



Cross Platform Performance Monitoring with RMF XP

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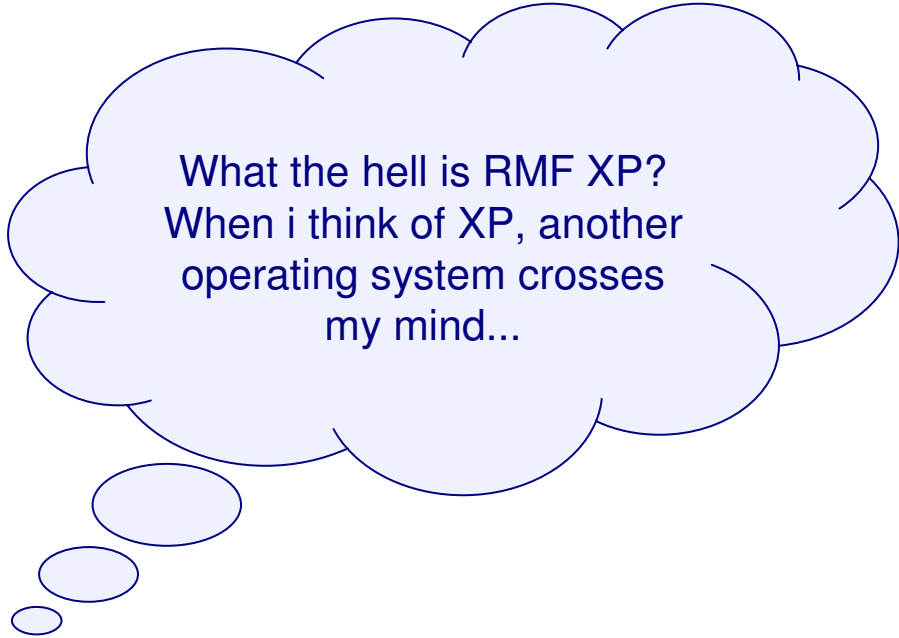
IBM Corporation

Thursday, August 15, 2013

Session 14213



The new Component: RMF XP



What the hell is RMF XP?
When i think of XP, another
operating system crosses
my mind...



A problem has been detected and Windows has been shut down to prevent damage to your computer.

PFN_LIST_CORRUPT

If this is the first time you've seen this Stop error screen, restart your computer. If this screen appears again, follow these steps:

Check to make sure any new hardware or software is properly installed. If this is a new installation, ask your hardware or software manufacturer for any Windows updates you might need.

If problems continue, disable or remove any newly installed hardware or software. Disable BIOS memory options such as caching or shadowing. If you need to use Safe Mode to remove or disable components, restart your computer, press F8 to select Advanced Startup Options, and then select Safe Mode.

Technical information:

*** STOP: 0x0000004e (0x00000099, 0x00900009, 0x00000900, 0x00000900)

Beginning dump of physical memory

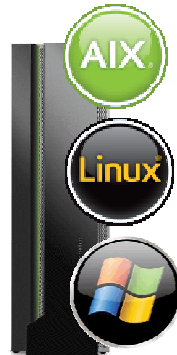
Physical memory dump complete.

Contact your system administrator or technical support group for further assistance.

The new Component: RMF XP...



- RMF XP cannot cause Bluescreens!
- RMF XP is the solution for **C**ross **P**latform Performance Monitoring
- RMF XP supports the Operating Systems running on
 - **x** Blades
 - **p** Blades



- In addition RMF XP supports Linux on System z
 - LPAR Mode
 - VM Guest Mode

RMF XP – Basic Idea

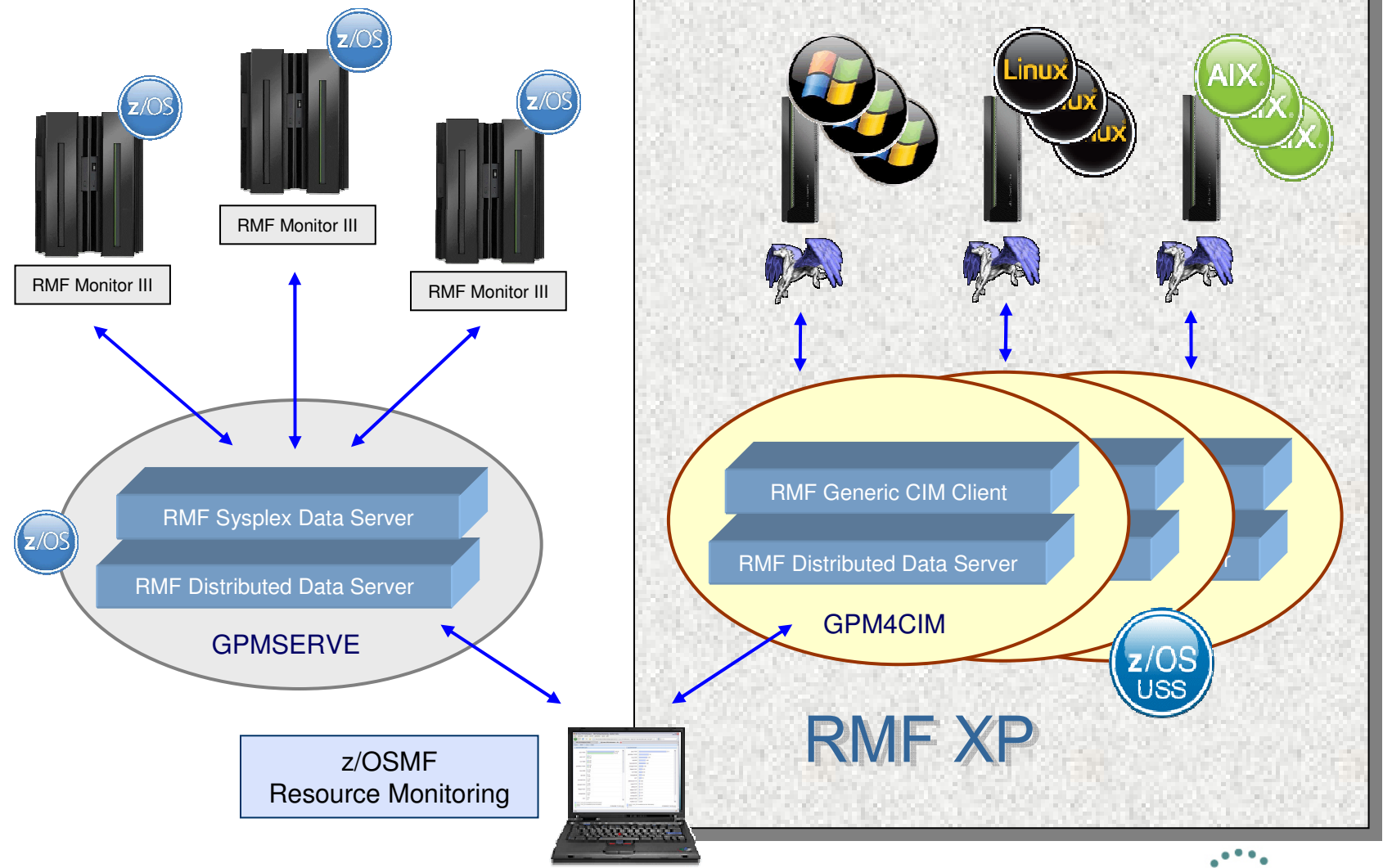


- The Common Information Model (aka CIM) instrumentation is available for almost all operating systems on this planet
- RMF has the infrastructure already in place to
 - combine performance data from multiple systems to a Sysplex wide view
 - display performance data by means of state-of-the-art graphical frontends

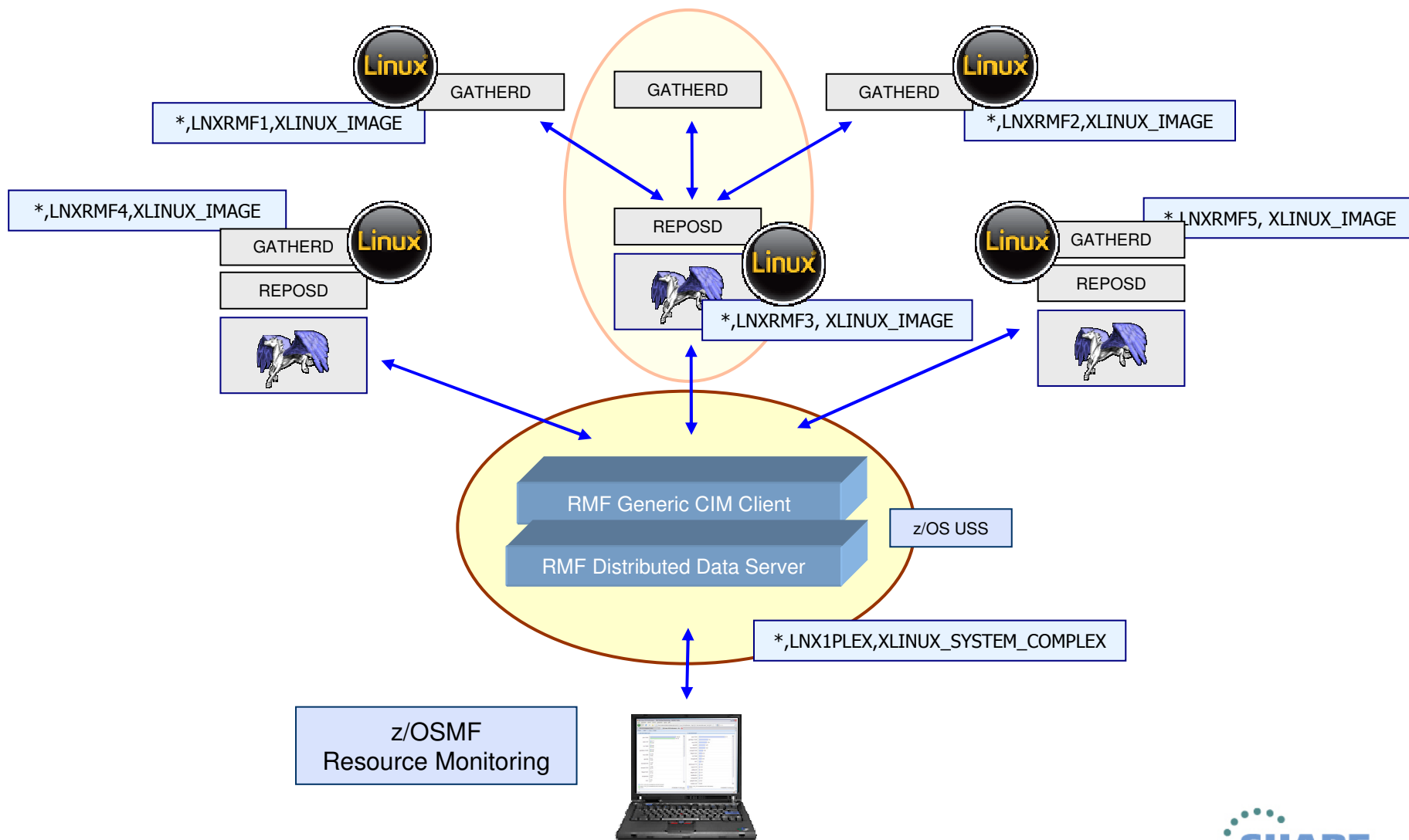
💡 Isn't it a good idea to bring those well-proven things together ?

