



RMF Development Edition

# z/OS Resource Measurement Facility

## RMF Technical Overview



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# Agenda

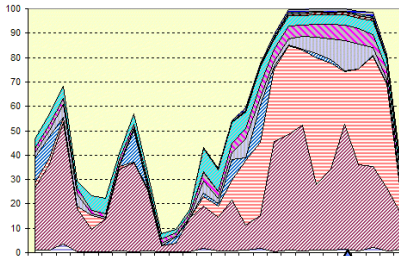


- Product Structure
- Address Spaces
- Controlling the Data Gatherers
- Historical Reporting
  - ▶ Postprocessor
  - ▶ Spreadsheet Reporter
  - ▶ XML Toolkit
- Realtime Reporting
  - ▶ Monitor III
  - ▶ Monitor II
  - ▶ WTO Alerts
  - ▶ Data Portal
  - ▶ z/OSMF RM / RMF Performance Monitoring
- RMF Performance Data APIs

# RMF Product Overview



RMF Spreadsheet Reporter



RMF Spreadsheet Reporter/  
RMF Performance Data Portal/  
RMF XML Toolkit

Display Controls for RMF Postprocessor Report

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

RMF Version : zOS V2R1 RMF Date : zOS V2R1

Start : 06/03/2016 17:44:36 End : 06/03/2016 17:50:36 Interval : 10:00:00 minutes

General PCIE Activity

Operation ID	Function PCMD	Function Name	Function Type	Function Status	Owner Name	Owner Address	Owner Agent	Percentage Allocation	PCIE List Operations Rate	PCIE Name Operations Rate	PCIE Bus Operations Rate
0001	037C	Hardware Accelerator	10140480	Allocated	PF00000001	000	0	0.120	0	0	0
0002	037C	Hardware Accelerator	10140480	Allocated	PF00000002	800	0	0.120	0	0	0
0003	038C	Hardware Accelerator	10140480	Allocated	PF00000002	800	0	0.120	0	0	0
0004	038C	Hardware Accelerator	10140480	Allocated	PF00000001	800	0	0.121	0	0	0

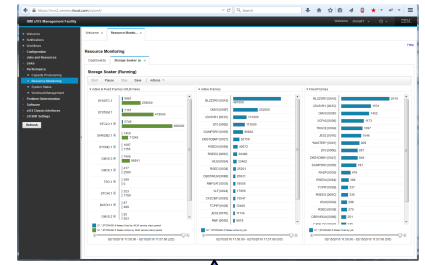
Hardware Accelerator Activity

RMF Performance Data Portal

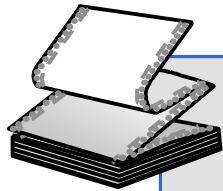
RMF Data Portal for z/OS

z/OSMILE	z/OSMILE	z/OSMILE	z/OSMILE
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	0.00	0.00	0.00

z/OSMF Resource Monitoring



Postprocessor Reports in Text or XML Format



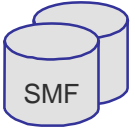
**RMF Distributed Data Server (GPM SERVE) & RMF XP (GPM4CIM)**

**RMF Postprocessor**  
Historical Reporting, Analysis and Planning

**RMF Monitor II and III**  
Real-Time Reporting, Problem Determination

**RMF Sysplex Data Server and APIs**

**CIM Client APIs**



**RMF Data Gatherer**

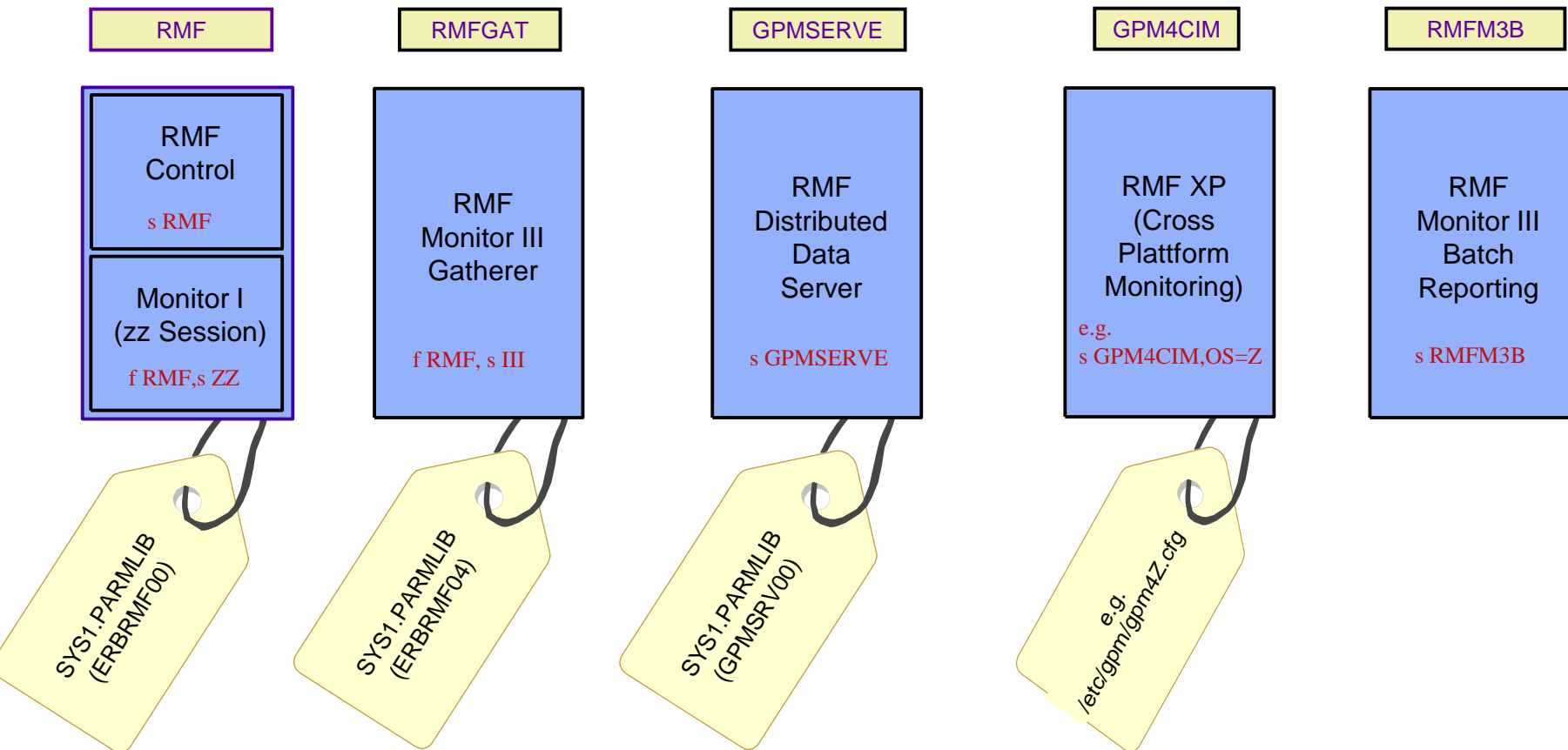
RMF Monitor I    RMF Monitor II background    RMF Monitor III

**AIX & Linux CIM Provider**

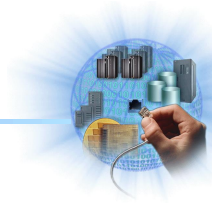
# RMF Address Spaces / Procedures



Procedures located SYS1.PROCLIB:



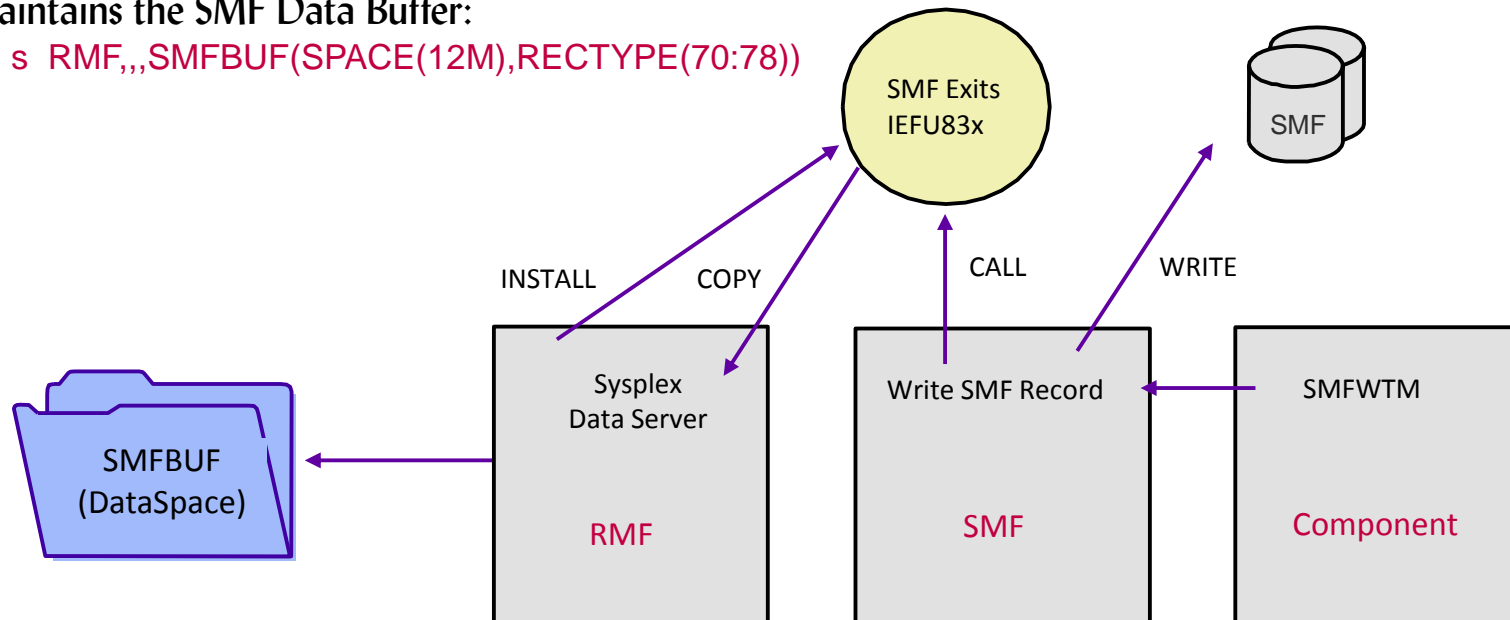
# RMF Control Address Space



- ▶ keeps Configuration Tables and other Control Information
- ▶ provides the Command Interface to set of modify Options:
- ▶ maintains the SMF Data Buffer:

f RMF,f ZZ,MEMBER(99)

s RMF,,,SMFBUF(SPACE(12M),RECTYPE(70:78))



all SMF Record Types can be maintained by the RMF Sysplex Data Server !

# Data Gathering Methods

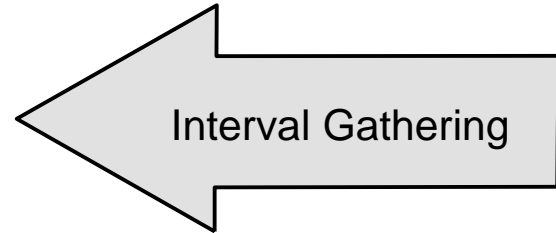


## ■ exact measurement counts

- ▶ pick up consecutive counters
- ▶ calculating the difference at the end of an interval

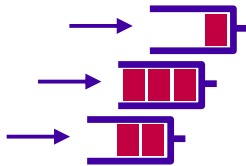


eg. CPU seconds, device connect time...

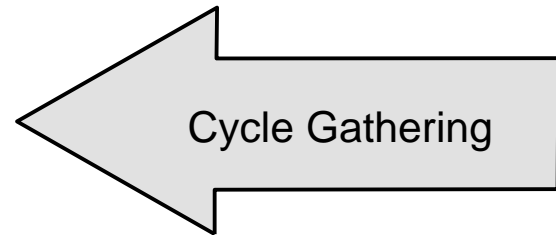


## ■ sampling counts

- ▶ inspect variable counters continuously
- ▶ building the average at the end of an interval



eg. queue counts, frame counts...

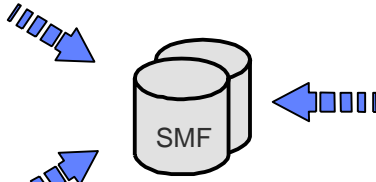


# Monitor I Data Gathering



## Measurements

- |           |          |
|-----------|----------|
| ▶ CACHE   | SMF 74.5 |
| ▶ CHANNEL | SMF 73   |
| ▶ CPU     | SMF 70.1 |
| ▶ CRYPTO  | SMF 70.2 |
| ▶ DEVICE  | SMF 74.1 |
| ▶ ENQ     | SMF 77   |
| ▶ IOQ     | SMF 78.3 |
| ▶ FCD     | SMF 74.7 |
| ▶ ESS     | SMF 74.8 |
| ▶ PAGESP  | SMF 75   |
| ▶ PAGING  | SMF 71   |
| ▶ TRACE   | SMF 76   |
| ▶ VSTOR   | SMF 78.2 |
| ▶ WKLD    | SMF 72.3 |



SMF 72.5	SDELAY
SMF 74.2	XCF
SMF 74.3	OMVS
SMF 74.4	CF
SMF 74.6	HFS
SMF 74.9	PCIE
SMF 74.10	SCM



## 2. Timing

- ▶ CYCLE(1000)
- ▶ NOSTOP
- ▶ SYNC(SMF)

## 3. Reporting / Recording

- ▶ RECORD
- ▶ REPORT(REALTIME)
- ▶ SYSOUT(A)

## 4. User Exits

- ▶ NOEXITS



# Monitor III Data Gathering

## 1. Measurements

- ▶ IOSUB
- ▶ CFDETAIL
- ▶ CACHE
- ▶ VSAMRLS
- ▶ OPD
- ▶ HFSNAME
- ▶ zFS
- ▶ SGSPACE
- ▶ LOCK
- ▶ PCIE
- ▶ SCM

## 2. Timing

- ▶ CYCLE(1000)
- ▶ MINTIME(60)
- ▶ NOSTOP
- ▶ SYNC(00)

## 3. Recording

- ▶ DATASET(ADD(RMF.M3G.&SYSNAME..DS1))
- ▶ DATASET(ADD(RMF.M3G.&SYSNAME..DS2))
- ▶ DATASET(START)
- ▶ DATASET(NOSWITCH)
- ▶ DATASET(WHOLD(7))

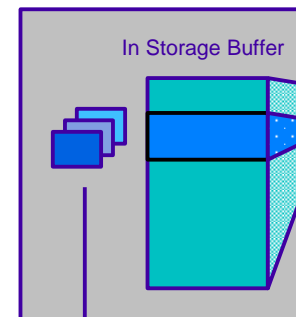
## 4. Other Controls

- ▶ WSTOR(32)
- ▶ ZIIPUSE
- ▶ MASTER

ERBVSDDEF vsam\_ds VSAMVOL(volser)  
DATASET(ADD(vsam\_ds))



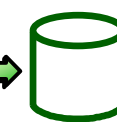
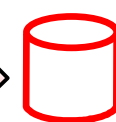
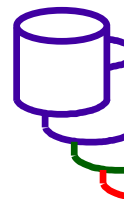
RMFGAT Address Space



WSTOR(32)  
DATASET(WHOLD(7))

DATASET(DEL(vsam\_ds))

ERBV2S vsam\_ds seq\_ds



ERBS2V seq\_ds vsam\_ds



# Monitor III Data Gathering 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

# Monitor III Data Gathering III zIIP Exploitation



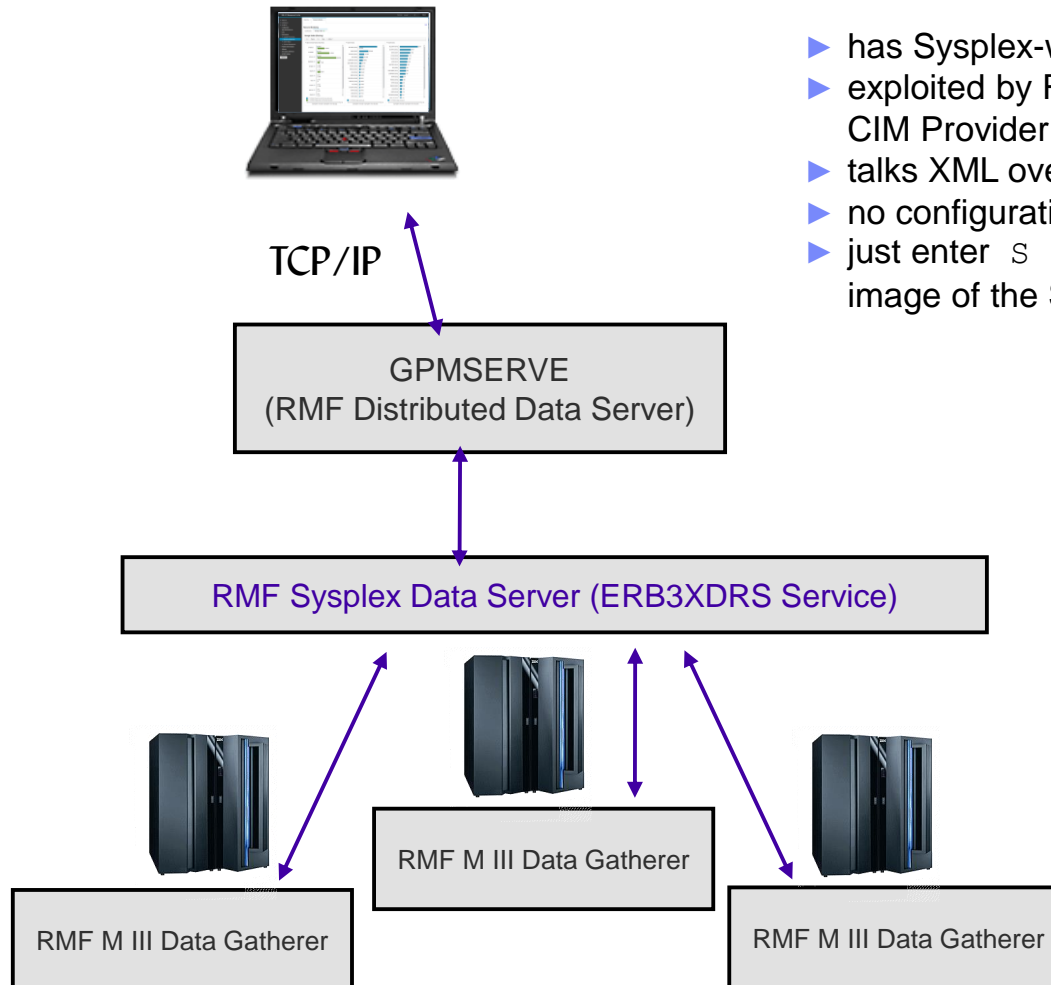
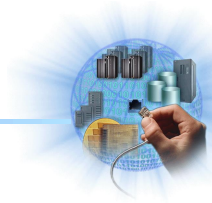
- ▶ When at least one zIIP processor is recognized by the Monitor III gatherer, RMFGAT will schedule an Enclave SRB and offloads the Coupling Facility gathering to the zIIP processor

```

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
Current op
Enclave
*SUMMARY
ENC00001
RMF Enclave Details
Details for enclave ENC00001 with token 00000034 00000006
Press Enter to return to the Report panel.
- CPU Time -- - zAAP Time - - zIIP Time -
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 0.0 0.0
  
```

- ▶ 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 RMFGAT zIIP activity

# RMF Distributed Data Server

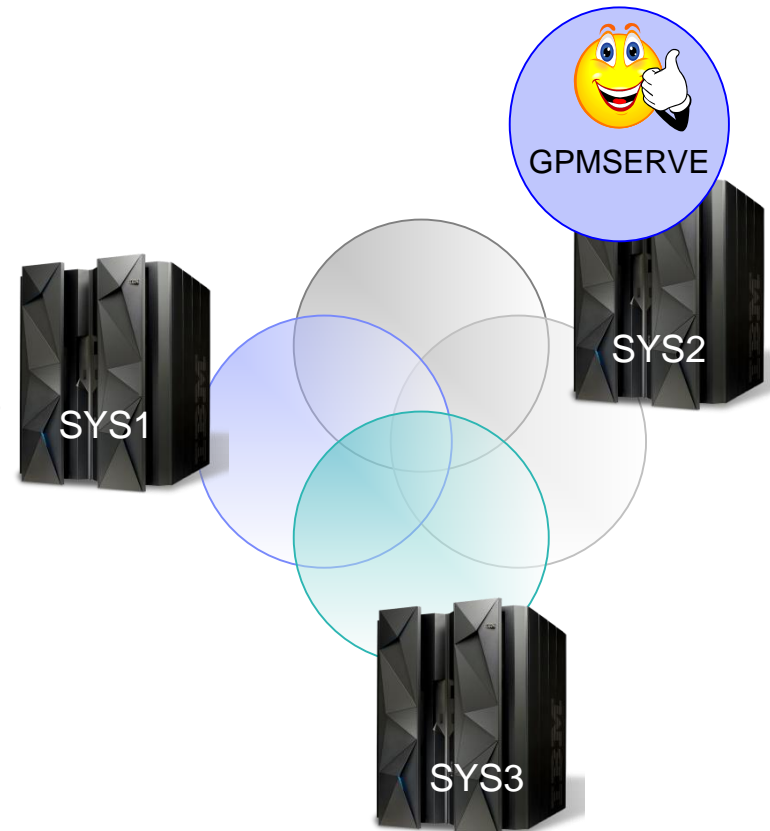


- ▶ has Sysplex-wide scope
- ▶ exploited by RMF PM, Monitor III Data Portal, CIM Provider
- ▶ talks XML over HTTP
- ▶ no configuration needed!
- ▶ just enter `S GPMSEIVE` or `F RMF, DDS` on one image of the Sysplex

