RMF Development Edition

IBM

z/OS
Resource Measurement Facility

RMF Spreadsheet Reporter –
Reloaded

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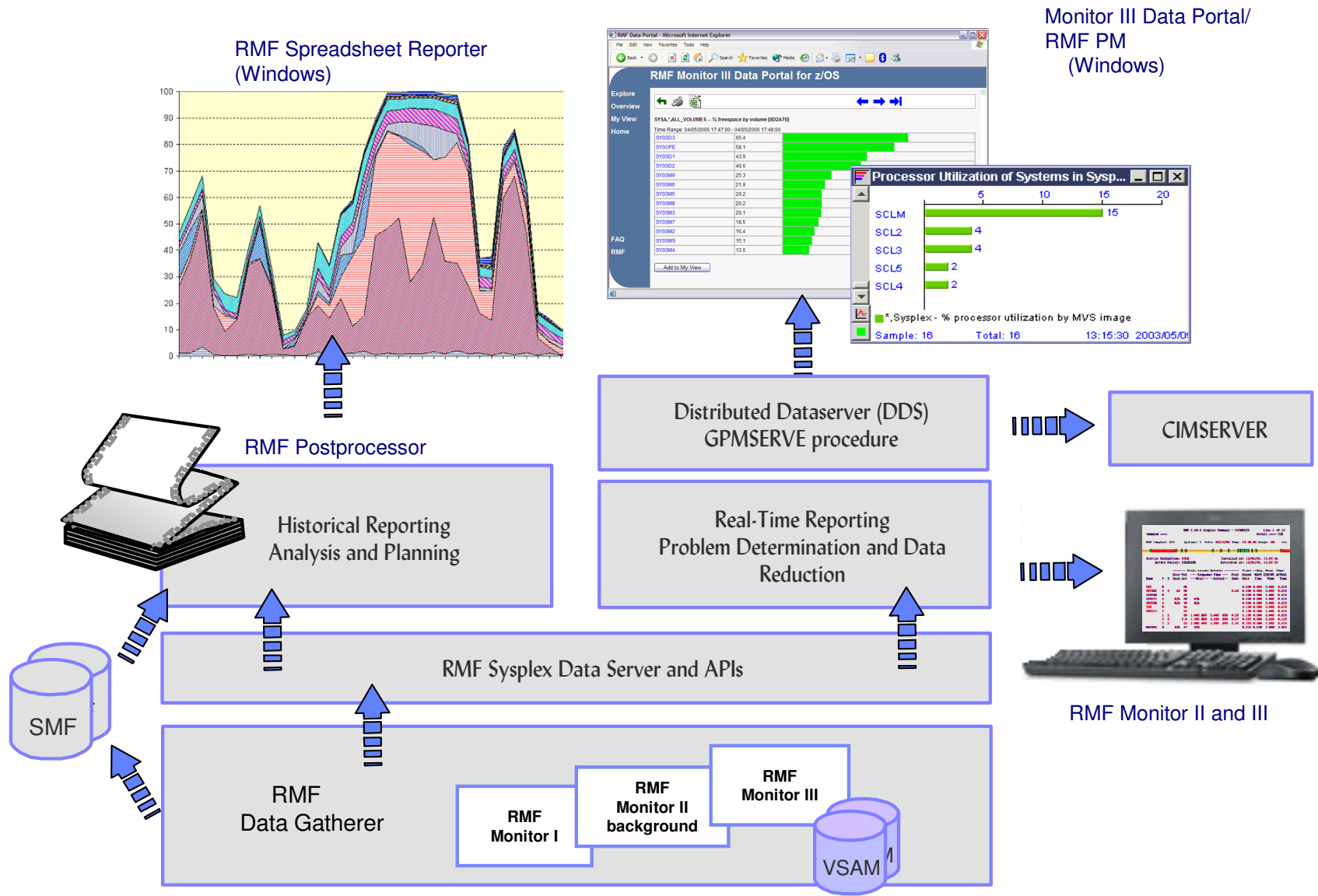
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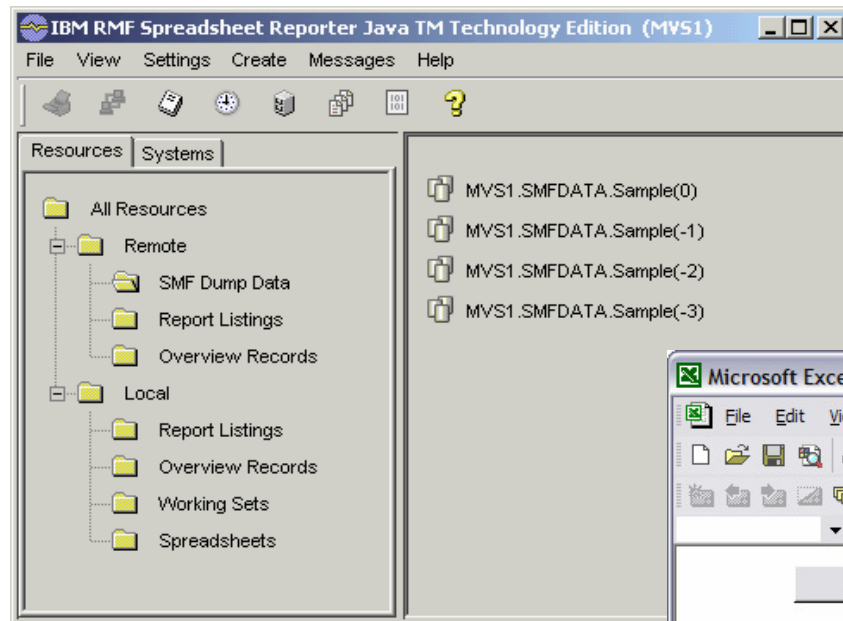
Agenda

► RMF Overview

► RMF Spreadsheet Reporter

    ► How to use
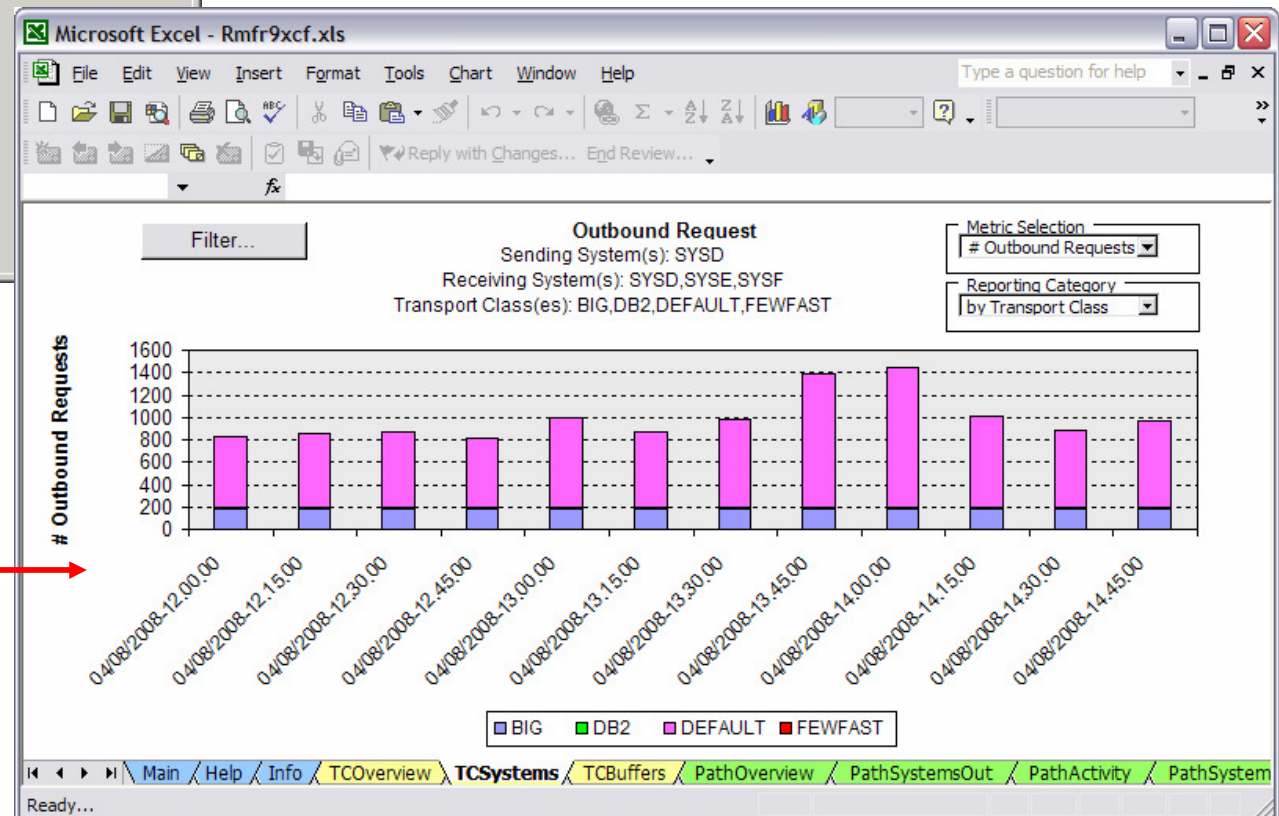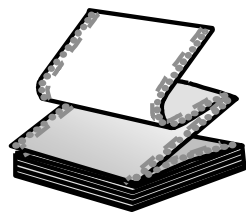
    ► Cookbook: System Health Check

    ► Troubleshooting

RMF Product Overview

RMF Spreadsheet Reporter
(Windows)

Monitor III Data Portal/
RMF PM
(Windows)