✓ We thought it is and we created the RMF XP

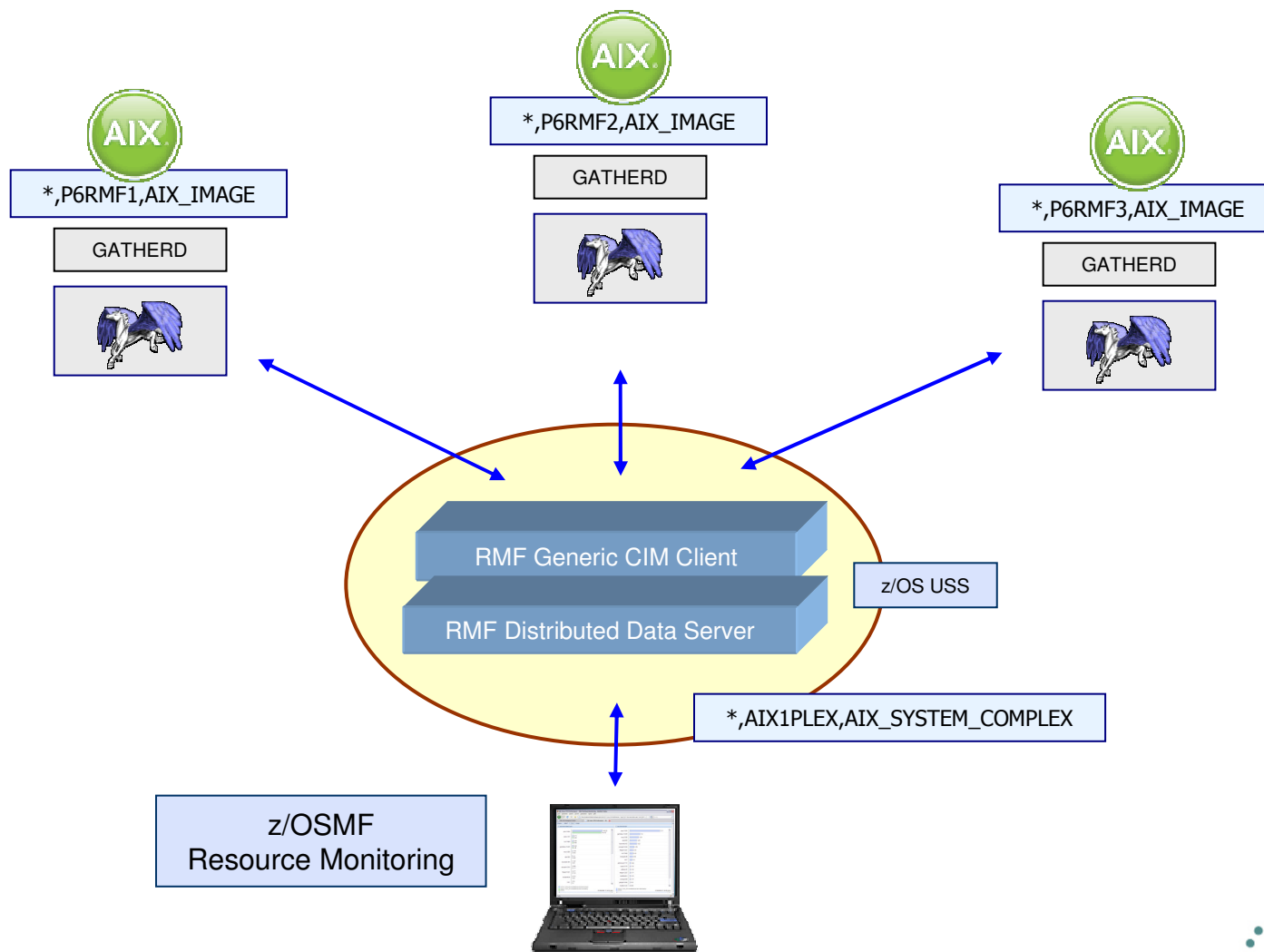
RMF XP – Component Overview



RMF XP – Linux & Windows Data Collection



RMF XP – AIX Data Collection



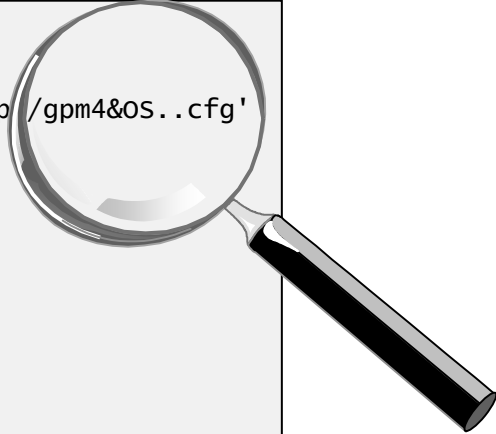
RMF XP – Invocation

- Started Task: SYS1.PROCLIB(GPM4CIM)
- Runs in USS Environment via BPXBATCH
- Multiple instances can run in parallel: one STC per platform
 - S GPM4CIM.GPM4A,OS=A
 - S GPM4CIM.GPM4X,OS=X
 - S GPM4CIM.GPM4Z,OS=Z
 - **S GPM4CIM.GPM4W,OS=W**

```
//GPM4CIM  PROC OS=A
//STEP1    EXEC PGM=BPXBATCH,TIME=NOLIMIT,REGION=0M,
//          PARM='PGM /usr/lpp/gpm/bin/gpm4cim cfg=/etc/gpm/gpm4&OS..cfg'
//STDENV   DD   PATH='/etc/gpm/gpm4cim.env'
//STDOUT   DD   PATH='/var/gpm/logs/gpm4cim&OS..out',
//          PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//          PATHMODE=(SIRUSR,SIWUSR,SIRGRP)
//STDERR   DD   PATH='/var/gpm/logs/gpm4cim&OS..trc',
//          PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//          PATHMODE=(SIRUSR,SIWUSR,SIRGRP)
//SYSPRINT DD   SYSOUT=*
//SYSOUT   DD   SYSOUT=*
//          PEND
```

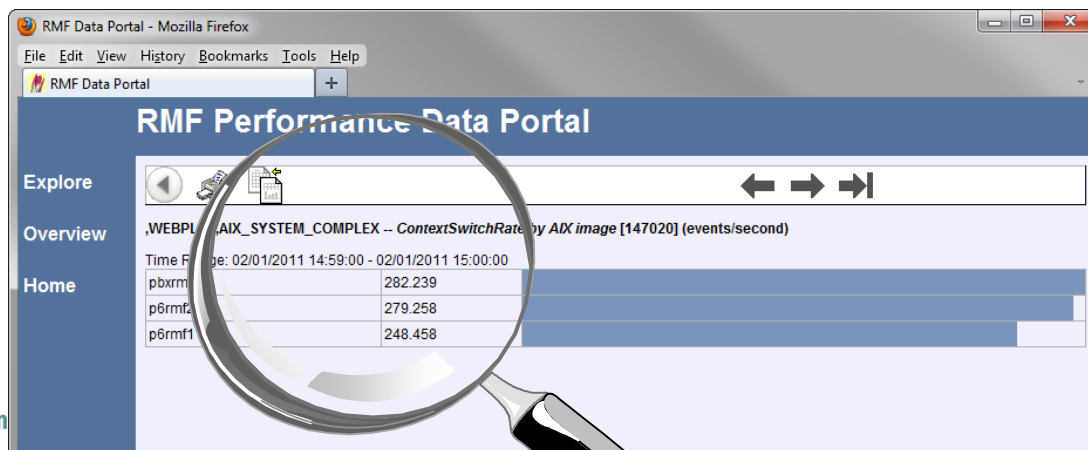
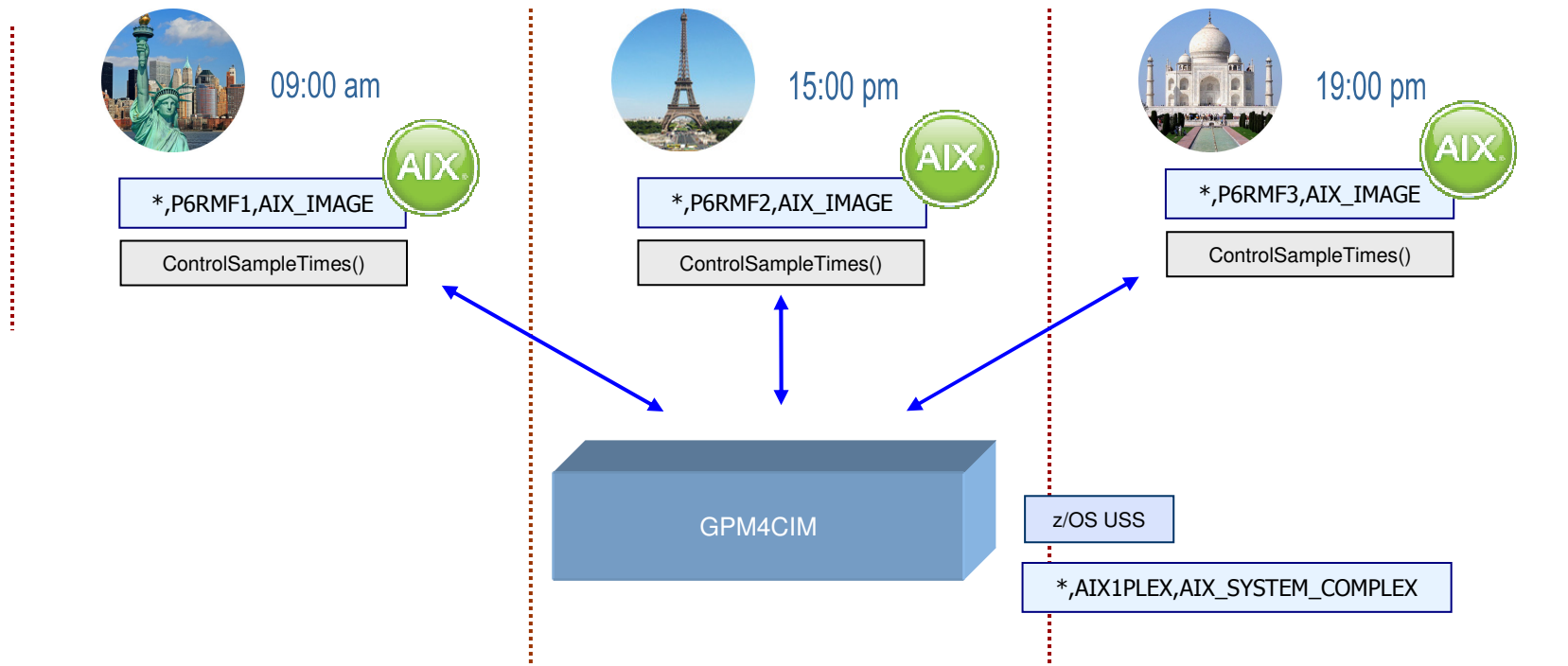
RMF XP – Invocation

```
//GPM4CIM PROC OS=A
//STEP1 EXEC PGM=BPXBATCH,TIME=NOLIMIT,REGION=0M,
// PARM='PGM /usr/lpp/gpm/bin/gpm4cim cfg=/etc/gp /gpm4&OS..cfg'
//STDENV DD PATH='/etc/gpm/gpm4cim.env'
//STDOUT DD PATH='/var/gpm/logs/gpm4cim&OS..out',
// PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
// PATHMODE=(SIRUSR,SIWUSR,SIRGRP)
//STDERR DD PATH='/var/gpm/logs/gpm4cim&OS..trc',
// PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
// PATHMODE=(SIRUSR,SIWUSR,SIRGRP)
//SYSPRINT DD SYSOUT=*
//SYSOUT DD SYSOUT=*
// PEND
```

