

Managing MaxDB

SPC150

Version 7.6

THE BEST-RUN BUSINESSES RUN SAP™



What Has to be Monitored?

Standby Database

Central Monitoring – Transaction DB59

Database Assistant – Transaction DB50

Performance Analysis Tools

Alert Monitor – Transaction RZ20

Snapshot

As a result of this workshop, you will be able to:

- Integrate your MaxDB instances into your monitoring landscape in transaction DB59.
- Use transaction DB50 to monitor your MaxDB instances.
- Use the MaxDB performance analysis tools to determine performance bottlenecks.
- Create a standby database and snapshots.
- Activate the Alert Monitor for your MaxDB instances.
- Schedule backups and other administrative tasks using the DBA Planning Calendar.

DISCLAIMER

This presentation reflects current planning. Contents may be changed without prior notice, and are in no way binding upon SAP.

What Has to be Monitored?

Standby Database

Central Monitoring – Transaction DB59

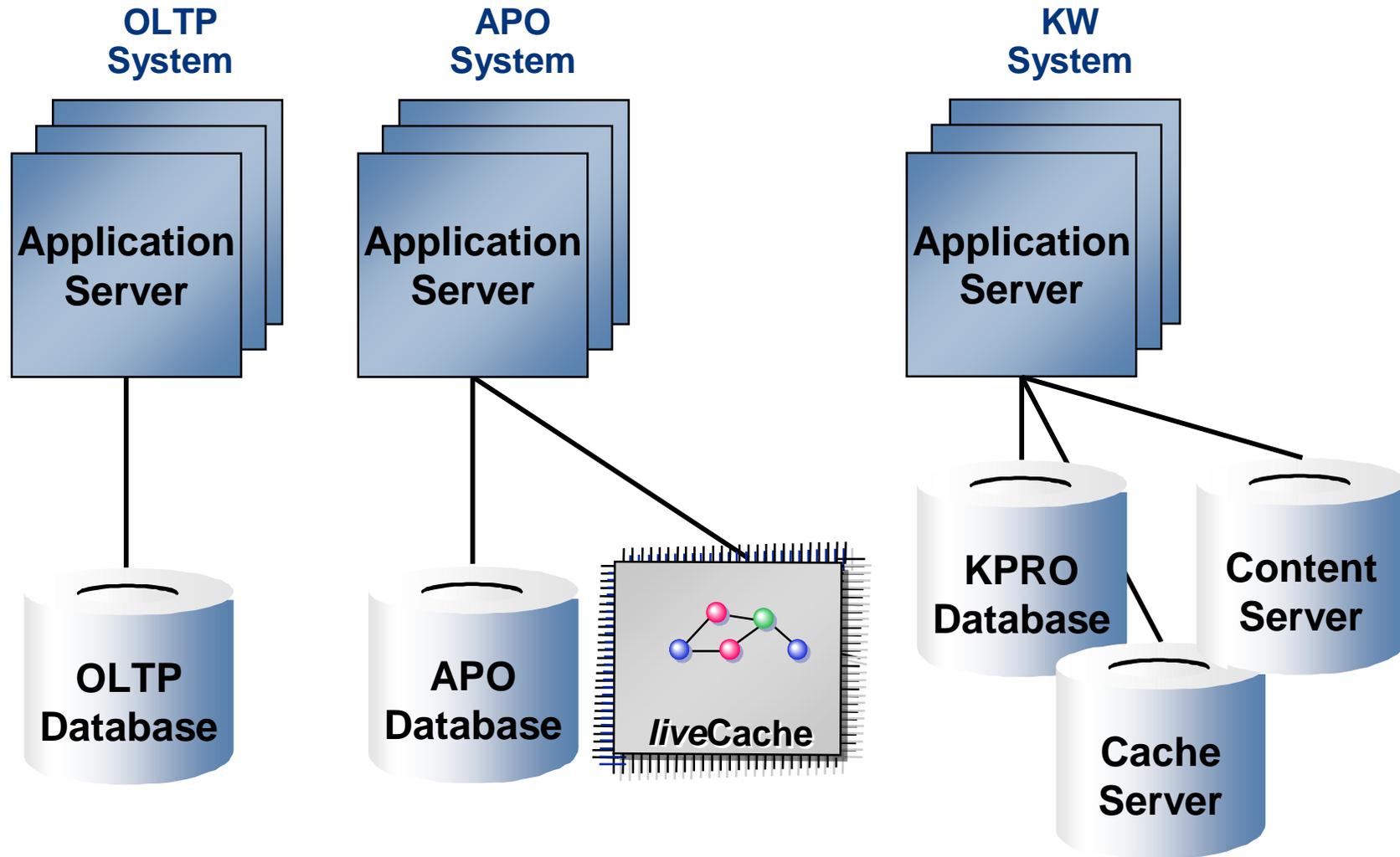
Database Assistant – Transaction DB50

Performance Analysis Tools

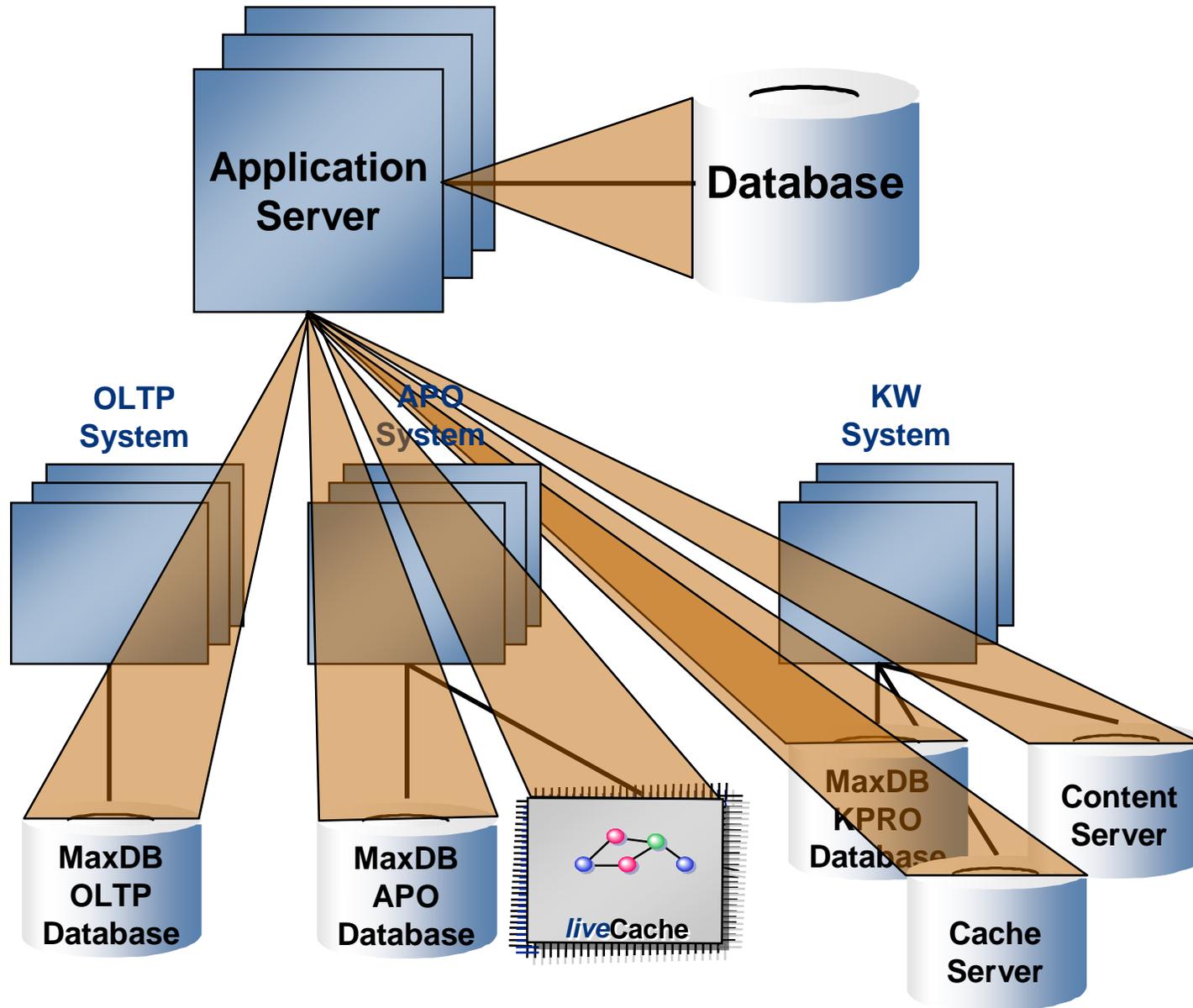
Alert Monitor – Transaction RZ20

Snapshot

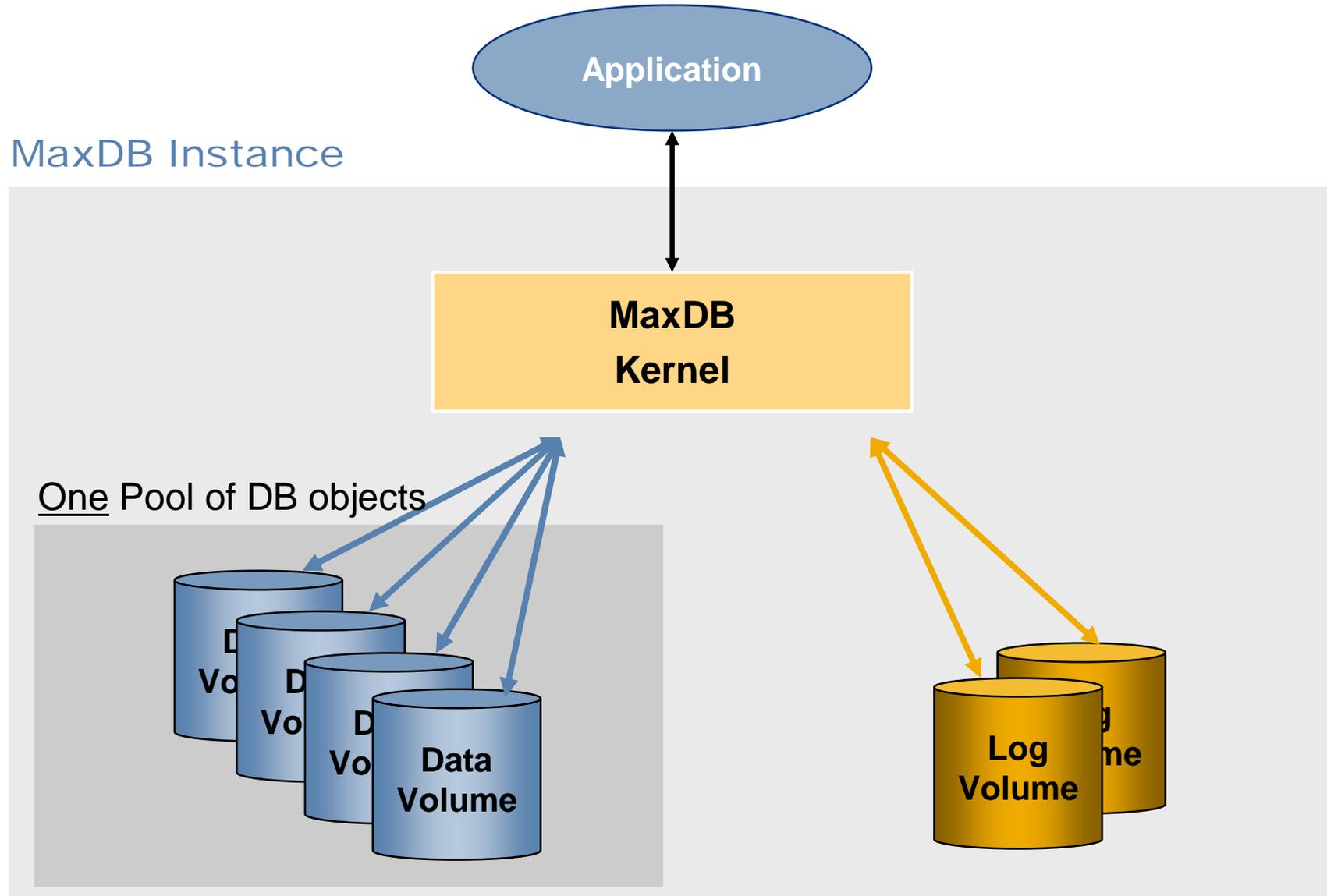
Which Instances can be Monitored?