RMF Postprocessor

Distributed Dataserver (DDS)
GPMSERVE procedure

CIMSERVER

Historical Reporting
Analysis and Planning

Real-Time Reporting
Problem Determination and Data
Reduction

RMF Monitor II and III

SMF

RMF Sysplex Data Server and APIs

RMF
Data Gatherer

RMF
Monitor I

RMF
Monitor II
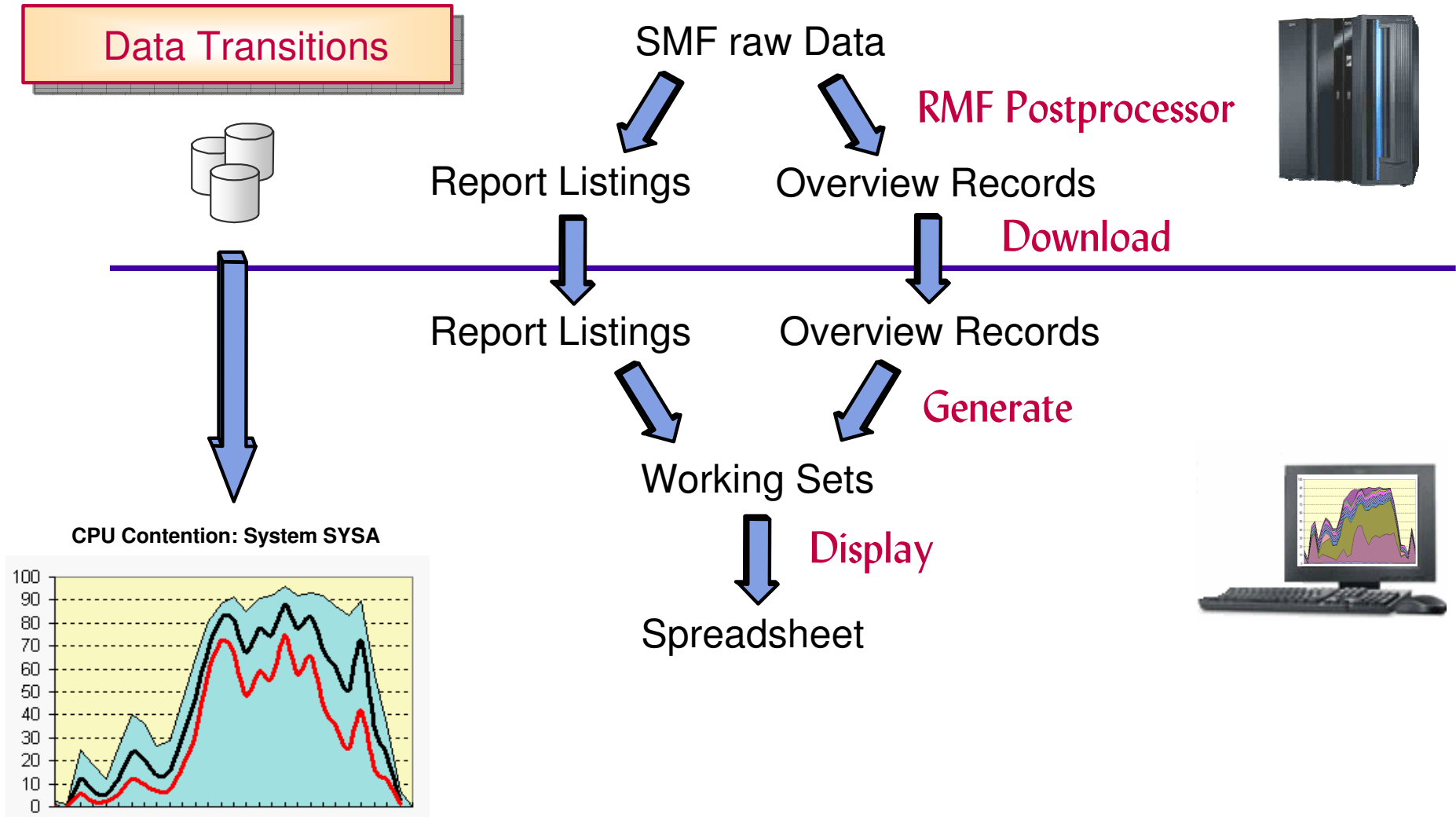background

RMF
Monitor III

VSAM

RMF Spreadsheet Reporter

► Easy way to create some nice Microsoft Excel charts based on RMF Postprocessor Reports
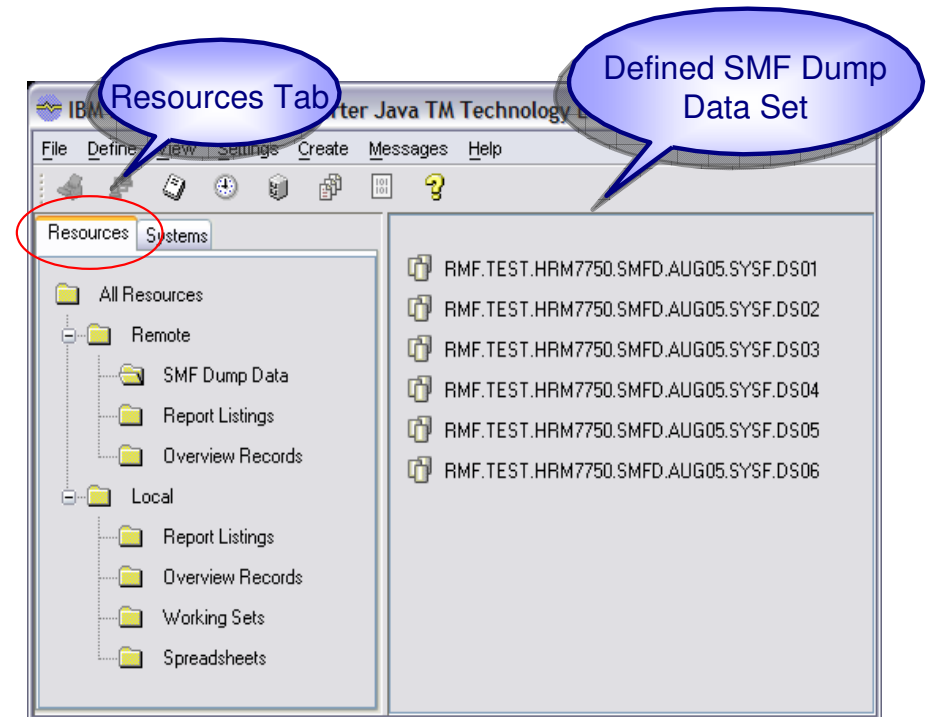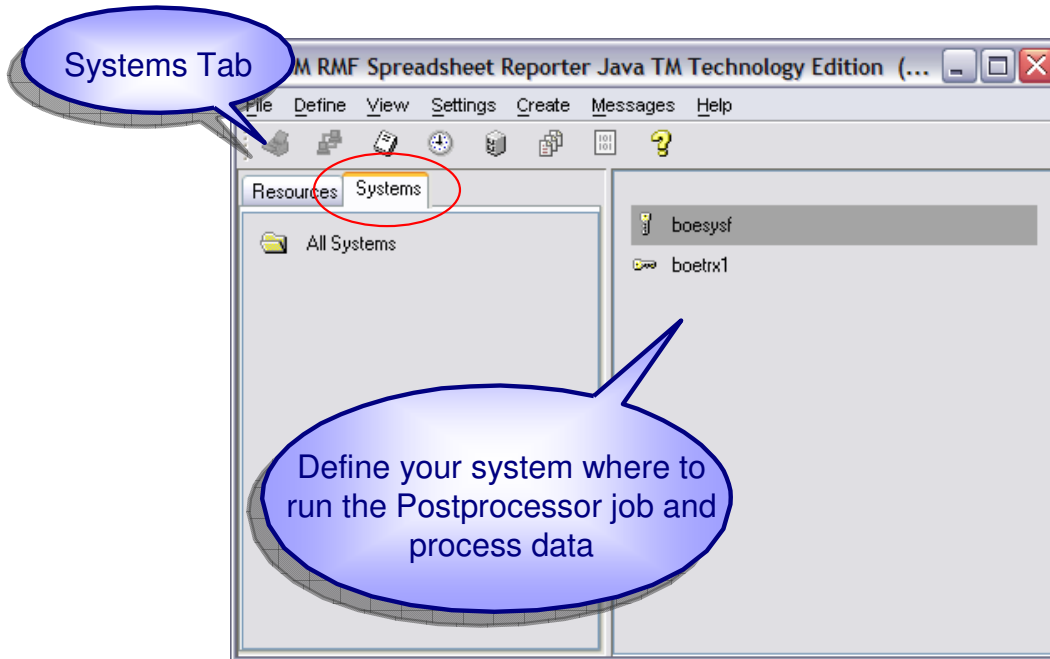► Version 5.3.0 supports Excel 2007

RMF Spreadsheet Reporter

Data Transitions

SMF raw Data

RMF Postprocessor

Report Listings

Overview Records

Download

Report Listings

Overview Records

Generate

Working Sets

Display

CPU Contention: System SYSA

Spreadsheet

RMF Spreadsheet Reporter

Resource Oriented

Systems Tab

IBM RMF Spreadsheet Reporter Java TM Technology Edition (...

File Define View Settings Create Messages Help

Resources | Systems

All Systems

boesysf

boetrx1

Define your system where to run the Postprocessor job and process data

Resources Tab

Defined SMF Dump Data Set

IBM ... ter Java TM Technology

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

RMF.TEST.HRM7750.SMFD.AUG05.SYSF.DS01
RMF.TEST.HRM7750.SMFD.AUG05.SYSF.DS02
RMF.TEST.HRM7750.SMFD.AUG05.SYSF.DS03
RMF.TEST.HRM7750.SMFD.AUG05.SYSF.DS04
RMF.TEST.HRM7750.SMFD.AUG05.SYSF.DS05
RMF.TEST.HRM7750.SMFD.AUG05.SYSF.DS06

navigation pane for direct access to all kinds of resources

RMF Spreadsheet Reporter

Define your system on the System tab

dataset high-level qualifier can be specified independent from userid

choose security level: SSL Server Authentication or none

Select active or passive FTP mode

System

System ID	BOESYSA
Hostname	boesysa.boeblingen.de.ibm.com
Dataset HLQ	RMF.TEST
User ID	BMAI
Password	
Account	D3141
Jobclass	A
Msgclass	H
FTP Security	None
FTP Mode	Active
OVW	

Ok   Cancel

IBM RMF Spreadsheet Reporter Java TM Technology Edition

File   Define   View   Settings   Create   Messages   Help

System
SMF Dump Data...
Remote Report Listing...
Remote Overview Record...

Res

boesysf
boetrx1

New
Rename
Delete
Properties

► hint: use multiple system definitions for the work with different overview control statement sets

To create overview records, specify file with set of overview control statements

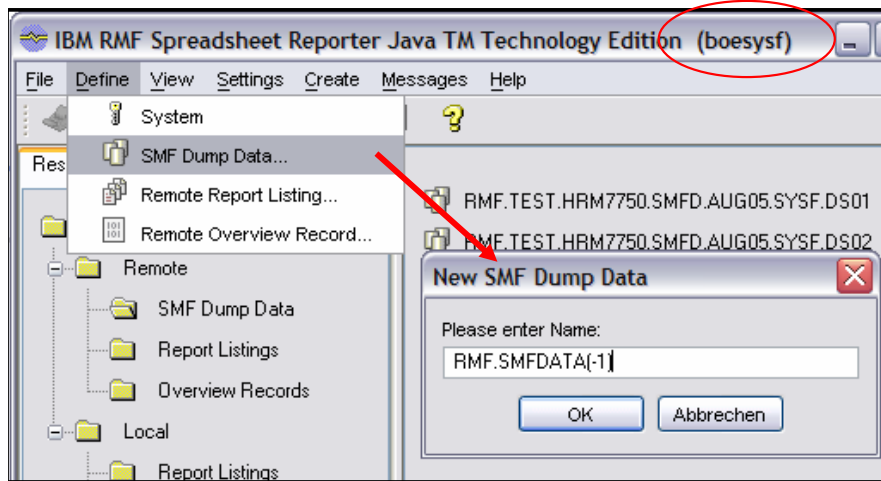# RMF Spreadsheet Reporter Java Edition...