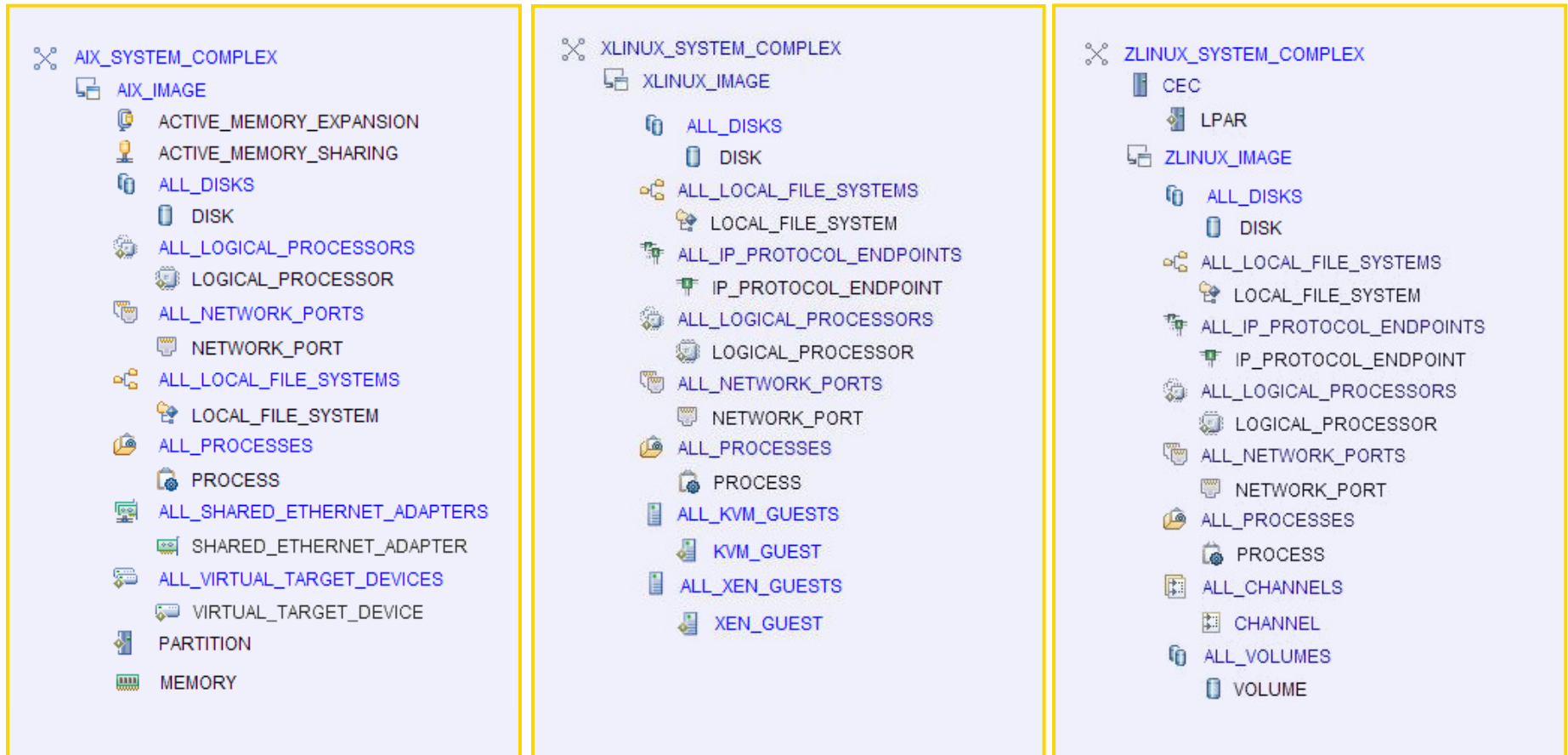


```
MAXSESSIONS_HTTP(20) /* MaxNo of concurrent HTTP requests */
HTTP_PORT(8805) /* Port number for HTTP requests */
HTTP_ALLOW(*) /* Mask for hosts that are allowed */
HTTP_NOAUTH(*) /* No server can access without auth.*/
INTERVAL(300) /* Length of the monitoring interval */
AIX_COMPLEX(WEBPLEX) /* Name of system complex */
AIX_IMAGE(p6rmf1.boeblingen.de.ibm.com:5988) /* Hostname of member */
AIX_IMAGE(p6rmf2.boeblingen.de.ibm.com:5988)
```

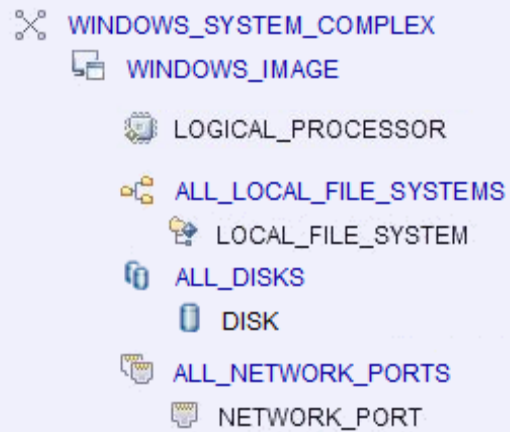
RMF XP – Interval Synchronization



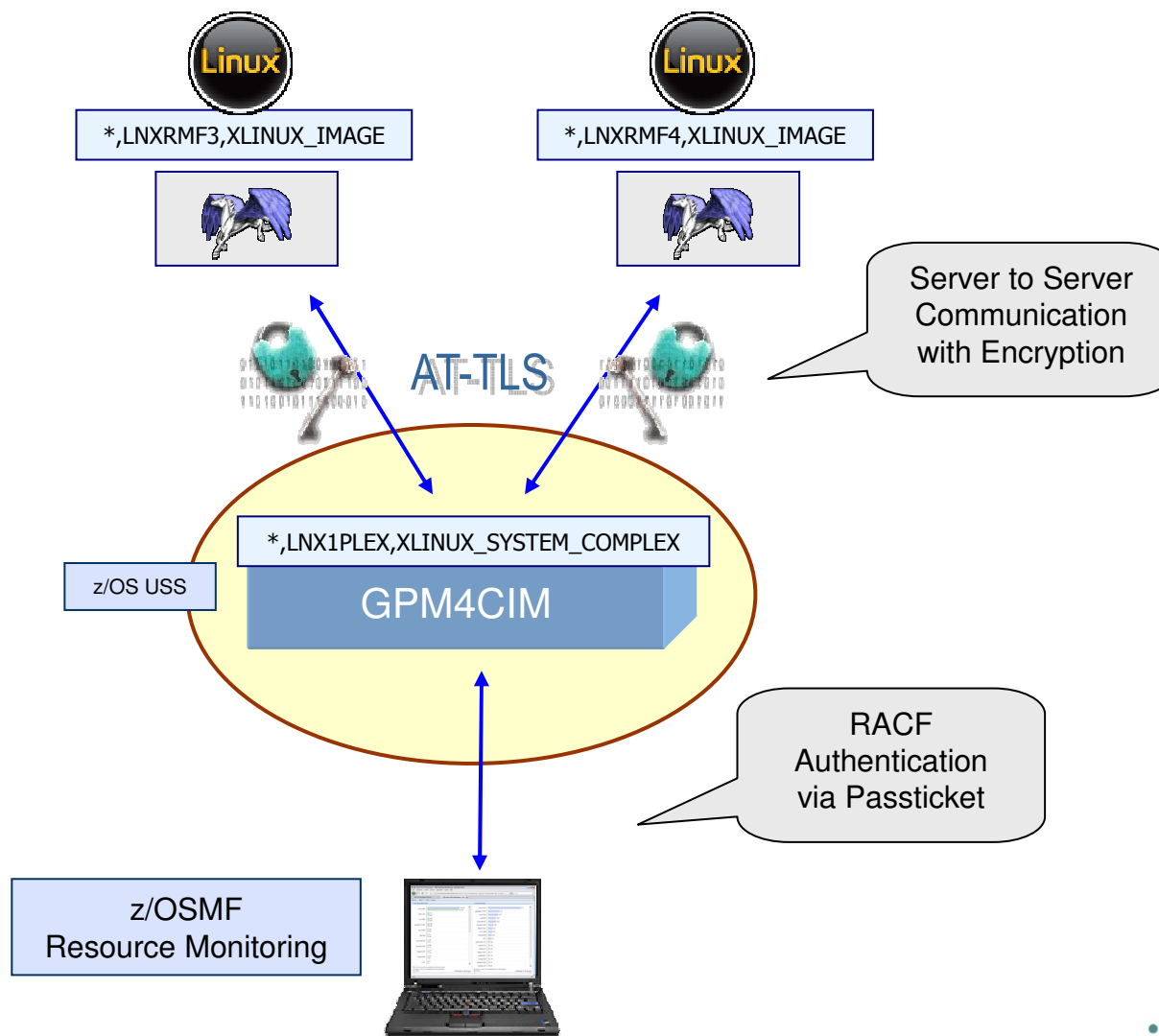
RMF XP – Platform specific Resource Models



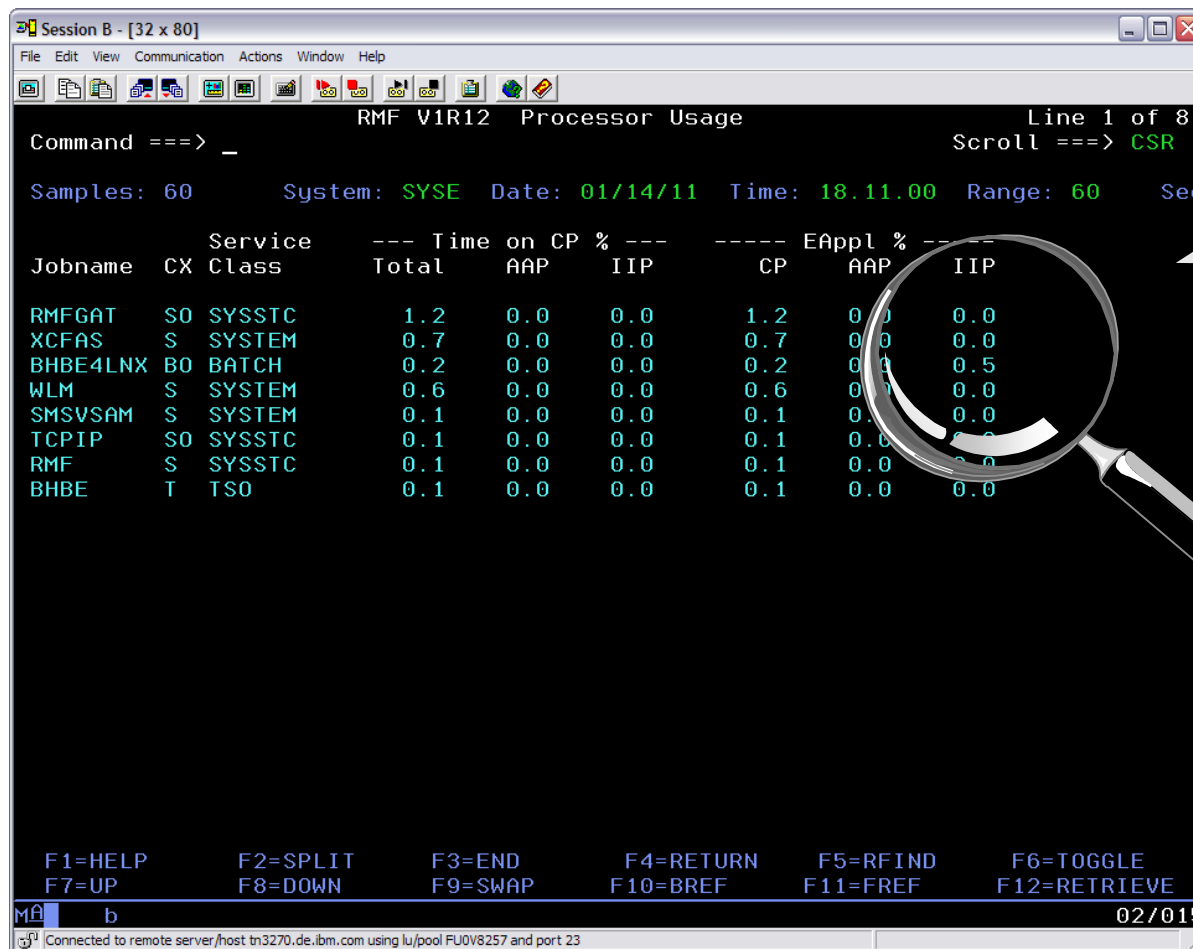
RMF XP – Platform specific Resource Models...



RMF XP – Security



RMF XP – zIIP Exploitation



RMF V1R12 Processor Usage

Line 1 of 8
Scroll ==> CSR

Command ==> _

Samples: 60 System: SYSE Date: 01/14/11 Time: 18.11.00 Range: 60 Sec

Jobname	CX	Service Class	--- Time on CP % ---	--- EAppl % ---				
			Total	AAP	IIP	CP	AAP	IIP
RMFGAT	S0	SYSSTC	1.2	0.0	0.0	1.2	0.0	0.0
XCFAS	S	SYSTEM	0.7	0.0	0.0	0.7	0.0	0.0
BHBE4LNX	B0	BATCH	0.2	0.0	0.0	0.2	0.0	0.5
WLM	S	SYSTEM	0.6	0.0	0.0	0.6	0.0	0.0
SMSVSAM	S	SYSTEM	0.1	0.0	0.0	0.1	0.0	0.0
TCPIP	S0	SYSSTC	0.1	0.0	0.0	0.1	0.0	0.0
RMF	S	SYSSTC	0.1	0.0	0.0	0.1	0.0	0.0
BHBE	T	TSO	0.1	0.0	0.0	0.1	0.0	0.0

F1=HELP F2=SPLIT F3=END F4=RETURN F5=RFIND F6=TOGGLE
F7=UP F8=DOWN F9=SWAP F10=BREF F11=FREF F12=RETRIEVE

MA b 02/015
Connected to remote server/host tn3270.de.ibm.com using lu/pool FU0V8257 and port 23

Up to 70%
CPU utilization
can be
offloaded to
zIIPs !