Central Monitoring



Anatomy of a MaxDB Instance



MaxDB Monitoring



Memory consumption

CPU consumption

Expensive SQL statements

Task activities

Critical Regions

Caches

I/O

Command Analyzer

SQL Interpreter & Optimizer

SQL basis
(B* trees)

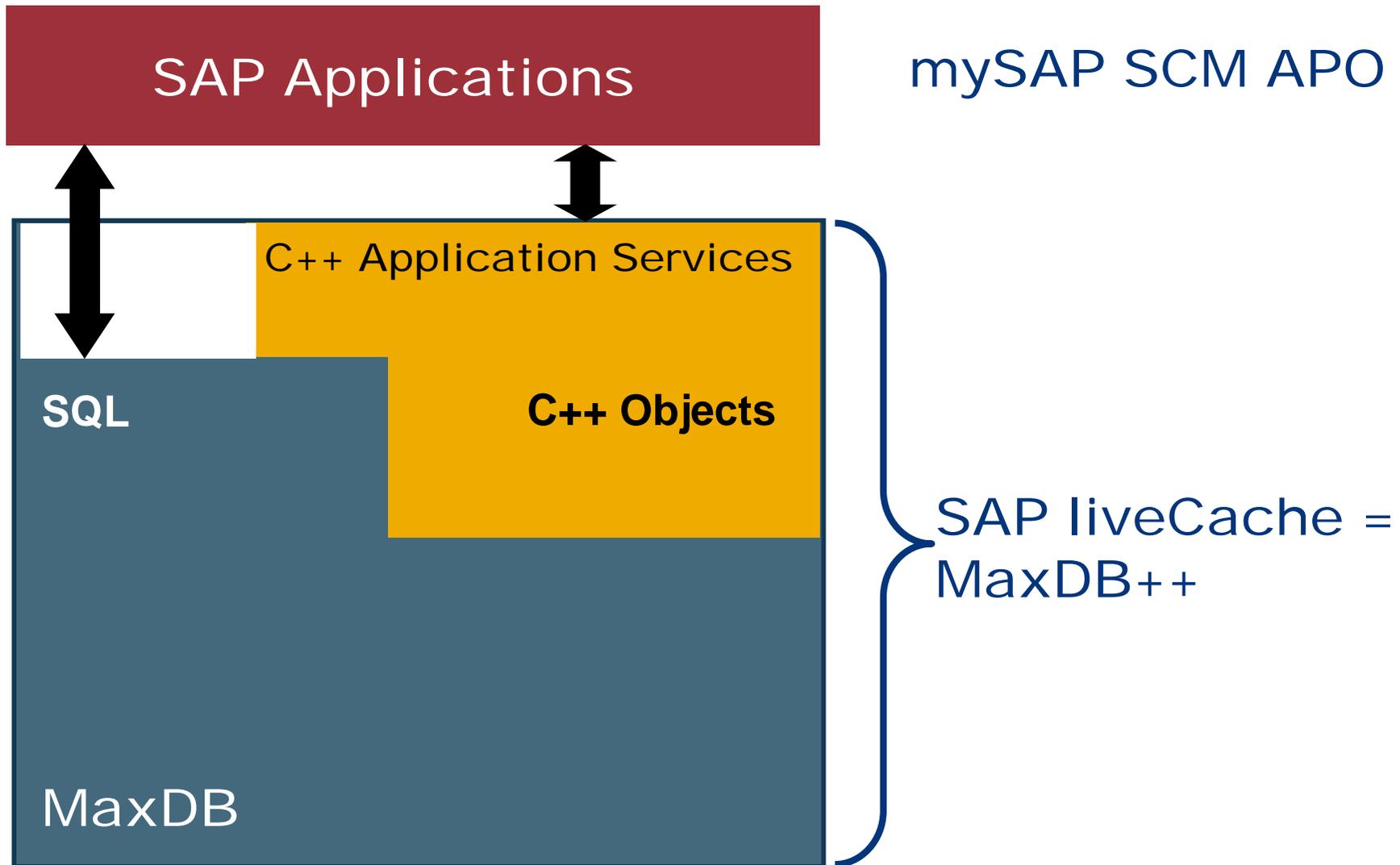
I/O buffer cache

SQL data & Converter
Data Volume(s)

Log Files

Log queue

Log Volume(s)



Transaction Availability



	DB50	DB59 / DB50N	LC10	RZ20	DB13C
4.6C	GA	Basis SP 44	GA	Basis SP 44	NA
4.6D	GA	Basis SP 33	GA	Basis SP 33	NA
6.10	GA	Basis SP 32	GA	Basis SP 32	Basis SP 28
6.20	GA	Basis SP 21	GA	Basis SP 21	Basis SP 18
6.40	GA	GA	GA	GA	GA
7.00	GA	GA	GA	GA	NA – new: DBACOCKPIT

GA: **general available**; NA: **not available**

DB50 and DB50N work exclusively with SAP DB/MaxDB instances (as of version 7.3).