Option Dialogs

►Menu bar: Settings->Options / Intervals
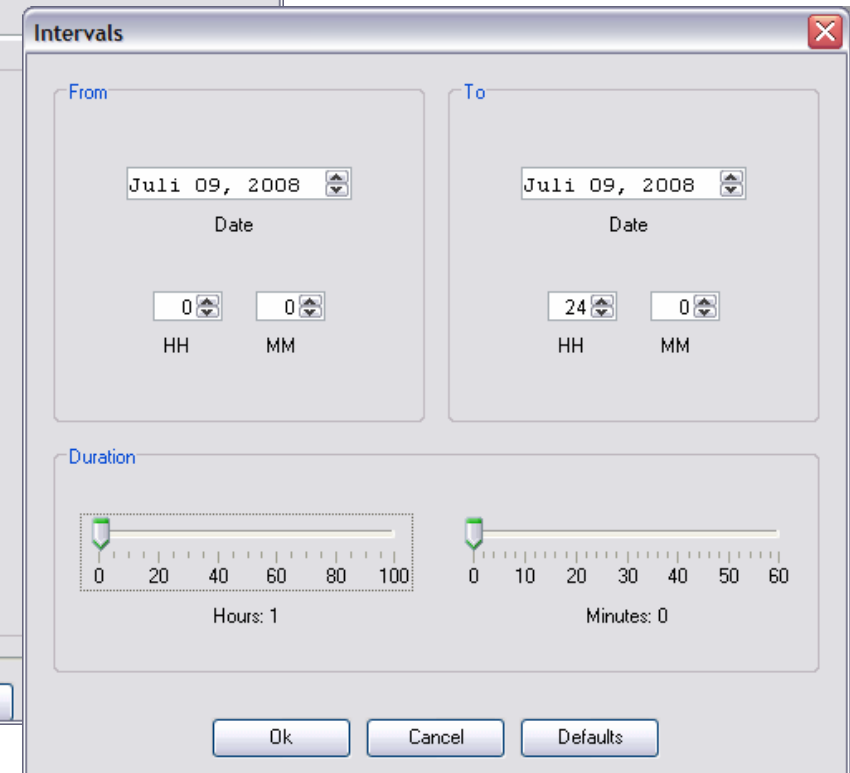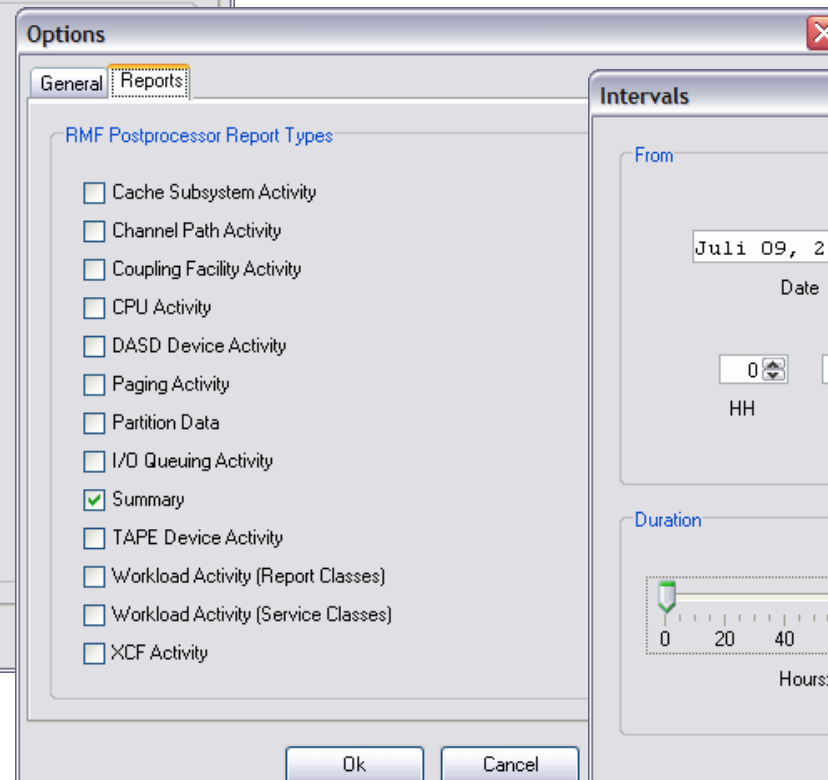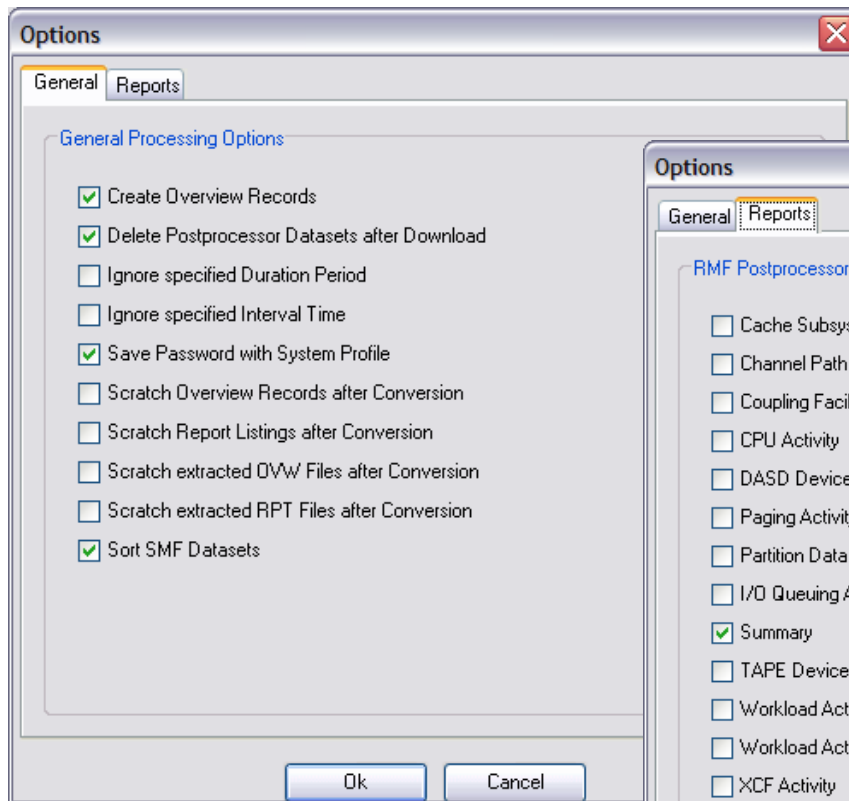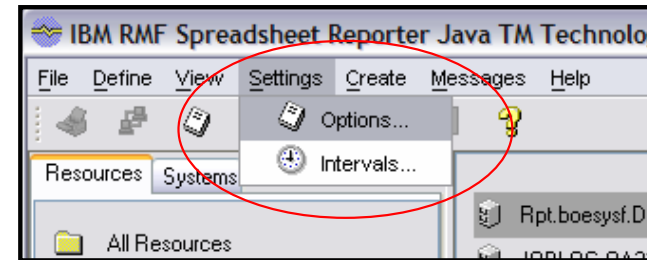
RMF Spreadsheet Reporter

Create your working set based on SMF Dump Data

► Ensure to select on the Systems tab the system to submit the postprocessor job
► Switch to the Resources tab
► To define your SMF Dump Datasets or GDG use Define->SMF Dump Data

After the input data selection, create the Working set
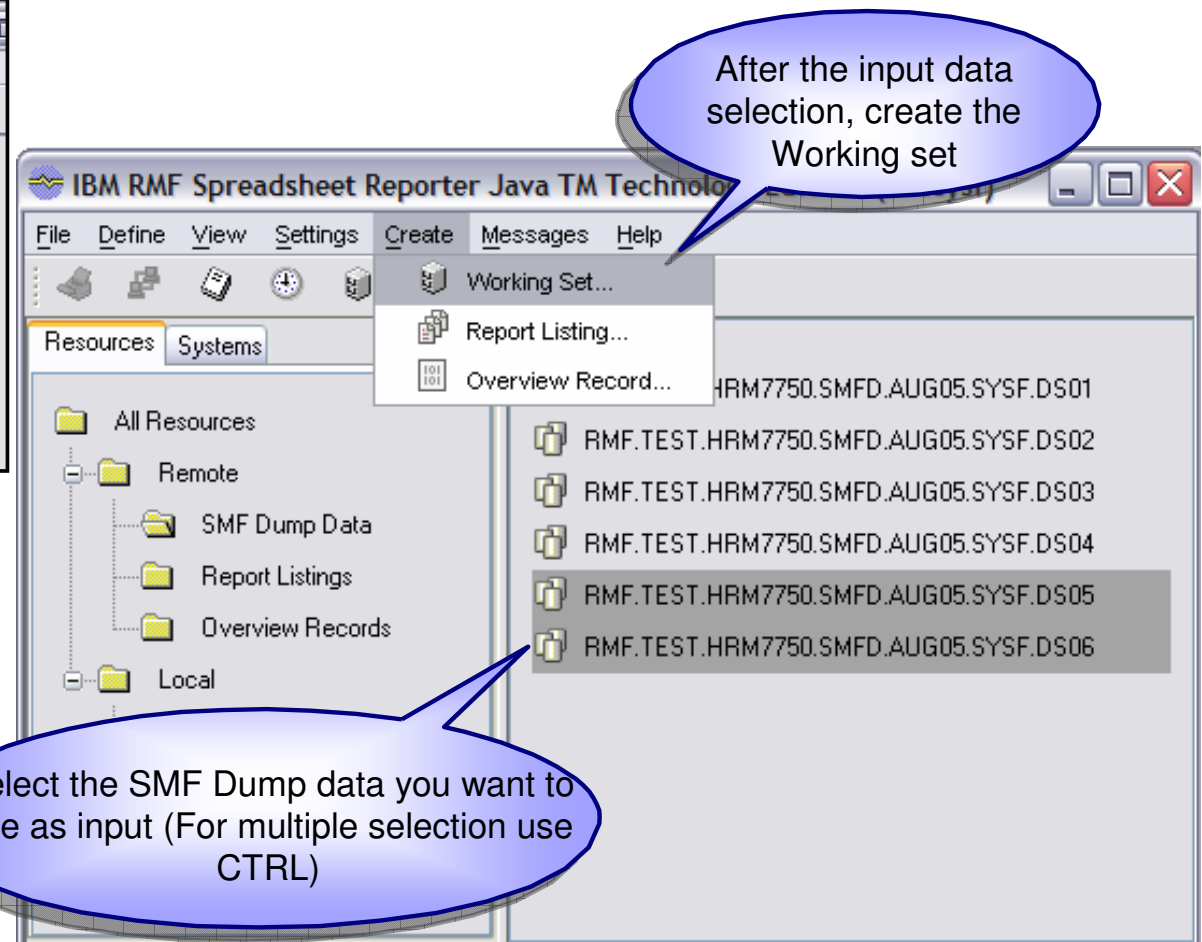
To run against the SMF Buffer, don't select any SMF Dump Data

Select the SMF Dump data you want to use as input (For multiple selection use CTRL)

RMF Spreadsheet Reporter Java Edition...