RMF XP – Performance Considerations

```
//GPM4CIM PROC OS=A
//STEP1 EXEC PGM=BPXBATCH,TIME=NOLIMIT,REGION=0M,
// PARM='PGM /usr/lpp/gpm/bin/gpm4cim cfg=/etc/gpm/gpm4&OS..cfg'
//STDENV DD PATH='/etc/gpm/gpm4cim.env'
//STDOUT DD PATH='/var/gpm/logs/gpm4cim&OS..out',
// PATHOPTS=(OWRONLY, OCREAT, OTRUNC),
// PATHMODE=(SIRUSR, SIWUSR, SIRGRP)
//STDERR DD PATH='/var/gpm/logs/gpm4cim.trc',
// PATHOPTS=(OWRONLY, OCREAT, OTRUNC),
// PATHMODE=(SIRUSR, SIWUSR, SIRGRP)
//SYSPRINT DD SYSOUT=*
//SYSOUT DD SYSOUT=*
// PEND
```

```
GPM_HOME=/u/bhbe/gpm/
ICLUI_TRACETO=STDERR
_BPX_SHAREAS=NO
_BPXK_AUTOCVT=ON
LIBPATH=/u/bhbe/gpm:/usr/lpp/wbem/lib
GPM_NETWORK_PORT=1
GPM_LOCAL_FILE_SYSTEM=1
GPM_PROCESS=0
GPM_LOGICAL_PROCESSOR=1
GPM_DISK=1
GPM_IP_PROTOCOL_ENDPOINT=1
```

Deactivation of metrics
on process level can save
up to 90% CPU utilization



Exclude individual metric categories from the
data collection

RMF XP – Resource Tree



RMF Data Portal - Mozilla Firefox

RMF Performance Data Portal

Explore

Overview

My View

Home

Welcome, you are connected to: ,WEBPLEX,AIX_SYST

Icon	Resource	Metrics
	,WEBPLEX,AIX_SYSTEM_COMPLEX	Metrics

RMF-DDS-Server GPM4CIM - 1 Validity Level: 3000

RMF Data Portal - Mozilla Firefox

RMF Performance Data Portal

Explore

Overview

My View

Home

Children of: ,WEBPLEX,AIX_SYSTEM_COMPLEX

Icon	Resource	Metrics	Attributes	Res-Type
	tmcc-123-131,AIX_IMAGE	Metrics	N/A	AIX_IMAGE
	tmcc-123-133,AIX_IMAGE	Metrics	N/A	AIX_IMAGE
	tmcc-123-139,AIX_IMAGE	Metrics	N/A	AIX_IMAGE
	tmcc-123-140,AIX_IMAGE	Metrics	N/A	AIX_IMAGE
	tmcc-123-141,AIX_IMAGE	Metrics	N/A	AIX_IMAGE

RMF Data Portal - Mozilla Firefox

RMF Performance Data Portal

Explore

Overview

My View

Home

Children of: tmcc-123-141,*,ALL_NETWORK_PORTS

Icon	Resource	Metrics
	tmcc-123-141.en0.NETWORK_PORT	Metrics
	tmcc-123-141.en1.NETWORK_PORT	Metrics
	tmcc-123-141.io0.NETWORK_PORT	Metrics
	tmcc-123-141.sit0.NETWORK_PORT	Metrics

RMF Data Portal - Mozilla Firefox

RMF Performance Data Portal

Explore

Overview

My View

Home

Children of: ,tmcc-123-141,AIX_IMAGE

Icon	Resource	Metrics	Attributes	Res-Type
	tmcc-123-141,*,ACTIVE_MEMORY_EXPANSION	Metrics	N/A	ACTIVE_MEMORY_EXPANSION
	tmcc-123-141,*,ACTIVE_MEMORY_SHARING	Metrics	N/A	ACTIVE_MEMORY_SHARING
	tmcc-123-141,*,ALL_DISKS	Metrics	N/A	ALL_DISKS
	tmcc-123-141,*,ALL_LOGICAL_PROCESSORS	Metrics	N/A	ALL_LOGICAL_PROCESSORS
	tmcc-123-141,*,ALL_NETWORK_PORTS	Metrics	N/A	ALL_NETWORK_PORTS
	tmcc-123-141,*,ALL_LOCAL_FILE_SYSTEMS	Metrics	N/A	ALL_LOCAL_FILE_SYSTEMS
	tmcc-123-141,*,ALL_PROCESSES	Metrics	N/A	ALL_PROCESSES
	tmcc-123-141,*,ALL_SHARED_ETHERNET_ADAPTERS	Metrics	N/A	ALL_SHARED_ETHERNET_ADAPTERS
	tmcc-123-141,*,ALL_VIRTUAL_TARGET_DEVICES	Metrics	N/A	ALL_VIRTUAL_TARGET_DEVICES
	tmcc-123-141,*,PARTITION	Metrics	N/A	PARTITION
	tmcc-123-141,*,MEMORY	Metrics	N/A	MEMORY

RMF XP – Metrics



RMF Performance Data Portal

Welcome, you are connected to: ,WEBPLEX,AIX_SYSTEM_COMPLEX

Icon	Resource	Metrics	Alerts
	,WEBPLEX,AIX_SYSTEM_COMPLEX	Metrics	N

RMF-DDS-Server GPM4CIM - Functionality Level: 3000

RMF Performance Data Portal

Available metrics for: ,WEBPLEX,AIX_SYSTEM_COMPLEX

Metric description	Help	Id
by shared ethernet adapter		
ByteInRate by shared ethernet adapter	Explanation	049010
ByteOutRate by shared ethernet adapter	Explanation	049020
PacketInRate by shared ethernet adapter	Explanation	049030
PacketOutRate by shared ethernet adapter	Explanation	049040
TransferredRate by shared ethernet adapter	Explanation	049050
by disk		
ActiveTimePercentage by disk	Explanation	043010
AvailableSpace by disk	Explanation	043020
AverageDeviceUtilization by disk	Explanation	043030
Capacity by disk	Explanation	043040
IOIntensity by disk	Explanation	043050
QueueDepth by disk	Explanation	043060
ReadOperations by disk	Explanation	043070
ReadThroughput by disk	Explanation	043080
RequestRate by disk	Explanation	043090
ResponseTime by disk	Explanation	043100
TransferredOperations by disk	Explanation	043110
TransferredThroughput by disk	Explanation	043120
WaitTime by disk	Explanation	043130
WriteOperations by disk	Explanation	043140
WriteThroughput by disk	Explanation	043150
by local file system		
AvailableSpace by local file system	Explanation	045010
TotalSpace by local file system	Explanation	045020
UsedSpace by local file system	Explanation	045030
by AIX image		
ActiveMemorySharingEnabled by AIX image	Explanation	050010
ActiveVirtualMemory by AIX image	Explanation	046010
ActiveVirtualProcessors by AIX image	Explanation	042010

RMF XP – Metric Values



The screenshots show the RMF Performance Data Portal interface in Mozilla Firefox. The interface includes a navigation sidebar with 'Explore', 'Overview', 'My View', and 'Home' options. The main content area displays performance data for various system components.

Top-Left Screenshot: Shows the 'Children of: tmcc-123-131,*ALL_LOGICAL_PROCESSOR' view. A table lists logical processors with their respective metrics.

Icon	Resource	Metrics
	tmcc-123-131,cpu0,LOGICAL_PROCESSOR	Metrics
	tmcc-123-131,cpu1,LOGICAL_PROCESSOR	Metrics
	tmcc-123-131,cpu2,LOGICAL_PROCESSOR	Metrics
	tmcc-123-131,cpu3,LOGICAL_PROCESSOR	Metrics

Top-Right Screenshot: Shows the 'tmcc-123-131,cpu0,LOGICAL_PROCESSOR -- TotalCPUTimePercentage [001010] (percent)' view. The time range is 02/01/2011 14:59:00 - 02/01/2011 15:00:00. A bar chart shows a value of 91.8112. An 'Add to My View' button is present.

Bottom-Left Screenshot: Shows the 'Children of: ,tmcc-123-131,AIX_IMAGE' view. A table lists various system resources with their metrics and attributes.

Icon	Resource	Metrics	Attributes
	tmcc-123-131,*ACTIVE_MEMORY_EXPANSION	Metrics	N/A
	tmcc-123-131,*ACTIVE_MEMORY_SHARING	Metrics	N/A
	tmcc-123-131,*ALL_DISKS	Metrics	N/A
	tmcc-123-131,*ALL_LOGICAL_PROCESSORS	Metrics	N/A
	tmcc-123-131,*ALL_NETWORK_PORTS	Metrics	N/A
	tmcc-123-131,*ALL_LOCAL_FILE_SYSTEMS	Metrics	N/A
	tmcc-123-131,*ALL_PROCESSES	Metrics	N/A

Bottom-Right Screenshot: Shows the 'tmcc-123-131,*ALL_LOGICAL_PROCESSORS -- TotalCPUTimePercentage by logical processor [021010] (percent)' view. The time range is 02/01/2011 14:59:00 - 02/01/2011 15:00:00. A table shows CPU usage percentages for each processor, with a bar chart for each.

Logical Processor	TotalCPUTimePercentage (percent)
cpu0	91.8112
cpu1	49.1353
cpu3	2.18854
cpu2	1.35127



RMF XP – Metric Scope



RMF Performance Data Portal

Explore Overview My View Home

tmcc-123-139,*ALL_NETWORK_PORTS -- BytesReceived by network port [024010] (bytes)

Time Range: 02/01/2011 15:42:00 - 02/01/2011 15:43:00

en0	2571	
lo0	1085	
en1	196	
si0	0	

Add to My View

A callout bubble labeled "System Scope" points to the main content area.