# DDS High Availability



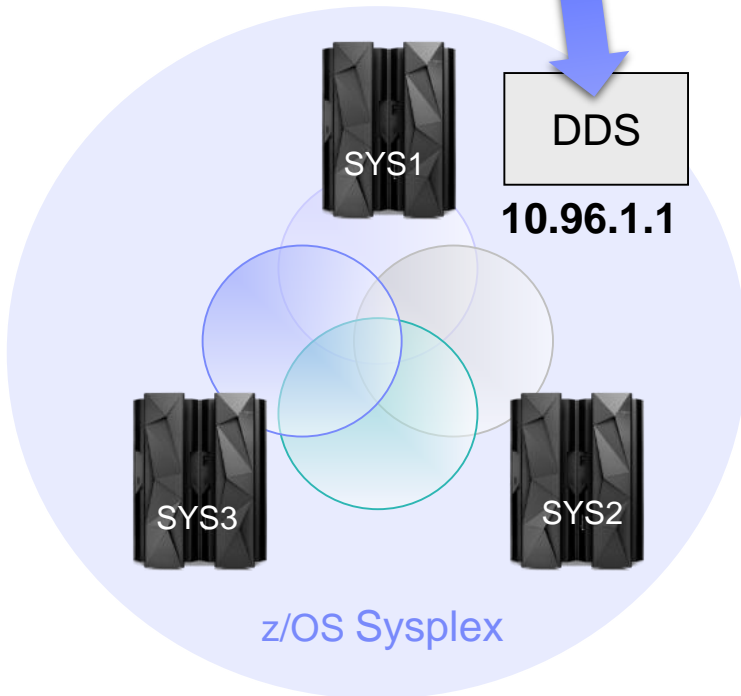
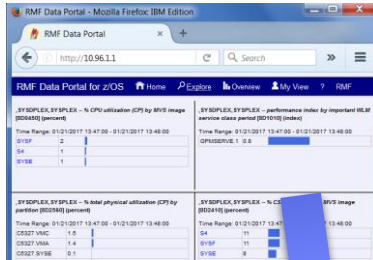
- RMF DDS option allows a sysplex-wide DDS management
- When the RMF initialization is complete and DDS option was specified, DDS is started automatically on the best suited system of the Sysplex
- The system running DDS has to be determined according to following rules:
  - Monitor III Gatherer active
  - Highest RMF Release
  - SMF Buffer active
  - Monitor III MASTER option specified
- Following possibilities to specify DDS option:
  1. Start command:           START RMF,,DDS
  2. Modify command:        MODIFY RMF,DDS
  3. Procedure parm:



```
//RMF      PROC
//IEFPROC  EXEC PGM=ERBMFMFC,REGION=32M,TIME=1440,
//          PARM='DDS'
```

# DDS High Availability

- ✓ Applications can use Dynamic Virtual IP Address (dynamic VIPA) to contact a DDS running on any sysplex system



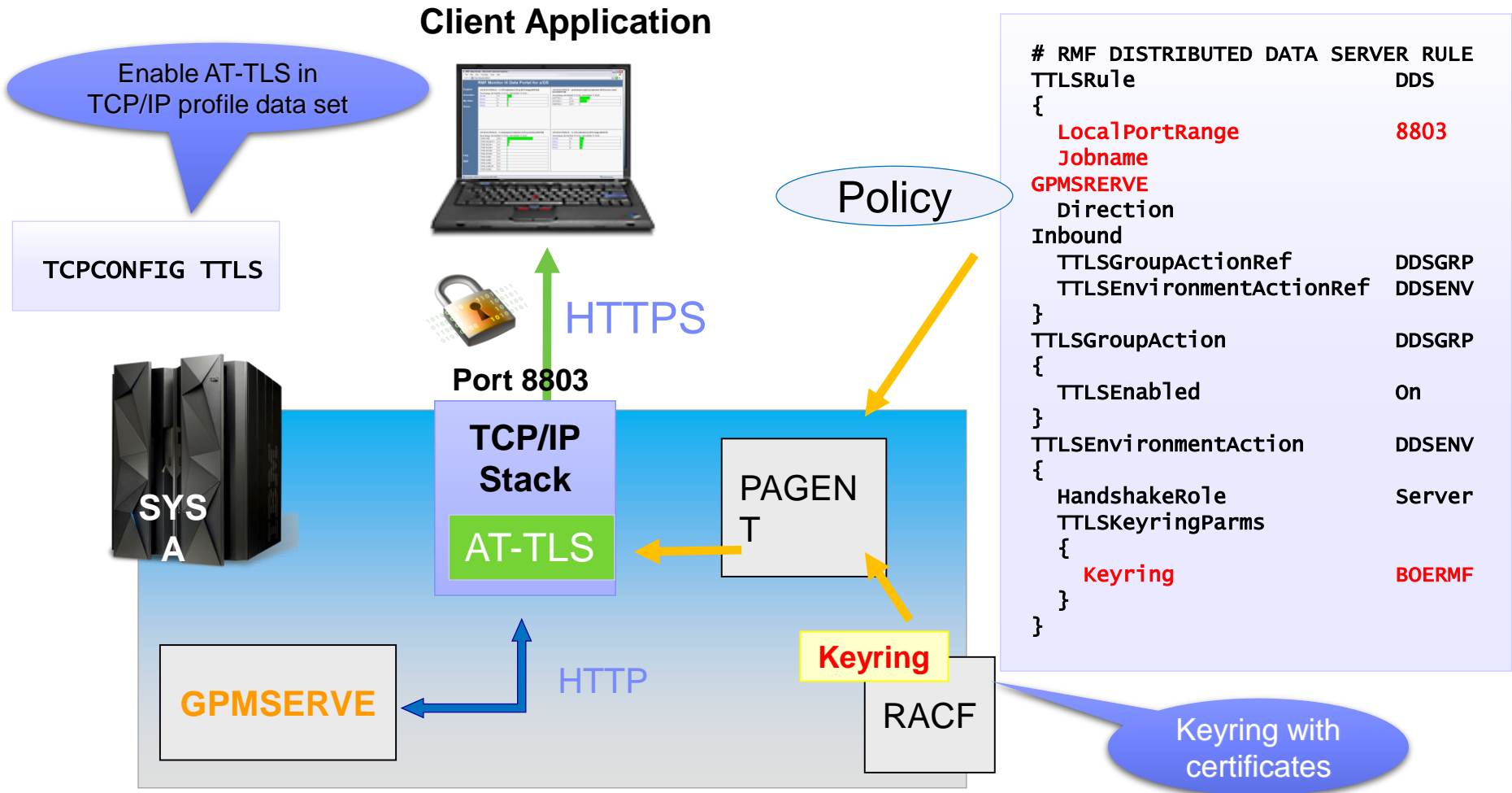
```
//GPMERVE PROC MEMBER=00,VIPA='10.96.1.1'
//TCPDVP EXEC PGM=MODDVIPA,
// PARM='/-p TCPIP -c &VIPA'
//STEP1 EXEC PGM=GPMDDSRV,REGION=128M,TIME=1440,
// PARM='TRAP(ON)/&MEMBER'
//*
//GPMINI DD DISP=SHR,DSN=SYS1.SERBPWSV(GPMINI)
//GPMHTC DD DISP=SHR,DSN=SYS1.SERBPWSV(GPMHTC)
//GPMPPJCL DD DISP=SHR,DSN=SYS1.SERBPWSV(GPMPPJCL)
//CEEDUMP DD DUMMY
//SYSPRINT DD DUMMY
//SYSOUT DD DUMMY
//TCPDVP EXEC PGM=MODDVIPA,
// PARM='/-p TCPIP -d &VIPA'
// PEND
```

Create  
Dynamic VIPA

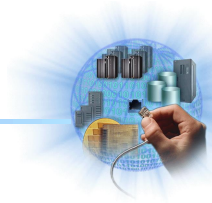
Delete  
Dynamic VIPA

# DDS and HTTPS

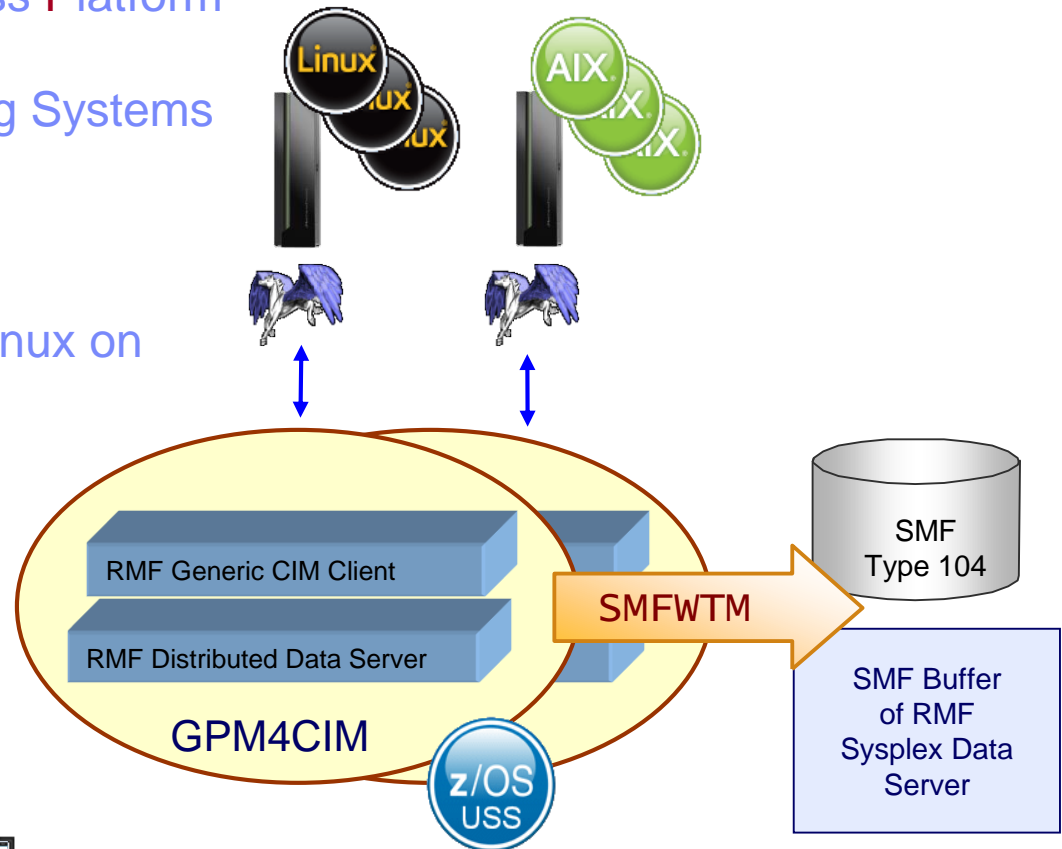
- Use AT-TLS (Application Transparent – Transport Layer Security), part of Communication Server



# RMF XP



- ▶ 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 can be configured to write SMF records



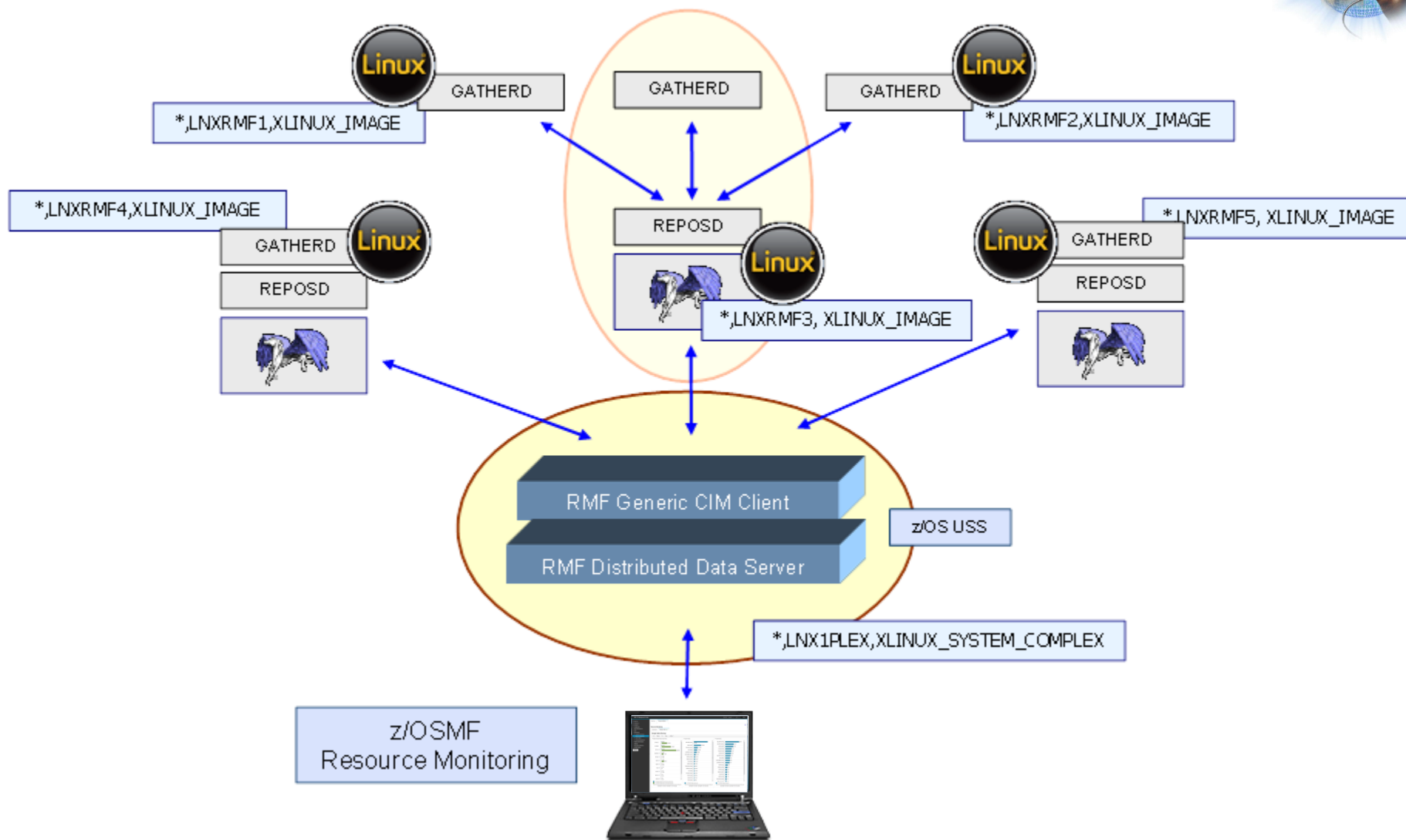
z/OSMF  
Resource  
Monitoring



## RMF XP



# RMF XP – eg. Linux Data Collection



# RMF XP - zIIP Exploitation



```

Session B - [32 x 80]
File Edit View Communication Actions Window Help
RMF VIR12 Processor Usage Line 1 of 8
Command ==> _ Scroll ==> CSR
Samples: 60 System: SYSE Date: 01/14/11 Time: 18.11.00 Range: 60
Jobname CX Class --- Time on CP % --- EAppl % ---
Total AAP IIP CP AAP IIP
RMFGAT SO 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 BO 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 SO 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

In our IBM test environment, we have observed that up to 70% of the CPU consumption was offloaded to zIIP engines

# RMF XP and SMF Records



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

Linux on System z	S T
Linux_IPProtocol Endpoint	40
Linux_LocalFile System	41
Linux_NetworkPort	42
Linux_Operating System	43
Linux_Processor	44
....	

# Historical Reporting

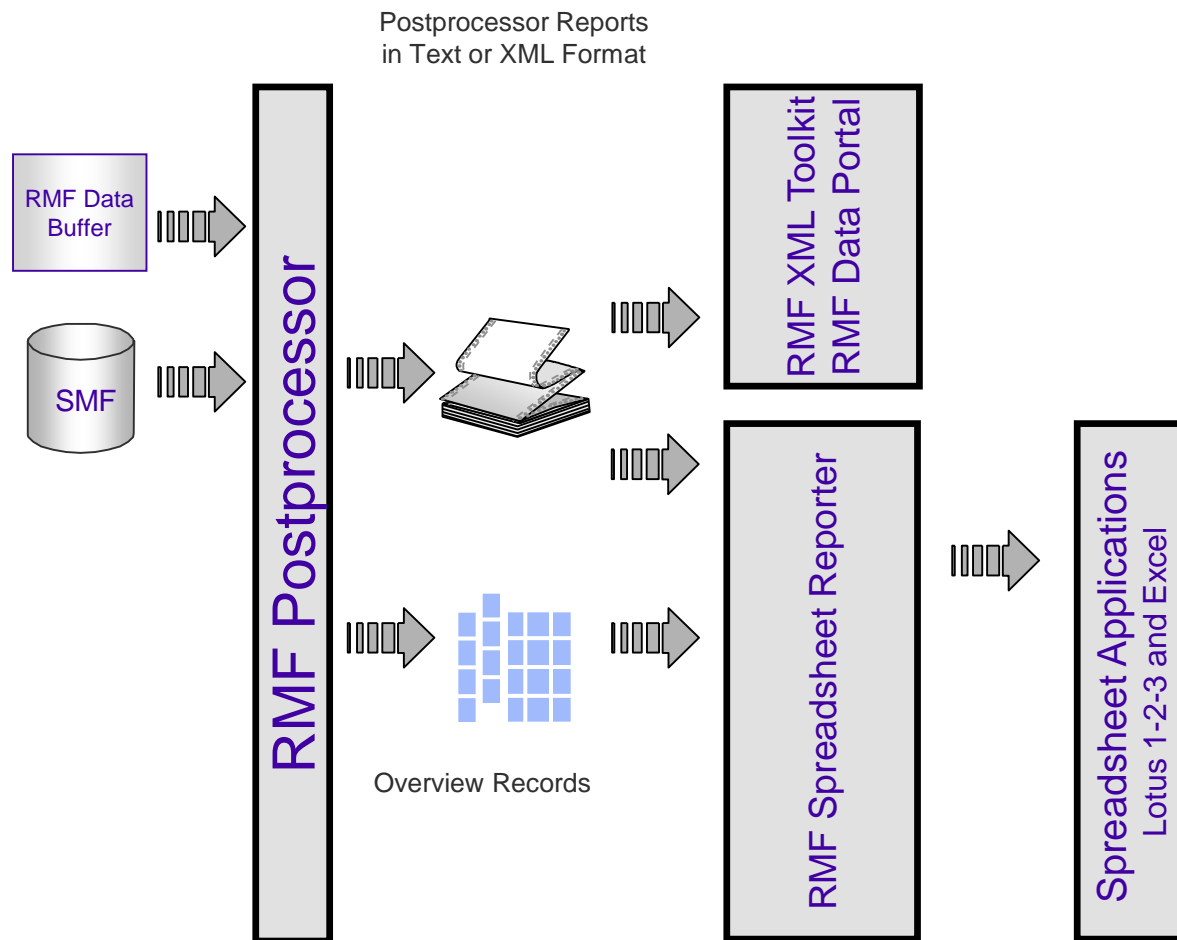


## Activities measured by Monitor I

- ▶ Cache Subsystem
- ▶ Channel Path
- ▶ CPU / Crypto
- ▶ Device
- ▶ Enqueue
- ▶ Ficon Director
- ▶ I/O Queuing
- ▶ Page/Swap Data Set
- ▶ Paging
- ▶ Trace
- ▶ Virtual Storage
- ▶ Workload

## Activities measured by Monitor III

- ▶ XCF
- ▶ OMVS
- ▶ Coupling Facility
- ▶ HFS
- ▶ SCM
- ▶ PCIE
- ▶ SDELAY



# Postprocessor: Preparing SMF Data



```
//SMFDUMP EXEC PGM=IFASMFDP
//IDD1 DD DISP=SHR,DSN=<input_smfdata_system1>
//IDD2 DD DISP=SHR,DSN=<input_smfdata_system2>
//SMFDATA DD DISP=(NEW,PASS),SPACE=(CYL,(10,10),RLSE),
// UNIT=SYSDA,DCB=(RECFM=VBS,LRECL=32760,BLKSIZE=0)
//SYSIN DD *
INDD (IDD1,OPTIONS (DUMP))
INDD (IDD2,OPTIONS (DUMP))
OUTDD (SMFDATA,TYPE (70:78))
```

```
//RMFSORT EXEC PGM=SORT
//SORTIN DD DISP=SHR,DSN=<input_smfdata_system1>
// DD DISP=SHR,DSN=<input_smfdata_system2>
//SYSIN DD *
SORT FIELDS=(11,4,CH,A,7,4,CH,A),EQUALS
MODS E15=(ERBPPE15,36000,,N),E35=(ERBPPE35,3000,,N)
```

- SMF data is kept in VSAM datasets
- Postprocessor requires sequential format
- use SMF dump utility IFASMFDP to unload the data
- usually GDGs are the preferred target:
  - ▶ RMF.SMFDATA.SYSNAME(0)
  - ▶ RMF.SMFDATA.SYSNAME(-1)
  
- SMF reords must be sorted by date and time
- SORT step is required for sysplex-wide reporting
  - ▶ Workload Activity Report
  - ▶ Coupling Facility Report
  - ▶ Shared DASD Report

# Postprocessor: Preparing SMF Data



Or use SMF Log-streams and IFASMF DL instead of IFASMF DP

```
//SMFDUMP EXEC PGM=IFASMF DL
//OUTDD1 DD DISP=(NEW,CATLG),UNIT=SYSDA,SPACE=(CYL,(500,50),RLSE),
//          DCB=(LRECL=32760,RECFM=VBS,BLKSIZE=0),
//          DSN=SMFDATA.OUTPUT.SYSF
//SYSIN DD *
          LSNAME (IFASMF.PERF.SYSDPLEX,OPTIONS (DUMP))
          OUTDD (OUTDD1,TYPE (70:79),START (1200),END (1300))
          SID (SYSF)
```

Or much smarter – access SMF Log-streams via IFASEXIT

```
//RMFPP EXEC PGM=ERBRMFPP
//MFPMSGDS DD DISP=SHR,DSN=*.ALLOC.MSG
//MFPINPUT DD DSN=IFASMF.SYSPLEX.TYPRMF,DISP=SHR,
//          DCB=(RECFM=VB,BLKSIZE=32760,LRECL=32756),
//          SUBSYS=(LOGR,IFASEXIT,'FROM=(2015/348,09:00),TO=(2015/348,12:00),X
//          LOCAL')
//PPRPTS DD DISP=SHR,DSN=RMF.INTERVAL.REPORTS
//PXSPTS DD DISP=SHR,DSN=RMF.SYSPLEX.REPORTS
//SYSIN DD *
          DATE(04212015,04232015)
          RTOD(0000,2400)
          DINTV(0100)
          REPORTS (ALL)
```

# Postprocessor JCL



## ■ DD Names

- ▶ MFPMSGDS Message Output
- ▶ MFPINPUT SMF Input Datasets
- ▶ PPRPTS combined Interval Reports
- ▶ PPSUMnnn Summary Report Output
- ▶ PPXSRPTS Sysplex Report Output
- ▶ PPORPnnn Overview Report Output
- ▶ PPOVWREC Overview Record Output
- ▶ XPRPTS combined Interval Reports in XML Format
- ▶ XPOVWRPT Overview Report Output in XML Format
- ▶ XPXSRPTS Sysplex Report Output in XML Format

JCL can be generated by ISPF Application or Spreadsheet Reporter