Create your working set based on local Report Listings

►Create the Postprocessor Report Listing on your own (using your own JCL and download it to your workstation)

►Select no Report Listing and use "Create Working Set" action to get a file dialog to choose your report listing
OR
Copy it to the Report Listing Directory and restart the Spreadsheet Reporter

Don't select a report listing and use "Create->Working Set" to get the file dialog
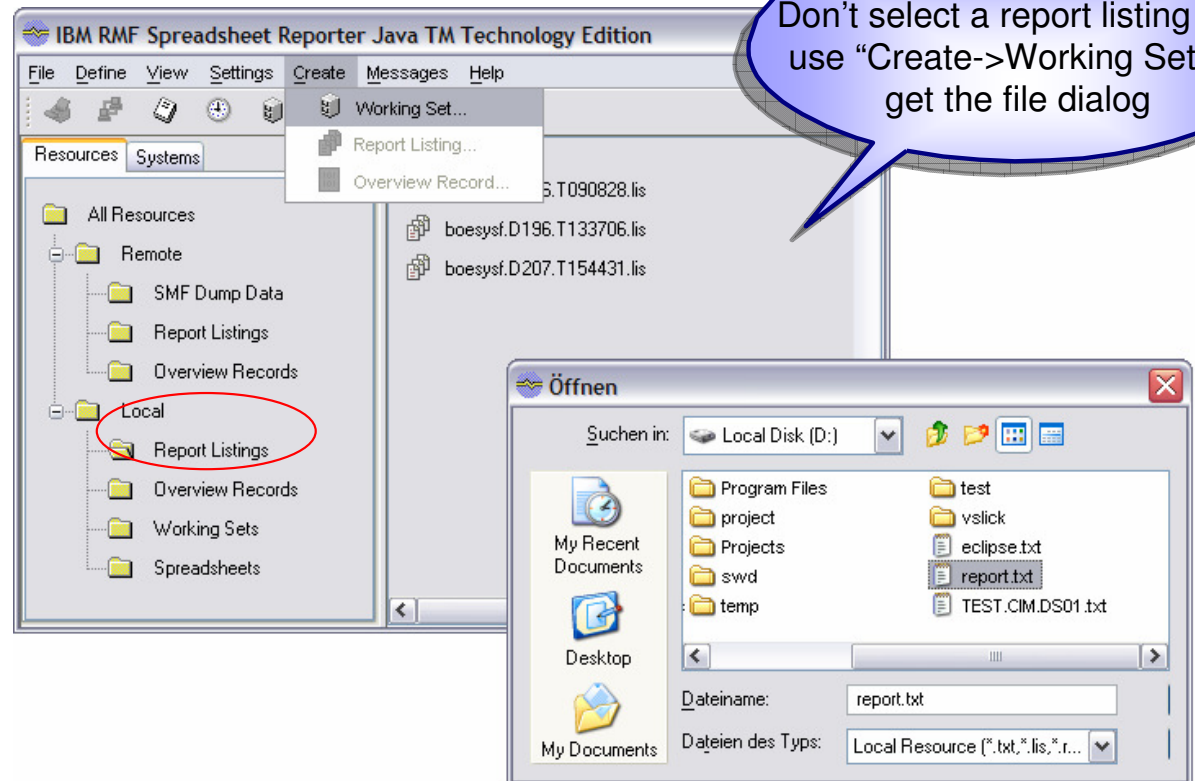
💡 Default Report Listing directory:
C:\Documents and Settings\$user$\Application Data\RMF\RMF Spreadsheet Reporter\RmfListings

RMF Spreadsheet Reporter Java Edition...

Create your working set

Shows the previously selected SMF Dump Data - empty if SMF Buffer is used

Working Set was successfully created

Name of the new Working Set

Check/modify the settings and press "Run"
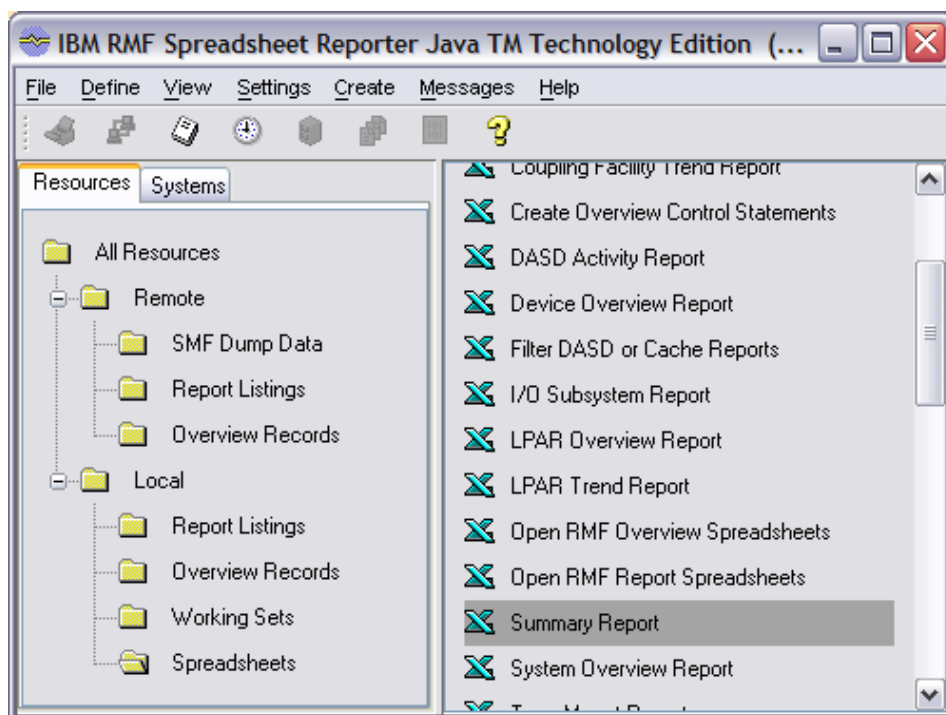
RMF Spreadsheet Reporter Java Edition...

Process Data with Spreadsheet Macro

►Select the Spreadsheet Folder and launch a Spreadsheet, e.g. Summary Report Spreadsheet (double click)

Available Report Spreadsheets:
►Summary Report
►DASD Activity Report
►Workload Activity Trend Report
►Coupling Facility Trend Report
►Cache Subsystem Report
►I/O Subsystem Report (Cache & Dasd Report)
►LPAR Trend Report
►Tape Mount Report
►XCF Trend Report

Available Overview Spreadsheets:
►LPAR Overview Report
►System Overview Report
►Workload Overview Report
►Device Overview Report
►Cache Subsystem Overview Report
►Channel Overview Report
►Generic Overview Spreadsheet:
    Open RMF Overview Spreadsheets

►Create Overview Control Statements

RMF Spreadsheet Reporter

Spreadsheet Macros Overview

Based on Postprocessor Reports

```
//RMFPP  EXEC PGM=ERBRMFPP
//SYSIN    DD   *
  DATE(10142002,10142002)
  RTOD(1100,1300)
  REPORTS(CPU)
  SYSOUT(H)
```

Macro	PP Option	SMF Record
Cache Subsystem Report	CACHE	SMF74.5
CF Trend	CF	SMF74.4
DASD Activity Report	DEVICE(DASD)	SMF74.1
I/O Subsystem Report	DEVICE(DASD)	SMF74.1
	+CACHE	SMF74.5
LPAR Trend	CPU	SMF70.1
Summary Report	SUMMARY	SMF70.1,71,74.1
Tape Mount Report	DEVICE(TAPE)	SMF74.1
Workload Activity Trend	WLMGL	SMF72.3
XCF Trend Report	XCF	SMF74.2

Based on Overview Records

```
//RMFPP  EXEC PGM=ERBRMFPP
//SYSIN    DD   *
  DATE(10142002,10142002)
  OVERVIEW(RECORD)
  OVW(CPUBUSY(CPUBSY))
  OVW(MVSBUSY(MVSBSY))
  OVW(NUMPROC(NUMPROC))
```
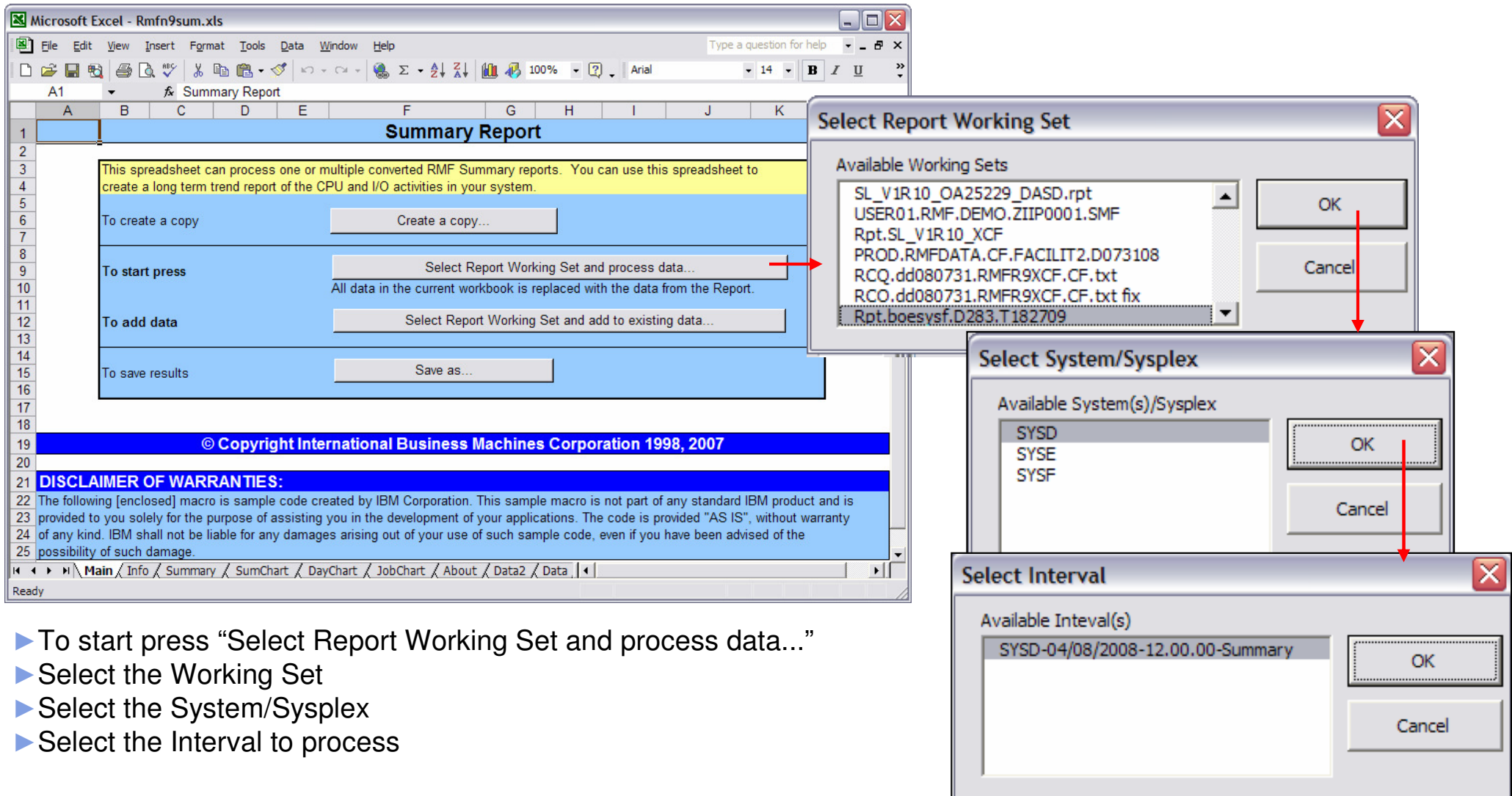
Macro	SMF Record
System Overview	SMF70.1,71,72.3
LPAR Overview	SMF70.1
Workload Overview	SMF72.3
Cache Subsystem Overview	SMF74.5
Device Overview	SMF74.1
Channel Overview	SMF73

➧ Standard Macros: Single intervals

➧ Summary + Trend Macros: Multiple Intervals

➧ Overview Macros: Multiple Intervals

RMF Spreadsheet Reporter Java Edition...