RMF Performance Data Portal

Explore Overview My View Home

.WEBPLEX,AIX_SYSTEM_COMPLEX -- BytesReceived by network port [044010] (bytes)

Time Range: 02/01/2011 15:42:00 - 02/01/2011 15:43:00

tmcc-123-139.en0	2571	
tmcc-123-139.lo0	1085	
tmcc-123-140.en1	948	
tmcc-123-141.en0	840	
tmcc-123-131.en1	812	
tmcc-123-140.en0	658	
tmcc-123-131.lo0	572	
tmcc-123-141.lo0	426	
tmcc-123-139.en1	196	
tmcc-123-133.lo0	142	
tmcc-123-140.lo0	68	
tmcc-123-133.en1	60	
tmcc-123-141.en1	60	
tmcc-123-139.si0	0	
tmcc-123-141.si0	0	
tmcc-123-131.en0	0	
tmcc-123-131.si0	0	
tmcc-123-133.si0	0	
tmcc-123-140.si0	0	
tmcc-123-133.en0	0	

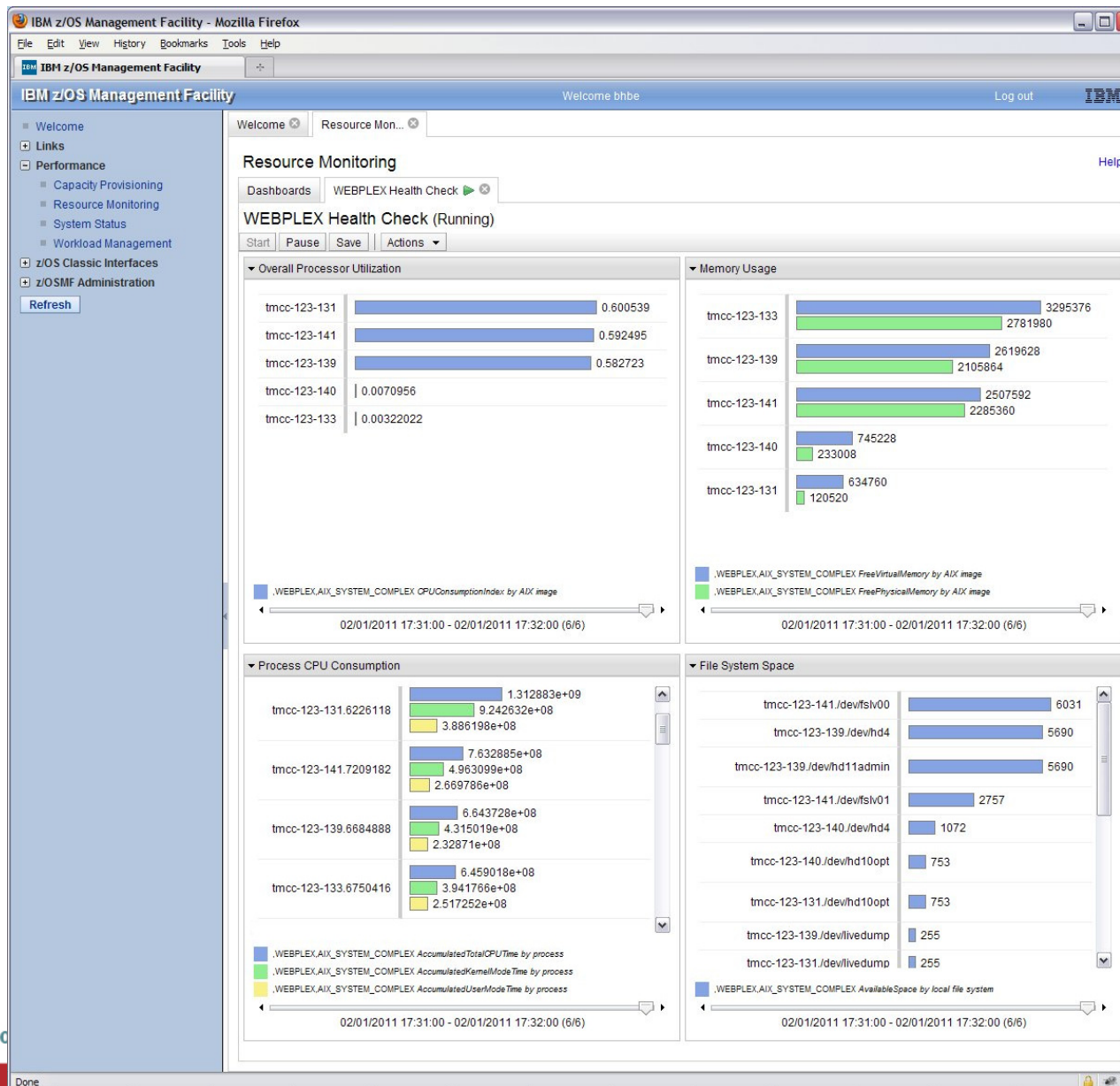
Add to My View

FAQ RMF

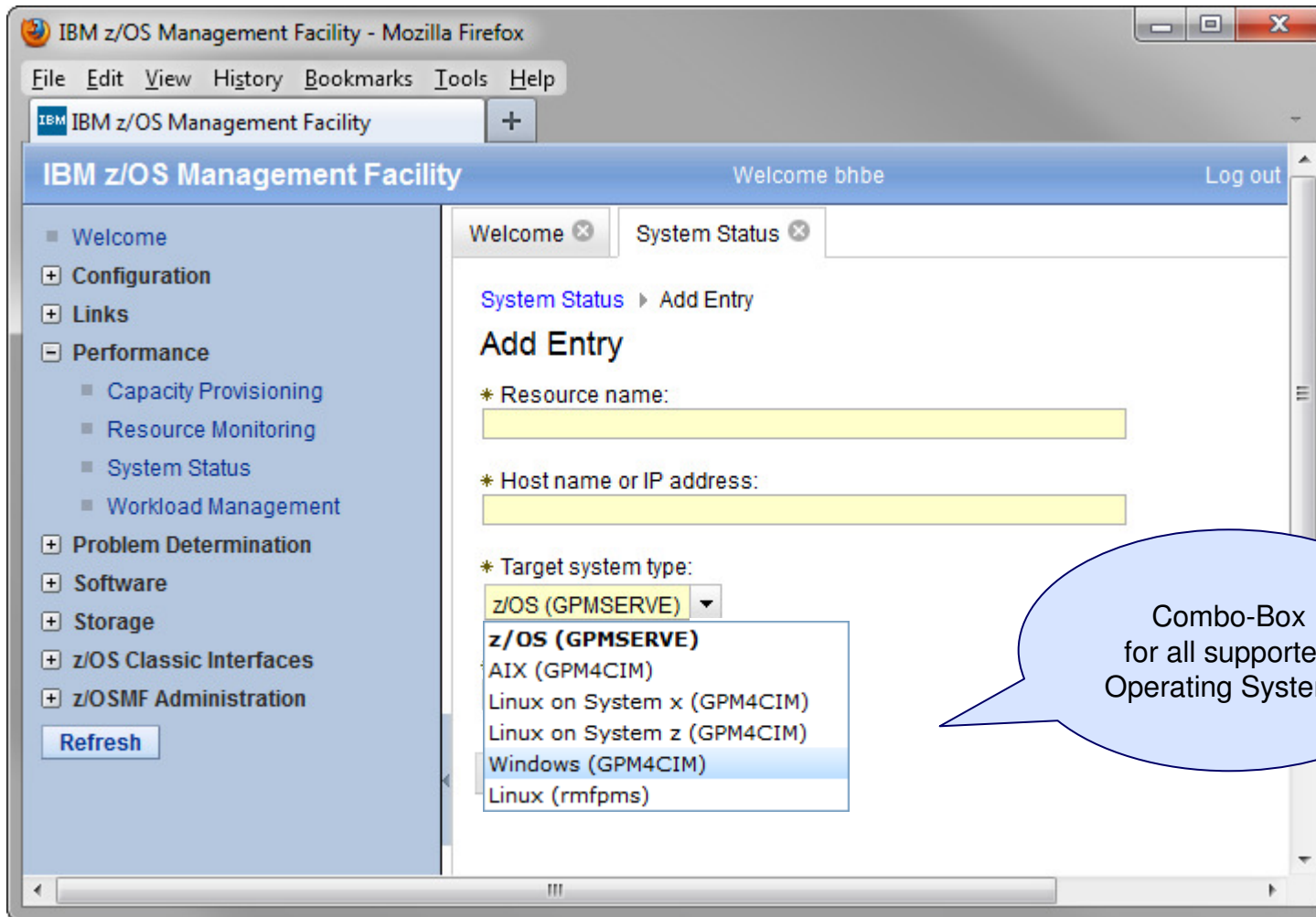
Done

A callout bubble labeled "System Complex Scope" points to the main content area.