```
//RMFPP EXEC PGM=ERBRMFPP
//MFPMSGDS DD DISP=SHR,DSN=* .ALLOC.MSG
//MFPINPUT DD DISP=(OLD,DELETE),DSN=* .RMFSORT.SORTOUT
//PPRPTS DD DISP=SHR,DSN=RMF.INTERVAL.REPORTS
//PXSRRPTS DD DISP=SHR,DSN=RMF.SYSPLEX.REPORTS
//SYSIN DD *
DATE(04212003,04232003)
RTOD(0000,2400)
DINTV(0100)
REPORTS(ALL)
```

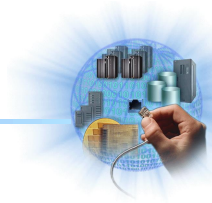
## ■ Control Statements

- ▶ DATE Start / End Date
- ▶ RTOD Start / End Time
- ▶ DINTV Duration Interval Length
- ▶ REPORTS Report Types
- ▶ OVERVIEW Report or Record
- ▶ OVW Overview Control Statement





# Postprocessor: Overview Reporting

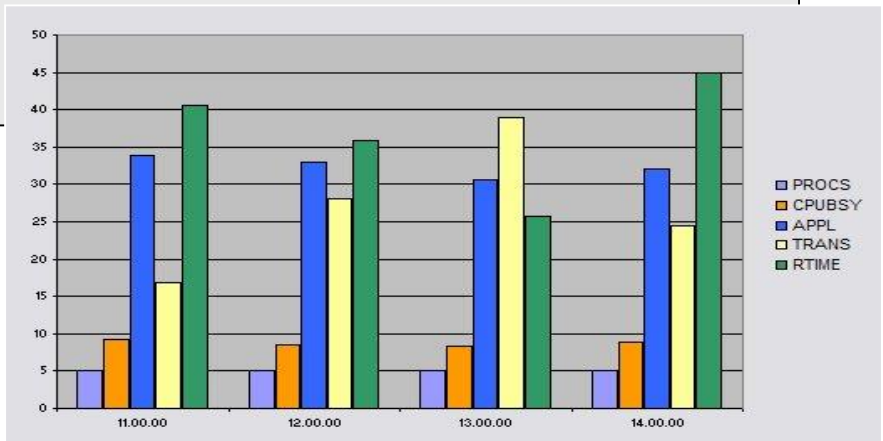


```
OVERVIEW (RECORD , REPORT)
OVW (PROCS (NUMPROC )
OVW (CPUBSY (CPUBSY )
OVW (APPL (APPLPER (POLICY ) )
OVW (TRANS (TRANS (POLICY ) )
OVW (RTIME (RTIME (POLICY ) )
DINTV (0100)
```

(via Spreadsheet Reporter)

RMF OVERVIEW REPORT									
z/OS V1R8		SYSTEM ID SYSF			START 08/07/2015-11.00.00		INTERVAL 01.00.00		
		RPT VERSION V1R8 RMF			END 08/07/2015-15.00.00		CYCLE 1.000 SECONDS		
NUMBER OF INTERVALS 4				TOTAL LENGTH OF INTERVALS 04.00.00					
DATE	TIME	INT	PROCS	CPUBSY	APPL	TRANS	RTIME		
MM/DD	HH.MM.SS	HH.MM.SS							
08/07	11.00.00	01.00.00	5.0	9.2	33.9	16.8	40.56		
08/07	12.00.00	01.00.00	5.0	8.5	33.0				
08/07	11.00.00	01.00.00	5.0	8.3	30.6				
08/07	12.00.00	01.00.00	5.0	8.8	24.5				

Format of the **INTERVAL** column changes from **MM.SS** to **HH.MM.SS**

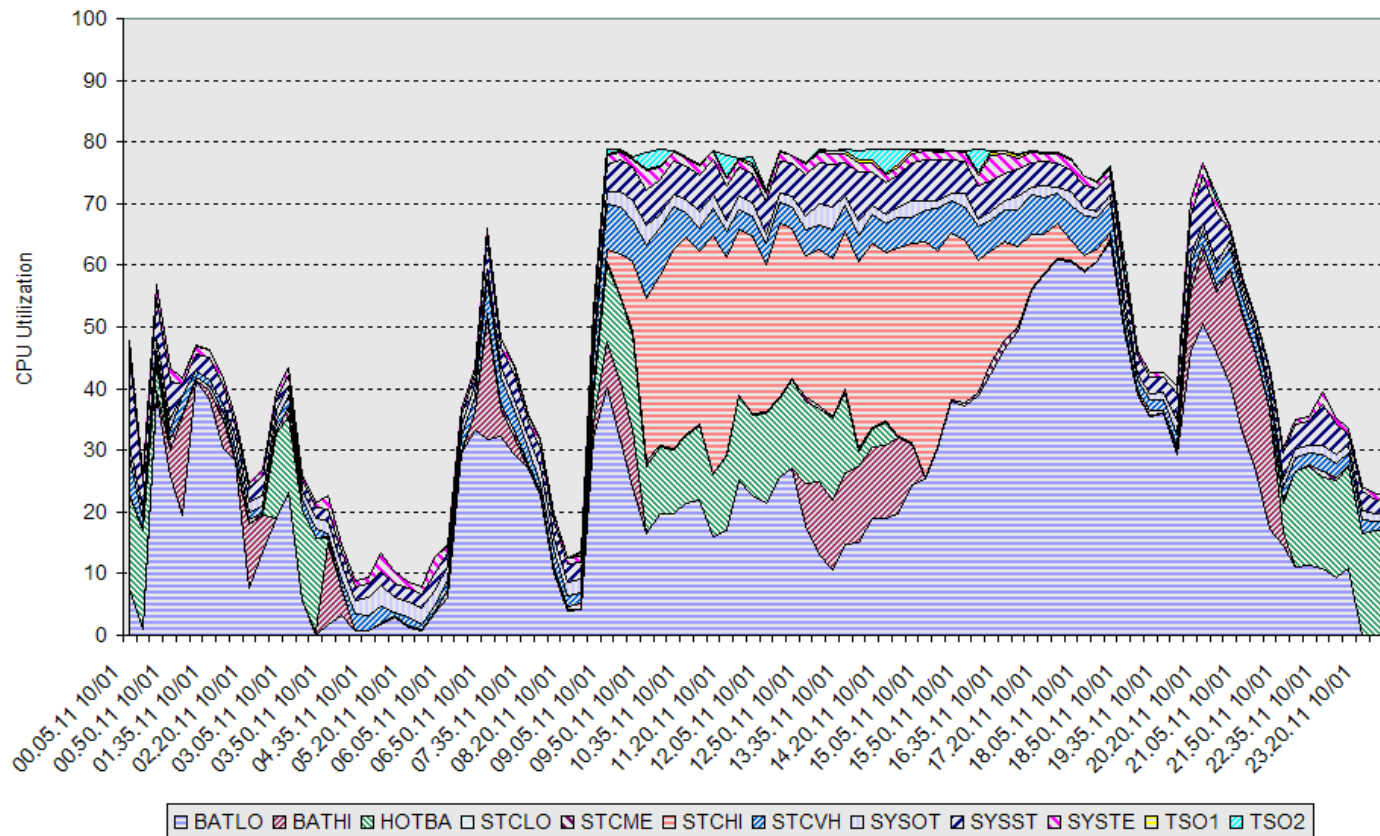


# RMF Spreadsheet Reporter

- ▶ converts SMF Data to Spreadsheet Format
- ▶ creates graphical Views for Trend Analysis
- ▶ can be downloaded from the RMF Homepage



Workload Utilization for System: UIG1, Reporting Date: 10/01/2006



# RMF Spreadsheet Reporter



SMF Dump Data



collect

Report Listings

Overview Records



download

XML Reports

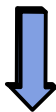
Working Sets



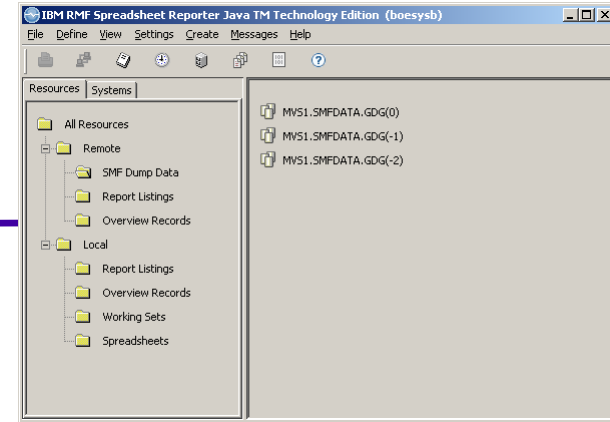
generate

Web Browser

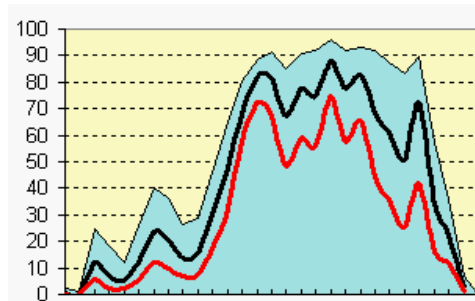
Spreadsheet



display



CPU Contention: System SYSA



# RMF Spreadsheet Reporter



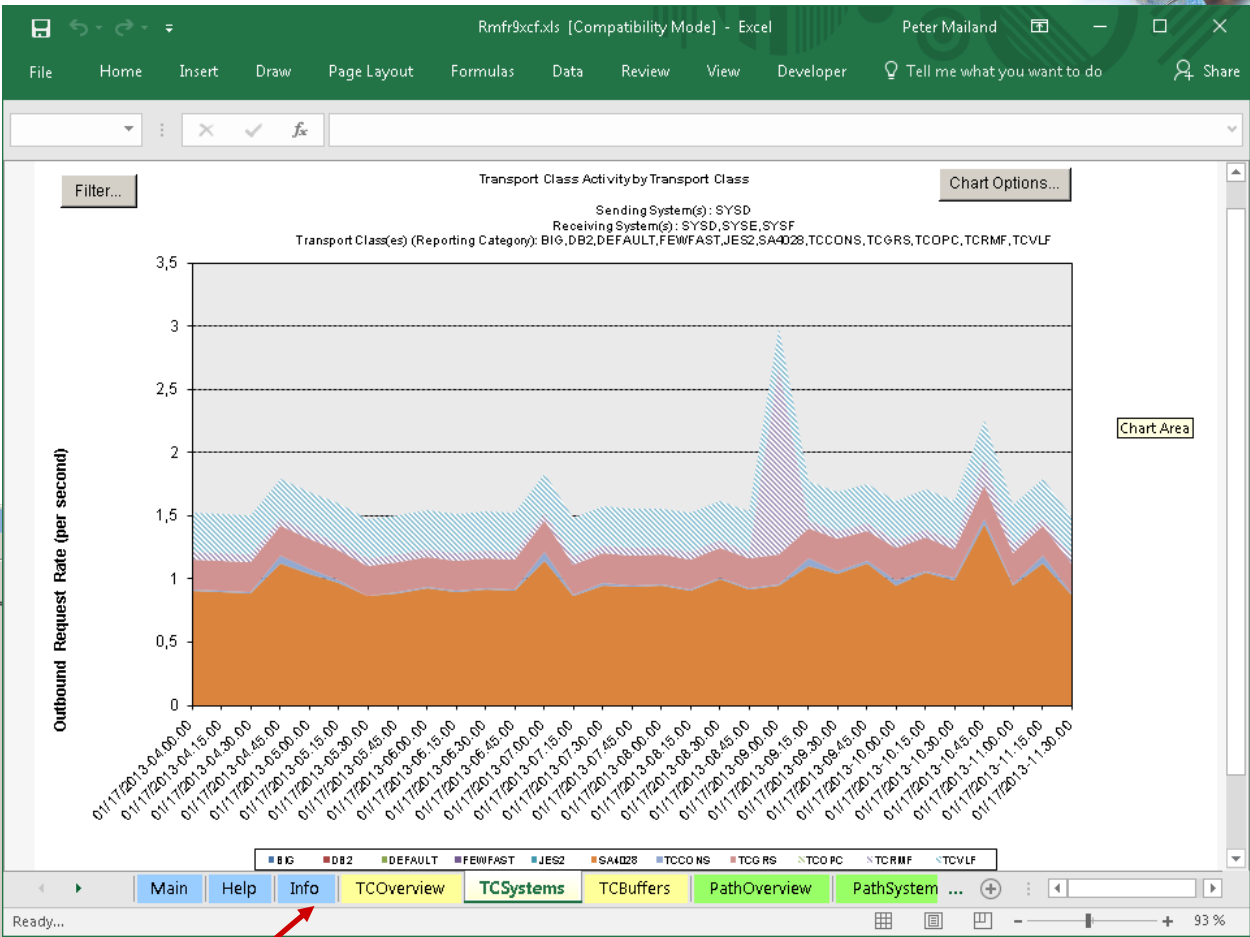
Macros for all Types of Performance relevant Areas !! (based on reports or overview records)

IBM RMF Spreadsheet Reporter Java TM Technology Editor (boesysb)

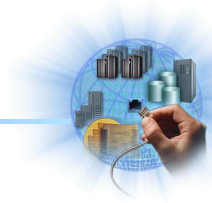
File Define View Settings Create Messages Help

Resources Systems

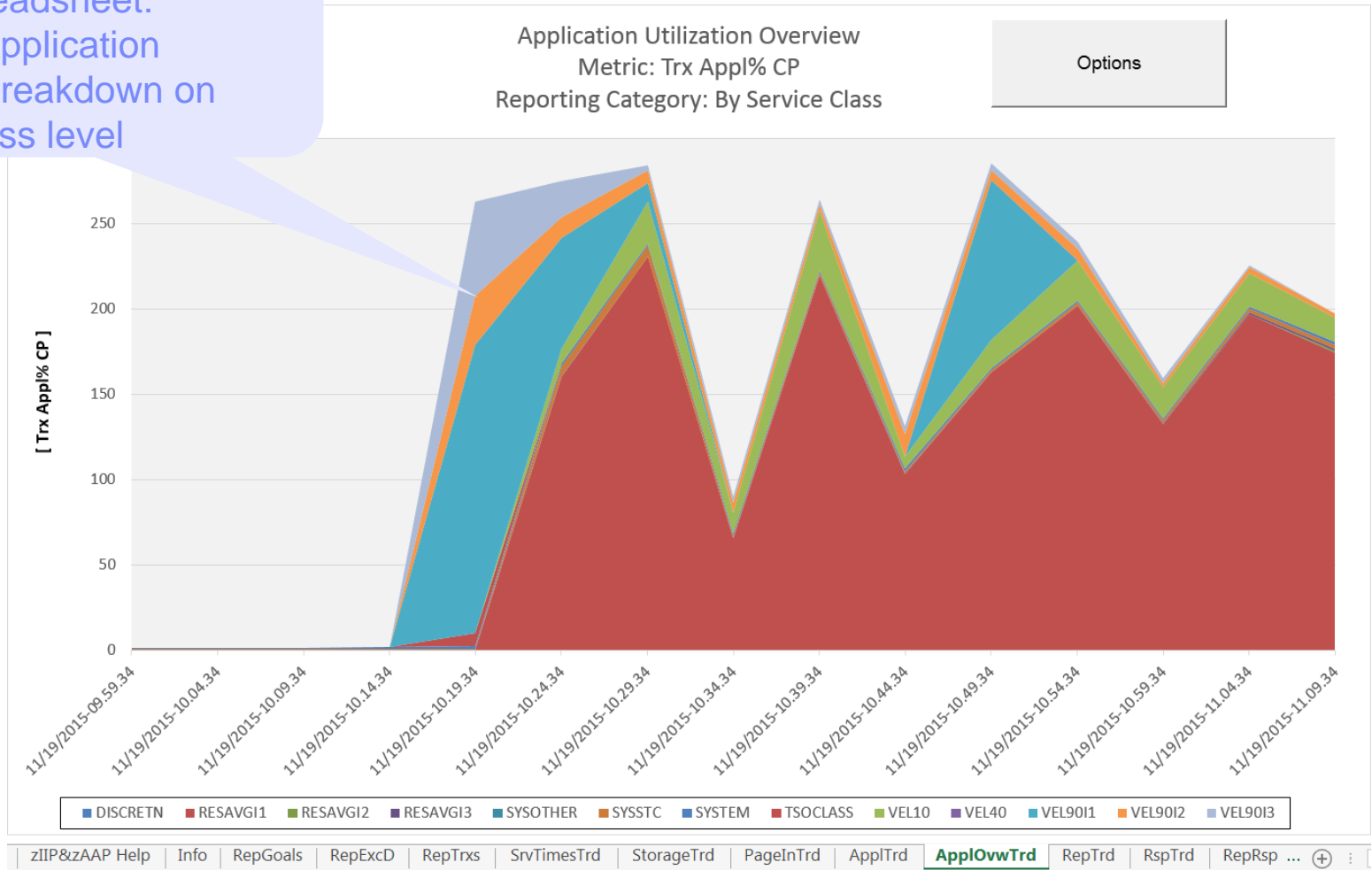
- All Resources
  - Remote
    - SMF Dump Data
    - Report Listings
    - Overview Records
  - Local
    - Report Listings
    - Overview Records
    - Working Sets
    - Spreadsheets
- Systems
  - DASD Activity Report
  - Device Overview Report
  - Filter DASD or Cache Reports
  - I/O Subsystem Report
  - LPAR Overview Report
  - LPAR Trend Report
  - Open RMF Overview Spreadsheets
  - Open RMF Report Spreadsheets
  - Summary Report
  - System Overview Report
  - Tape Mount Report
  - Workload Activity Trend Report
  - Workload Overview Report
  - XCF Trend Report



# RMF Spreadsheet Reporter



Eg Workload Activity Trend Report Spreadsheet: Graphical Application Utilization breakdown on Service Class level



# RMF Spreadsheet Reporter

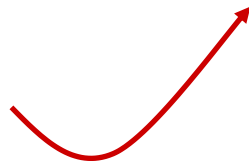
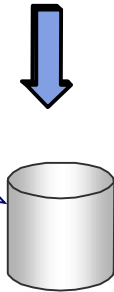


- Use overview control statements to create a working set and load the data into the generic RMF Overview Report spreadsheet, which offers a bunch of chart !

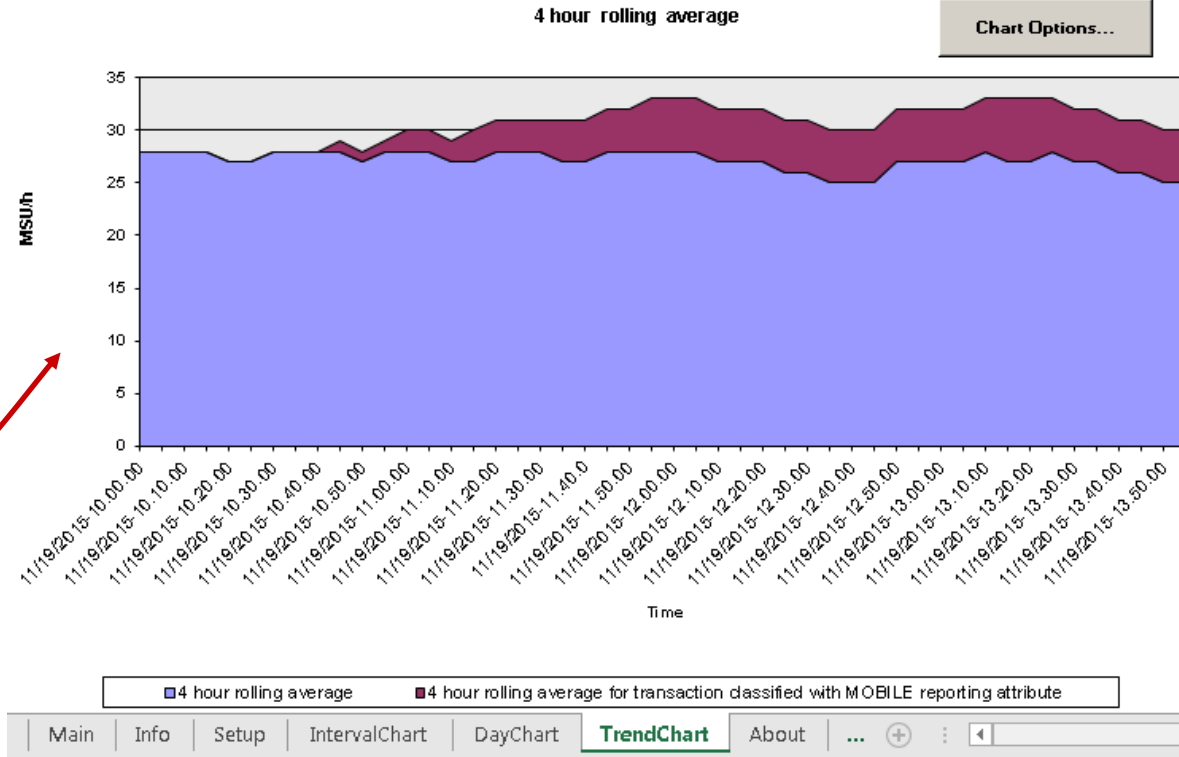
## Overview Conditions:

OVW ( 4HRA ( LACS ) )  
 OVW ( MOB4HRA ( LACSM ) )

Working set  
 (based on  
 Overview Record)



DATE	TIME	INT	4HRA	MOB4HRA
MM/DD	HH.MM.SS	HH.MM.SS		
11/19	10.00.00	00.05.00	28	0
11/19	10.05.00	00.05.00	28	0
11/19	10.10.00	00.05.00	28	0
11/19	10.15.00	00.05.00	28	0
11/19	10.20.00	00.05.00	27	0
11/19	10.25.00	00.05.00	27	0
...				



# RMF Postprocessor Reports in XML Format



- The generation of Postprocessor reports in XML format is controlled by the ddnames XPRPTS, XPXSRPTS and XPOVWRPT
- Either use SYSOUT class or data sets as output (RECFM=VB, LRECL between 256 and 8192)