DB59 and DB13C are database independent.

LC10 works exclusively with liveCache instances. To start/stop/initialize the liveCache this transaction should only be used in the corresponding APO/SCM system - but liveCache instances can be monitored in any SAP system using the mentioned Basis SPs.

RZ20 is database independent and available as of SAP release 4.6C. The integration of any SAP DB/MaxDB and liveCache instances is possible as of the mentioned SPs.

Target



- The following slides can be used as a reference book – they contain screenshots of the used transactions and additional information.

What Has to be Monitored?

Standby Database

Central Monitoring – Transaction DB59

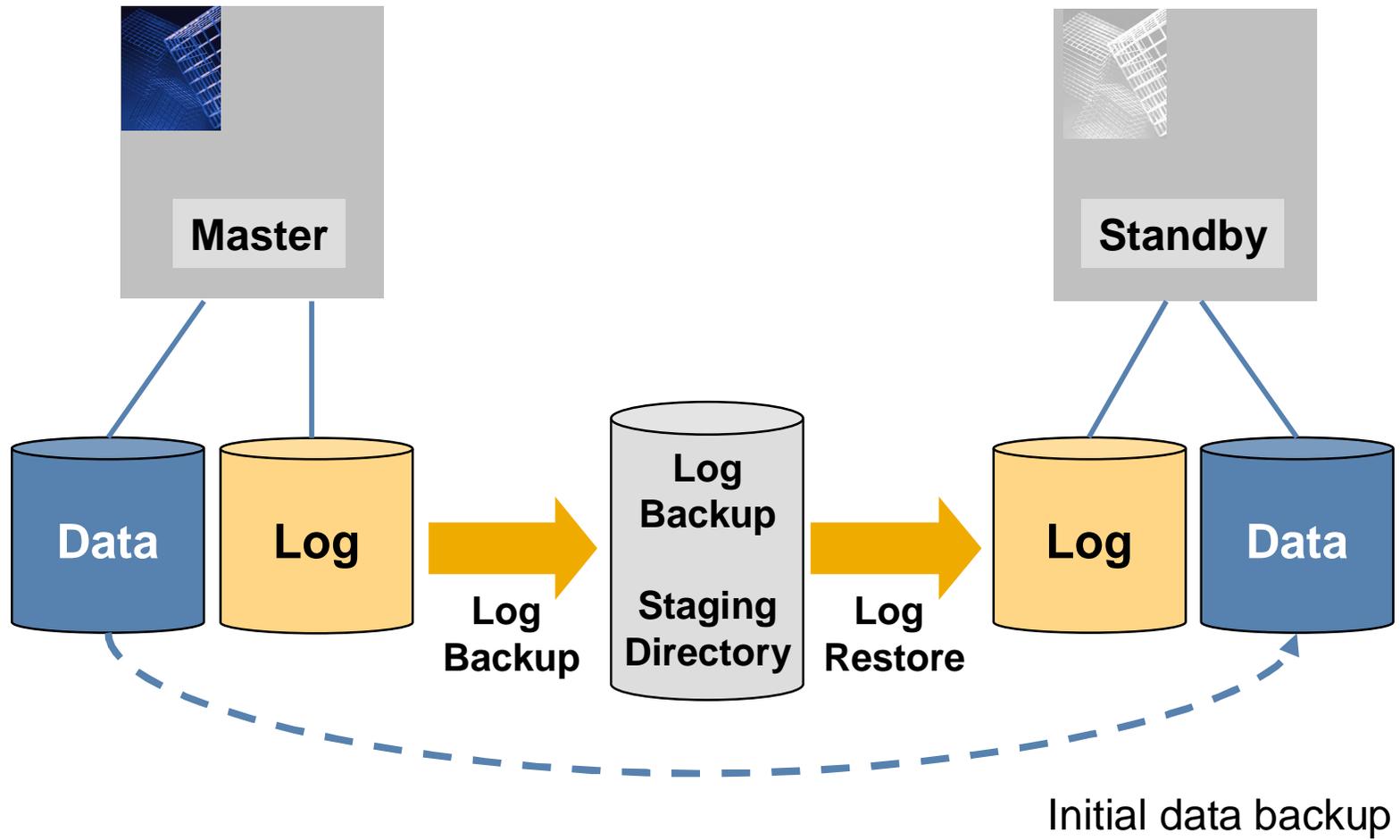
Database Assistant – Transaction DB50

Performance Analysis Tools

Alert Monitor – Transaction RZ20

Snapshot

Standby Database (w/ Log Shipping)