RMF XP – z/OSMF Integration



RMF XP – z/OSMF System Status Task



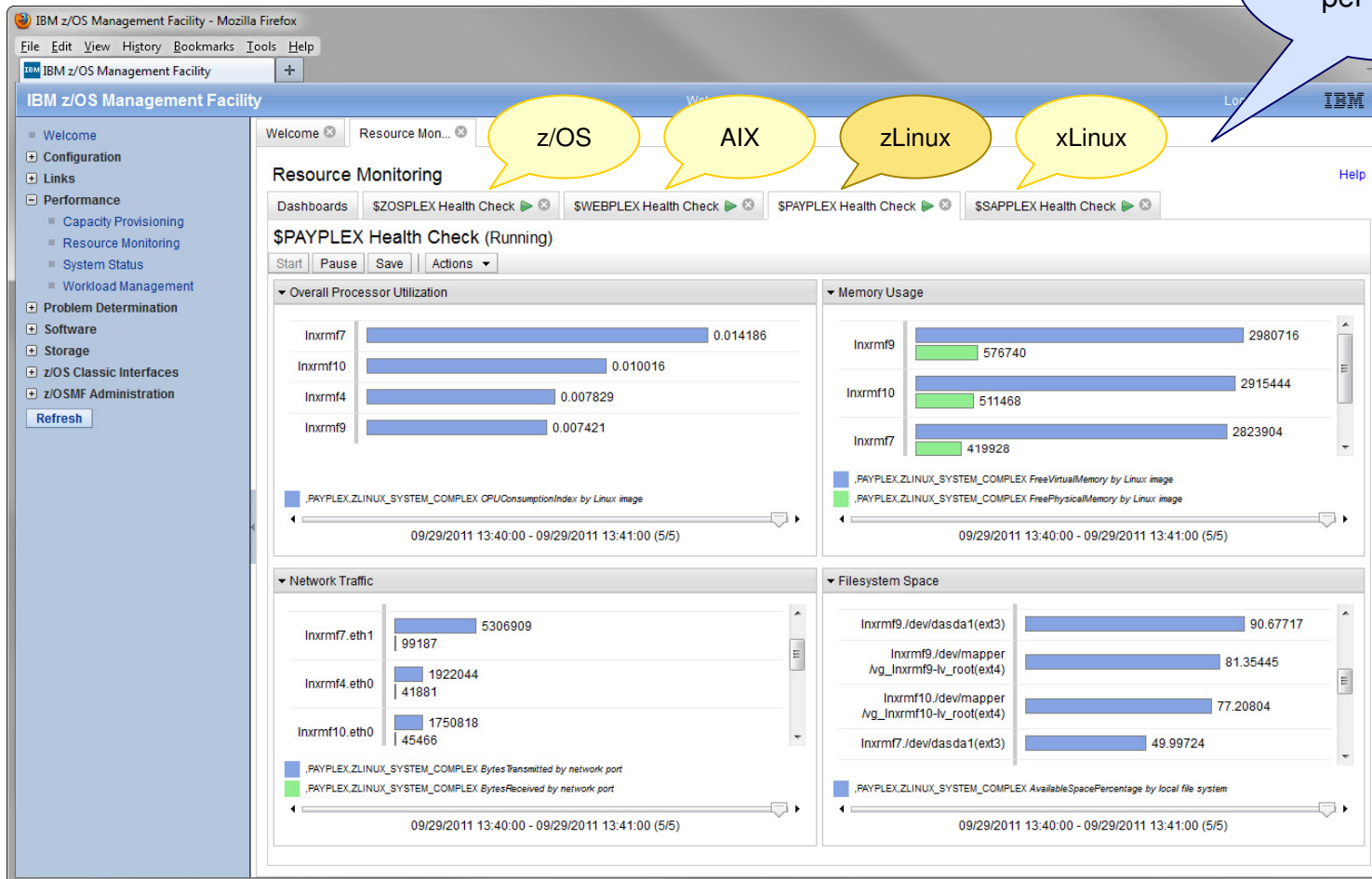
RMF XP – Resource Monitoring Task



RMF XP & z/OSMF – Single Point of Control



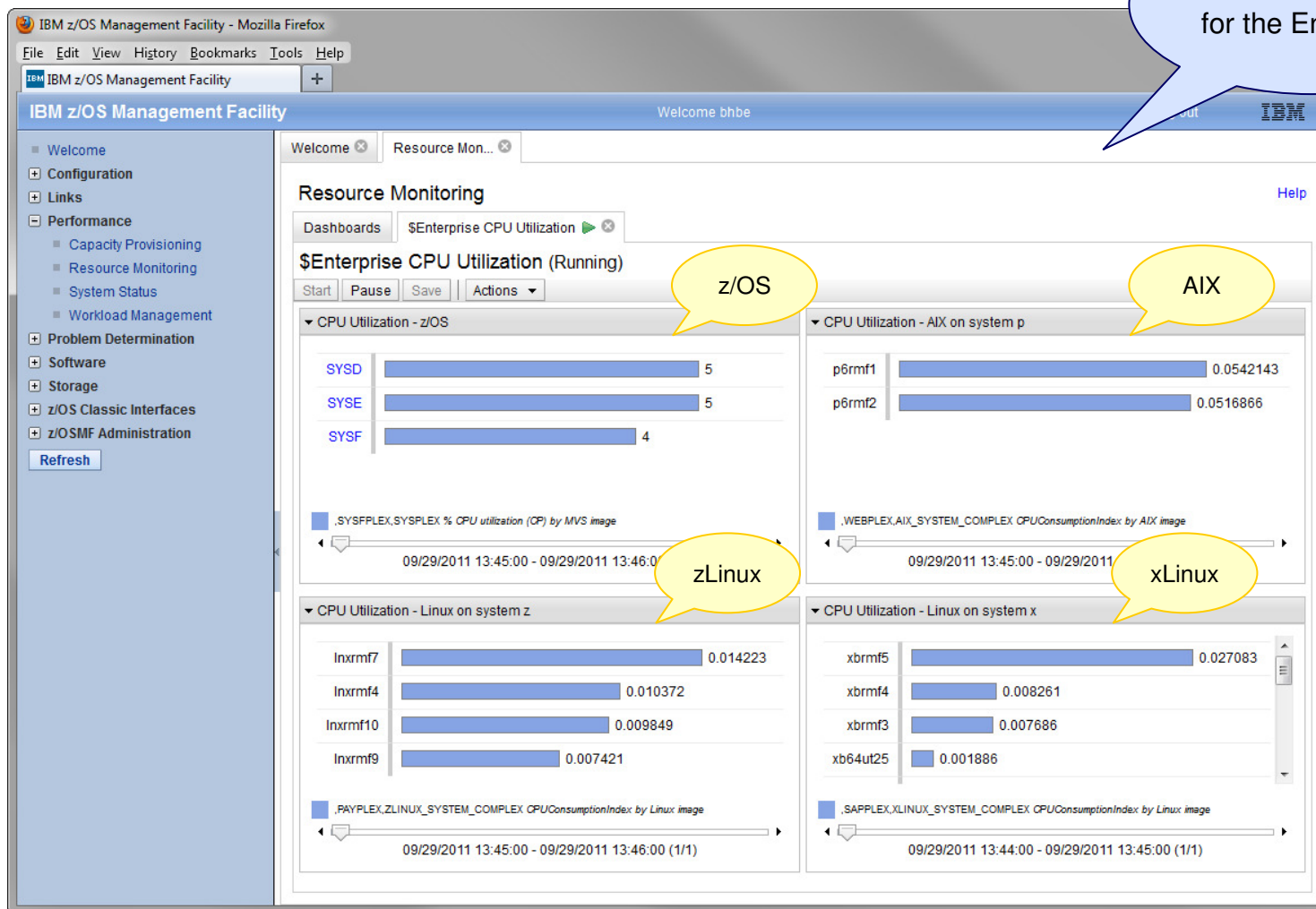
One Dashboard per Platform



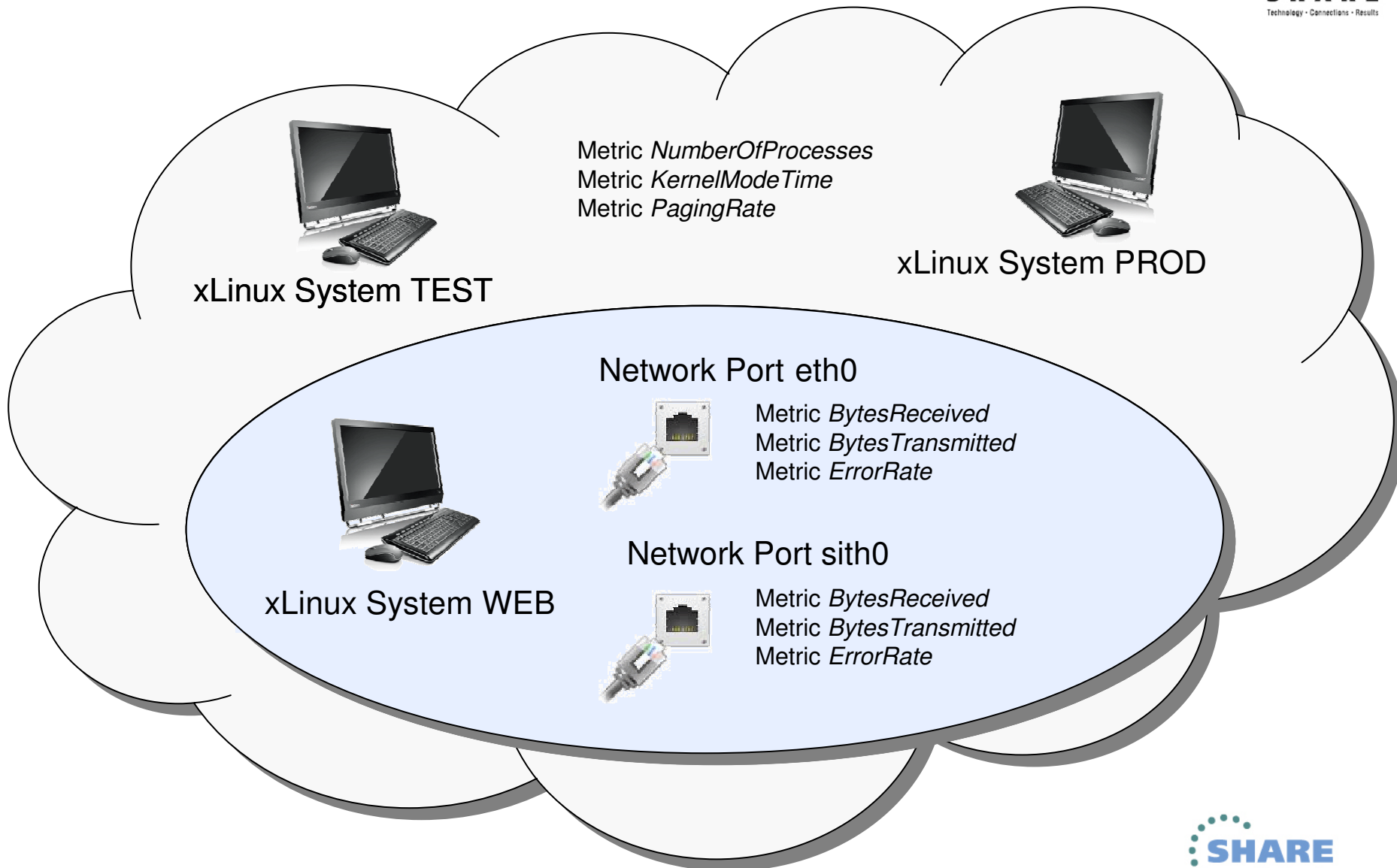
RMF XP & z/OSMF – Single Point of Control...



One Dashboard for the Enterprise



RMF XP – The Metric Promotion Concept

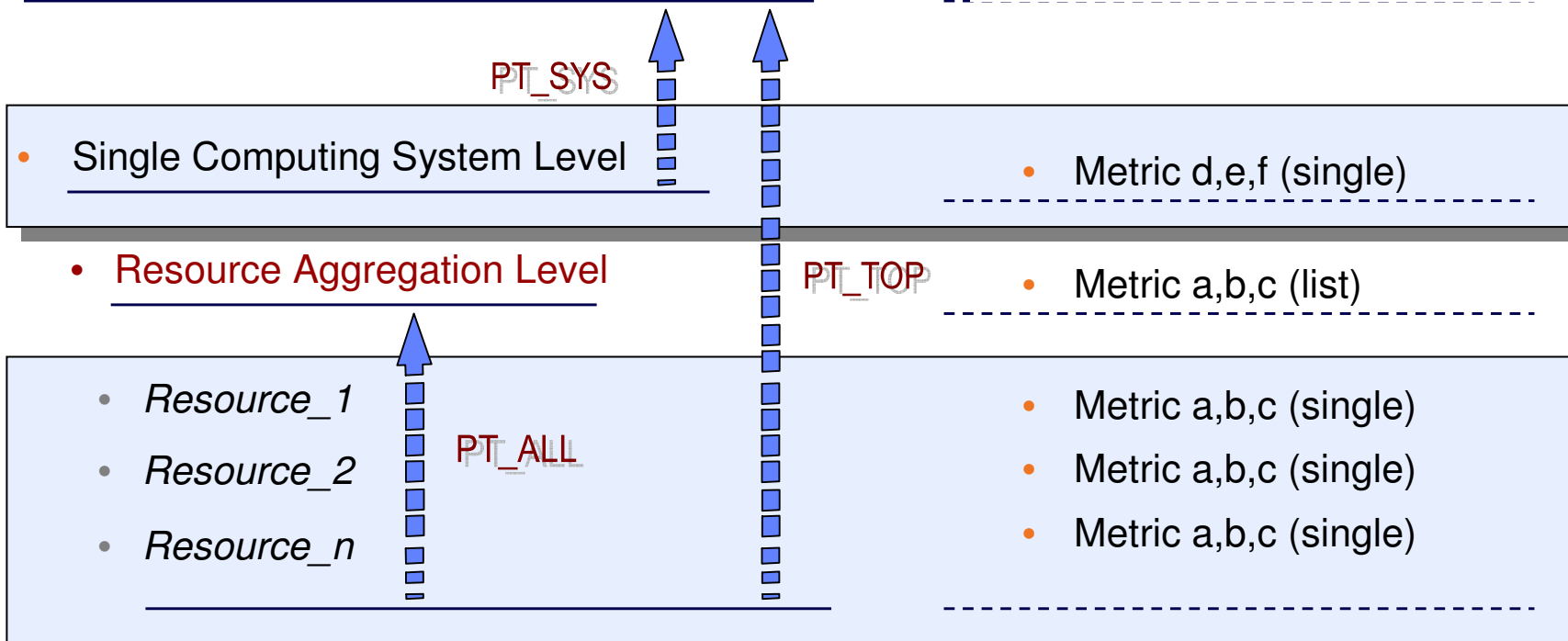


RMF XP – The Metric Promotion Concept...



• Computing System Complex Level

- Metric a,b,c,d,e,f (list)



- ⇒ PT_SYS: Promotion Type System
- ⇒ PT_ALL: Promotion Type All
- ⇒ PT_TOP: Promotion Type Top