Process Data with Summary Report Spreadsheet Macro

- ► To start press "Select Report Working Set and process data..."
- ► Select the Working Set
- ► Select the System/Sysplex
- ► Select the Interval to process

RMF Spreadsheet Reporter

Analyse the data with Summary Report Spreadsheet Macro

Now let's analyze the data on the sheets
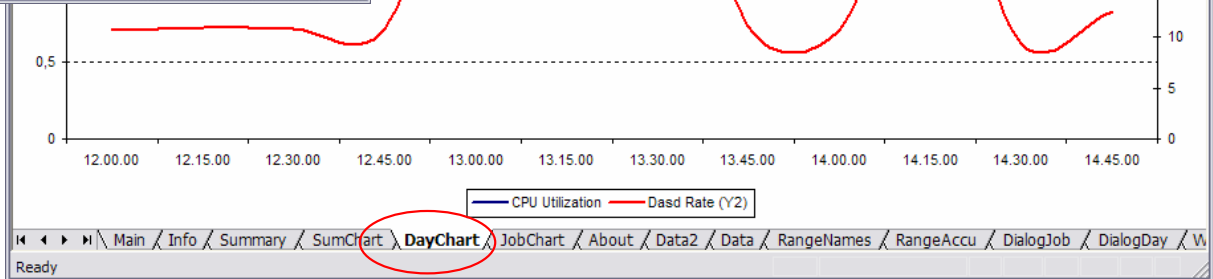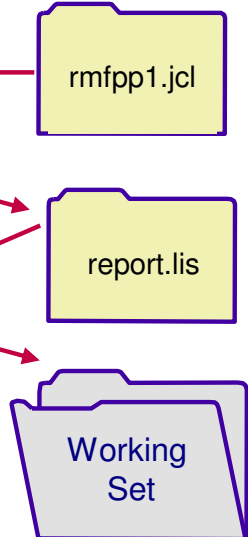
RMF Spreadsheet Reporter

Batch Mode: Use the Spreadsheet Reporter without the GUI

Batch File Name	Function
Collect.bat	generate JCL from skeleton file send JCL to remote system execute RMF Postprocessor retrieve JES joblog retrieve Postprocessor messages transfer Report Listing
CreateRptWset.bat	create Working Set based on Report Listings
CreateOvwWset.bat	create Working Set based on Overview Records

Execution
of Collect.bat and
CreateRptWset.bat
does it all !

rmfpp1.jcl

report.lis

Working
Set

Batch files are located in the Spreadsheet Reporter Program Directory, e.g.
C:\Program Files\RMF\RMF Spreadsheet Reporter

System Health Check

➡ **Processor**
- CPU Utilization
- CPU Contention
- LPAR Management Time
- Capture Ratio

➡ **I/O Subsystem**
- DASD I/O Intensity
- Cache Hit Ratio

➡ **Coupling Facilities**
- Service Times
- Delayed Requests

how can i perform
an overall health check
of my system?
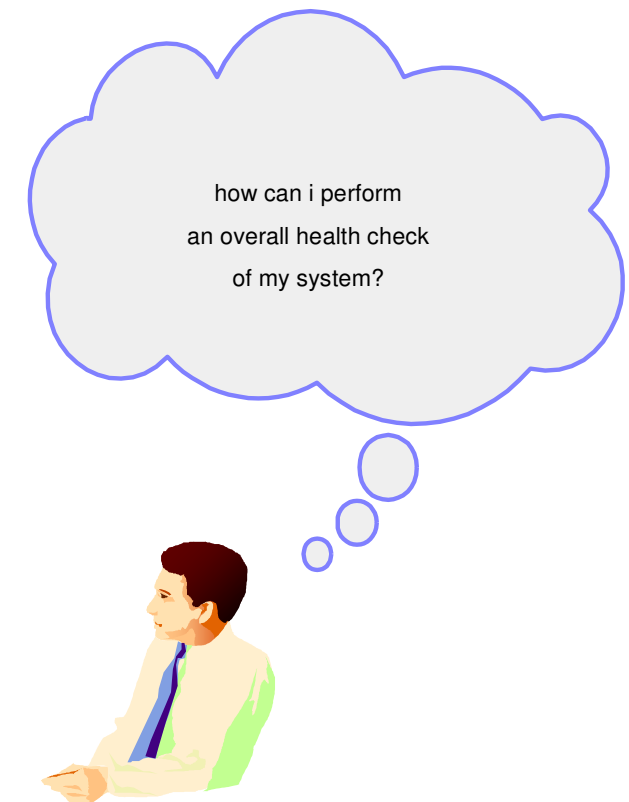
System Health Check

Spreadsheet References

Metric	Spreadsheet Name	Chart Name	File Name
Processor			
■ CPU Utilization	Summary Report	SumChart	Rmfn9sum.xls
■ CPU Contention	System Overview Report	OneCpuCont	Rmfy9ovw.xls
■ LPAR Management Time	LPAR Trend Report	RepTrd	Rmfr9lp.xls
■ Capture Ratio	System Overview Report	OneCpuUtil	Rmfy9ovw.xls
I/O Subsystem			
■ DASD I/O Intensity	Device Overview Report	Overview	Rmfx9dev.xls
■ DASD Response Time	Device Overview Report	RepAllDevs	Rmfx9dev.xls
■ Cache Hit Ratio	Cache Subsystem Report	SSIDOvw	Rmfr9cac.xls
Coupling Facilities			
■ Service Times	CF Trend Report	RepSubChn2	Rmfr9cf.xls
■ Delayed Requests	CF Trend Report	RepSubChn1	Rmfr9cf.xls

System Health Check

CPU Utilization

➡ **no overall guideline**
➡ **identify:**
  - peak day
  - peak shift
  - peak hour

Average and Peak CPU Utilization

System: SYS1, Time Range: 8:00 - 17:59

Legend: CPU Busy (Average) — CPU Busy (Peak) (Y2)
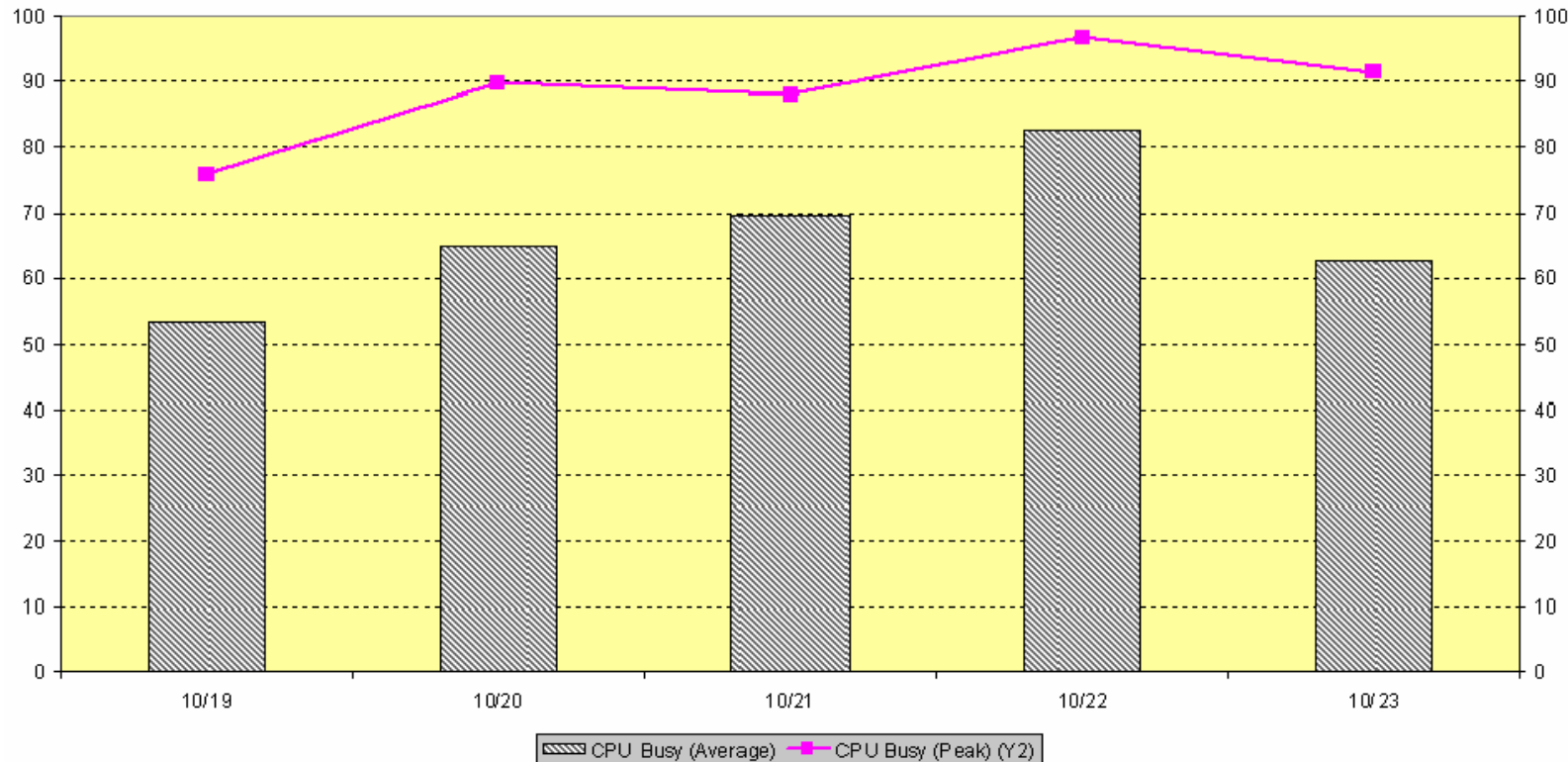
System Health Check

CPU Utilization

No overall guideline is given for the pure CPU utilization:

- ✘ a low CPU utilization value may be an indicator for "latent demand": The processor looks underutilized because of bottlenecks in other areas. Storage contention or I/O problems can be the reason for a bad application performance. At the point, where those bottlenecks are removed, the processor utilization will increase
- ✘ a high CPU utilization can be considered as an indicator for a well tuned system. Exception: a utilization of 100 % over long periods of time can be a symptom of CPU constraints
- ✘ the CPU utilization is a good measurement to identify the peak day/shift/hour for further detailed analysis