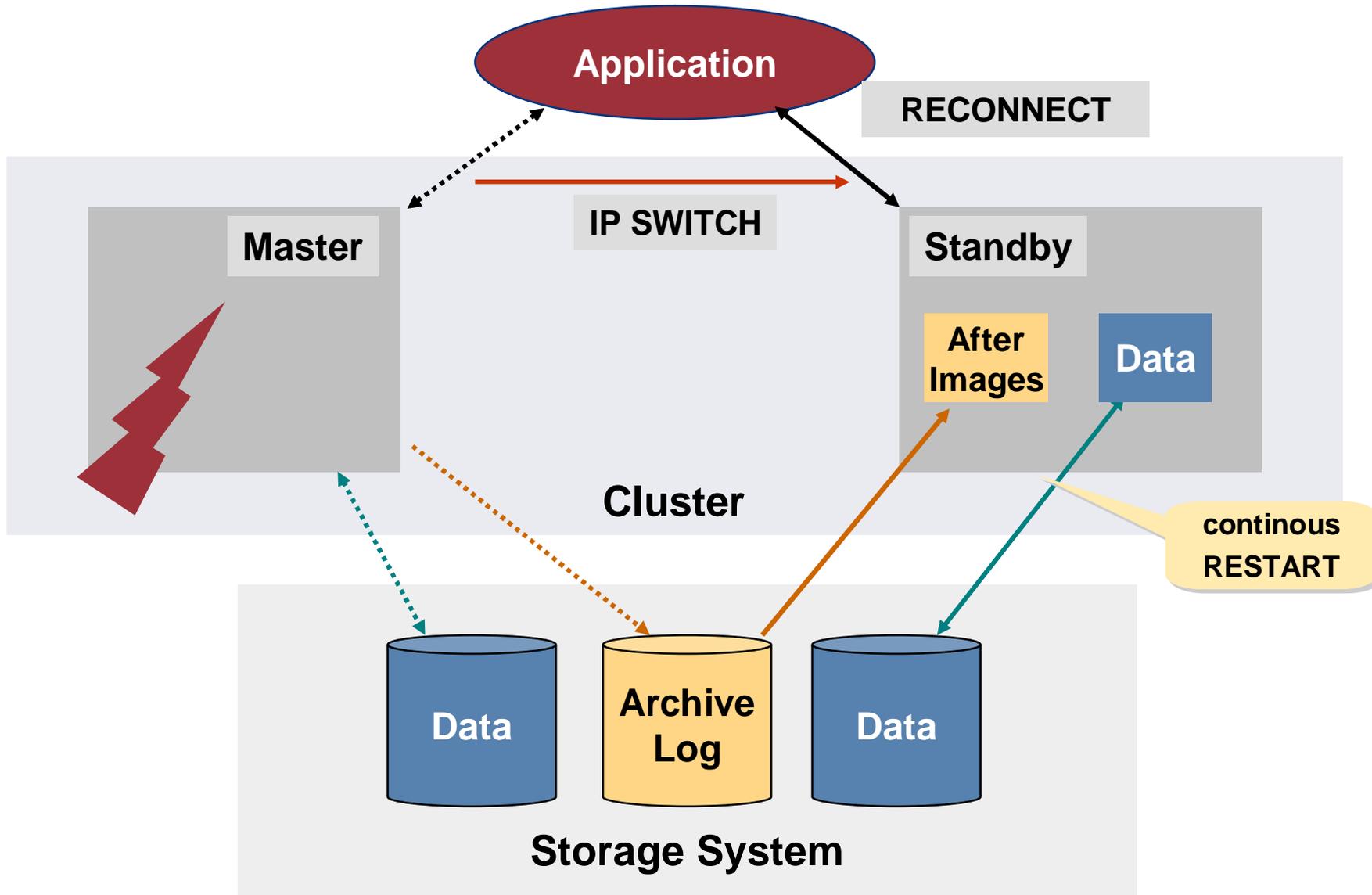
Standby Mode

- Initialize once with complete backup from Master
- Redo logs as they appear

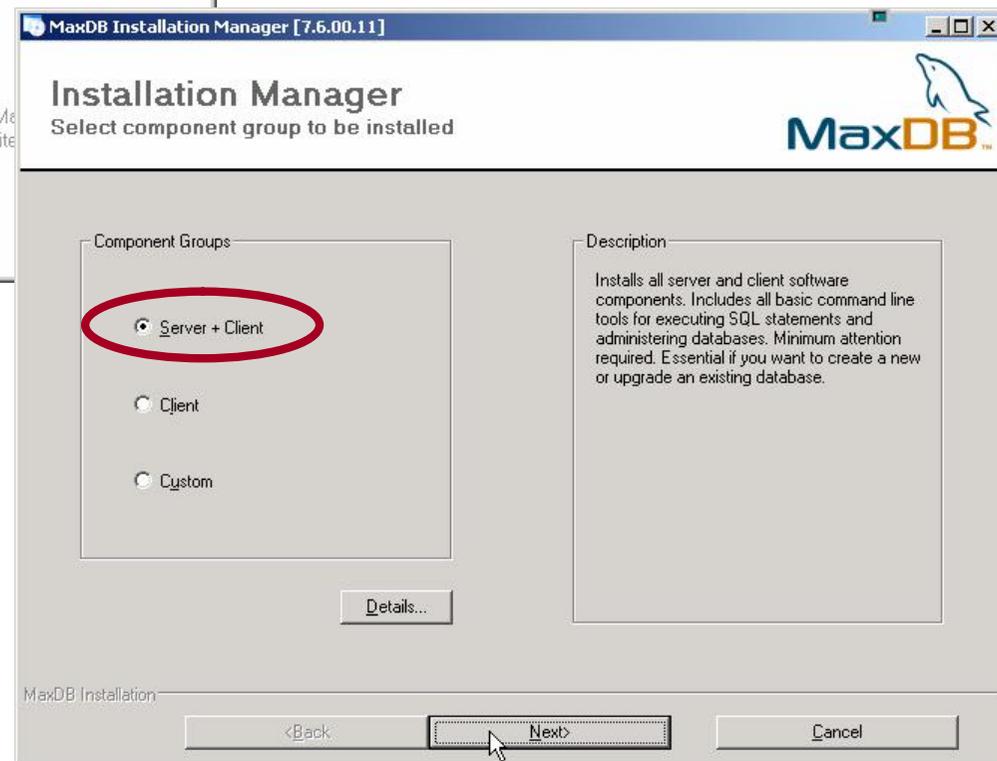
Start Slave to online mode in case of emergency

- If possible, back up last piece of log from master
- Redo all 'open' log backups (there should be none)
- Redo final log piece
- Restart slave to be the new master