```

1 <?xml version="1.0" encoding="UTF-8"?>
2 <?xml-stylesheet type="text/xsl" href="include/ddsml-pp.xsl"?>
3 <ddsml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4     xsi:noNamespaceSchemaLocation="include/ddsml.xsd">
5 <server>
6 <name>RMF-DDS-Server</name>
7 <version>ZOSV2R2</version>
8 <functionality>3202</functionality>
9 <platform>z/OS</platform>
10 </server>
11 <postprocessor><metric id="PCIE"><description>PCIE Activity Report</description><type>I</type></postprocessor>
12 </resource><time-data><display-start locale="en-us">09/28/2015-15.44.35</display-start>
13 <segment id="1"><name>General PCIE Activity</name>
14 <part id="2">
15 <table id="3">
16 <column-headers><col type="T">Function ID</col><col type="T">Function PCHID</col><col type="T">Function Owner Address Space ID</col><col type="N">Function Allocation Time</col><col type="N">Refresh PCI Translations Operations Rate</col><col type="N">DMA Address Space Packets Transmitted Rate</col><col type="N">Work Units Processed Rate</col>
17 <row refno="1"><col>0021</col><col>037C</col><col>Hardware Accelerator</col><col>101404</col><col>0</col><col></col><col></col><col></col></row>
18 <row refno="2"><col>0025</col><col>037C</col><col>Hardware Accelerator</col><col>101404</col><col>0</col><col></col><col></col><col></col></row>
19 <row refno="3"><col>0028</col><col>03BC</col><col>Hardware Accelerator</col><col>101404</col><col>0</col><col></col><col></col><col></col></row>
20 <row refno="4"><col>002B</col><col>03BC</col><col>Hardware Accelerator</col><col>101404</col><col>0</col><col></col><col></col><col></col></row>
21 </table></part></segment>

```

# RMF XML Toolkit



Simplifies display of RMF Postprocessor XML reports in a web browser

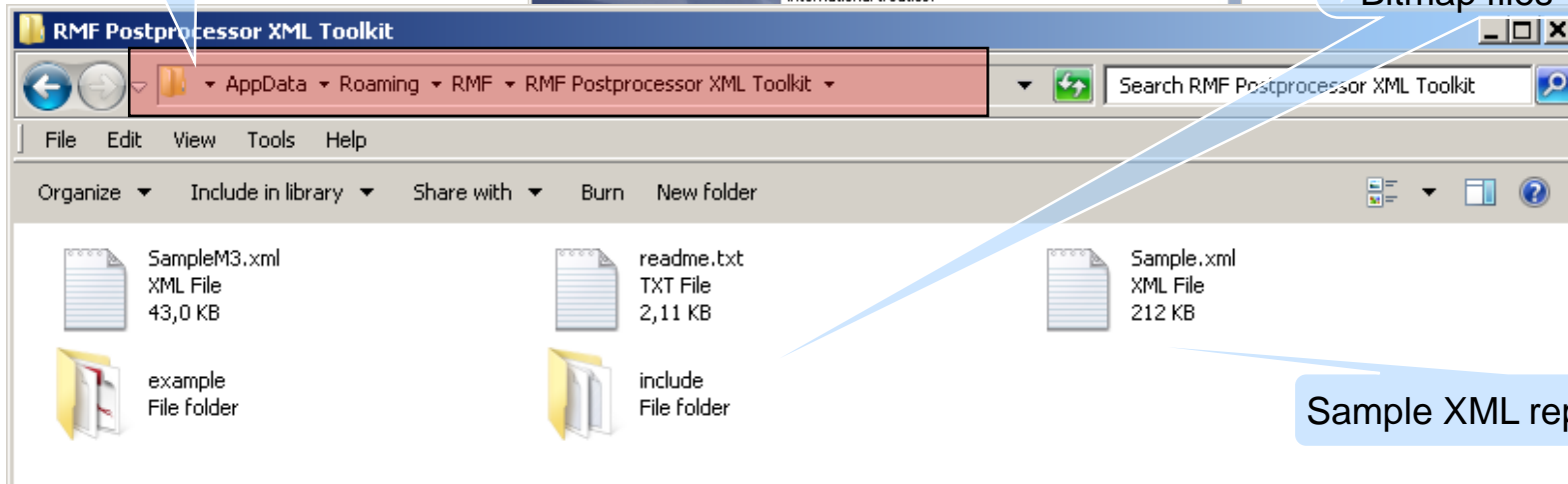
1. Download member SYS1.SERBPWSV(ERBXMLTK) as binary file erbxmltk.msi or get it from the RMF Homepage
2. Install MSI Package



ERBXMLTK.msi  
Windows Installer Package  
8,54 MB

Default Installation Directory

⇒ XSL stylesheet files  
⇒ Java script file  
⇒ Bitmap files

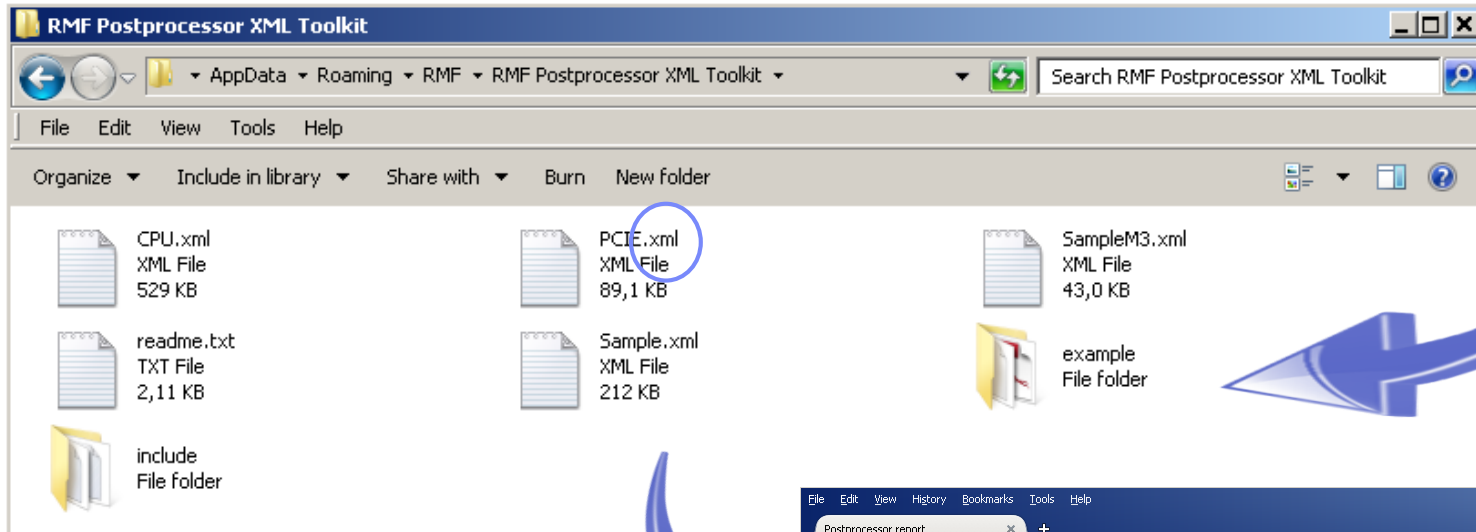


Sample XML reports (PP, M3)



# RMF XML Toolkit

## 1. Download Postprocessor XML report into Toolkit directory (ASCII format)



BKGE.PCIE.XML

## 2. Open XML report with web browser

Postprocessor report

file:///C:/Users/IBM\_ADMIN/AppData/Roaming/RMF/RMF Postprocessor XML Toolkit/PCIE.xml

Display Controls for RMF Postprocessor Report

Report Data Selection:

09/28/2015-15:44:35 SYSE PCIE

09/28/2015-15:44:35 S4 PCIE

09/28/2015-15:59:35 SYSE PCIE

09/28/2015-15:59:35 S4 PCIE

Show all Report Data

### RMF Postprocessor Interval Report [System SYSE] : PCIE Activity Report

RMF Version : z/OS V2R2 SMF Data : z/OS V2R2

Start : 09/28/2015-15:44:35 End : 09/28/2015-15:59:34 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 Translat Operati Rate
0021	037C	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0012	900	0	0.003	0	0.196
0025	037C	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0012	900	0	0.003	0	0.196
0028	039C	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0012	900	0	0.003	0	0.196

# RMF Spreadsheet Reporter – XML Support



The screenshot shows the IBM RMF Spreadsheet Reporter application window with the 'Options' dialog box open. The 'Reports' tab is selected in the dialog, and the 'Use XML Report Format' checkbox is checked. A callout bubble points to this checkbox with the text: "List of currently available reports in XML format".

**Options - General Processing Options**

- Create Overview Records
- Delete Postprocessor Datasets after Download
- Ignore specified Duration Period
- Ignore specified Interval Time
- Save Password with System Profile
- Scratch Overview Records after Conversion
- Scratch Report Listings after Conversion
- Scratch extracted OVW Files after Conversion
- Scratch extracted RPT Files after Conversion
- Sort SMF Datasets
- Use XML Report Format

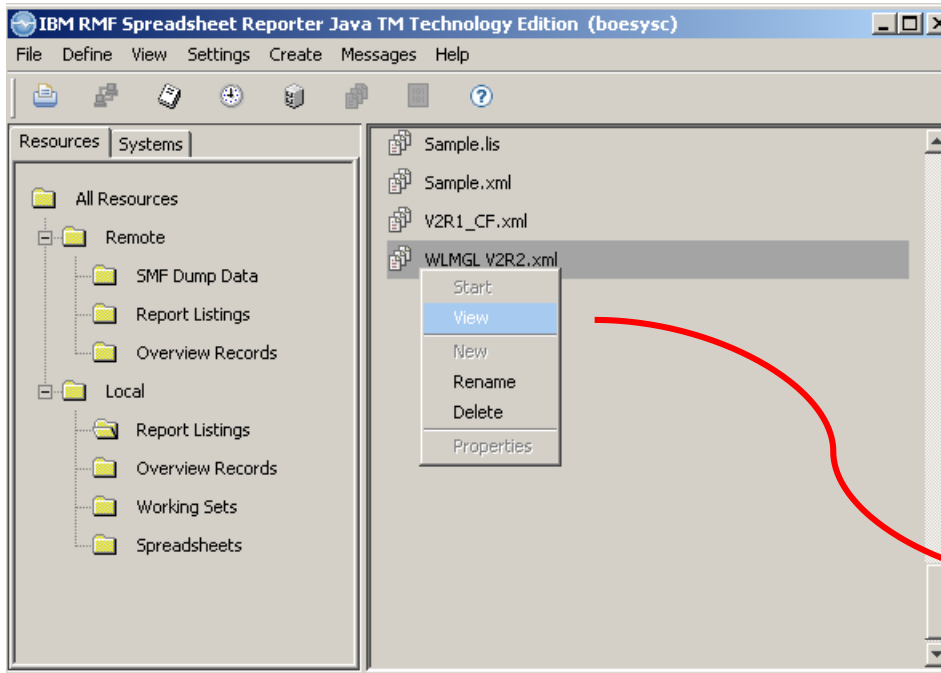
**Options - RMF Postprocessor Report Types**

<input type="checkbox"/> Cache Subsystem Activity	<input checked="" type="checkbox"/> PCIE Activity
<input type="checkbox"/> Channel Path Activity	<input checked="" type="checkbox"/> Storage Class Memory Activity
<input type="checkbox"/> Coupling Facility Activity	<input checked="" type="checkbox"/> Serialization Delays
<input checked="" type="checkbox"/> CPU Activity	<input type="checkbox"/> Shared DASD Device Activity
<input checked="" type="checkbox"/> Crypto Hardware Activity	<input type="checkbox"/> Shared TAPE Device Activity
<input type="checkbox"/> DASD Device Activity	<input type="checkbox"/> TAPE Device Activity
<input type="checkbox"/> Enqueue Activity	<input type="checkbox"/> Virtual Storage Activity
<input type="checkbox"/> Enterprise Disk Systems	<input type="checkbox"/> Workload Activity (Report Classes)
<input type="checkbox"/> FICON Director Activity	<input type="checkbox"/> Workload Activity (Service Classes)
<input type="checkbox"/> HFS Statistics	<input checked="" type="checkbox"/> XCF Activity
<input type="checkbox"/> I/O Queuing Activity	
<input type="checkbox"/> OMWS Kernel Activity	
<input type="checkbox"/> Page Data Set Activity	
<input checked="" type="checkbox"/> Paging Activity	

# RMF Spreadsheet Reporter – XML Support



1. Create an Postprocessor Report in XML format based on SMF Dump Data or the RMF SMFBUFFER by using Create->Report Listing



RMF Postprocessor Interval Report [System S

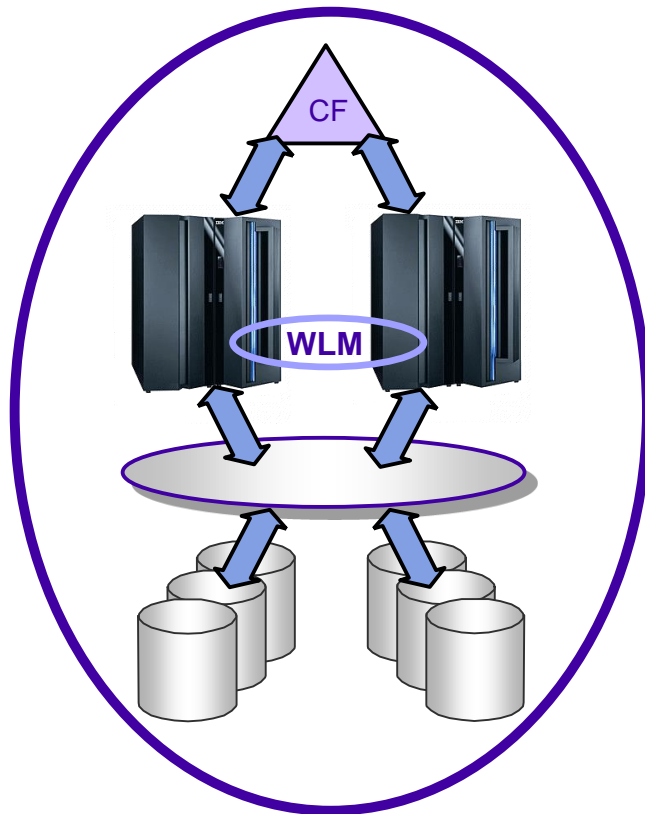
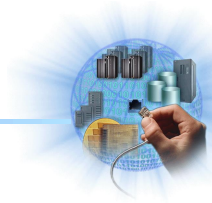
**RMF Version :** z/OS V2R2    **SMF Data :** z/OS V2R2  
**Start :** 09/28/2015-15.44.35    **End :** 09/28/2015-15.59.34    **Interval :** 15:00:000 minutes

▼ **General PCIE Activity**

Function ID	Function PCHID	Function Name	Function Type	Function Status	Owner Job Name	Owner Address Space ID
0021	037C	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0012
0025	037C	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0012
0028	03BC	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0012
002B	03BC	Hardware Accelerator	1014044B	Allocated	FPGHWAM	0012

▼ **Hardware Accelerator Activity**

# Realtime Reporting



- covers all Sysplex related aspects
- two monitors and a workstation extension
  - ▶ Monitor III, best suited for
    - ➔ short-term, real-time and historical reporting
    - ➔ online performance analysis
    - ➔ goal attainment supervision
    - ➔ sysplex-wide and single-system reporting
    - ➔ monitoring of exceptional conditions
  - ▶ Monitor II, best suited for
    - ➔ snapshot reporting
    - ➔ single job and resource monitoring
  - ▶ RMF PM / Data Portal
    - ➔ enterprise-wide reporting of z/OS systems
    - ➔ based on RMF Monitor III data

# Monitor III Reporting



## Monitor III Delay Monitoring

- Processor
- Storage
- Device
- Enqueue
- Operator
  - ▶ Message
  - ▶ Tape Mount
- Subsystem
  - ▶ HSM - JES - XCF



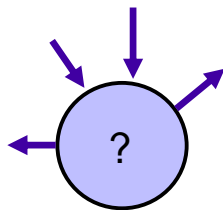
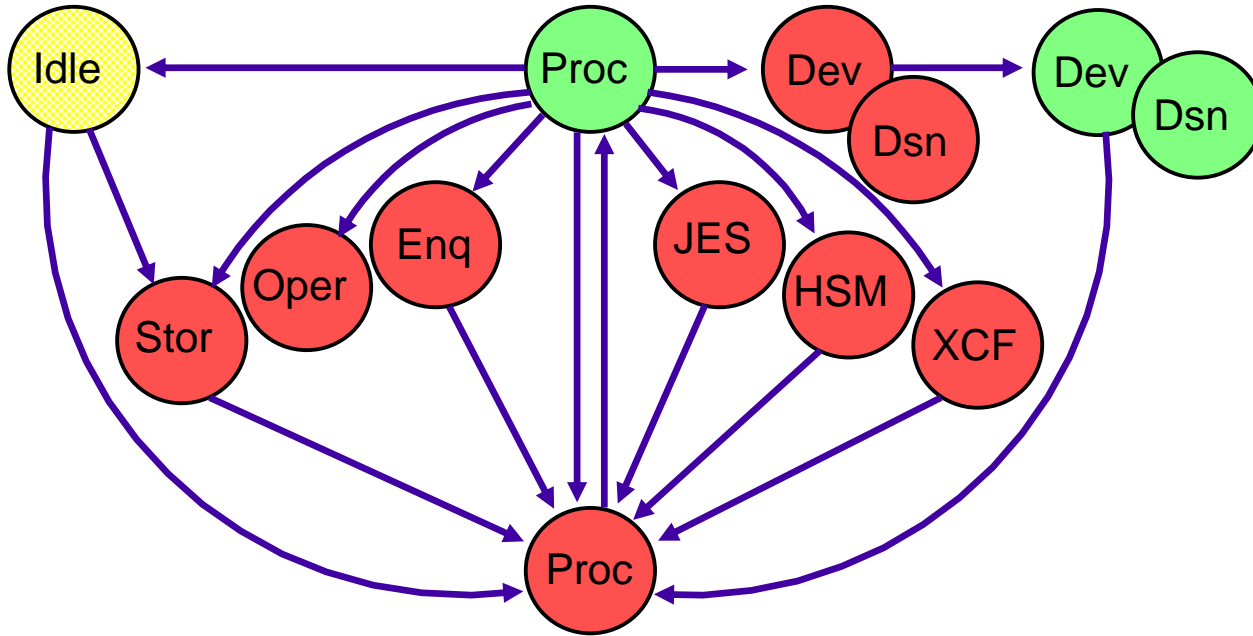
## Monitor III Activity Monitoring

- Common Storage
- Page/Swap Data Sets
- Storage Frames
- Device
- Data Set Level by Job and Volume
- Cache
- Coupling Facility
- Goal Attainment
- VSAM RLS
- UNIX System Services
- Enclaves
- zFS
- Diskspace
- Spin/Suspend Locks
- Job Resource Consumption

## Monitor III Features

- Cursor-Sensitive Navigation
- Workflow/Exceptions Monitoring
- Automatic Customization
- Support of WTO Messages
- Continuous Monitoring
- Hardcopy Reports
- On-Line Tutorial
- On-Line Help
- Adaptive Reports
- User Reports
- Sysplex-wide Reports
- Remote Reporting

# States of a Job



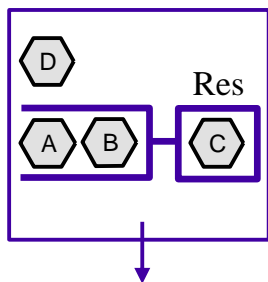
Unknown

$$\text{Using(\%)} = \frac{\text{using samples}}{\text{number of samples}} \times 100 = 50\%$$

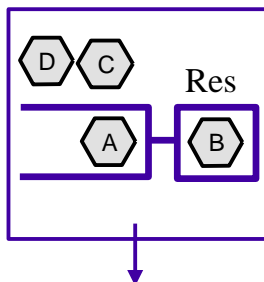
$$\text{Delay(\%)} = \frac{\text{delay samples}}{\text{number of samples}} \times 100 = 33\%$$

$$\text{Workflow (\%)} = \frac{\text{using samples}}{\text{using samples} + \text{delay samples}} \times 100 = 60\%$$

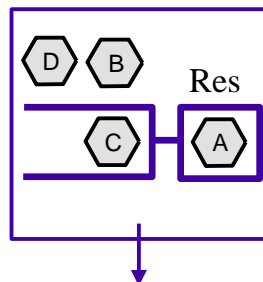
# Example: Using and Delay



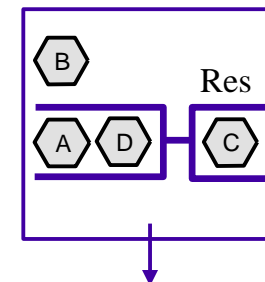
Job	I	U	D	Why
A			*	C
B			*	C
C		*		
D	*			



Job	I	U	D	Why
A			*	B
B		*		
C	*			
D	*			



Job	I	U	D	Why
A		*		
B	*			
C			*	A
D	*			



Job	I	U	D	Why
A			*	C
B	*			
C		*		
D			*	C

**RMF Monitor III Delay Report**

Samples: 4 Time: 06.28.20 Range: 4 Sec

Jobname	WFL %	USG %	DLY %	IDL %	Primary Reason
A	25	25	75	0	C
B	50	25	25	50	C
C	66	50	25	25	A
D	0	0	25	75	C

**RMF Monitor III Resource Delay Report**

Samples: 4 Time: 06.28.20 Range: 4 Sec

Resource	WFL %	ADU	Jobname	USG %	DLY %	Reason
Res	40	1.5	A	25	75	C
			B	25	25	C
			C	50	25	A
			D	0	25	C

# Monitor III: Job Delays



RMF V2R2 Delay Report Line 1 of 326

Samples: 100 System: AQTS Date: 07/18/15 Time: 06.28.20 Range: 1

Name	CX	Service Class	Cr	WFL %	USG %	DLY %	IDL %	UKN %	---- % Delayed for ----					Prim Reason	
									PRC	DEV	STR	SUB	OPR	ENQ	
SUSANK	T	TSOPRIME		0	0	100	0	0	0	0	0	100	0	0	HSM
CONSOLE	S	SYSTEM		0	0	15	0	85	0	0	0	0	15	0	Message
RRSSERVQ	B	WLMSHORT		0	0	1	0	1	0	0	0	1	0	0	JES
BHBE	T	TSOPRIME		40	4	6	90	0	6	0	0	0	0	0	JHUGO
MORABIT	T	TSOPRIME		41	37	56	0	7	0	56	0	0	0	0	COMPK5
RONDA2A	B	COMBUILD		42	29	42	0	29	1	41	0	0	0	0	COMPK5
D24JAP1	T	TSOPRIME		49	22	23	56	0	0	23	0	0	0	0	PRIPK5
RRSSERVQ	B	WLMSHORT		50	2	2	0	0	0	2	0	0	0	0	SPOL1J
GRSARTSQ	B	WLMSHORT		50	1	1	0	0	0	0	0	1	0	0	JES
RRSSERVQ	B	WLMSHORT		50	1	1	0	0	0	0	0	1	0	0	JES
CATALOG	S	SYSTEM		63	57	39	0	12	0	39	0	0	0	0	MCATTS
ANFWPROC	SO	SYSSTC		67	2	1	0	2	0	1	0	0	0	0	SPOL1J
GRSARTSQ	B	WLMSHORT		71	5	2	0	0	0	1	0	1	0	0	SPOL1J
SMFDRS	S	STCMED		71	5	2	0	93	0	0	0	0	0	2	SYSZVDS
JES2	S	SYSSTC		73	16	6	0	79	0	6	0	0	0	0	SPOL1J
GRSARTSQ	B	WLMSHORT		80	4	1	0	0	0	0	0	1	0	0	JES
ARTXESQ	B	WLMSHORT		80	4	1	0	0	0	1	0	0	0	0	SPOL1L
DFRMM	S	SYSSTC		83	81	18	0	1	0	18	0	0	0	0	SL3061

Address Space  
Performance at a Glance !

- ▶ sorted by ascending Workflow
- ▶ Delay Type Breakdown
- ▶ Delay Reason Information



# Monitor III: Usage Report



Identify Top Resource Consumers at a Glance

RMF V2R2 Job Oriented Usage

Samples: 60 System: TRX1 Date: 04/18/15 Time: 10.56.00 Range: 60 Sec

Jobname	Service		--- I/O ---		--- CPU ---		- Storage -		----- QScan -----		
	CX	Class	Conn	EXCP	Total	TCB	Total	Fixed	Total	Resct	Time
XCFAS	S	SYSTEM	0.446	1.97	0.25	0.11	7754	2384	0	0.0	0
*MASTER*	S	SYSTEM	0.042	0.00	0.02	0.00	6323	1107	0	0.0	0
SMF	S	SYSTEM	0.028	0.00	0.00	0.00	900	210	0	0.0	0
CATALOG	S	SYSTEM	0.027	0.17	0.03	0.03	1824	228	0	0.0	0
GRS	S	SYSTEM	0.020	0.00	0.01	0.01	14136	451	0	0.0	0
JES2	S	SYSSTC	0.010	0.38	0.03	0.02	9277	1041	0	0.0	0
NET	S	SYSSTC	0.010	0.00	0.01	0.00	3050	138	0	0.0	0
DFSZFS	S	SYSSTC	0.008	0.60	0.00	0.00	30660	499	0	0.0	0
OMVS	S	SYSTEM	0.006	0.17	0.00	0.00	16098	356	0	0.0	0
SMS	S	SYSSTC	0.004	0.93	0.00	0.00	548	89	0	0.0	0
PAGENT	SO	SYSSTC	0.003	9.45	0.01	0.01	2978	18072	0	0.0	0
HZSPROC	SO	SYSSTC	0.000	0.00	0.00	0.00	5125	183	0	0.0	0

DELAYJ

Filter

DEV

PROCU

STORF

Cursor Sensitivity

# Monitor III: Goal Attainment



RMF V2R2 Sysplex Summary - SCLMPLEX Line 1 of 14  
 Command ==> Scroll ==> CSR

WLM Samples: 240 Systems: 3 Date: 05/15/15 Time: 13.00.00 Range: 60 Sec



Service Definition: SCLM Installed at: 12/06/00, 10.07.24  
 Active Policy: STANDARD Activated at: 12/06/00, 10.07.24

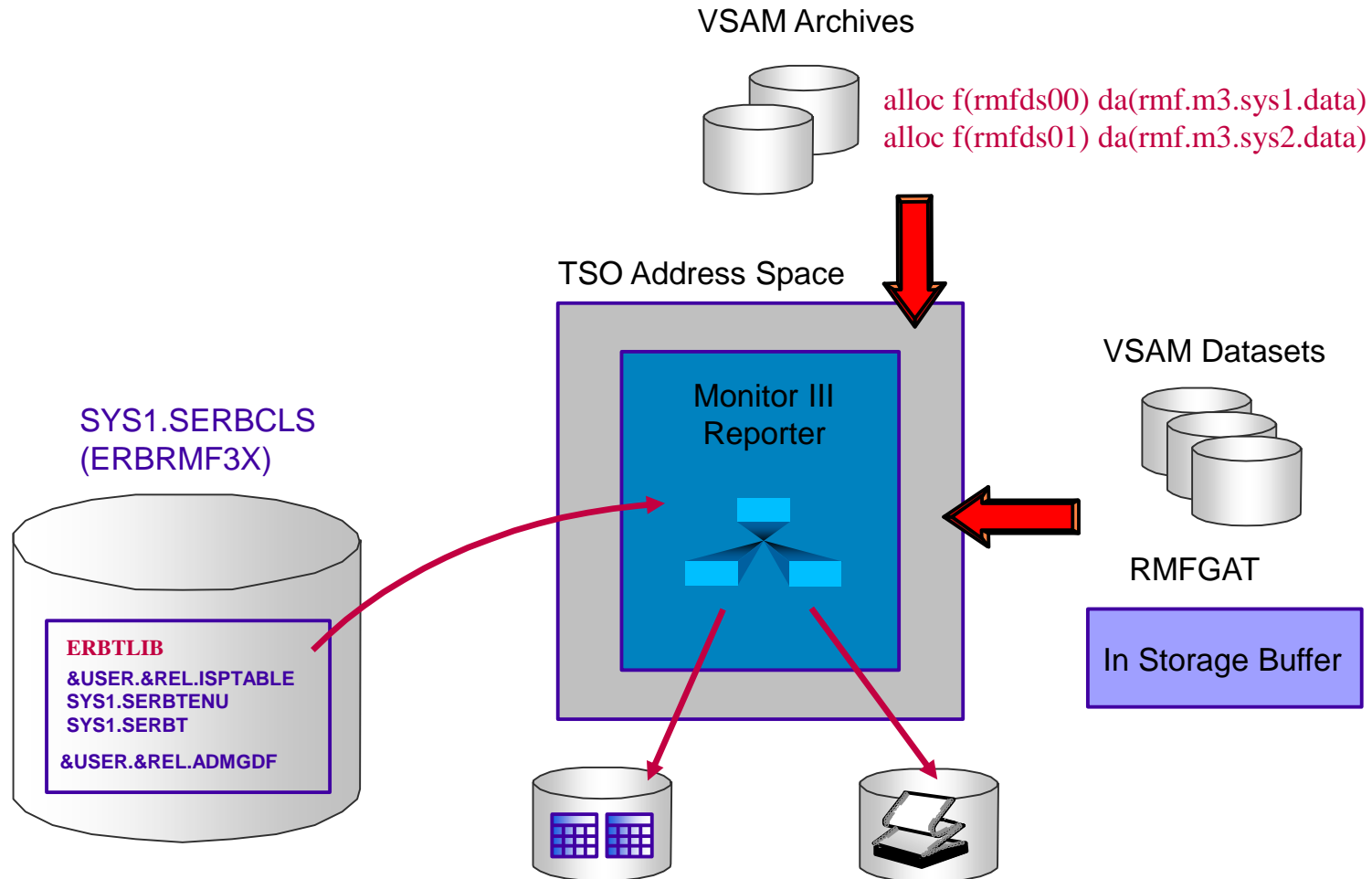
Name	T	I	Goals versus Actuals				Perf Indx	Trans Ended Rate	--Avg. Resp Time			
			Exec Vel	Response Time	Response Time	Response Time			WAIT	EXEC		
			Goal	Act	---Goal---	--Actual--						
STC	W			88				0.000	0.000			
STCCMD	S	3	40	88			0.46	0.000	0.000			
SYSTEM	W			69				0.000	0.000			
SYSSTC	S		N/A	68	N/A			0.000	0.000			
SYSTEM	S		N/A	70	N/A			0.000	0.000			
TSO	W			84				2.100	0.000	0.608		
PRDTSO	S			84				2.100	0.000	0.608		
		1	60	1.000	AVG	0.080	AVG	0.08	1.150	0.000	0.080	0.080
		2	0.0	1.500	AVG	0.109	AVG	0.07	0.567	0.000	0.109	0.109
		3	85	2.000	AVG	2.928	AVG	1.46	0.383	0.000	2.928	2.928
MASTER	R		N/A	47	N/A			0.000	0.000	0.000	0.000	0.000

**Sysplex Performance at a Glance !**

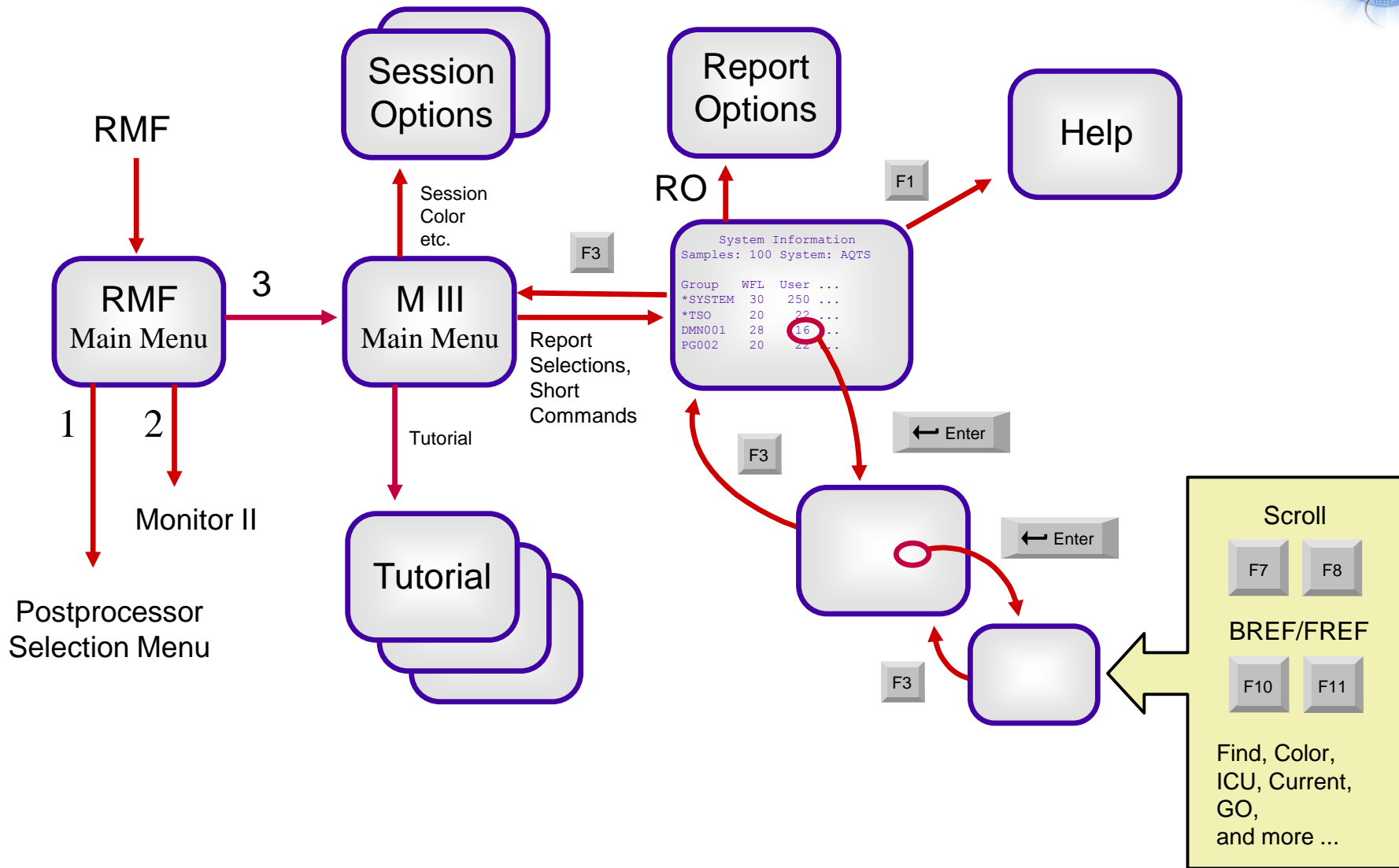
- ▶ 80 Intervals in GO Mode
- ▶ colored Indication for PI > 1

Importance = 1+2  
 Importance > 2

# Monitor III: Session Setup



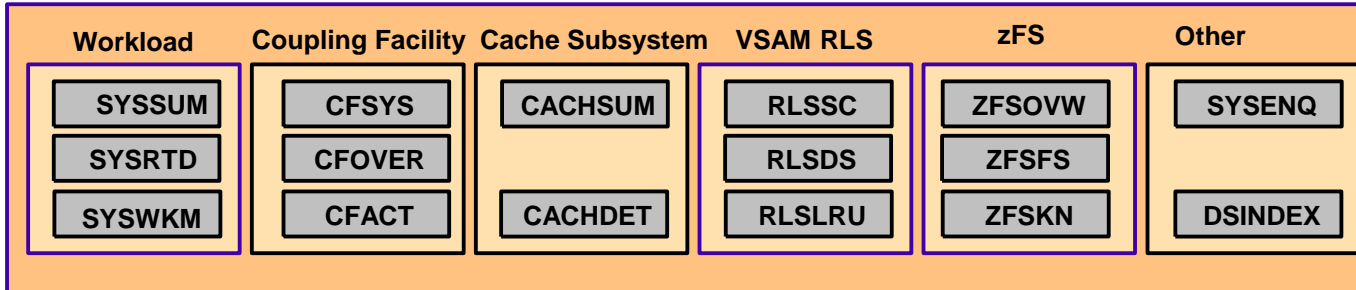
# Monitor III Reporter Usage



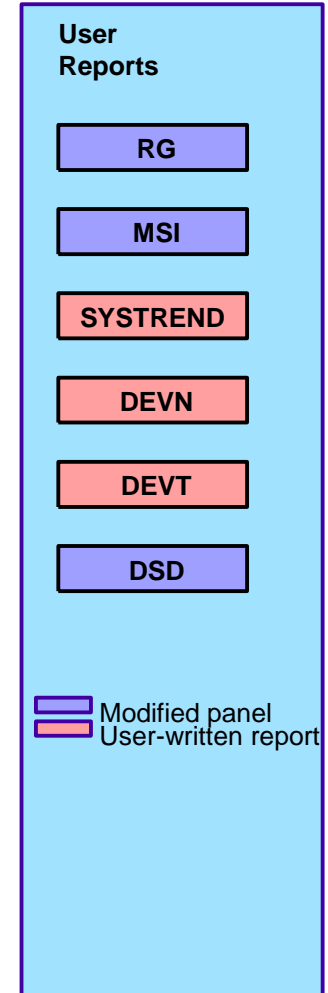
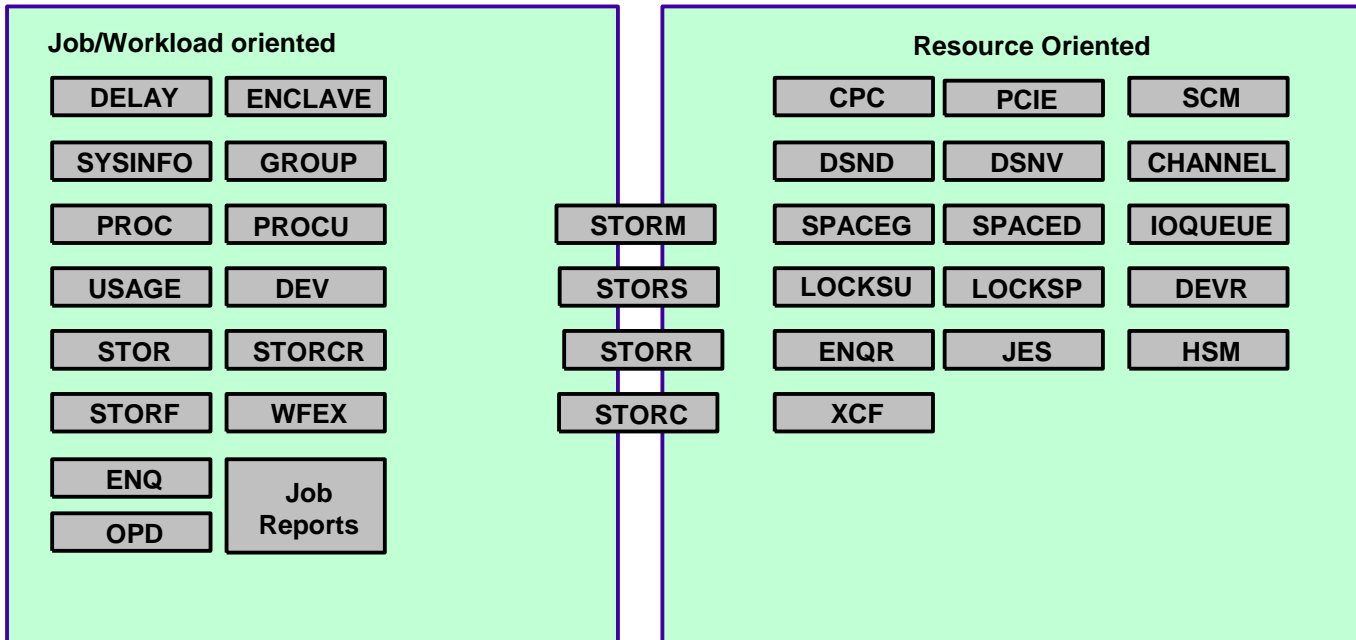
# Monitor III Report Overview



## Sysplex Reports



## System Reports



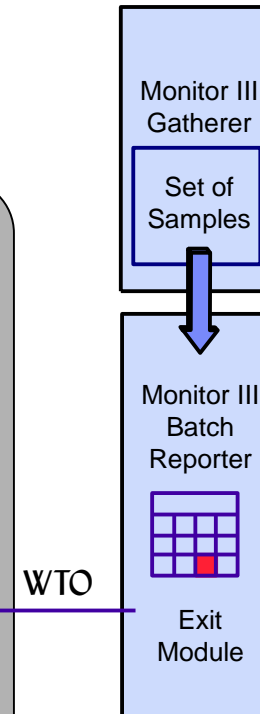
# Monitor III: Setup for WTO's



- Monitor III Batch Address Space creates Reporting Tables
- Thresholds can be defined via
  - ▶ Workflow Exception Options Dialog
  - ▶ Reporter Phase Exit Module
- Console Message is generated by Exit Module (e.g. WLM Capping)