System Health Check

CPU Contention

➡ indicator: in-ready queue

➡ thresholds:
- good: < 20 %
- critical: > 80 %

CPU Contention for System: SYS1   Date: 10/22/02

Legend: % Waiting >= 1 Jobs | % Waiting >= 2 Jobs | % Waiting >= 3 Jobs
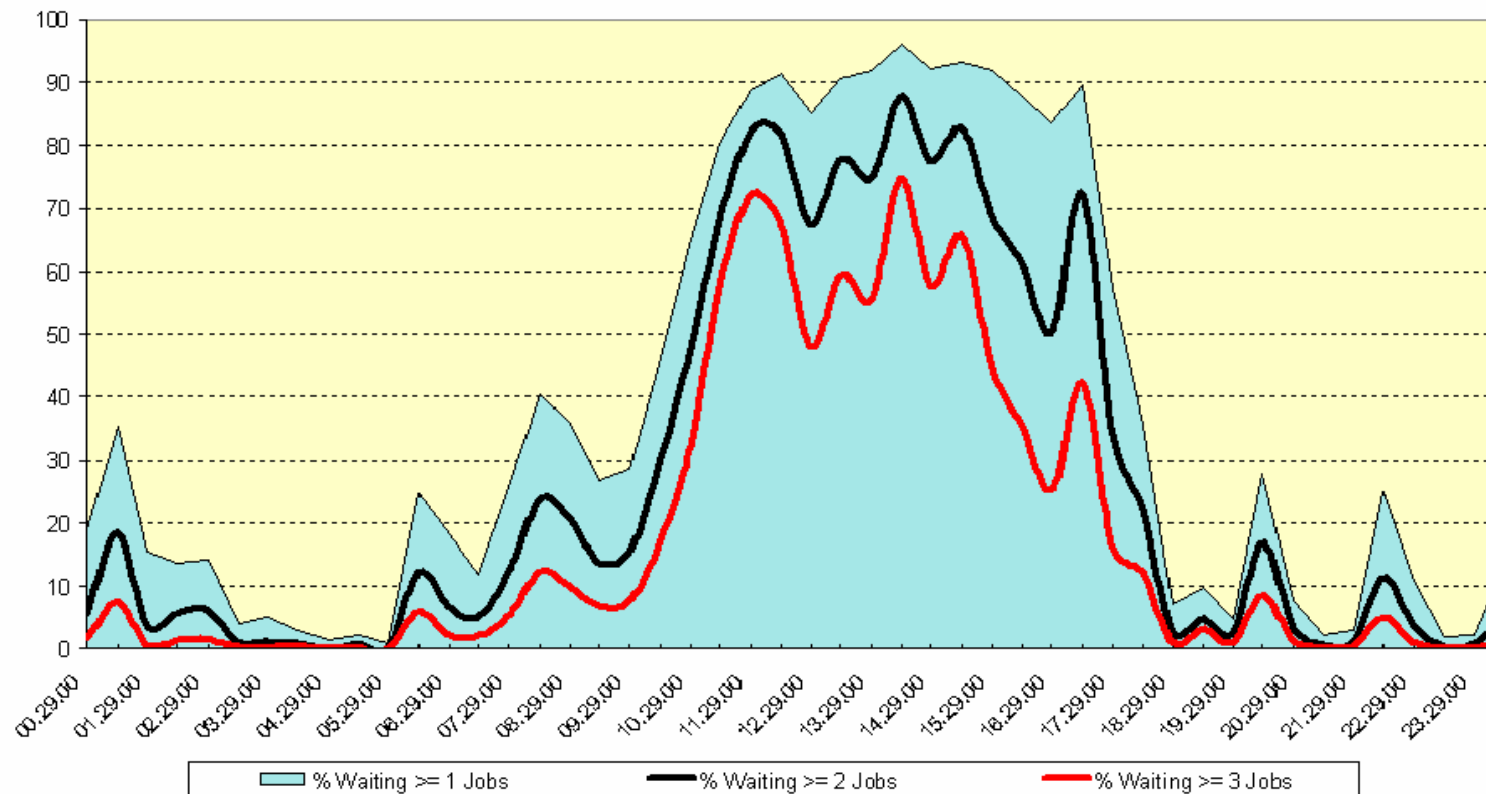
System Health Check

CPU Contention

The In-Ready Queue is taken as indicator for the CPU contention

✘ the percentage of time, where the CPU is utilized and at least one address space is waiting for the processor, is considered as contention rate.
✘ in a multi processor environment, the contention begins at the point, where the In-Ready Queue is longer than the number of processors.
✘ the distribution of queues with a length of 2 or more can be considered as an auxiliary measurement

System Health Check

LPAR Management Time

➡ **overhead for LPARs**
➡ **thresholds:**
- good: < 3 %
- critical: > 5 %

LPAR Management Time for System: SYS1   Date: 10/22/02
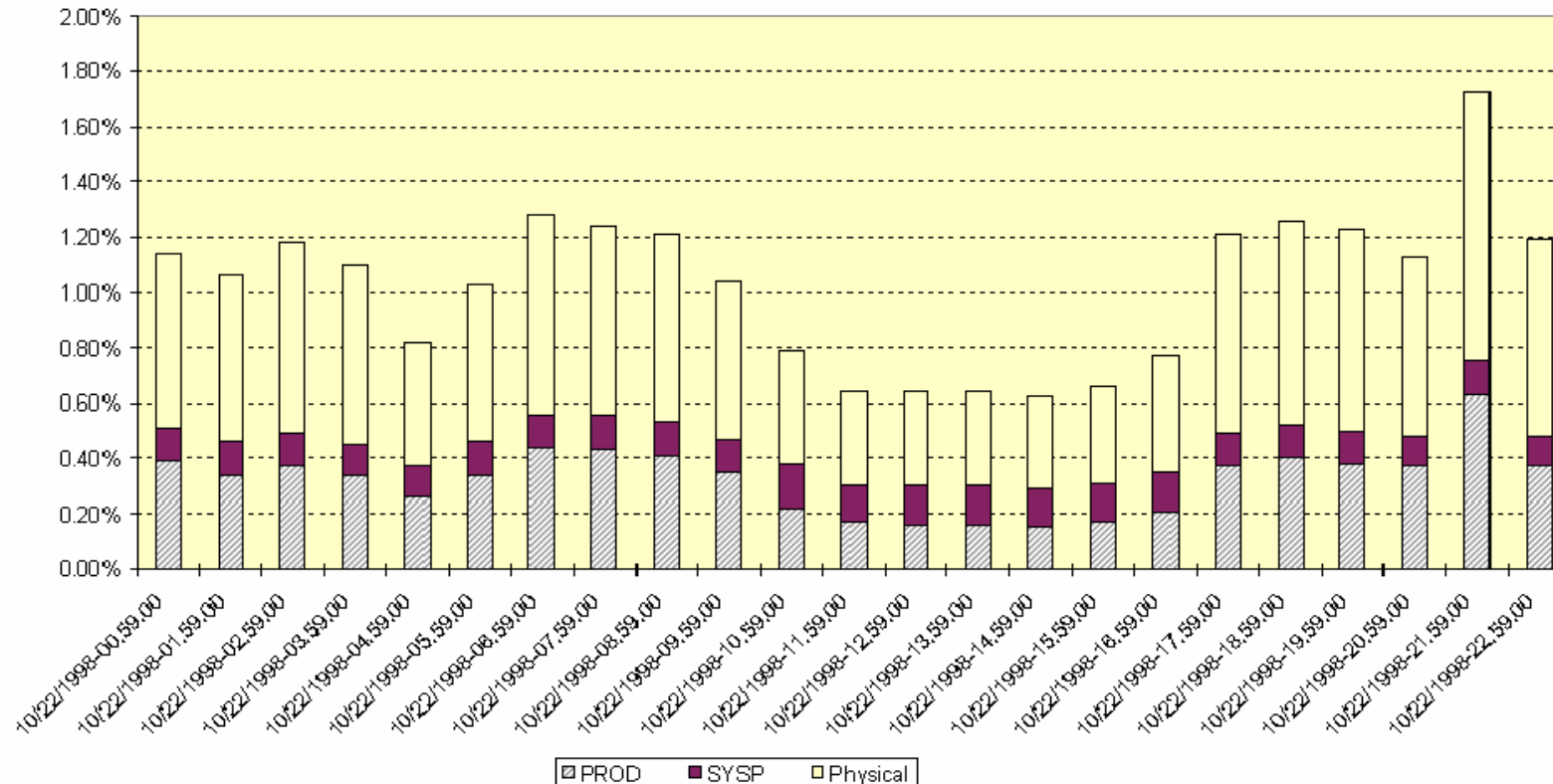
System Health Check

> ## LPAR Management Time

The LPAR Management Time indicates the processor overhead needed for the LPAR administration

- ✘ the difference between the total dispatch times and effective dispatch times for standard partitions is counted to LPAR management work. Additionally, the total CPU time for the partition identified by the name *PHYSICAL* is part of the LPAR management time
- ✘ the usage of dedicated processors generally reduces LPAR management work
- ✘ the sum of all logical processors should not exceed the double number of physical processors - otherwise the LPAR hypervisors overhead to (re)-assign the processors to the logical partitions can increase to an inadequate amount

System Health Check

Capture Ratio

➡ captured CPU time / total CPU time

➡ thresholds:
  - good: > 90 %
  - critical: < 80 %

CPU Utilization for System: SYS1 Date: 10/22/02

Legend: CPU/LPar Busy — MVS Busy — Capture Ratio — Application Utilization
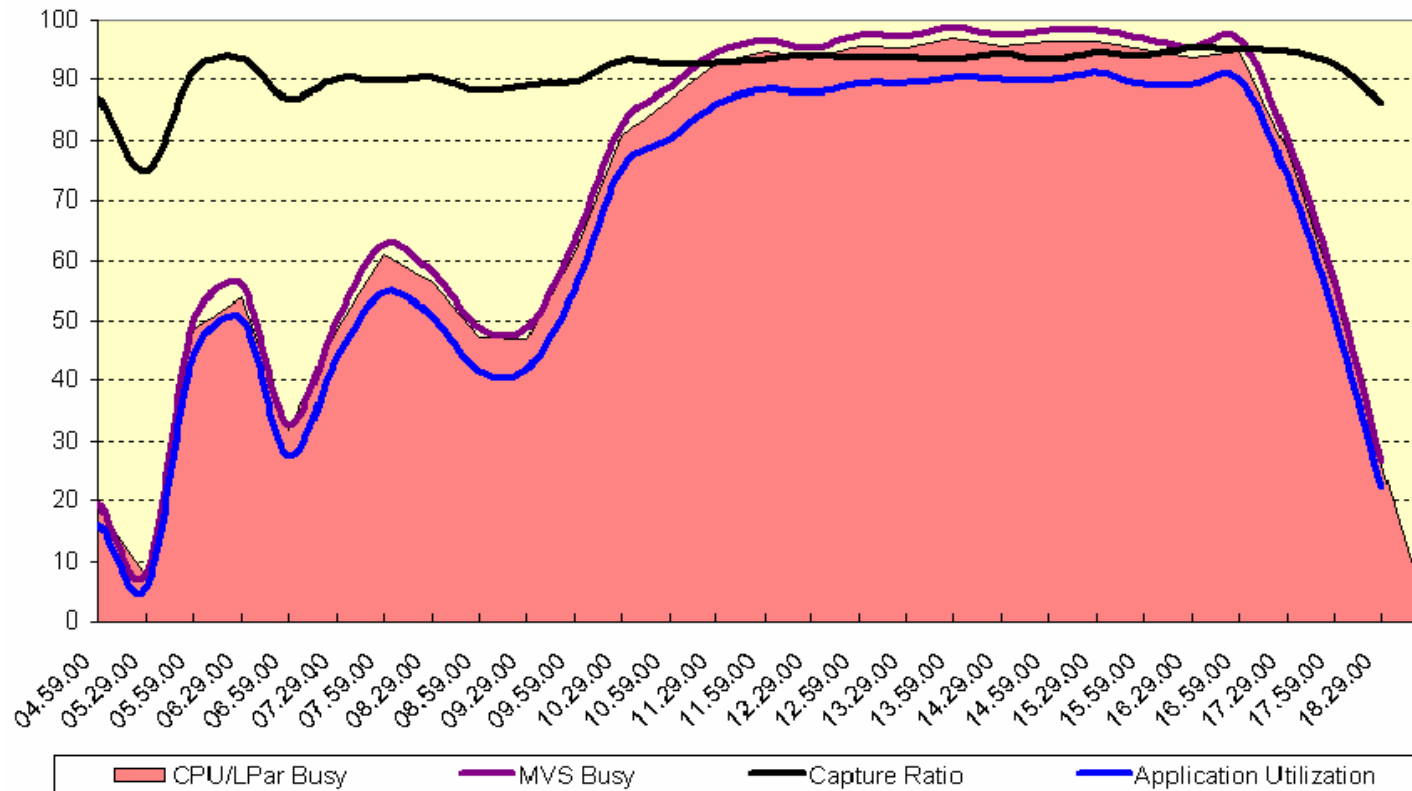
System Health Check