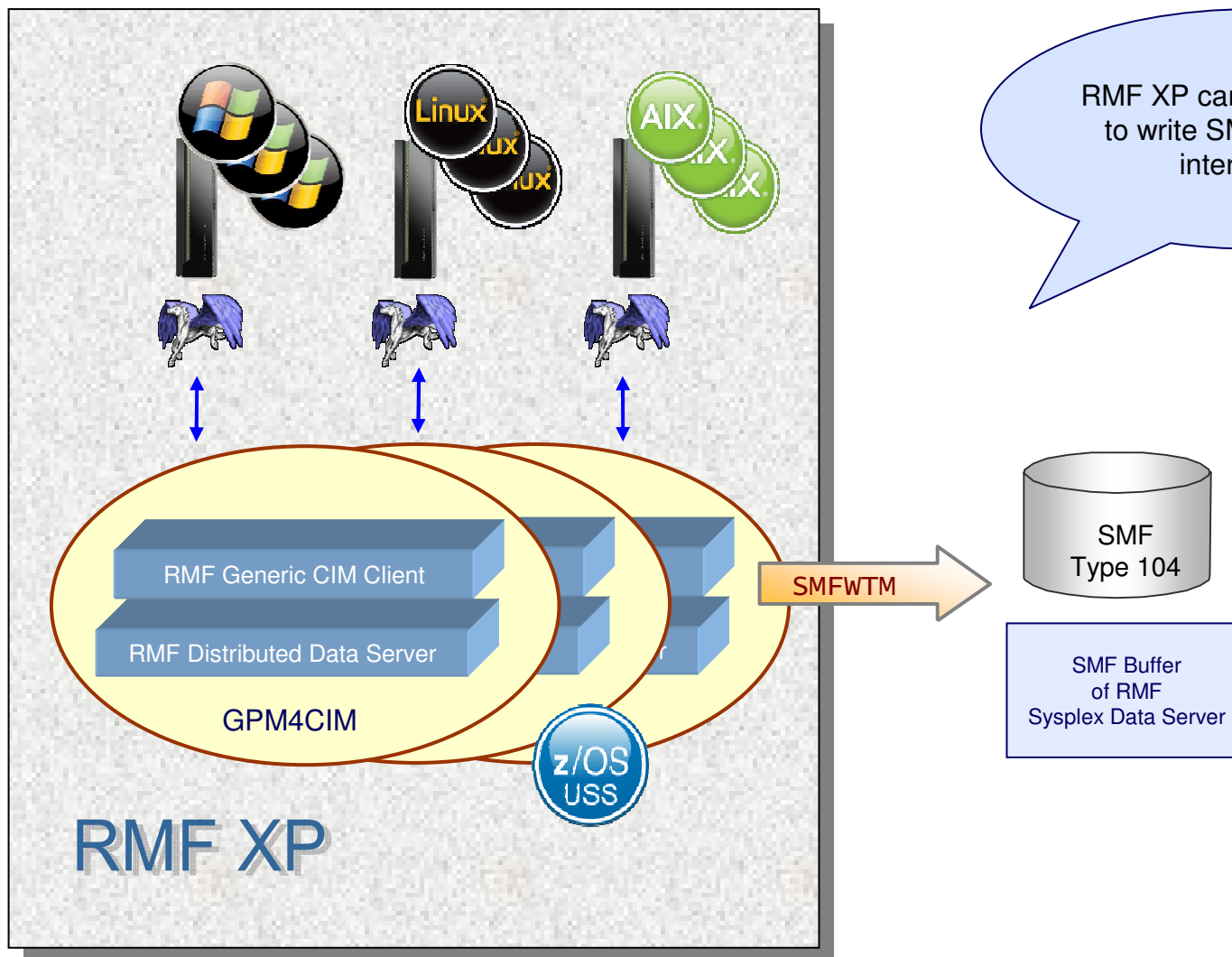
RMF XP SMF Recording Facility



Rationale

- Data source for after the facts analysis and accounting
- SMF records are the reliable standard on z/OS for decades
- One consistent repository for z/OS and distributed platforms
- Manage z/OS AND distributed platforms from z/OS
- Well-proven SMF postprocessing tools are already in place
- RMF infrastructure can be reused in terms of the RMF Sysplex Dataserver

RMF XP SMF Recording Facility...



RMF XP can be configured to write SMF records at interval end

RMF XP SMF Recording Facility..

One Subtype per Metric Category



- ✂ AIX_SYSTEM_COMPLEX
 - 📁 AIX_IMAGE
 - 📄 ACTIVE_MEMORY_EXPANSION
 - 📄 ACTIVE_MEMORY_SHARING
 - 📄 ALL_DISKS
 - 📄 DISK
 - 📄 ALL_LOGICAL_PROCESSORS
 - 📄 LOGICAL_PROCESSOR
 - 📄 ALL_NETWORK_PORTS
 - 📄 NETWORK_PORT
 - 📄 ALL_LOCAL_FILE_SYSTEMS
 - 📄 LOCAL_FILE_SYSTEM
 - 📄 ALL_PROCESSES
 - 📄 PROCESS
 - 📄 ALL_SHARED_ETHERNET_ADAPTERS
 - 📄 SHARED_ETHERNET_ADAPTER
 - 📄 ALL_VIRTUAL_TARGET_DEVICES
 - 📄 VIRTUAL_TARGET_DEVICE
 - 📄 PARTITION
 - 📄 MEMORY

Subtypes 1-12

- ✂ XLINUX_SYSTEM_COMPLEX
 - 📁 XLINUX_IMAGE
 - 📄 ALL_DISKS
 - 📄 DISK
 - 📄 ALL_LOCAL_FILE_SYSTEMS
 - 📄 LOCAL_FILE_SYSTEM
 - 📄 ALL_IP_PROTOCOL_ENDPOINTS
 - 📄 IP_PROTOCOL_ENDPOINT
 - 📄 ALL_LOGICAL_PROCESSORS
 - 📄 LOGICAL_PROCESSOR
 - 📄 ALL_NETWORK_PORTS
 - 📄 NETWORK_PORT
 - 📄 ALL_PROCESSES
 - 📄 PROCESS
 - 📄 ALL_KVM_GUESTS
 - 📄 KVM_GUEST
 - 📄 ALL_XEN_GUESTS
 - 📄 XEN_GUEST

Subtypes 20-31

- ✂ ZLINUX_SYSTEM_COMPLEX
 - 📄 CEC
 - 📄 LPAR
 - 📁 ZLINUX_IMAGE
 - 📄 ALL_DISKS
 - 📄 DISK
 - 📄 ALL_LOCAL_FILE_SYSTEMS
 - 📄 LOCAL_FILE_SYSTEM
 - 📄 ALL_IP_PROTOCOL_ENDPOINTS
 - 📄 IP_PROTOCOL_ENDPOINT
 - 📄 ALL_LOGICAL_PROCESSORS
 - 📄 LOGICAL_PROCESSOR
 - 📄 ALL_NETWORK_PORTS
 - 📄 NETWORK_PORT
 - 📄 ALL_PROCESSES
 - 📄 PROCESS
 - 📄 ALL_CHANNELS
 - 📄 CHANNEL
 - 📄 ALL_VOLUMES
 - 📄 VOLUME

Subtypes 40-53



RMF XP SMF Recording Facility...

One Subtype
per Metric Category

- ✂ WINDOWS_SYSTEM_COMPLEX
 - 📁 WINDOWS_IMAGE
 - 🖨 LOGICAL_PROCESSOR
 - 📁 ALL_LOCAL_FILE_SYSTEMS
 - 📁 LOCAL_FILE_SYSTEM
 - 📁 ALL_DISKS
 - 📁 DISK
 - 📁 ALL_NETWORK_PORTS
 - 📁 NETWORK_PORT

Subtypes 60-64

RMF XP SMF Recording Facility...

One Subtype
per Metric Category



AIX on System p	ST	Linux on System x	ST	Linux on System z	ST
AIX_ActiveMemoryExpansion	1	Linux_IPProtocolEndpoint	20	Linux_IPProtocolEndpoint	40
AIX_Processor	2	Linux_LocalFileSystem	21	Linux_LocalFileSystem	41
AIX_ComputerSystem	3	Linux_NetworkPort	22	Linux_NetworkPort	42
AIX_Disk	4	Linux_OperatingSystem	23	Linux_OperatingSystem	43
AIX_NetworkPort	5	Linux_Processor	24	Linux_Processor	44
AIX_FileSystem	6	Linux_UnixProcess	25	Linux_UnixProcess	45
AIX_Memory	7	Linux_Storage	26	Linux_Storage	46
AIX_OperatingSystem	8	Linux_KVM	30	Linux_zCEC	50
AIX_Process	9	Linux_Xen	31	Linux_zLPAR	51
AIX_SharedEthernetAdapter	10			Linux_zChannel	52
AIX_ActiveMemorySharing	11			Linux_zECKD	53
AIX_VirtualTargetDevice	12				

RMF XP SMF Recording Facility...

Windows on System x	ST
Windows_LocalFileSystem	60
Windows_NetworkPort	61
Windows_OperatingSystem	62
Windows_Processor	63
Windows_Storage	64

One Subtype
per Metric Category

RMF XP SMF Recording Facility...



SMF Header with common Layout

Offsets	Name	Length	Format	Description												
Common header for SMF record type 104																
0	0 SMF104LEN	2	binary	Record length. This field and the next field (total of four bytes) form the RDW (record descriptor word).												
2	2 SMF104SEG	2	binary	Segment descriptor (see record length field).												
4	4 SMF104FLG	1	binary	System indicator: <table border="0"> <tr> <td>Bit</td> <td>Meaning When Set</td> </tr> <tr> <td>0</td> <td>New record format</td> </tr> <tr> <td>1</td> <td>Subtypes used</td> </tr> <tr> <td>2</td> <td>Reserved</td> </tr> <tr> <td>3-6</td> <td>Version indicators*</td> </tr> <tr> <td>7</td> <td>System is running in PR/SM mode</td> </tr> </table>	Bit	Meaning When Set	0	New record format	1	Subtypes used	2	Reserved	3-6	Version indicators*	7	System is running in PR/SM mode
Bit	Meaning When Set															
0	New record format															
1	Subtypes used															
2	Reserved															
3-6	Version indicators*															
7	System is running in PR/SM mode															
5	5 SMF104RTY	1	binary	Record type 104 (X'68').												
6	6 SMF104TME	4	binary	Time since midnight, in hundredths of a second, that the record was moved into the SMF buffer.												
10	A SMF104DTE	4	packed	Date when the record was moved into the SMF buffer, in the form <i>0cyyddaf</i> .												
14	E SMF104SID	4	EBCDIC	System identification (from the SMFPRMxx SID parameter).												
18	12 SMF104SSI	4	EBCDIC	Subsystem identification (GPM).												
22	16 SMF104STY	2	binary	Record subtype.												
24	18 SMF104TRN	2	binary	Number of triplets in this record. A triplet is a set of three SMF fields (offset/length/number values) that defines a section of the record. The offset is the offset from the RDW.												
26	1A	2		Reserved.												
28	1C SMF104PRS	4	binary	Offset to RMF XP product section from the RDW.												
32	20 SMF104PRL	2	binary	Length of RMF XP product section.												
34	22 SMF104PRN	2	binary	Number of RMF XP product sections.												
Header extension for all subtypes																
36	24 SMF104ICS	4	binary	Offset to image control section from the RDW.												
40	28 SMF104ICL	2	binary	Length of image control section.												
42	2A SMF104ICN	2	binary	Number of image control sections.												
44	2C SMF104MES	4	binary	Offset to metric section from the RDW.												
48	30 SMF104MEL	2	binary	Length of metric section.												
50	32 SMF104MEN	2	binary	Total number of metric sections.												



RMF XP SMF Recording Facility...



RMF Product Section with common Layout

Offsets	Name	Length	Format	Description
0	0 SMF104MFV	2	packed	RMF version number.
2	2 SMF104PRD	8	EBCDIC	Product name (<i>RMF XP</i>).
10	A SMF104IST	4	packed	Time that the RMF XP measurement interval started, in the form <i>0hhmmssF</i> , where <i>hh</i> is the hours, <i>mm</i> is the minutes, <i>ss</i> is the seconds, and <i>F</i> is the sign.
14	E SMF104DAT	4	packed	Date when the RMF measurement interval started, in the form <i>0cyyddF</i> .
18	12 SMF104INT	4	packed	Duration of RMF measurement interval, in the form <i>mmsstttF</i> , where <i>mm</i> is the minutes, <i>ss</i> is the seconds, <i>ttt</i> is the milliseconds, and <i>F</i> is the sign. The end of the measurement interval is the sum of the recorded start time and this field.
22	16 SMF104LGO	8	binary	Offset GMT to local time (STCK format).
30	1E	2		Reserved.
32	20 SMF104XPL	2	binary	RMF XP functionality level.
34	12 SMF104CPX	24	EBCDIC	System complex name, specified with the COMPLEX parameter in the <i>cfg4AIX/Z</i> configuration file.
58	3A SMF104OSL	8	EBCDIC	Operating system label served by RMF XP (AIX or LINUX).
66	42 SMF104PLT	2	binary	Platform type served by RMF XP: 0 System p 1 System x 2 System z
68	44 SMF104MVS	8	EBCDIC	z/OS software level for the current system (consists of an acronym and the version, release, and modification level - <i>ZVvrrmm</i>).
76	4C SMF104XNM	8	EBCDIC	Sysplex name of the current sysplex as defined in parmlib member COUPLExx.
84	54 SMF104SNM	8	EBCDIC	System name for the current system as defined in parmlib member IEASYsxx SYSNAME parameter.

RMF XP SMF Recording Facility...