```

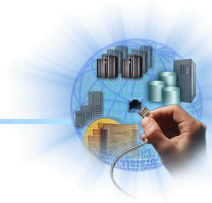
$HASP100 BMAI      ON TSOINRDR
$HASP373 BMAI      STARTED
IEF125I BMAI - LOGGED ON - TIME=12.36.20
+RMF300I 3B: Processing CPC Report...
+RMF301I 3B: Local Partition Capping State:
+RMF303I 3B: Time until Capping (sec):    40 (WTO Limit:
600)
+RMF304I 3B: MSU Consumption of critical LPARs:
+RMF305I 3B: SYS1  :    64 (WTO Limit: 60)
+RMF305I 3B: SYS4  :    48 (WTO Limit: 32)
IEF126I BMAI - LOGGED OFF - TIME=12.38.00
$HASP395 BMAI      ENDED
$HASP250 BMAI      PURGED
+RMF300I 3B: Processing CPC Report...
+RMF301I 3B: Local Partition Capping State:
+RMF302I 3B: WLM Capping %: 24.2 (WTO Limit: 10.0)
+RMF304I 3B: MSU Consumption of critical LPARs:
+RMF305I 3B: SYS1  :    82 (WTO Limit: 60)
+RMF305I 3B: SYS2  :    12 (WTO Limit: 10)
$HASP100 BMGU      ON TSOINRDR
$HASP373 BMGU      STARTED
  
```



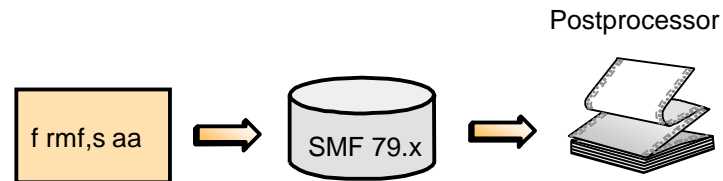
Sample Exits provided for:

- ➔ Workflow Exception Report
- ➔ Sysinfo Report
- ➔ CPC Capacity Report

# Monitor II: Overview



- Monitor II is a Snapshot Reporter
  - ▶ collects the status of system resources (CPU, devices, paging activity, ...)
  - ▶ collects the status of address spaces (resource usage, state information)
- use Monitor II to
  - ▶ continuously monitor resource usage
  - ▶ determine the state of any address space in the system
  - ▶ track CPU usage of problem address spaces
  - ▶ collect supplemental information when analyzing performance problems with Monitor III
- choose Background Session
  - ▶ to collect SMF records for archiving and later postprocessing
  - ▶ to automate snapshot reporting
- choose Display Session
  - ▶ for immediate feedback
  - ▶ for online analysis



# Monitor II Reporting



## Activities measured by Monitor II:

- Address Space Data
  - ▶ Resource
  - ▶ State
  - ▶ SRM
- Channel Path
- Device
- I/O Queuing
- Enqueue
- HFS
- IRLM Long Locks
- Paging
- Page/Swap Data Set
- SRM Resource Data
- Sysplex Data Server
- Library Display
- OPT Settings



- ▶ for most comfortable usage
- ▶ supports sorting and finding
- ▶ started from TSO READY or from RMF main menu



- ▶ don't use it anymore!



# Monitor II Commands



TSO-Command: RMF MON2

Monitor II Primary Menu