Capture Ratio

The Capture Ratio represents the percentage of CPU time, which can be counted to application work

✘ the CPU time reported for the sum of all workloads never adds up to the total CPU time used by the system. The CPU time for all workloads together will typically account for 80-90% of the total CPU time

✘ the uncaptured time is usually considered as system overhead. This is misleading, because system activities like paging are no overhead, but necessary system work

System Health Check

I/O Subsystem: DASD I/O Intensity

➡ **volume utilization**
➡ **thresholds:**
- good: < 300 ms/s
- critical: > 300 ms/s
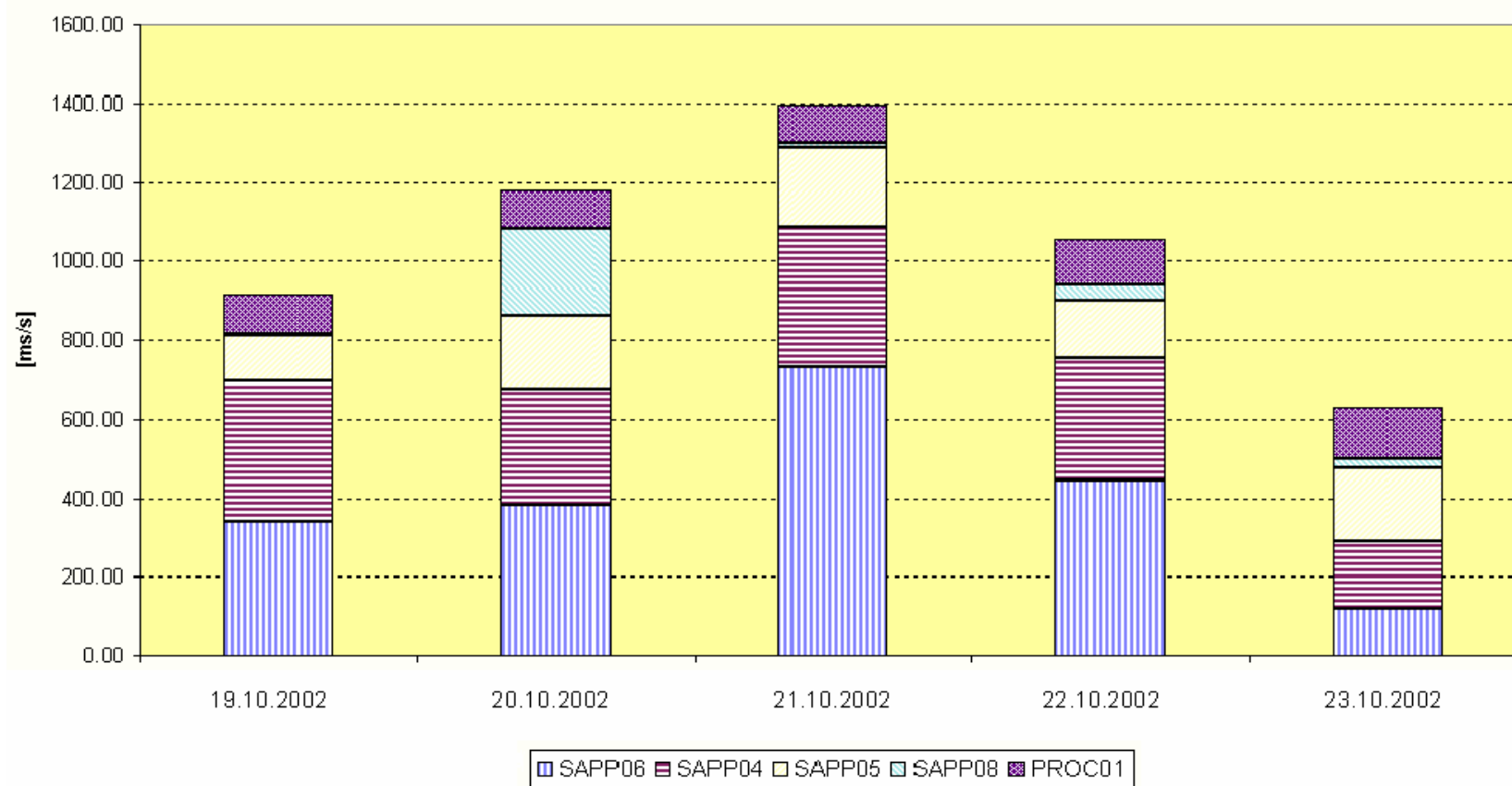
Average I/O Intensity for selected Devices of System SYS1

All Days, Time Frame: 9:00 - 11:59

System Health Check

I/O Subsystem: DASD I/O Intensity

The DASD I/O Intensity can be taken as indicator for the volume utilization

- ✘ even the extremely high response time for a single device is not of interest, if the activity rate of this device is very low. For this reasons the I/O intensity (=response time * activity rate) is a well suited measurement to detect over utilized devices
- ✘ theoretically, the I/O intensity for a device may be higher than 1000ms/sec because the IOS-queue time is part of the response time
- ✘ for the rough performance evaluation of the entire I/O Subsystem, the following guideline can be taken: the accumulated I/O intensity for the 5 highly utilized devices should not exceed 1500 ms/sec during the prime shift

System Health Check

I/O Subsystem: DASD Response Time

➡ **volume performance**
➡ **thresholds:**
  - good: < 3 ms
  - critical: > 5 ms

Response Time (all devices) System: SYS1 Reporting Date 10/19/02

Legend: SAPP06, SAPP04, SAPP05, SAPP08, PROC01
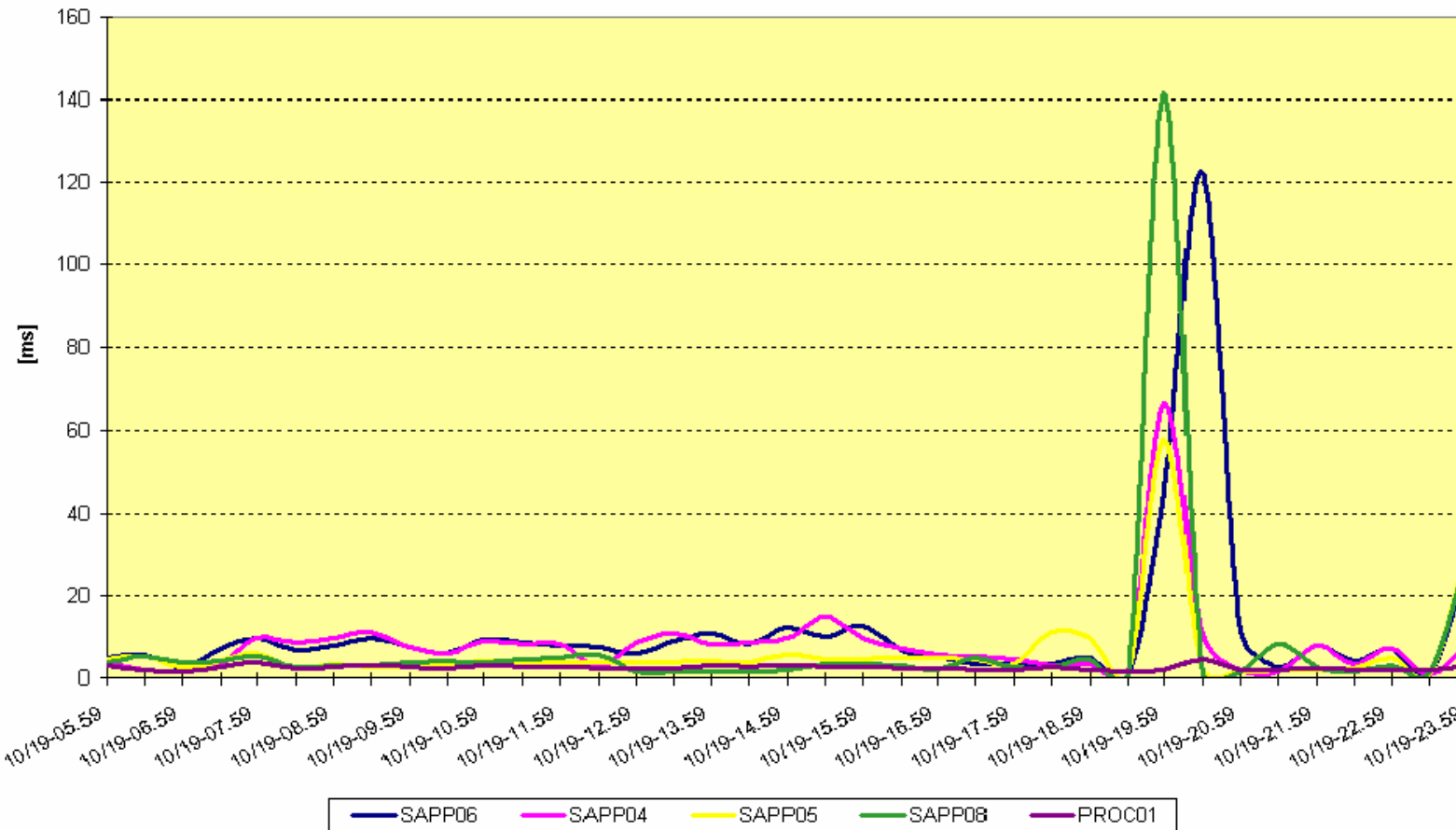
System Health Check

