LOCALPLEX (Running)' and features a control bar with 'Start', 'Pause', 'Save', and 'Actions' buttons. A mouse cursor is pointing at the 'Save' button. Below the control bar are two charts: 'Execution Velocity' and 'Response Time'. The 'Execution Velocity' chart shows bars for STC (100), SYSTEM (97), BATCH (0), OMVS (0), and TSO (0). The 'Response Time' chart shows bars for SYSTEM (0.017), OMVS (0), BATCH (0), TSO (0), and STC (0). A legend at the bottom of each chart identifies the data series.

Category	Value
STC	100
SYSTEM	97
BATCH	0
OMVS	0
TSO	0

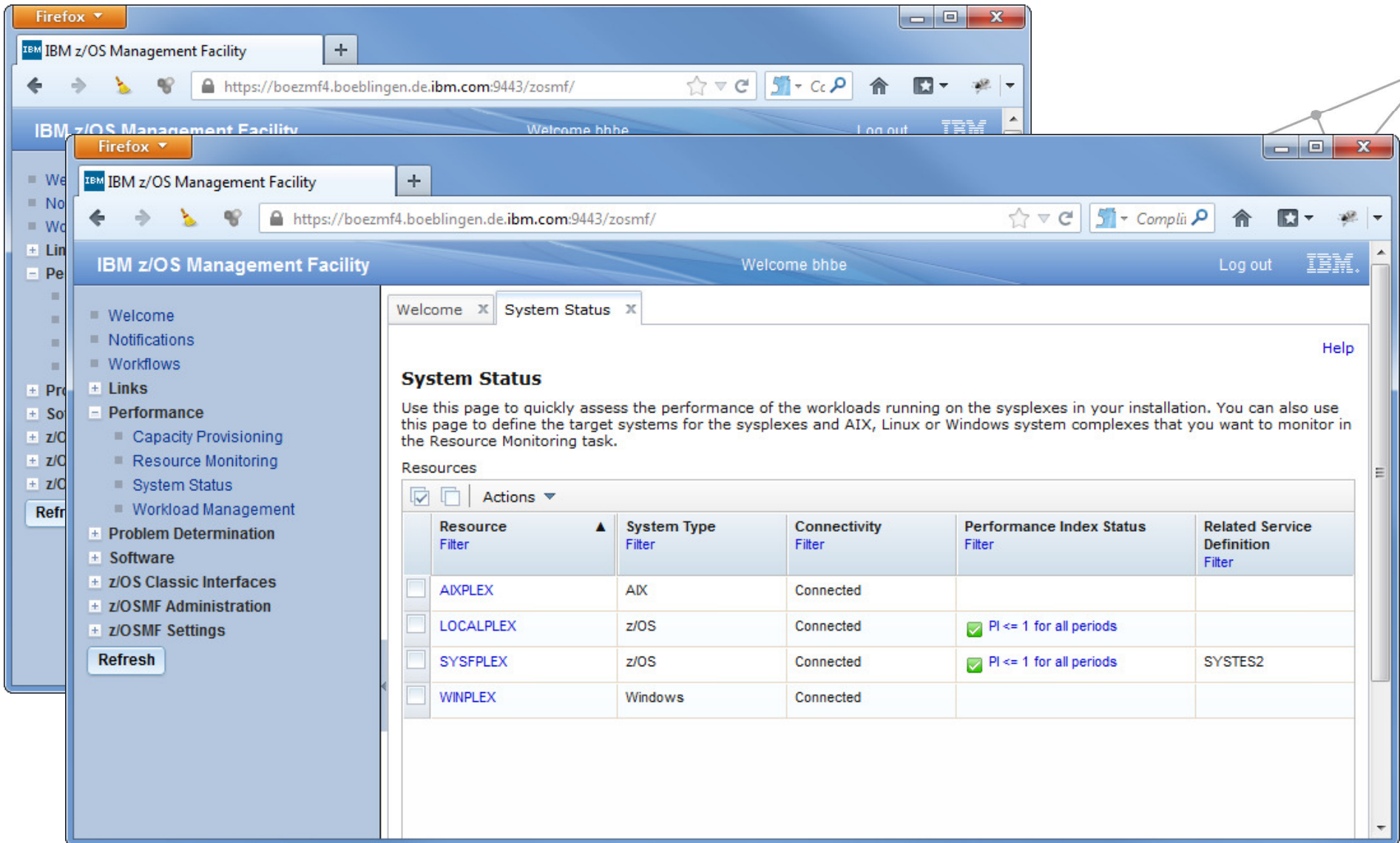
Category	Value
SYSTEM	0.017
OMVS	0
BATCH	0
TSO	0
STC	0

- ⇒ The user can customize dashboards opened by Application Linking and save them to the Dashboards list.
- ⇒ Then the Dashboard can be opened directly in Resource Monitoring using the Dashboards list.
- ⇒ Subsequent application linking events will use the saved dashboard.