```

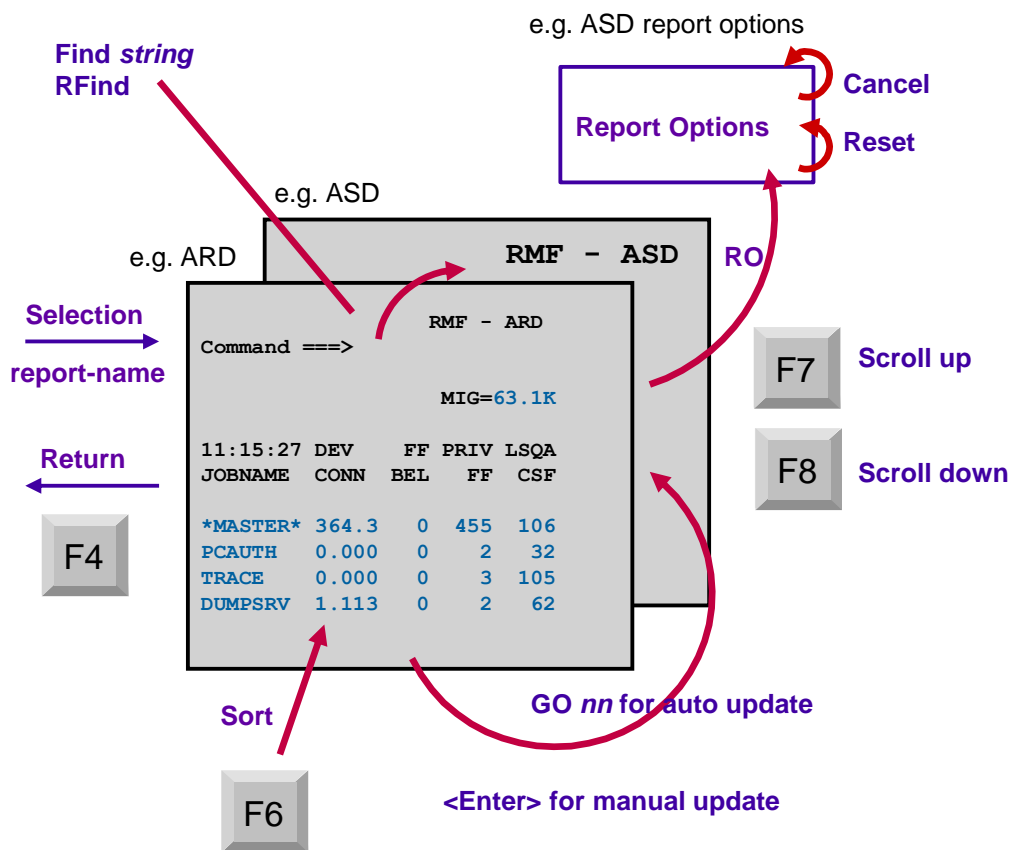
RMF
Selection ==>
Enter selection number or command

1 Address Spaces
2 I/O Subsystem
3 Resource

L Library Lists
U User
    
```

Other commands:

H	Prints all reports
D	Delta-mode
Print	Prints current screen
Sys	Remote reporting
Keys	View/Assign PF-keys



# Monitor II: ARD Report



RMF - ARD Address Space Resource Data Line 1 of 48

Command ==> Scroll ==> PAGE

CPU= 45/ 30 UIC=2540 PR= 0 System= SCLM Total

16:04:11 DEV	FF	PRV	LSQA	LSQA	SRM	TCB	CPU	EXCP	SWAP	LPA	CSA	NVI	V&H			
JOBNAME	CONN	16M	FF	CSF	ESF	M	CR	ABS	TIME	TIME	RATE	RATE	RT	RT	RT	RT
HSM	79920	1	4	136	6		0.0	8508	10575	0.01	0.00	0.0	0.0	0.0	0.0	0.0
ANTMAIN	28880	2	23	160	12	X	0.0	360.2	427.7	0.00	0.00	0.0	0.0	0.0	0.0	0.0
*MASTER*	8616	0	731	102	18		0.0	296.6	2652	0.04	0.00	0.0	0.0	0.0	0.0	0.0
XCFAS	4485	0	2K	1059	459	X	0.0	409.7	796.5	2.41	0.00	0.0	0.0	0.0	0.0	0.0
IOSAS	3774	0	29	109	10	X	0.0	46.07	46.89	0.02	0.00	0.0	0.0	0.0	0.0	0.0
RMFGAT	3144	1	20	65	6	X	0.0	5160	5236	0.67	0.00	0.0	0.0	0.0	0.0	0.0
JES2	773.4	9	66	185	43		0.0	360.8	455.3	2.19	0.00	0.0	0.0	0.0	0.0	0.0
SMSVSAM	771.2	1	205	764	85	X	0.0	434.8	550.2	1.55	0.00	0.0	0.0	0.0	0.0	0.0
SMS	697.1	0	2	53	12	X	0.0	166.1	174.2	2.88	0.00	0.0	0.0	0.0	0.0	0.0
OMVS	548.4	5	131	630	60	X	0.0	85.77	103.0	0.00	0.00	0.0	0.0	0.0	0.0	0.0
CATALOG	376.5	0	2	234	1	X	0.0	111.7	117.4	0.21	0.00	0.0	0.0	0.0	0.0	0.0
HSMMON	81.79	0	3	53	9		0.0	99.15	101.8	0.19	0.00	0.0	0.0	0.0	0.0	0.0
NET	66.93	0	36	79	67	X	0.0	771.0	1556	0.00	0.00	0.0	0.0	0.0	0.0	0.0
SMF	52.73	0	2	56	8	X	0.0	0.20	3.70	0.00	0.00	0.0	0.0	0.0	0.0	0.0
LLA	27.73	0	40	67	14	X	0.0	3.65	4.09	0.06	0.00	0.0	0.0	0.0	0.0	0.0
NETVSCLM	24.02	1	5	148	31	X	0.0	115.1	125.9	0.00	0.00	0.0	0.0	0.0	0.0	0.0
IXGLOGR	23.65	0	5	87	48	X	0.0	38.28	45.04	0.00	0.00	0.0	0.0	0.0	0.0	0.0

Address Space Resource Consumption at a Glance !

- ▶ I/O Activity
- ▶ Frame Counts
- ▶ CPU Time

↑  
all Table Reports are sortable !

# Monitor II: OPT Report



RMF - OPT Settings Line 1 of 37

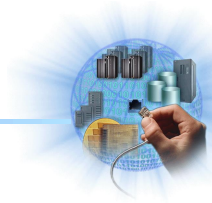
CPU= 3/ 1 UIC= 65K PR= 0 System= SYSE Total

OPT: P0 Time: 02/05/16 12:30:01

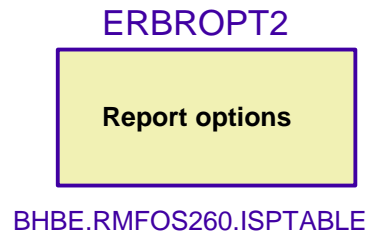
Parameter	Default	Value	Unit	Description
ABNORMALTERM	Yes	Yes	Y/N	Abnormal terminations in routing
ABSMSUCAPPING	No	Yes	Y/N	Absolute, permanent MSU capping
BLWLINTHD	20	20	sec	Time blocked work waits for help
BLWLTRPCT	5	5	0/00	CPU cap. to promote blocked work
CCCAWMT	3200	3200	usec	Alternate wait management time
CCCSIGUR	45	24	msec	Min. mean-time-to-wait threshold
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
FULLPRESYSTEM	No	No	Y/N	System AS can preempt other work
HIPERDISPATCH	Yes	Yes	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
MANAGENONENCLAVE	No	No	Y/N	Manage non-enclave work
MAXPROMOTETIME	6	6	*10s	Holder allowed to run promoted
MCCAFCTH	400,800	3866,7732	#	Threshold for storage (low,ok)
MCCFXEPR	92	92	%	Fixed storage threshold < 16 MB
MCCFXTPR	80	80	%	Fixed online storage threshold
MT_CP_MODE	1	1	#	MT CP mode

Display current setting of IEAOPTxx parmlib parameter

# Monitor II Session Setup



1. ALLOC F(RMFDMTSO)  
 DA('BHBE.M2.REPORTS') disp  
 DCB=(RECFM=VBA,BLKSIZE=1693,LRECL=137)
2. RMF MON2



H | Print

```

RMF - ARD
Command ==>
MIG=63.1K
11:15:27 DEV    FF PRIV LSQA
JOBNAME  CONN  BEL  FF  CSF
*MASTER* 364.3  0  455 106
PCAUTH   0.000  0   2  32
TRACE    0.000  0   3 105
DUMPSRV  1.113  0   2  62
  
```



# Monitor II Display Modes



Specific resource or job, e.g. job BHOL

All resources or jobs at a specific point in time

```

RMF - ARDJ Address Space Resou
Command ==>

CPU= 19/ 19 UIC=2540

BHOL  DEV  FF PRIV LSQA LSQA X SRM  TCB
TIME  CONN BEL  FF  CSF  ESF M  ABS  TIME
13:16:46 16.87 3 3 79 0 65K 7.20
13:16:47 16.88 3 3 79 0 65K 7.20
13:16:48 16.89 3 3 79 0 65K 7.20
13:16:49 16.90 3 3 79 0 65K 7.21
13:16:50 16.91 3 3 79 0 65K 7.21
13:16:51 16.92 3 3 79 0 65K 7.21
13:16:52 16.93 3 3 79 0 65K 7.22
13:16:53 16.94 3 3 79 0 65K 7.22
13:16:54 16.95 3 3 79 0 65K 7.22
    
```

```

RMF - ARD Address Space Resour
Command ==>

CPU= 9/ 8 UIC=2540

13:20:26 DEV  FF PRIV LSQA LSQA X SRM  TCB
JOBNAME CONN BEL  FF  CSF  ESF M  ABS  TIME
*MASTER* 409.1 0 503 106 0 0.0 34.00 2
PCAUTH 0.000 0 2 32 0 X 0.0 0.00
RASP 0.000 0 4 12 0 0.0 0.00
TRACE 0.000 0 3 105 0 X 0.0 0.00
DUMPSRV 1.113 0 2 62 2 0.0 0.05
XCFAS 273.9 0 1420 749 5 X 0.0 28.64
GRS 0.000 0 40 692 0 X 0.0 241.01 3
SMXC 0.000 0 2 33 0 0.0 30.28
SYSBMAS 0.000 0 41 73 0 0.0 3.94
    