I/O Subsystem: DASD Response Time

The DASD Response Time can be taken as indicator for the volume performance

✘ if the response times exceed the guideline significantly for those devices
  with high activity rates, you should investigate further
✘ some workloads are prone to higher response times, which may still be
  quite acceptable (for example, DB2 sequential prefetch, page/swap I/O)

System Health Check

I/O Subsystem: Cache Hit Ratio
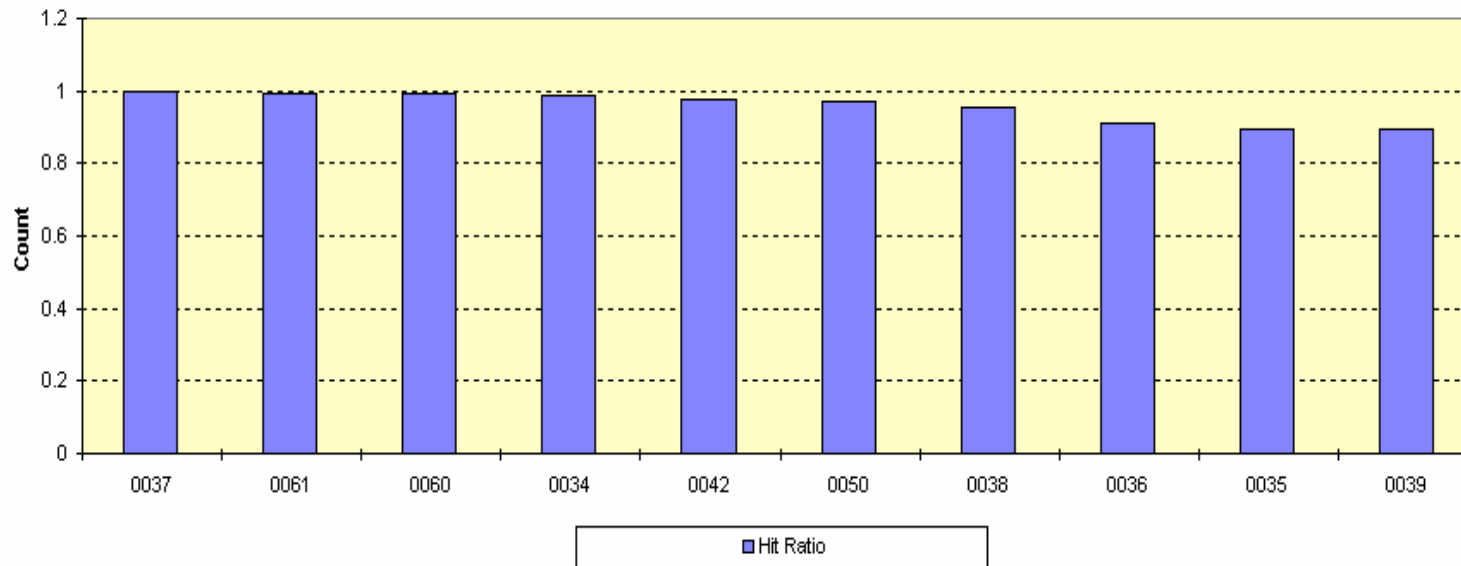
➡ cache effectiveness

➡ thresholds:
- good: > 0.9
- critical: < 0.8

Total I/O Hit Ratio (Top 10 SSIDs)

System: SYS1 Reporting Date 10/19/02

System Health Check

I/O Subsystem: Cache Hit Ratio

The Cache Hit Ratio can be taken as indicator for the cache effectiveness

- ✘ check whether all volumes are experiencing a good hit ratio (80% or higher)
- ✘ pay special attention to those volumes that do a lot of I/O
- ✘ the occurrence of a low hit ratio for one or more devices cannot be interpreted as a sure sign of the need for more cache. It may be caused by datasets which do not cache well, bypass cache, etc.

System Health Check

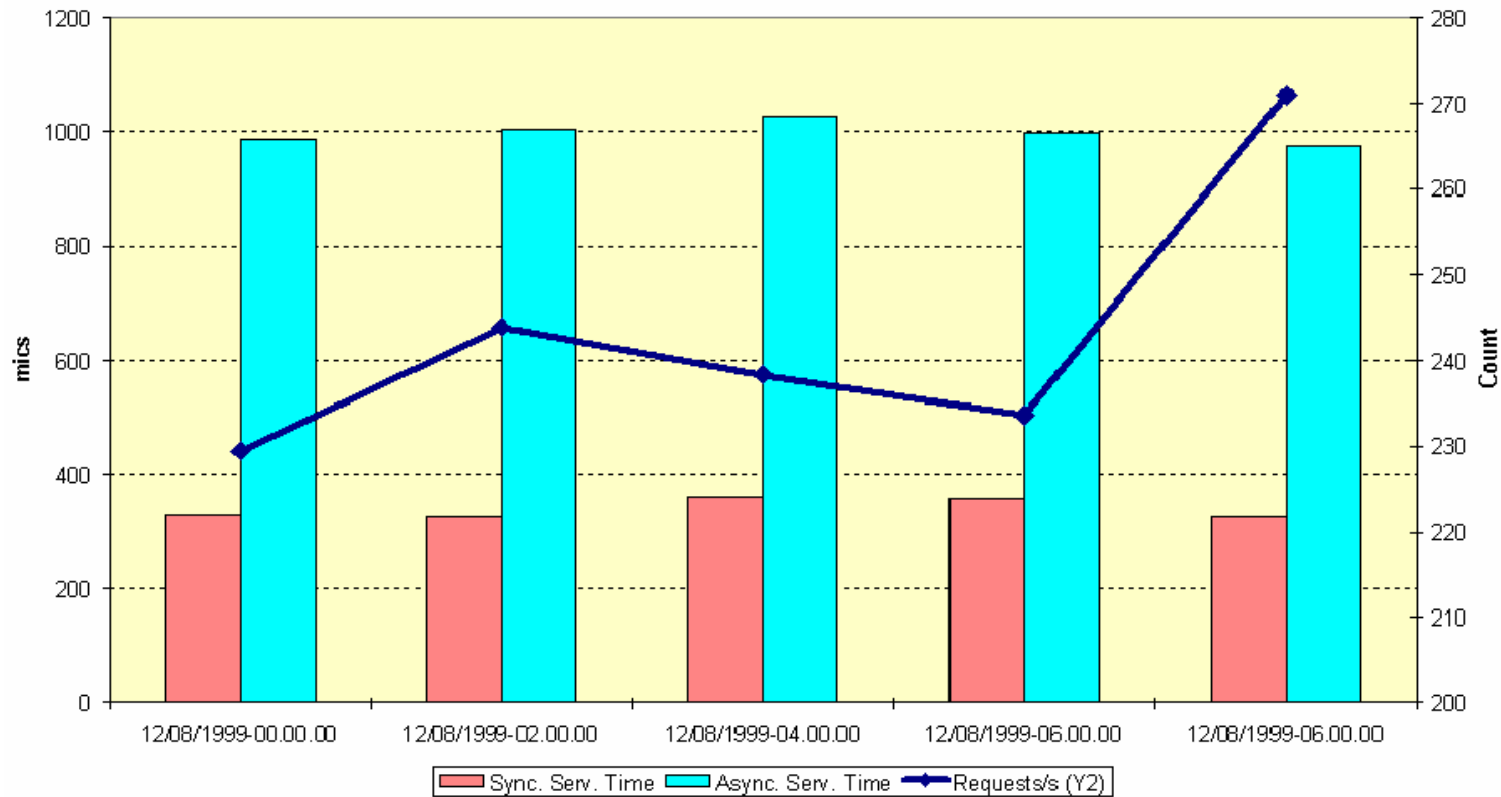Coupling Facility: Service Times

➡ CF performance
➡ thresholds:
  ▪ good: < 40   mic sync
          < 250   mic async
  ▪ critical: > 60   mic sync
          > 400   mic async

Report for Coupling Facility: CF01, System: SYS1

Sync. Serv. Time Async. Serv. Time Requests/s (Y2)

System Health Check

Coupling Facility: Service Times

The CF service times can be taken as indicator for the performance of Coupling Facilities

✘ if a synchronous request takes to long, it may be changed to an asynchronous operation, so we should also pay attention to the changed request rate (CHNGD). Guideline: the number of changed requests should not exceed 10 % of the total synchronous requests

✘ synchronous as well as asynchronous requests are managed in terms of queues, if all subchannels to the Coupling Facility are busy. Guideline: the sum of delayed SYNC and ASYNC requests should be less than 10 % of the total requests

✘ if the CF service times are too high or too many requests are changed or queued, you may need additional CF processor power or more CF links

RMF Spreadsheet Reporter

FTP connectivity problems

► Verify the connection: use command line FTP
► control host timeout condition (JESPUTGETTO parameter)

```
Command Prompt                                                    _ □ X

D:\Rmfpp\PROGS>ftp boesclm
Connected to boesclm.boeblingen.de.ibm.com.
220-FTPD1 IBM FTP CS V2R10 at BOESCLM.boeblingen.de.ibm.com, 09:41:39 on 2003-04
-24.
220 Connection will close if idle for more than 60 minutes.
User (boesclm.boeblingen.de.ibm.com:(none)): bhbe
331 Send password please.
Password:
230 BHBE is logged on.  Working directory is "BHBE.".
ftp> ascii
200 Representation type is Ascii NonPrint
ftp> put iefbr14.jcl
200 Port request OK.
125 Storing data set BHBE.IEFBR14.JCL
250 Transfer completed successfully.
ftp: 287 bytes sent in 0.00Seconds 287000.00Kbytes/sec.
ftp> quote site filetype=jes
200 SITE command was accepted
ftp> get iefbr14.jcl iefbr14.joblog
200 Port request OK.
125-Submitting job iefbr14.jcl FIXrecfm 80
125 When JOB02121 is done, will retrieve its output
250 Transfer completed successfully.
ftp: 3412 bytes received in 3.11Seconds 1.10Kbytes/sec.
ftp> bye
221 Quit command received. Goodbye.

D:\Rmfpp\PROGS>
```

how can i verify my FTP connection setup ?

► Additional: Check active/passive FTP
► You can adapt the JCL Skeleton in the Connect directory, e.g.
  C:\Program Files\RMF\RMF Spreadsheet Reporter\Connect\RMFPP1.JCL

Information and Tools

RMF homepage: www.ibm.com/servers/eserver/zseries/zos/rmf/

■ Product information, newsletters, presentations, ...

■ Downloads

> ▶ Spreadsheet Reporter
> ▶ RMF PM Java Edition
> ▶ RMF data collector for Linux

RMF email address: 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/r10pdf/

■ RMF Redbook: Effective zSeries Performance Monitoring Using Resource Measurement Facility, SG24-6645-00

http://www.redbooks.ibm.com
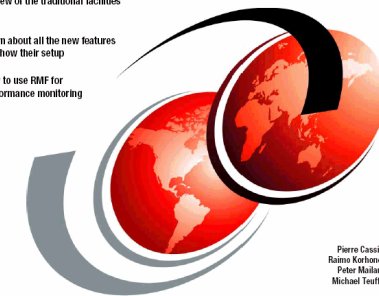
IBM
SG24-6645-00

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

Redbooks

ibm.com/redbooks