Conditions for Application Linking between WLM & RM

- ▶ In the Workload Management task, the *View Performance...* actions and links are only available if the service definition in the *View/Modify* tab is currently activated in the Sysplex.
- ▶ In the System Status task, the WLM related *View* actions (and corresponding links) are only available if the selected resource is the z/OS sysplex where z/OSMF is running in (local sysplex).
- ▶ In a monitoring dashboard, the context menu icon is only visible if the performance data is retrieved from the local sysplex and the chart is related to WLM definitions, i.e.,
 - ⇒ The resources in the chart are WLM service classes, service class periods, report classes, or workloads.
 - ⇒ The metric is filtered by a workscope of a WLM service class, service class period, report class, or workload.
(Example: *% using by MVS image [BATCH,S]* , where *[BATCH,S]* means: filtered by workscope of service class *BATCH*)

Resource Monitoring – Windows Support

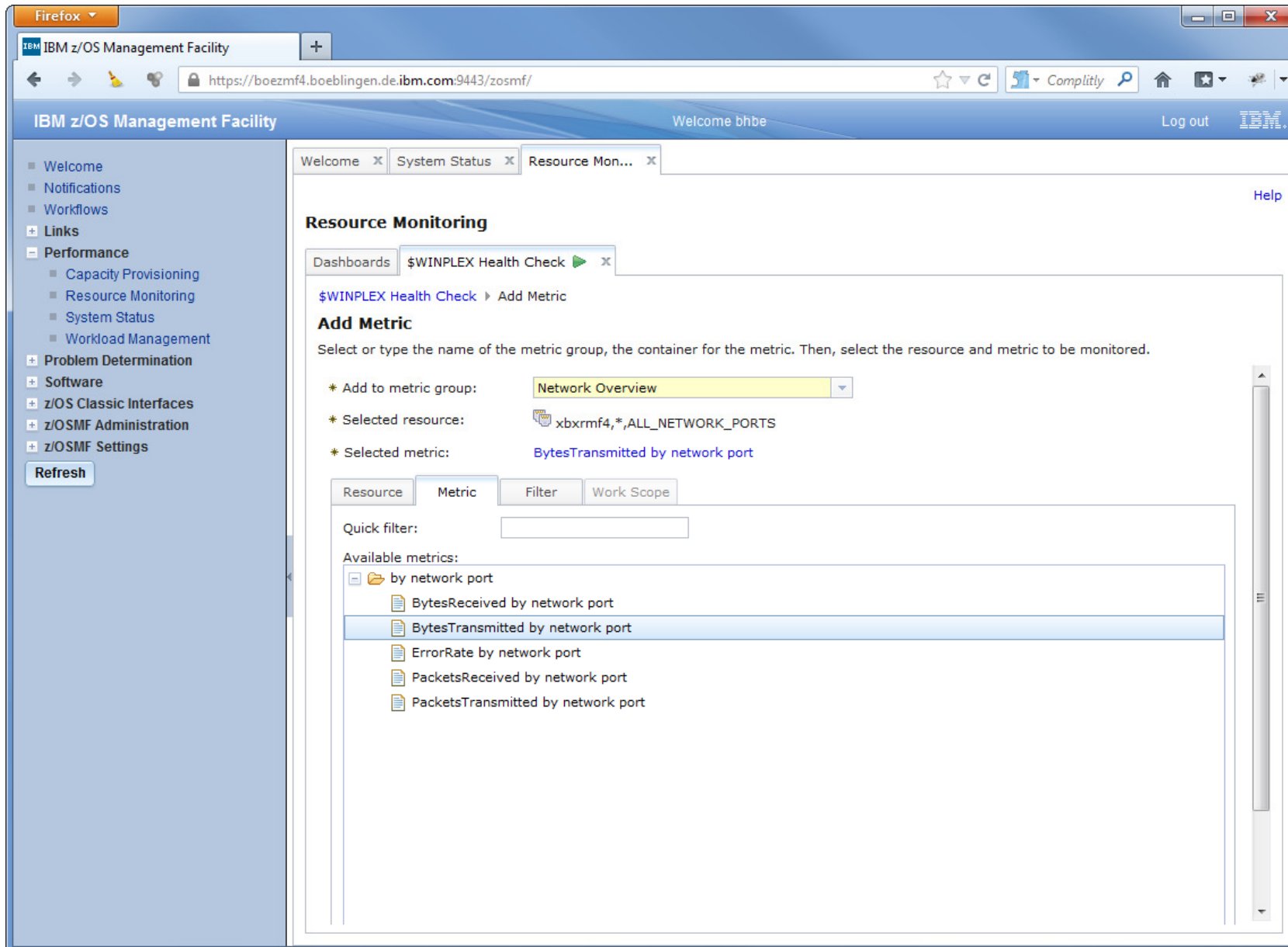


The screenshot displays the IBM z/OS Management Facility System Status page. The page title is "System Status" and it includes a "Welcome" message and a "Log out" link. The main content area is titled "System Status" and contains a table of