```

## Row Report

→ Current status in highlighted line

## Table Report

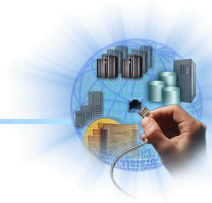
→ Current status in whole report

# Monitor II Report Overview



Name	Mon I	Row	Explanation
ARD			Address space resource data
ARDJ		Y	
ASD			Address space state data
ASDJ		Y	
ASRM			Address space SRM data
ASRMJ		Y	
CHANNEL			Channel path activity data
DEV	Y		Device activity data
DEVV	Y	Y	
HFS			HFS statistics
ILOCK			IRLM locking data
IOQUEUE	Y		I/O queuing activity data
LLI			Library lists
OPT			IEAOPTxx Settings
PGSP	Y		Page/swap data set activity
SDS			Sysplex data server statistics
SENQ			Enqueue contention
SENQR			Enqueue reserve activity
SPAG		Y	Paging activity
SRCS		Y	Central storage, processor, SRM

# RMF Monitor III Data Portal



- ▶ direct connection to the RMF Distributed Data Server
- ▶ just specify **http://<hostname>:8803**
- ▶ Subset of RMF Monitor III Reports and metrics available



The screenshot shows a web browser window with the address bar containing 'boesysc:8803'. The page title is 'RMF Data Portal for z/OS'. The navigation menu includes 'Home', 'Explore', 'Overview', 'My View', and 'RMF'. The main content area features a large graphic with binary code, a bar chart, and a smiling man's face. Below the graphic is a copyright notice: '© IBM Corporation, 1998-2015'. Underneath is a section titled 'Important notes:' with a bulleted list of instructions and supported browsers. At the bottom, there is a footer with technical details: 'Server running on: Sysplex: SYSAPLEX, SMF-Id: SYSC, System Name: SYSC, OS Type+Version: z/OS 2.2.0 SP7.2.2' and trademark information.

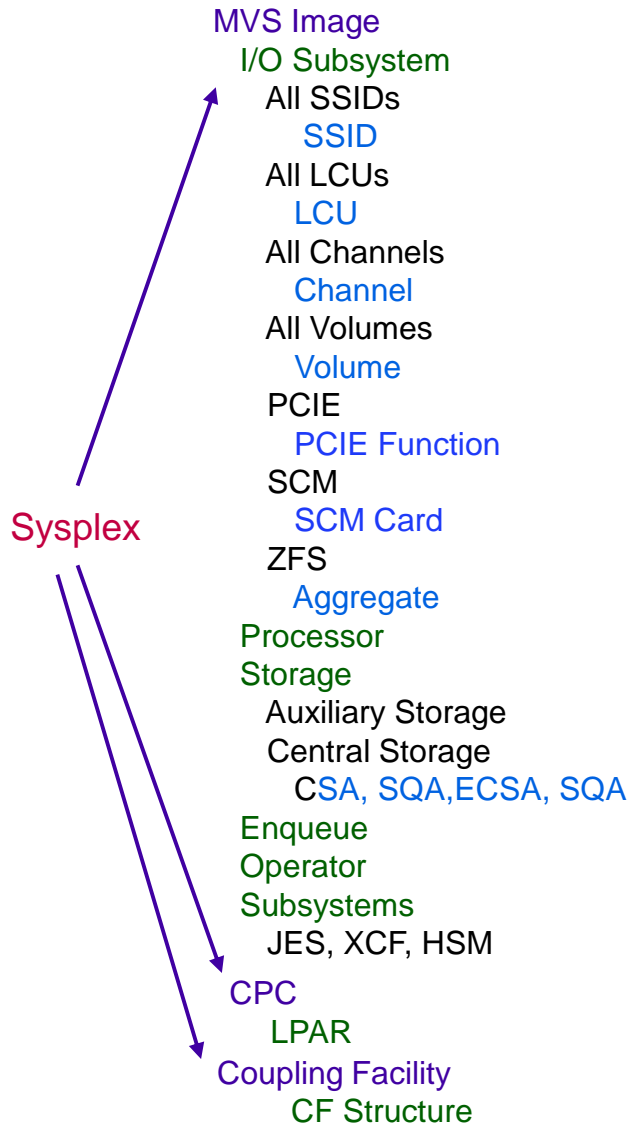
Important notes:

- When using this application you will be prompted to login to the Sysplex with a valid userid and password.
- This application requires Javascript to be enabled
- For some functions (such as "My View") you must allow your browser to store cookies.
- This application has been successfully tested with:
  - Microsoft Internet Explorer Version 9, 10 and 11 for Windows
  - The Mozilla Suite or Firefox Browser Version ESR 24 and 31 from www.mozilla.org for various platforms.

Server running on: Sysplex: SYSAPLEX, SMF-Id: SYSC, System Name: SYSC, OS Type+Version: z/OS 2.2.0 SP7.2.2  
 Trademarks: z/OS, z/Series, and RMF are trademarks of the IBM Corporation. Windows (XP, Vista, Windows 7) and Internet Explorer are trademarks of the Microsoft Corporation. Linux is a registered trademark of Linus Torvalds. Mozilla and Firefox are trademarks of the the Mozilla Foundation.



# RMF Monitor III Data Portal - The Resource Model



➔ The Sysplex is the top-level resource

RMF Data Portal for z/OS

Welcome, you are connected to: **,SYSAPLEX,SYSPLEX**

**RMF Monitor III Data:**

Icon	Resource	Metrics	Attributes	Res-Type
	<b>,SYSAPLEX,SYSPLEX</b>	Metrics	Show	SYSPLEX

RMF Data Portal for z/OS

**Children of: ,SYSAPLEX,SYSPLEX**

Icon	Resource	Metrics	Attributes	Res-Type
	,SYSB,MVS_IMAGE	Metrics	Show	MVS_IMAGE
	,SYSC,MVS_IMAGE	Metrics	Show	MVS_IMAGE
	,SYSA,MVS_IMAGE	Metrics	Show	MVS_IMAGE
	,CF01,COUPLING_FACILITY	Metrics	Show	COUPLING_FACILITY
	,CF02,COUPLING_FACILITY	Metrics	Show	COUPLING_FACILITY
	,4255,CPC	Metrics	Show	CPC



# RMF Monitor III Data Portal - The Resource Model



Resource specific actions:

- ▶ List metrics
- ▶ Show attributes

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

Welcome, you are connected to: ,SYSAPLEX,SYSPLEX

**RMF Monitor III Data:**

Icon	Resource	Metrics	Attributes	Res-Type
	,SYSAPLEX,SYSPLEX	<a href="#">Metrics</a>	<a href="#">Show</a>	SYSPLEX

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

**Full RMF Reports:**

CACHDET	CACHSUM	CFACT	CFOVER	CFSYS	SPACED	SPACEG	SYSSUM	XCFGROUP	XCFOWW	XCFPATH
XCFSYS	ZFSFS	ZFSKN	ZFSOWW							

**Available metrics for: ,SYSAPLEX,SYSPLEX**

Metric description	Help	Id
<a href="#">% delay</a>	<a href="#">Explanation</a>	8D0160
<a href="#">% delay for enqueue</a>	<a href="#">Explanation</a>	8D1A20
<a href="#">% delay for i/o</a>	<a href="#">Explanation</a>	8D1A80
<a href="#">% delay for operator</a>	<a href="#">Explanation</a>	8D1AE0
<a href="#">% delay for processor</a>	<a href="#">Explanation</a>	8D1B40
<a href="#">% delay for storage</a>	<a href="#">Explanation</a>	8D1BA0
<a href="#">% delay for swsub</a>	<a href="#">Explanation</a>	8D1C00

RMF Data Portal for z/OS Home Explore Overview

**Attributes of: ,SYSAPLEX,SYSPLEX**

Description	Value
Service Definition name	system
Service Definition installation time	11/09/16, 18.14.03
Name of active WLM service policy	POLICY01
Activation time of WLM service policy	11/09/16, 18.14.10
Sysplex Name	SYSAPLEX

# RMF Monitor III Data Portal - The Resource Model



Resource specific actions:

▶ View a metric

RMF Data Portal for z/OS [Home](#) [Explore](#) [Overview](#) [My View](#) ?

Full RMF Reports:

CACHDET	CACHSUM	CFACT	CFOVER	CFSYS	SPACED	SPACEG	SYSSUM	XCFGROUP	XCFOWW	XCFPATH
XCFSYS	ZFSFS	ZFSKN	ZFSOWW							

Available metrics for: ,SYSAPLEX,SYSPLEX

Metric description	Help	Id
% delay	<a href="#">Explanation</a>	8D0160
% delay for enqueue	<a href="#">Explanation</a>	8D1A20
% delay for i/o	<a href="#">Explanation</a>	8D1A80
% delay for operator	<a href="#">Explanation</a>	8D1AE0
% delay for processor	<a href="#">Explanation</a>	8D1B40
% delay for storage	<a href="#">Explanation</a>	8D1BA0
% delay for swsub	<a href="#">Explanation</a>	8D1C00
% using	<a href="#">Explanation</a>	8D04A0
% using for i/o		
% using for processor		
% workflow		
% workflow for i/o		
% workflow for processor		
# active users		
# delayed i/o requests		
# users		
to delay with request rate		

Get metric help

click  
Add to My View  
for Persistence

select  
Metric from List

RMF Data Portal for z/OS [Home](#) [Explore](#) [Overview](#) [My View](#) ?

Navigation icons: back, forward, refresh

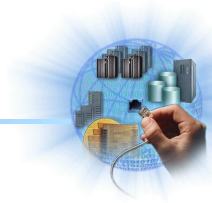
,SYSAPLEX,SYSPLEX -- # users [8D0D50] (count)

Time Range: 01/26/2017 15:13:00 - 01/26/2017 15:14:00

	444	
--	-----	--

Add to My View

# RMF Monitor III Data Portal - metrics



Each resource is associated with various metrics

Two basic metric types:

Single valued metrics - consists of exactly one value

List valued metrics - is represented by a list of name/value pairs

.SYSAPLEX,SYSPLEX -- % total utilization by channel path [8D0090] (percent)		SYSC,30,CHANNEL_PATH -- % total utilization [8D0080] (percent)	
Time Range: 01/26/2017 15:16:00 - 01/26/2017 15:17:00		Time Range: 01/26/2017 15:16:00 - 01/26/2017 15:17:00	
SYSC.30	0.7	0.7	
SYSC.38	0.7		
SYSB.30	0.7		
SYSB.38	0.7		
SYSA.30	0.7		
SYSA.38	0.7		
SYSC.34	0.1		
SYSA.34	0.1		
SYSB.34	0.1		
SYSA.3C	0		
SYSA.B4	0		
SYSB.3C	0		
SYSC.B4	0		
SYSC.3C	0		
SYSB.B4	0		

This window will automatically refresh every 60 seconds (MINTIME) ...

# RMF Monitor III Data Portal...



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

← → ↻

**,SYSAPLEX,SYSPLEX -- # users [8D0D50] (count)**

Time Range: 01/26/2017 15:13:00 - 01/26/2017 15:14:00

444
-----

**Add to My View**

select favorite Metric from List

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

### Manage Metrics in My View

Select	Origin	Resource	Metric Id
<input checked="" type="checkbox"/> (1)	My View	,SYSAPLEX,SYSPLEX	8D0090
<input checked="" type="checkbox"/> (2)	My View	SYSC,30,CHANNEL_PATH	8D0080
<input checked="" type="checkbox"/> (3)	Added (New)	,SYSAPLEX,SYSPLEX	8D0D50

OK CANCEL HELP

Manage My View

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

Welcome, you are connected to:

**RMF Monitor III Data:**

Icon	Resource	Metrics	Attributes	Res-Type
	,SYSAPLEX,SYSPLEX	Metrics	Show	SYSPLEX

My View definitions are stored persistently

<p><b>,SYSAPLEX,SYSPLEX -- % total utilization by channel path [8D0090] (percent)</b></p> <p>Time Range: 01/26/2017 15:24:00 - 01/26/2017 15:25:00</p> <table border="1"> <tr><td>SYSC.30</td><td>0.7</td></tr> <tr><td>SYSC.38</td><td>0.7</td></tr> <tr><td>SYSB.30</td><td>0.7</td></tr> <tr><td>SYSB.38</td><td>0.7</td></tr> <tr><td>SYSA.30</td><td>0.7</td></tr> </table>	SYSC.30	0.7	SYSC.38	0.7	SYSB.30	0.7	SYSB.38	0.7	SYSA.30	0.7	<p><b>SYSC,30,CHANNEL_PATH -- % total utilization [8D0080] (percent)</b></p> <p>Time Range: 01/26/2017 15:24:00 - 01/26/2017 15:25:00</p> <table border="1"> <tr><td>0.7</td></tr> </table>	0.7
SYSC.30	0.7											
SYSC.38	0.7											
SYSB.30	0.7											
SYSB.38	0.7											
SYSA.30	0.7											
0.7												
<p><b>,SYSAPLEX,SYSPLEX -- # users [8D0D50] (count)</b></p> <p>Time Range: 01/26/2017 15:24:00 - 01/26/2017 15:25:00</p> <table border="1"> <tr><td>445</td></tr> </table>	445											
445												

This window will automatically refresh every 60 seconds (MINTIME) ...

# RMF Monitor III Data Portal...



- Sysplex-wide reports and single system reports available via *Metrics* selection
- View full RMF Monitor III Reports (also hidden fields)

Scrollable and resizable!

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

Welcome, you are connected to: ,SYSAPLEX,SYSPLEX

**RMF Monitor III Data:**

Icon	Resource	Metrics	Attributes	Res-Type
	,SYSAPLEX,SYSPLEX	<a href="#">Metrics</a>	<a href="#">Show</a>	SYSPLEX

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

**Full RMF Reports:**

CACHDET	CACHSUM	CFACT	CFOVER	CFSYS	SPACED	SPACEG	SYSSUM	XCFGROUP	XCFOW
XCFSYS	ZF8FS	ZFSKN	ZFSOW						

**Available metrics for: ,SYSAPLEX,SYSPLEX**

Metric description	Help
% delay	<a href="#">Explanation</a>
% delay for enqueue	<a href="#">Explanation</a>
% delay for i/o	<a href="#">Explanation</a>
% delay for operator	<a href="#">Explanation</a>

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

**Children of: ,SYSAPLEX,SYSPLEX**

Icon	Resource	Metrics	Attributes	Res-Type
	,SYSB,MVS_IMAGE	<a href="#">Metrics</a>	<a href="#">Show</a>	MVS_IMAGE
	,SYSC,MVS_IMAGE	<a href="#">Metrics</a>	<a href="#">Show</a>	MVS_IMAGE
	,SYSB,MVS_IMAGE	<a href="#">Metrics</a>	<a href="#">Show</a>	MVS_IMAGE
	,CF01,COUPLING_FACILITY	<a href="#">Metrics</a>	<a href="#">Show</a>	COUPLING_FACILITY
	,CF02,COUPLING_FACILITY	<a href="#">Metrics</a>	<a href="#">Show</a>	COUPLING_FACILITY
	,4255,CPC	<a href="#">Metrics</a>	<a href="#">Show</a>	CPC

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

**Full RMF Reports:**

CHANNEL	CPC	DELAY	DEV	DEV	DEV	DSND	ENCLAVE	ENG	HSM	JES	IOQ
LOCKSP	LOCKSU	OPD	PCIE	PROC	PROCU	SCM	STOR	STORC	STORCR	STORF	
STORM	STORR	STORS	SYSINFO	USAGE	ZFSACT	ZFSSUM					

**Available metrics for: ,SYSC,MVS\_IMAGE**

Metric description	Help	Id
% delay	<a href="#">Explanation</a>	8D0160
% idle	<a href="#">Explanation</a>	8D03E0

# RMF Monitor III Data Portal...



RMF Data Portal for z/OS [Home](#) [Explore](#) [Overview](#) [My View](#)

---

**Full RMF Reports:**

CHANNEL	CPC	DELAY	DEV	DEVR	DSND	ENCLAVE	ENQ	HSM	JES	IOQ
LOCKSP	LOCKSU	OPD	PCIE	PROC	PROCU	SCM	STOR	STORC	STORCR	STORF
STORM	STORR	STORS	SYSINFO	USAGE	ZFSACT	ZFSSUM				

**Available metrics for: ,SYSC,MVS\_IMAGE**

Metric description	Help
% delay	Explanation
% idle	Explanation

**Select MIII Report**

RMF Data Portal for z/OS [Home](#) [Explore](#) [Overview](#) [My View](#)

---

20170126153100

**RMF Report [,SYSC,MVS\_IMAGE] : USAGE (Job Oriented Usage)**

Time Range: 01/26/2017 15:31:00 - 01/26/2017 15:32:00

Jobname	ASID (dec)	Job Class	Job Class Ext	Service Class	Period	Dispatching Priority	Transaction Active Time	Transaction Resident Time
RMFGAT	0114	S	SO	SYSSTC	1	FE	117:06:51	117:06:51
XCFAS	0006	S	S	SYSTEM	1	FF	117:07:53	117:07:53
SMF	0030	S	S	SYSTEM	1	FF	117:07:53	117:07:53
JES2	0052	S	S	SYSSTC	1	FE	117:06:55	117:06:55
*MASTER*	0001	S	S	SYSTEM	1	FF	117:08:33	117:08:33
CATALOG	0042	S	S	SYSTEM	1	FF	0:30:56	0:30:56
SMS	0024	S	S	SYSSTC	1	FE	117:07:49	117:07:49

# RMF Monitor III Data Portal...



Timing adjustments:  
 - step backward, forward  
 - jump to current time  
 - key in a time stamp  
 - use GO mode

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

20170126153200

RMF Report [,SYSC,MVS\_IMAGE] : USAGE (Job Oriented Usage)

Time Range: 01/26/2017 15:32:00 - 01/26/2017 15:33:00

Jobname	ASID (dec)	ASID	Period	Dispatching Priority	Transaction Active Time	Transaction Resident Time	Transaction Count	Total Frames	Fixed Frames	Fixed Frames High
FPGHWAM	0016	The address space id of a Job, TSO Userid, started task or USS address space. Unless otherwise indicated RMF displays the ASID number in decimal and not in hexadecimal notation.		FF	117:08:53	117:08:53	1	16968	16552	1650
XCFAS	0008		FF	117:08:53	117:08:53	1	7047	2723	1175	
*MASTER*	0001		FF	117:09:33	117:09:33	1	6632	1351	1175	
JES2	0054		FE	117:07:55	117:07:55	1	9364	1042	1175	
TRACE	0004		FF	117:09:33	117:09:33	1	871	835	1175	
TCPIP	0133		FE	117:07:26	117:07:26	1	14435	673	1175	
			FE	117:08:46	117:08:46	1	32245	504	462	

Fly over help!

Sort: Ascending or Descending

# RMF Data Portal: Postprocessor Reports in XML Format



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
	<a href="#">,SYSDPLEX,SYSPLEX</a>	<a href="#">Metrics</a>	<a href="#">Show</a>

**RMF Postprocessor Reports:**

Reports:

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

CF
  SDEVICE
  WLMGL

OVW

Filter Options:

Date(Start,End)  POLICY   
 SysID  RCLASS   
 Time of Day  RCPER   
 Duration  SCLASS   
 SCPER   
 SYSNAM   
 WGPER   
 WGROUP

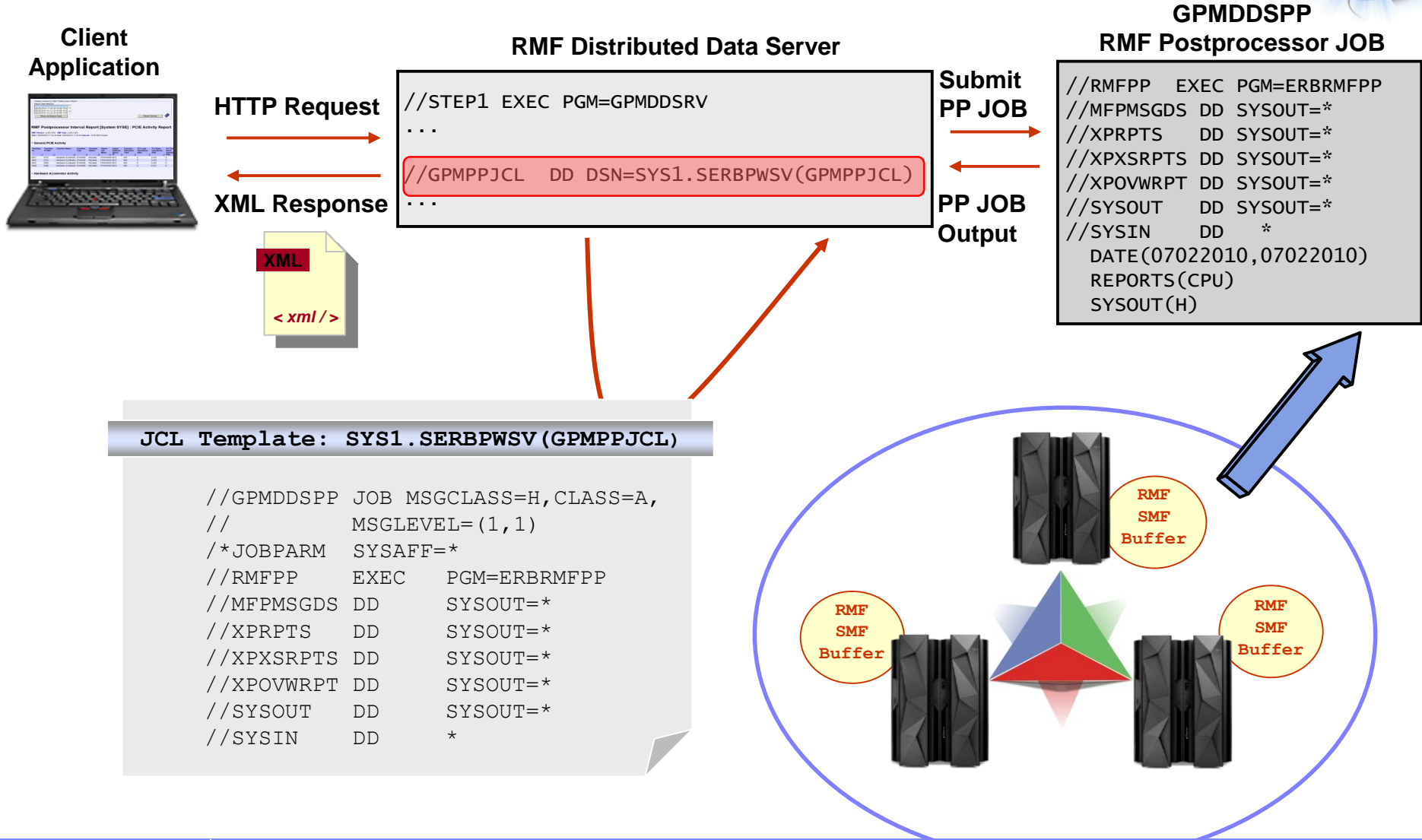
**Enhanced GUI**

**Extended Filtering Options**

Or use the Distributed Data Server HTTP API



# RMF Data Portal: Postprocessor Reports in XML Format



# RMF Data Portal: Postprocessor Reports in XML Format



Postprocessor report

file:///C:/Users/IBM\_ADMIN/AppData/Roaming/RMF/RMF Postprocessor XML Toolkit/PCIE.xml

Display Controls for RMF Postprocessor Report

Report Data Selection:

- 09/28/2015-15.44.35 SYSE PCIE
- 09/28/2015-15.44.35 S4 PCIE
- 09/28/2015-15.59.35 SYSE PCIE
- 09/28/2015-15.59.35 S4 PCIE

Show all Report Data

Reset Sorting

Select intervals

Sort columns

## RMF Postprocessor Interval Report [System SYSE] : PCIE Activity Report

RMF Version : z/OS V2R2 SMF Data : z/OS V2R2  
 Start : 09/28/2015-15.44.35 End : 09/28/2015-15.59.34 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	Read Transfer Rate	Write Transfer Rate	Packets Received Rate	Packets Transmitted Rate	Work Units Processed Rate	Adapter Utilization
0021	037C	Hardware Accelerator	1014044B	Allocated	FPGHWAM 0012		900	0	0.003	0	0.196	1	0	0				
0025	037C	Hardware Accelerator	1014044B	Allocated	FPGHWAM 0012		900	0	0.003	0	0.196	1	0	0				
0028	03BC	Hardware Accelerator	1014044B	Allocated	FPGHWAM 0012		900	0	0.003	0	0.196	1	0	0				
002B	03BC	Hardware Accelerator	1014044B	Allocated	FPGHWAM 0012		900	0	0.002	0	0.196	1	0	0				

### Hardware Accelerator Activity

Function ID	Time Busy %	Request Execution Time	Std Dev for Request Execution Time	Request Rate	Request Size	Transfer Rate Total
0021	<.001	47.4	0.759	745	2.30	72.5
0025	<.001	43.8	4.56	595	60.6	62.8
0028	<.001	43.3	4.59	685	59.6	62.0
002B	<.001	41.6	6.23	657	64.8	57.1

Expand & collapse sections

### 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
0021	0.036	0.002	6.45	0	0		16	0
0025	0.036	0.002	6.34	0	0		16	0
0028	0.036	0.002	6.49	0	0		16	0
002B	0.053	0.003	7.42	0	0		16	0

## z/OSMF RM



IBM z/OS Management Facility

Welcome shara01

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, Linux or Windows system complexes that you want to monitor in the Resource Monitoring task.

Resources

Actions

No filter applied

Resource Filter	System Type Filter	Connectivity Filter	Performance Index Status Filter	Related Service Definition Filter
<input type="checkbox"/> LOCALPLEX	z/OS	Connected	<input checked="" type="checkbox"/> PI <= 1 for all periods	SHARPLEX

Total: 1 Selected: 0

Refresh Last refresh: Feb 15, 2016, 4:30:54 PM local time (Feb 15, 2016, 3:30:54 PM GMT)

Automatic refresh

Use the automatically detected system or define your own!

# z/OSMF RM



The screenshot shows the IBM z/OS Management Facility (z/OSMF) web interface. The browser address bar displays `https://mvs1.centers.ihost.com/zosmf/`. The page title is "IBM z/OS Management Facility" and the user is logged in as "shara01". The left navigation pane shows the "System Status" menu item under the "Performance" section. The main content area displays the "Add Entry" form for "System Status". The form fields are:

- \* Resource name:
- \* Host name or IP address:
- \* Target system type:
  - (highlighted)
  - (selected)
  - 
  - 
  -

A blue speech bubble contains the text: "Monitor your z System but also your AIX, Linux on System z and Linux on System via via GPM4CIME".

# z/OSMF RM



IBM z/OS Management Facility

System Status x Resource Monito... x

Resource Monitoring

Dashboards

Actions

No filter applied

<input type="checkbox"/>	Name Filter
<input type="checkbox"/>	Common Storage Activity
<input type="checkbox"/>	Coupling Facility Overview
<input type="checkbox"/>	Execution Velocity
<input type="checkbox"/>	General Activity
<input type="checkbox"/>	Overall Image Activity
<input type="checkbox"/>	Performance Index
<input type="checkbox"/>	Response Time
<input type="checkbox"/>	Using & Delays
<input type="checkbox"/>	XCF Activity

Total: 9 Selected: 0

Refresh Last refresh: Feb 15, 2016, 4:41:35 PM local time (Feb 15, 2016, 3:41:35 PM GMT)

Use Actions to create your own dashboard!

Set of predefined dashboards

# z/OSMF RM



https://mvs1.centers.ihost.com/zosmf/

IBM z/OS Management Facility

Welcome shara01

Resource Monitoring

Storage Soaker (Running)

Start Pause Stop Save Actions

**Dashboard with multiple metric groups**

Active & Fixed Frames (WLM View)	Active Frames	Fixed Frames																																																																																																							
<table border="1"> <tr><td>SYSSTC.1</td><td>9981</td><td>239000</td></tr> <tr><td>SYSTEM.1</td><td>7161</td><td>419000</td></tr> <tr><td>STCLO.1</td><td>5749</td><td>668000</td></tr> <tr><td>SHRDB2.1</td><td>1450</td><td>71240</td></tr> <tr><td>STCMD.1</td><td>1097</td><td>1156</td></tr> <tr><td>OMVS.3</td><td>1065</td><td>98911</td></tr> <tr><td>OMVS.1</td><td>417</td><td>2580</td></tr> <tr><td>TSO.1</td><td>369</td><td>0</td></tr> <tr><td>STCHI.1</td><td>323</td><td>1789</td></tr> <tr><td>BATCH.1</td><td>87</td><td>499</td></tr> <tr><td>OMVS.2</td><td>83</td><td>553</td></tr> </table>	SYSSTC.1	9981	239000	SYSTEM.1	7161	419000	STCLO.1	5749	668000	SHRDB2.1	1450	71240	STCMD.1	1097	1156	OMVS.3	1065	98911	OMVS.1	417	2580	TSO.1	369	0	STCHI.1	323	1789	BATCH.1	87	499	OMVS.2	83	553	<table border="1"> <tr><td>BLZZSRV [00A3]</td><td>487000</td></tr> <tr><td>OMVS [000F]</td><td>252000</td></tr> <tr><td>IZUSVR1 [003C]</td><td>131000</td></tr> <tr><td>ZFS [000E]</td><td>113000</td></tr> <tr><td>DUMPSRV [0005]</td><td>96862</td></tr> <tr><td>DBS1DBM1 [0021]</td><td>62159</td></tr> <tr><td>RSED4 [0094]</td><td>40072</td></tr> <tr><td>RSED2 [009C]</td><td>39480</td></tr> <tr><td>WLM [000A]</td><td>33462</td></tr> <tr><td>RSED [0038]</td><td>25201</td></tr> <tr><td>DBS1IRLM [0088]</td><td>20831</td></tr> <tr><td>RMFGAT [0035]</td><td>18505</td></tr> <tr><td>VLF [0024]</td><td>17956</td></tr> <tr><td>CFZCIM1 [0093]</td><td>15547</td></tr> <tr><td>TCPIP [0028]</td><td>12400</td></tr> <tr><td>JES2 [001E]</td><td>11134</td></tr> <tr><td>RMF [009D]</td><td>9819</td></tr> </table>	BLZZSRV [00A3]	487000	OMVS [000F]	252000	IZUSVR1 [003C]	131000	ZFS [000E]	113000	DUMPSRV [0005]	96862	DBS1DBM1 [0021]	62159	RSED4 [0094]	40072	RSED2 [009C]	39480	WLM [000A]	33462	RSED [0038]	25201	DBS1IRLM [0088]	20831	RMFGAT [0035]	18505	VLF [0024]	17956	CFZCIM1 [0093]	15547	TCPIP [0028]	12400	JES2 [001E]	11134	RMF [009D]	9819	<table border="1"> <tr><td>BLZZSRV [00A3]</td><td>2510</td></tr> <tr><td>IZUSVR1 [003C]</td><td>1531</td></tr> <tr><td>OMVS [000F]</td><td>1452</td></tr> <tr><td>XCFAS [0006]</td><td>1173</td></tr> <tr><td>TRACE [0004]</td><td>1097</td></tr> <tr><td>JES2 [001E]</td><td>1046</td></tr> <tr><td>*MASTER* [0001]</td><td>929</td></tr> <tr><td>ZFS [000E]</td><td>851</td></tr> <tr><td>DBS1DBM1 [0021]</td><td>846</td></tr> <tr><td>DUMPSRV [0005]</td><td>787</td></tr> <tr><td>RASP [0003]</td><td>476</td></tr> <tr><td>RSED4 [0094]</td><td>388</td></tr> <tr><td>TCPIP [0028]</td><td>337</td></tr> <tr><td>RSED2 [009C]</td><td>335</td></tr> <tr><td>WLM [000A]</td><td>298</td></tr> <tr><td>RSED [0038]</td><td>270</td></tr> <tr><td>DBS1IRLM [0088]</td><td>251</td></tr> <tr><td>CFZCIM1 [0093]</td><td>248</td></tr> </table>	BLZZSRV [00A3]	2510	IZUSVR1 [003C]	1531	OMVS [000F]	1452	XCFAS [0006]	1173	TRACE [0004]	1097	JES2 [001E]	1046	*MASTER* [0001]	929	ZFS [000E]	851	DBS1DBM1 [0021]	846	DUMPSRV [0005]	787	RASP [0003]	476	RSED4 [0094]	388	TCPIP [0028]	337	RSED2 [009C]	335	WLM [000A]	298	RSED [0038]	270	DBS1IRLM [0088]	251	CFZCIM1 [0093]	248
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■ S1\*, STORAGE # frames fixed by WLM service class period  
■ S1\*, STORAGE # frames active by WLM service class period

02/15/2016 11:56:00 - 02/15/2016 11:57:00 (2/2)

02/15/2016 11:56:00 - 02/15/2016 11:57:00 (5/5)

02/15/2016 11:56:00 - 02/15/2016 11:57:00 (5/5)

# z/OSMF RM

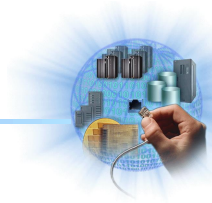


The screenshot shows the IBM z/OSMF Resource Monitoring interface. A dialog box titled "Retrieve Historical Data" is open, allowing users to specify parameters for data retrieval. The dialog includes the following fields and options:

- Metric groups:** A dropdown menu with options: "Active & Fixed Frames (WLM View)", "Active Frames", and "Fixed Frames".
- Timeframe:** A section with "Condition" set to "Past", "Amount" set to "2", and "Unit" set to "Hours".
- Data sample range:** Two radio buttons: "Use the default range" (unselected) and "Specify the range in seconds:" (selected). The "Specify the range in seconds:" field contains the value "600".
- Buttons:** "OK", "Restore Defaults", "Cancel", and "Help".

A blue callout bubble with the text "Retrieve historical data !" points to the dialog box. In the background, a bar chart displays various metrics with values such as 2510, 1531, 1452, 173, 997, and 46.

## z/OSMF RM



IBM z/OS Management Facility

Welcome shar201

Resource Monitoring

Export Dashboard

Step1: Select Scope and Intervals

Step2: Select Metrics and Resources

Select the scope and interval range of the data to export in CSV format.

**Scope of Data to Export**

- Metric group: Active & Fixed Frames (WLM View)
- Include all metrics and resources
- Include a selection of metrics and resources
- Entire dashboard with all metrics and resources

**Range of Intervals to Export**

Start time of first interval: 02/16/2016 02:00:45

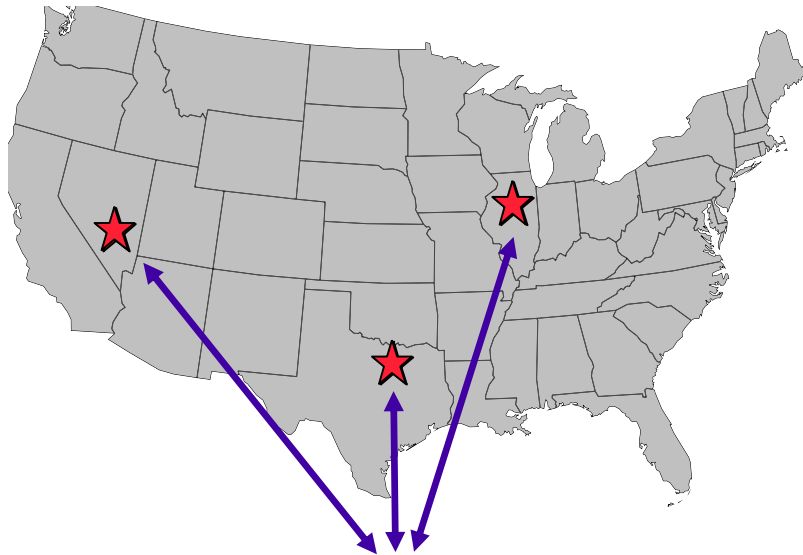
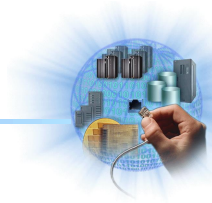
End time of last interval: 02/16/2016 09:26:00

Export data to CSV

< Back Next > Finish Cancel

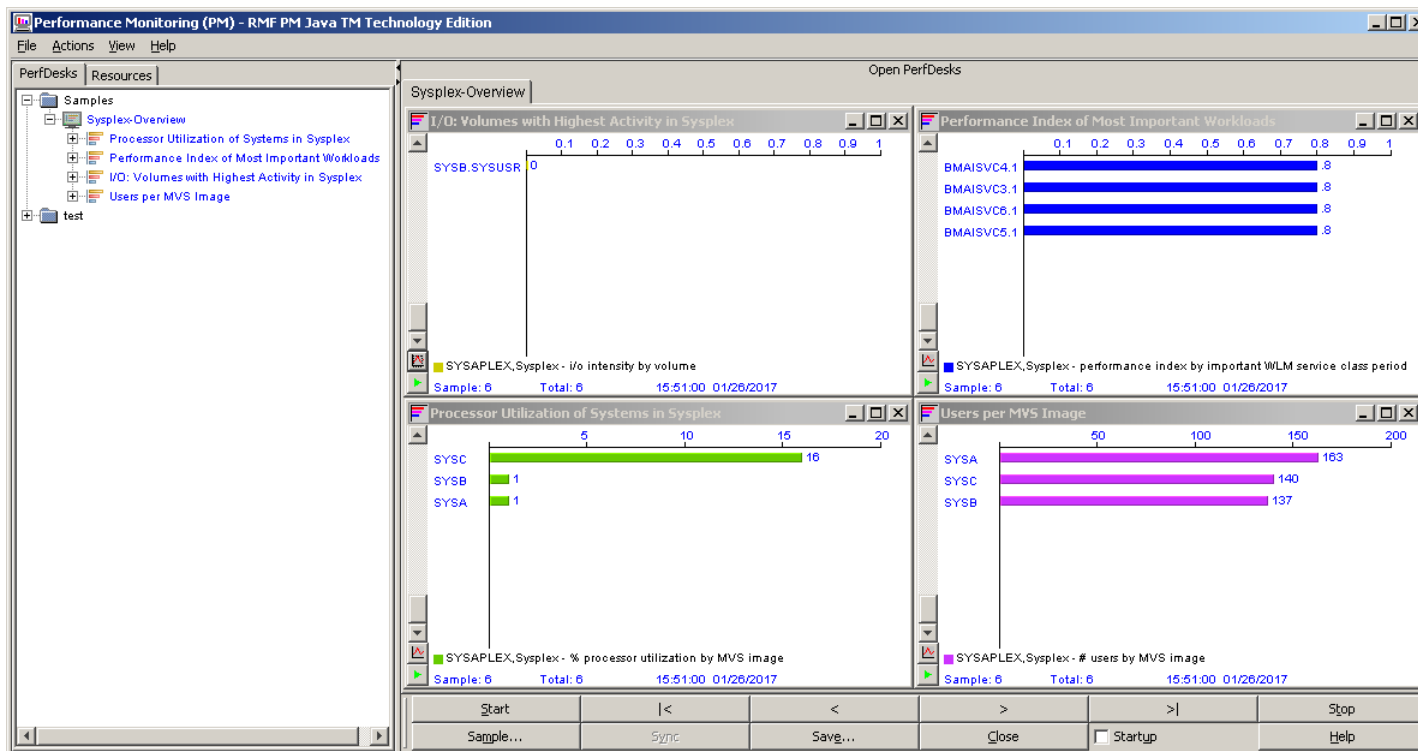


# RMF Performance Monitoring

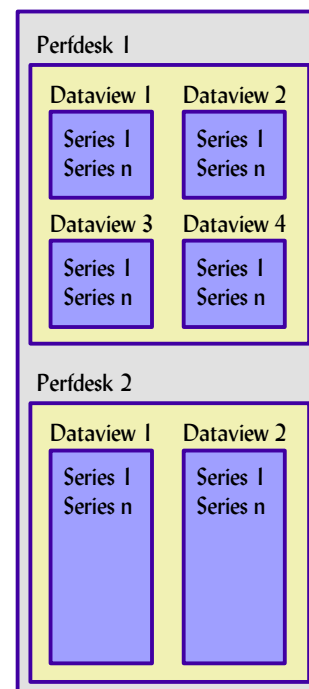


- ▶ Enterprise-wide performance monitoring of z/OS hosts
- ▶ Platform independent Java Edition
- ▶ Linux gathering support
- ▶ Graphical user interface
- ▶ Flexible definition of data
- ▶ Persistent definition of views
- ▶ Powerful data reduction
- ▶ Analysis support

# RMF PM: Perfdesk Concept



## Perfdesk Folder



# RMF PM: Resources and Metrics



Sysplex

- MVS Image
- I/O Subsystem
  - All SSIDs
    - SSID
  - All LCUs
    - LCU
  - All Channels
    - Channel
  - All Volumes
    - Volume
  - PCIE
    - PCIE Function
  - SCM
    - SCM Card
  - ZFS
    - Aggregate
- Processor
- Storage
  - Auxiliary Storage
  - Central Storage
    - CSA, SQA, ECSA, SQA
- Enqueue
- Operator
- Subsystems
  - JES, XCF, HSM
- CPC
- LPAR
- Coupling Facility
  - CF Structure

# RMF PM: Intelligent Analysis

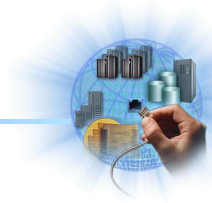


- ▶ data views with click-sensitive bars
- ▶ link to predefined Analysis PerfDesks

The screenshot displays the Performance Monitoring (PM) interface with several data views:

- PerfDesks:** A tree view on the left showing the hierarchy of resources under 'IBM z/OS' and 'Linux'.
- Sysplex-Overview:** A central area with multiple charts:
  - I/O: Volumes with Highest Activity in Sysplex:** A bar chart showing activity for SYSC.SYSAXA, SYSB.SYSUSR, and SYSC.SYSUSR. A context menu is open over SYSC.SYSAXA with options: Analysis..., Find highest, Find lowest, Series Settings..., Remove Series, Color chooser..., and Resource Attributes.
  - Processor Utilization of Systems in Sysplex:** A bar chart showing utilization for SYSC (16), SYSB (1), and SYSA (1).
  - Users per MVS Image:** A bar chart showing users for SYSA, SYSC, and SYSB.
- RMF PM Analysis in boesydc Dialog:** A modal dialog box on the right with the following fields:
  - Resource: SYSAPLEX, Sysplex
  - Work scope: (empty)
  - Metric: i/o intensity by volume
  - Value: 1
  - Name: SYSC.SYSAXA
  - Sample Time: 01/26/2017 15:55:00
  - Analysis type:
    - SYSC, SYSAXA, Volume - Context
    - SYSC, SYSAXA, Volume - Context by Job** (selected)
    - SYSC, SYSAXA, Volume - Sysplex Context
  - Close previous PerfDesk(s)
  - Buttons: Ok, Cancel, Help

# RMF Performance Data API's

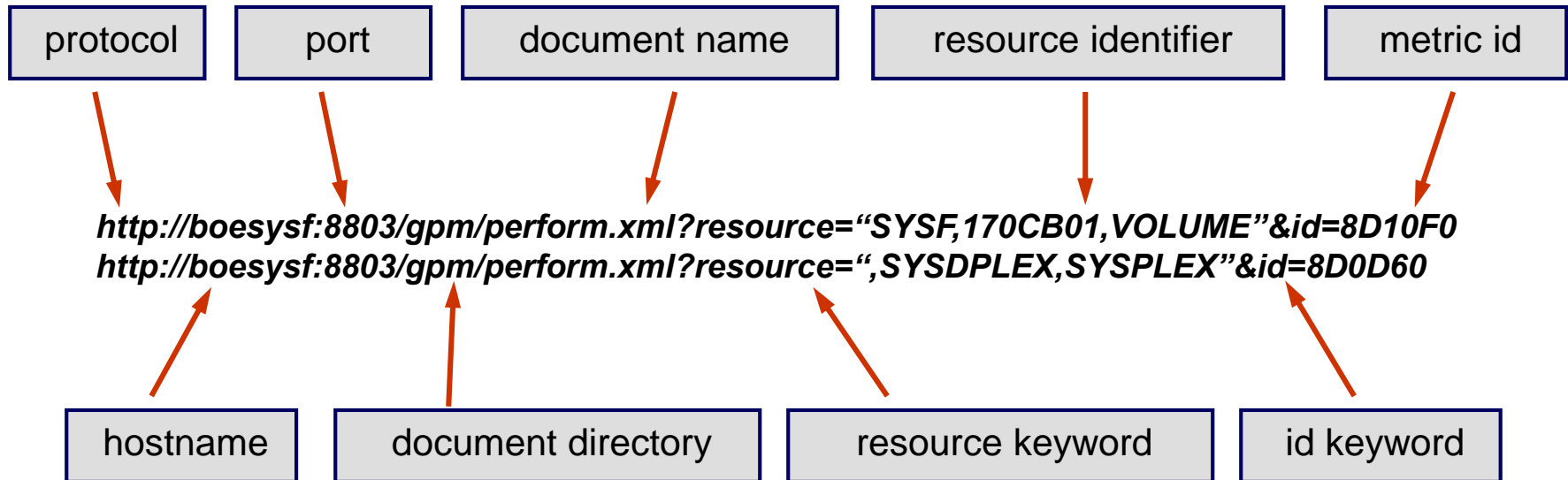


- ERBSMFI - Monitor II Data (SMF Type 79)
- RMF Sysplex Data Server (SDS)
  - ▶ SMF Data: ERBDSQRY, ERBDSREC
  - ▶ Monitor III Data: ERB3XDRS
  - ▶ Monitor II Data: ERB2XDGS
- RMF Distributed Data Server HTTP API

# RMF Distributed Data Server HTTP API



- ➔ RMF Distributed Dataserver responds to standard HTTP requests
- ➔ Example: request the single metric response time for volume *170CB01* located in the i/o subsystem of system *SYSF*  
request the list metric number of users MVS Image of sysplex *SYSDPLEX*



- |                   |  |
|-------------------|--|
| ▶ contained.xml   | returns the contained resources                  |
| ▶ listmetrics.xml | returns the list of associated metrics           |
| ▶ details.xml     | returns the properties of the resource           |
| ▶ perform.xml     | returns the metric specified by the id parameter |

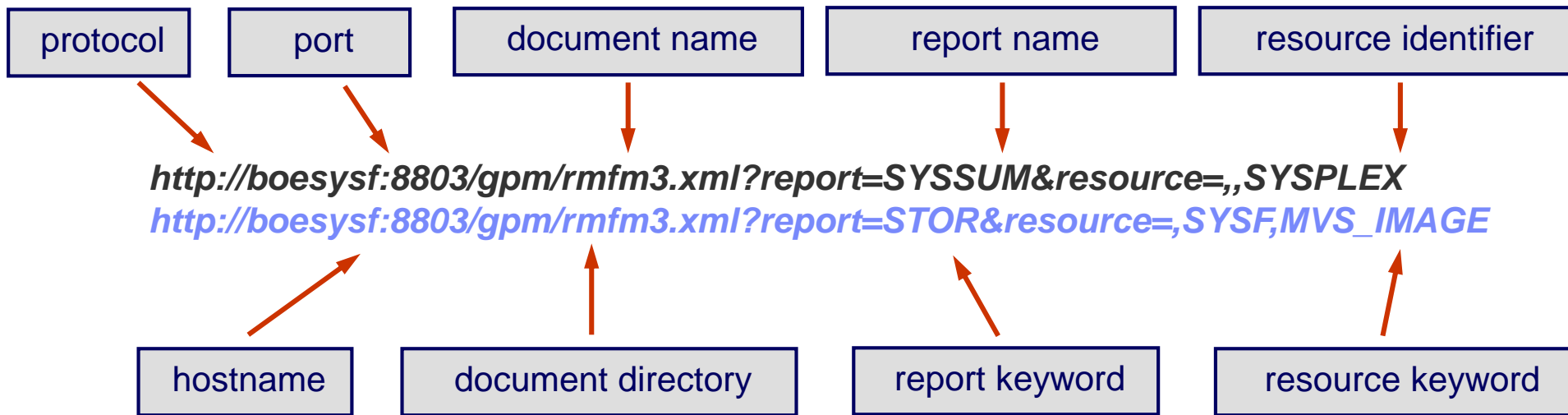
# RMF Distributed Data Server HTTP API



- Can be used to get Sysplex and single system reports, e.g.

Request the Sysplex Summary report of the resource **SYSPLEX**

Request the Storage Delay report of the resource **MVS\_IMAGE SYSF**



- Reports assigned to SYSPLEX resource:

*CACHDET, CACHSUM, CFACT, CFOVER, CFSYS, SPACEG, SPACED, SYSSUM, XCFGROUP, XCFOVW, XCFPATH, XCFSYS, ZFSFS, ZFSKN, ZFSOVW*

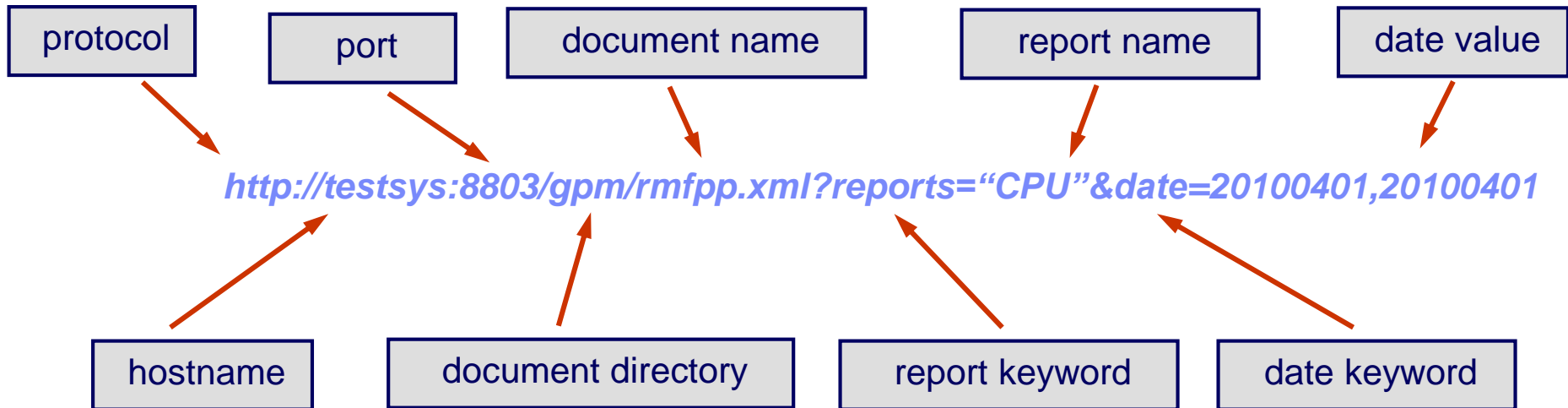
- Reports assigned to MVS\_IMAGE resource:

*CHANNEL, CPC, DELAY, DEV, DEVR, DSND, ENCLAVE, ENQ, HSM, JES, IOQ, LOCKSP, LOCKSU, OPD, PCIE, PROC, PROC, SCM, STOR, STORC, STORCR, STORF, STORM, STORR, STORS, SYSINFO, USAGE*

# RMF Distributed Data Server HTTP API



- A request using XML document name **rmfpp.xml** returns the requested RMF Postprocessor report
- Example: Request a Postprocessor CPU Activity Report



## Parameters for Postprocessor requests

<code>&amp;reports</code>	list of Postprocessor report names
<code>&amp;overview</code>	list of control statements for the Overview report
<code>&amp;date</code>	start and end date for the requested Postprocessor report(s)
<code>&amp;duration</code>	interval length for the requested Postprocessor duration report(s)
<code>&amp;timeofday</code>	start and end time of the reporting period
<code>&amp;sysid</code>	system name for single system reports
<code>&amp;timeout</code>	timeout period in seconds for the completion of Postprocessor jobs



# RMF Distributed Data Server HTTP API



- ▶ RMF Distributed Dataserver returns XML documents
- ▶ The requested metric can be extracted from the col tag
- ▶ Example: XML document for *response time for volume 170CB01 of SYSF*

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="/gpm/include/perform.xsl"?>
<ddsm1 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:noNamespaceSchemaLocation="/gpm/include/ddsm1.xsd">
  <server>
    <name>RMF-DDS-Server</name>
    <version>ZOSV1R9</version>
    <functionality>2344</functionality>
  </server>
  <report>
    <metric id="8D10F0">
      <description>response time</description>
      <format>single</format>
      <numcols>2</numcols>
    </metric>
    <resource>
      <relabel>SYSF,170CB01,VOLUME</relabel>
      <restype>VOLUME</restype>
      <relabelurl>SYSF,170CB01,VOLUME</relabelurl>
    </resource>
    <time-data>
      <local-start>20070321084500</local-start>
      <local-end>20070321084600</local-end>
      <gatherer-interval unit="seconds">60</gatherer-interval>
    </time-data>
    <row refno="1" percent="66.6667">
      <col></col><col>1.5</col>
    </row>
  </report>
</ddsm1>
```