Offsets	Name	Length	Format	Description
0	0 SMF104MIM	64	EBCDIC	Name of this monitored image, extracted from the CIM metrics collection.
64	40 SMF104TIM	14	EBCDIC	Timestamp in the format <i>yyyymmddhhmmss</i> , extracted from the CIM metrics collection.
78	4E SMF104DUR	14	EBCDIC	Interval duration in the format <i>yyyymmddhhmmss</i> , extracted from the CIM metrics collection.
92	5C SMF104CIM	64	EBCDIC	Name of the image where the CIM server is running, specified with the IMAGE parameter in the <i>cfg4A/XIZ</i> configuration file.
156	9C SMF104OST	4	EBCDIC	Operating system type where the CIM server is running, extracted from the OSType attribute of the CIM_Operating_System instance: 9 AIX 36 Linux
160	A0 SMF104OSV	64	EBCDIC	Operating system version where the CIM server is running, extracted from the version attribute of the CIM_Operating_System instance.
224	E0 SMF104CTZ	4	EBCDIC	Current time zone, extracted from the CurrentTimeZone attribute of the CIM_Operating_System instance. This value represents the GMT offset in minutes.
228	E4 SMF104MIND	2	binary	Index of first metric section associated with this monitored image.
230	E6 SMF104MNUM	2	binary	Number of metric sections associated with this monitored image.

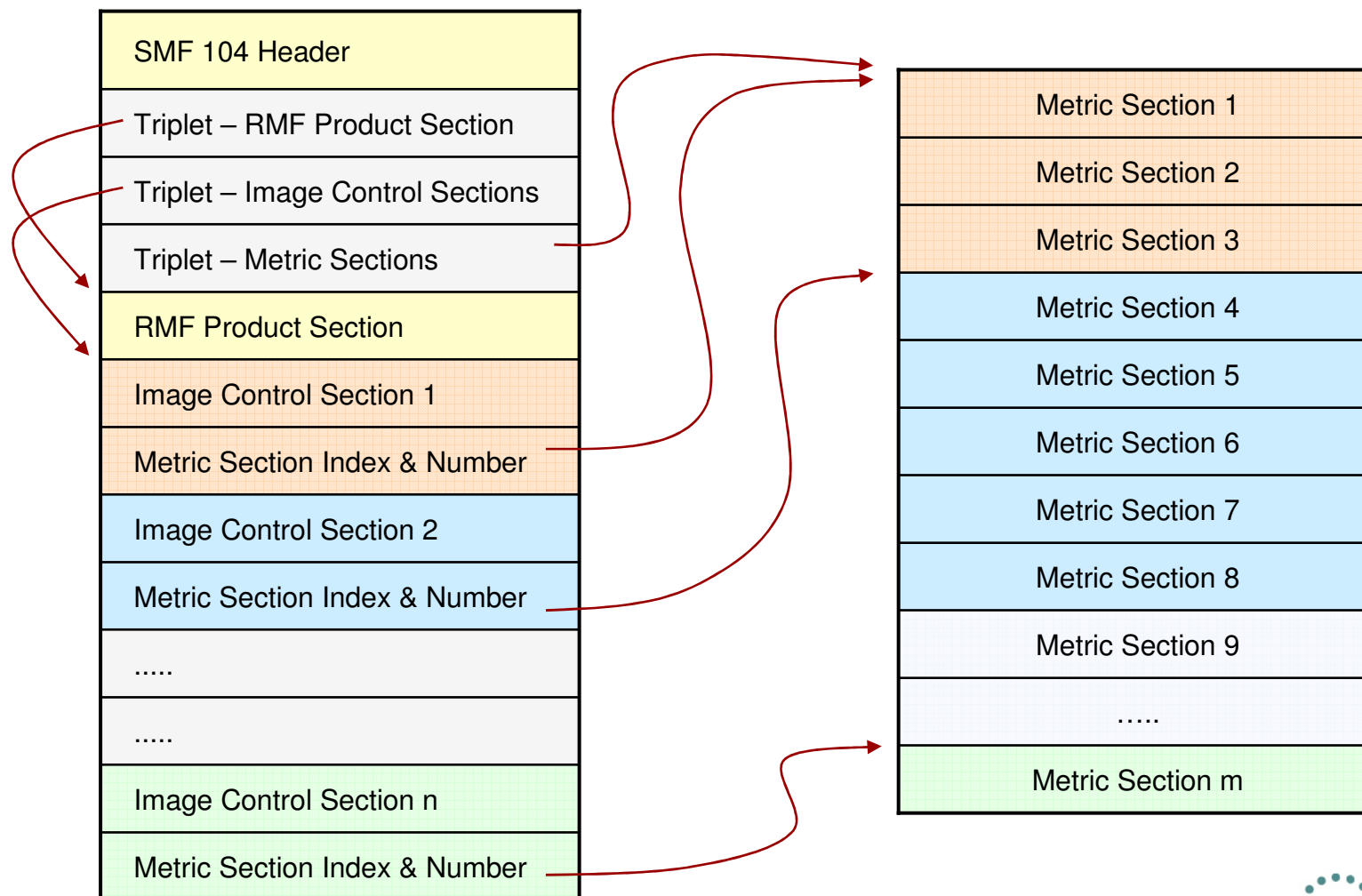
Image Control Section

Offsets	Name	Length	Format	Description
0	0 R10406MNAME	64	EBCDIC	Name of measured element, extracted from the MeasuredElementName attribute of the CIM_BaseMetricValue instance.
64	40 R10406AS	8	floating	Available space for this filesystem in megabytes. (AvailableSpace)
72	48 R10406TS	8	floating	Total space for this filesystem in megabytes. (TotalSpace)
80	50 R10406US	8	floating	Used space for this filesystem in megabytes. (UsedSpace)

Metric Section



RMF XP SMF Recording Facility...



RMF XP SMF Recording Facility...

RMF ERBSCAN Utility maps all Sections of the SMF Type 104 record

-> AIX Image Control Section (2)

=====

```
#1: +0000: 97F69994 86F10000 00000000 00000000 *p6rmf1      *
+0010: 00000000 00000000 00000000 00000000 *           *
+0020: 00000000 00000000 00000000 00000000 *           *
+0030: 00000000 00000000 00000000 00000000 *           *
+0040: F2F0F1F1 F0F9F0F8 F1F6F2F7 F0F3F0F0 *2011090816270300*
+0050: F0F0F0F0 F0F0F0F0 F0F1F0F1 97F69994 *000000000101p6rm*
+0060: 86F14B82 96858293 89958785 954B8485 *f1.boeblingen.de*
+0070: 4B898294 4B839694 00000000 00000000 *.ibm.com     *
+0080: 00000000 00000000 00000000 00000000 *           *
+0090: 00000000 00000000 00000000 F9000000 *           9 *
+00A0: F64BF14B F04BF000 00000000 00000000 *6.1.0.0     *
+00B0: 00000000 00000000 00000000 00000000 *           *
+00C0: 00000000 00000000 00000000 00000000 *           *
+00D0: 00000000 00000000 00000000 00000000 *           *
+00E0: F6F00000 00000002 *60          *
```

```
-> Image name      : p6rmf1
-> Operating system : 6.1.0.0
-> First metric sec. : #1
-> Number of metrics : 2
```

-> AIX_ProcessorMetrics (4)

=====

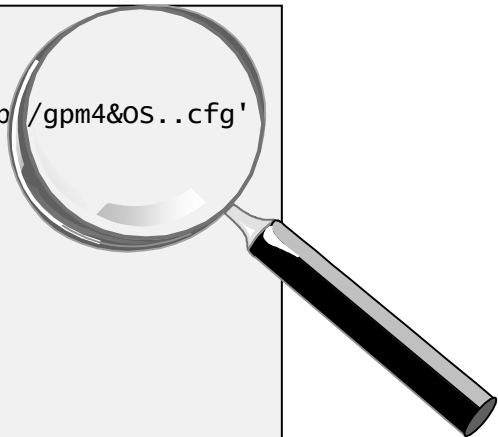
```
#1: +0000: 8397A4F0 00000000 00000000 00000000 *cpu0        *
+0010: 00000000 00000000 00000000 00000000 *           *
+0020: 00000000 00000000 00000000 00000000 *           *
+0030: 00000000 00000000 00000000 00000000 *           *
+0040: 414C5441 355475A3 425F383E 425AEE63 * <è èî tâ^ â!óÄ*
+0050: 412E1298 88F861A6 411E41B3 28B6D86F * qh8/w . !q?*
+0060: 3F28064E A3A70EA2 * +tx s      *
```

```
-> Measured element : cpu0
-> List of values   :
                        '414C5441355475A3'X  4.77057000
                        '425F383E425AEE63'X  95.2196999
                        '412E129888F861A6'X  2.87954000
                        '411E41B328B6D86F'X  1.89104000
                        '3F28064EA3A70EA2'X  0.00977164000
```

RMF XP SMF Recording Facility – Invocation



```
//GPM4CIM  PROC OS=A
//STEP1    EXEC PGM=BPXBATCH,TIME=NOLIMIT,REGION=0M,
//          PARM='PGM /usr/lpp/gpm/bin/gpm4cim cfg=/etc/gp /gpm4&OS..cfg'
//STDENV   DD  PATH='/etc/gpm/gpm4cim.env'
//STDOUT   DD  PATH='/var/gpm/logs/gpm4cim&OS..out',
//          PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//          PATHMODE=(SIRUSR,SIWUSR,SIRGRP)
//STDERR   DD  PATH='/var/gpm/logs/gpm4cim&OS..trc',
//          PATHOPTS=(OWRONLY,OCREAT,OTRUNC),
//          PATHMODE=(SIRUSR,SIWUSR,SIRGRP)
//SYSPRINT DD  SYSOUT=*
//SYSOUT   DD  SYSOUT=*
//          PEND
```



MAXSESSIONS_HTTP(20)	/* MaxNo of concurr
HTTP_PORT(8805)	/* Port number for
HTTP_ALLOW(*)	/* Mask for hosts
HTTP_NOAUTH(*)	/* No server can acc
INTERVAL(300)	/* Length of the monitor
AIX_COMPLEX(WEBPLEX)	/* Name of system comple
AIX_IMAGE(p6rmf1.boeblingen.de.ibm.com:5988)	/* Hostname of member
AIX_IMAGE(p6rmf2.boeblingen.de.ibm.com:5988)	/*
RECORD	/* write SMF Records

New global Option:
RECORD / NORECORD
 Default: NORECORD

- 💡 Change RECORD Option dynamically: F GPM4CIM, RECORD/NORECORD
- ✓ GPM253I SMF RECORDING IS NOW ON/OFF

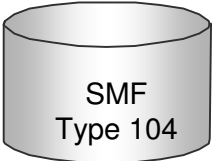


RMF XP SMF Recording Facility – Activation



```
ACTIVE                /* ACTIVE SMF RECORDING*/
DSNAME(SYS1.&SYSNAME..MAN1,
        SYS1.&SYSNAME..MAN2,
        SYS1.&SYSNAME..MAN3)
MAXDORM(3000)         /* WRITE AN IDLE BUFFER AFTER
MEMLIMIT(20000M)      /* MEMLIMIT ABOVE THE BAR BHL
STATUS(010000)       /* WRITE SMF STATS AFTER 1 HOUR
JWT(0900)            /* 522 AFTER 15 HOURS
SID(&SMFID)          /* SYSTEM ID IS SYSBLD
LISTDSN              /* LIST DATA SET STATUS AT IPL
INTVAL(15)
SYNCVAL(00)
SYS(TYPE(30,42,70:79,103,104(1:12,20:31,40:53,60:64),108),
     EXITS(IEFU83,IEFU84,IEFU85,IEFACTRT,IEFUJV,IEFUSI,
           IEFUJP,IEFUSO,IEFUJI,IEFUTL,IEFU29,IEFUAV),
     INTERVAL(SMF,SYNC),NODETAIL)
```

Control SMF Recording on Subtype Level via SMFPRMxx Parmlib Member



```
//RMF    PROC
//IEFPROC EXEC PGM=ERBMFMFC,REGION=32M,TIME=1440,
//      PARM='SMFBUF(RECTYPE(30,70:79,104(1:12,20:31,40:53,60:64)))'
```



Control SMF Buffering on Subtype Level via RMF and SMFBUF Parameter



RMF XP – Summary



- Seamless performance monitoring solution for z/OS and distributed platforms
- Promotion concept allows monitoring beyond the boundaries of a single system
- z/OS as monitoring platform for distributed environments
- Easy to setup, almost no customization needed
- Two graphical frontends
 - Instant access via web browser
 - z/OSMF with advanced capabilities
- zIIP exploitation helps to reduce costs
- Available with z/OS V1R13 RMF and z/OS V1R12 RMF (APAR OA36030)
- Windows Support and SMF Recording Facility added with z/OS V2R1 RMF

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