resources. The table has columns for "Resource Filter", "System Type Filter", "Connectivity Filter", "Performance Index Status Filter", and "Related Service Definition Filter". The table lists four resources: AIXPLEX (AIX), LOCALPLEX (z/OS), SYSFLEX (z/OS), and WINPLEX (Windows). The Performance Index Status for LOCALPLEX and SYSFLEX is "PI <= 1 for all periods".

Resource Filter	System Type Filter	Connectivity Filter	Performance Index Status Filter	Related Service Definition Filter
<input type="checkbox"/> AIXPLEX	AIX	Connected		
<input type="checkbox"/> LOCALPLEX	z/OS	Connected	✓ PI <= 1 for all periods	
<input type="checkbox"/> SYSFLEX	z/OS	Connected	✓ PI <= 1 for all periods	SYSTEMS2
<input type="checkbox"/> WINPLEX	Windows	Connected		



Resource Monitoring – Windows Support

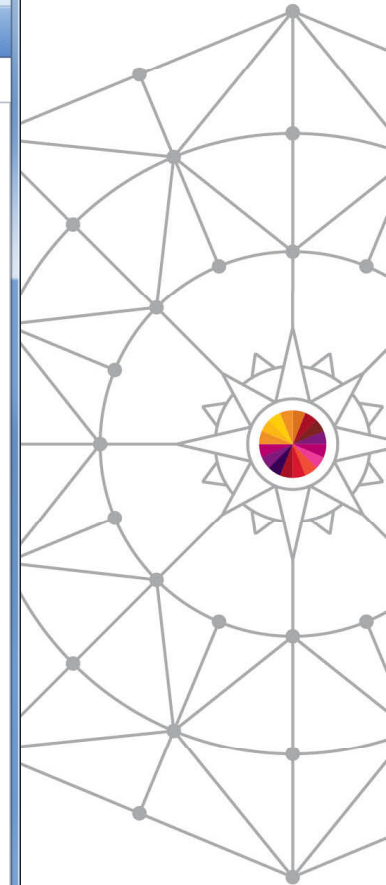


The screenshot shows the IBM z/OS Management Facility (zOSMF) interface in a Firefox browser. The browser address bar shows the URL: <https://boezmf4.boeblingen.de.ibm.com:9443/zosmf/>. The page title is "IBM z/OS Management Facility" and the user is logged in as "bhbe". The main content area is titled "Resource Monitoring" and shows a dashboard for "\$WINPLEX Health Check". The "Add Metric" section is active, showing the following configuration:

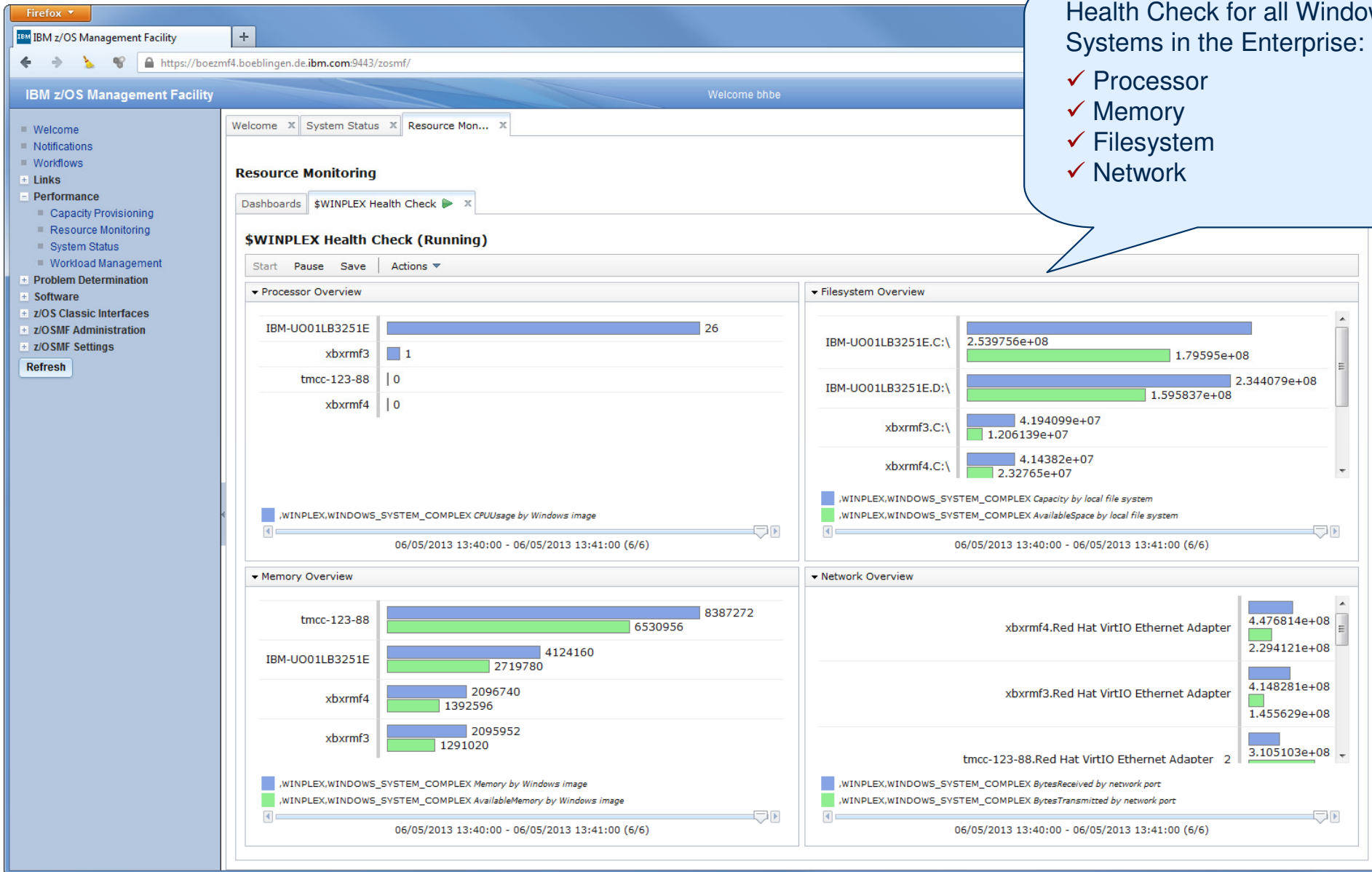
- * Add to metric group: Network Overview
- * Selected resource: xbxrnf4,*,ALL_NETWORK_PORTS
- * Selected metric: BytesTransmitted by network port

Below this, there is a table of available metrics:

Resource	Metric	Filter	Work Scope
Quick filter: <input type="text"/>			
Available metrics:			
<input type="checkbox"/>	by network port		
<input type="checkbox"/>	BytesReceived by network port		
<input checked="" type="checkbox"/>	BytesTransmitted by network port		
<input type="checkbox"/>	ErrorRate by network port		
<input type="checkbox"/>	PacketsReceived by network port		
<input type="checkbox"/>	PacketsTransmitted by network port		

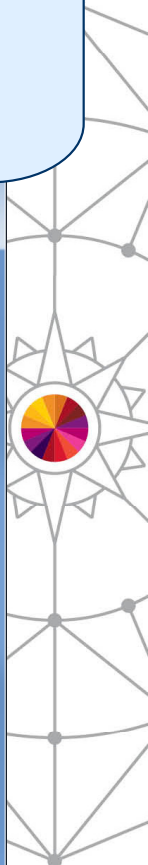


Resource Monitoring – Windows Support...



Health Check for all Windows Systems in the Enterprise:

- ✓ Processor
- ✓ Memory
- ✓ Filesystem
- ✓ Network



Information and Tools

RMF homepage: www.ibm.com/systems/z/os/zos/features/rmf/

- Product information, newsletters, presentations, ...
- Downloads
 - ▶ Spreadsheet Reporter
 - ▶ RMF PM Java Edition
 - ▶ Postprocessor XML Toolkit

RMF email address: rmf@de.ibm.com



Users Guide:
New RMF
XP Chapter

Documentation and news:

- RMF Performance Management Guide, SC33-7992
- RMF Report Analysis, SC33-7991
- RMF User's Guide, SC33-7990
- Latest version of PDF files can be downloaded from:
www.ibm.com/systems/z/os/zos/bkserv/r13pdf/#rmf



Function Reference



Function	Availability
Storage Class Memory & Pageable Large Pages I/O Interrupt Delay Time IFB Link Reporting Crypto CEX4 Statistics Warning Track Support	APAR OA38660 APAR OA39993 APAR OA37826 APAR OA37016 APAR OA37803 <div data-bbox="1549 488 1976 643" style="border: 1px solid blue; border-radius: 15px; padding: 5px; display: inline-block; background-color: #e6f2ff;"> zEC12 Enhancements </div>
Exploitation of System z Integrated Information Processors	z/OS 2.1 RMF
Postprocessor XML Formatted Reports	z/OS 1.11 RMF – z/OS 2.1 RMF
z/OSMF Resource Monitoring – Application Linking	z/OS 2.1 RMF