# Sysplex Data Server: Services



- Sysplex-wide access to SMF data
  - ▶ ERBDSQRY requests a directory of available SMF data in the sysplex
  - ▶ ERBDSREC requests SMF record data in the sysplex
- Sysplex-wide access to Monitor III data
  - ▶ ERB3XDRS requests a set\_of\_samples of Monitor III data
    - ✗ does not require an ISPF and Monitor III reporter environment
    - ✗ provides data reduction features to transfer only the necessary data
- Sysplex-wide access to Monitor II data
  - ▶ ERB2XDGS requests Monitor II data according to the specified SMF type 79 subtype
    - ✗ returns Monitor II snapshot data
    - ✗ provides data reduction features like ERB3XDRS



all Services are available as High-Level-Language APIs

# Information and Tools



RMF homepage: [www.ibm.com/systems/z/os/zos/features/rmf/](http://www.ibm.com/systems/z/os/zos/features/rmf/)

- **Product information, newsletters, presentations, ...**
- **Downloads**
  - ▶ **Spreadsheet Reporter**
  - ▶ **RMF XML Toolkit**

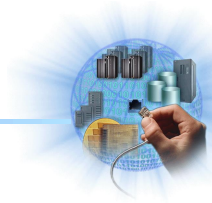
RMF email address: [rmf@de.ibm.com](mailto:rmf@de.ibm.com)

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:**  
<http://www.ibm.com/systems/z/os/zos/bkserv/>



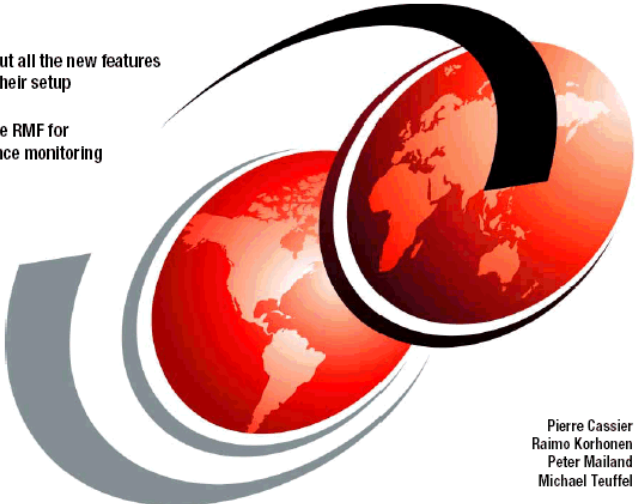
# RMF Redbook



  
SG24-6845-00

## Effective zSeries Performance Monitoring using Resource Measurement Facility (RMF)

- Review of the traditional facilities
- Learn about all the new features and how their setup
- How to use RMF for performance monitoring



Pierre Cassier  
Raimo Korhonen  
Peter Mailand  
Michael Teuffel

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