Hot Standby - Standby Within Seconds

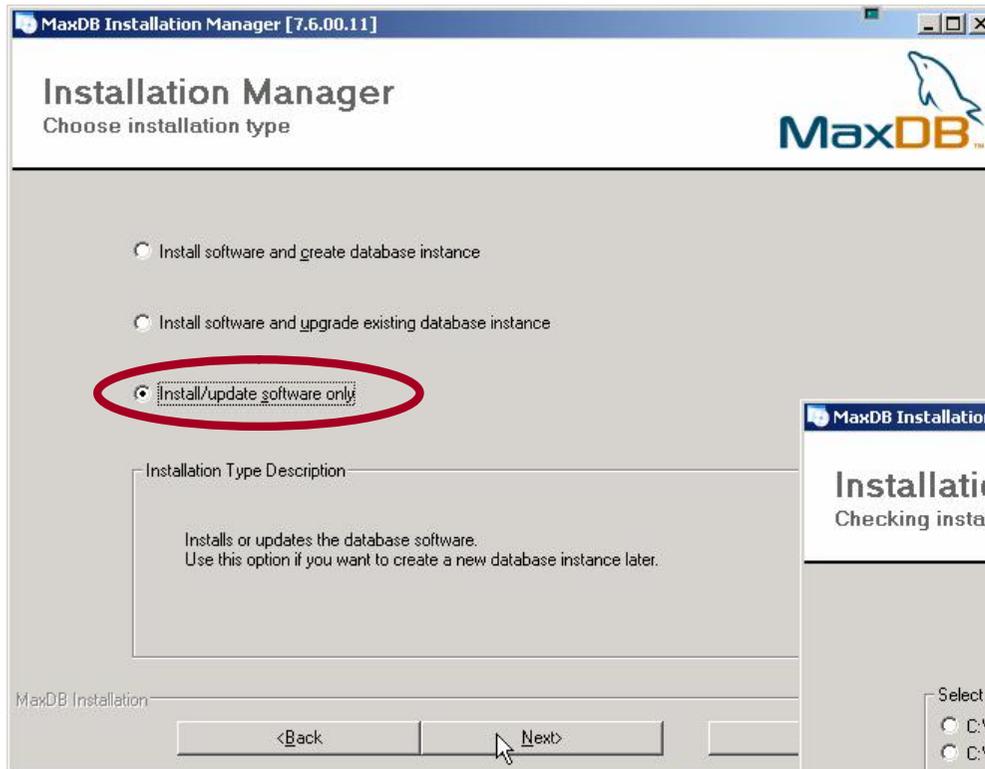


Standby Database: Installing Database Software I



MaxDB Software can be installed using the Installation Manager (SDBSETUP). It is possible to install the complete software package or to install just the client software, which is needed on SAP Application Servers. The *Custom* installation allows to select single software components to be installed.

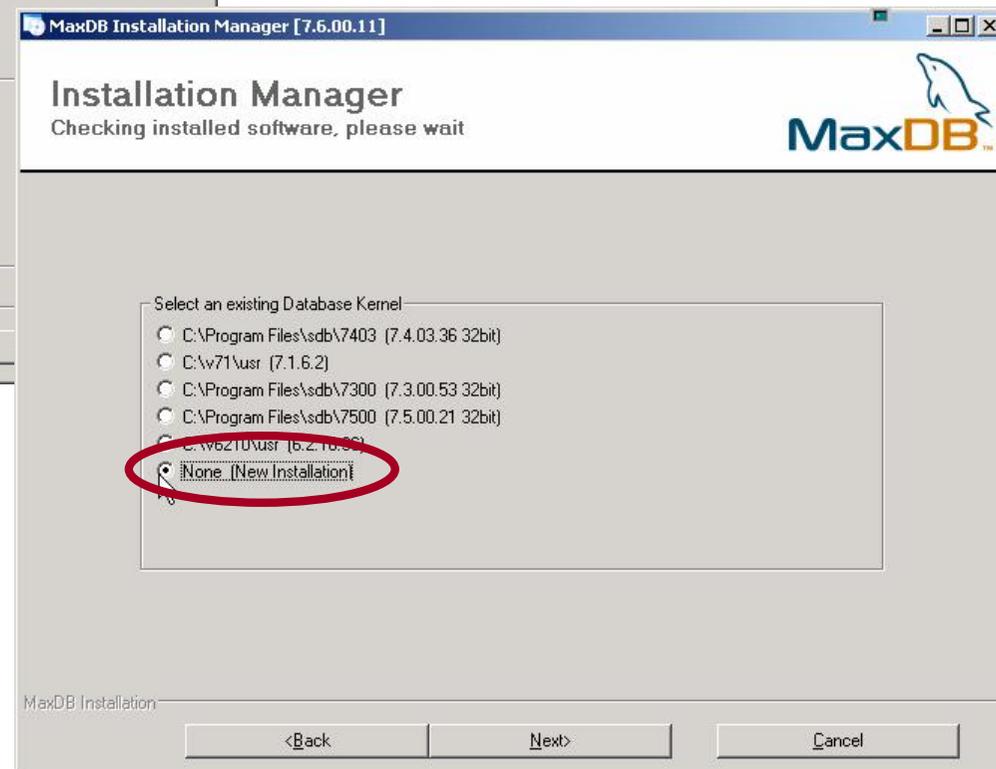
Standby Database: Installing Database Software II



You can choose if you would like to

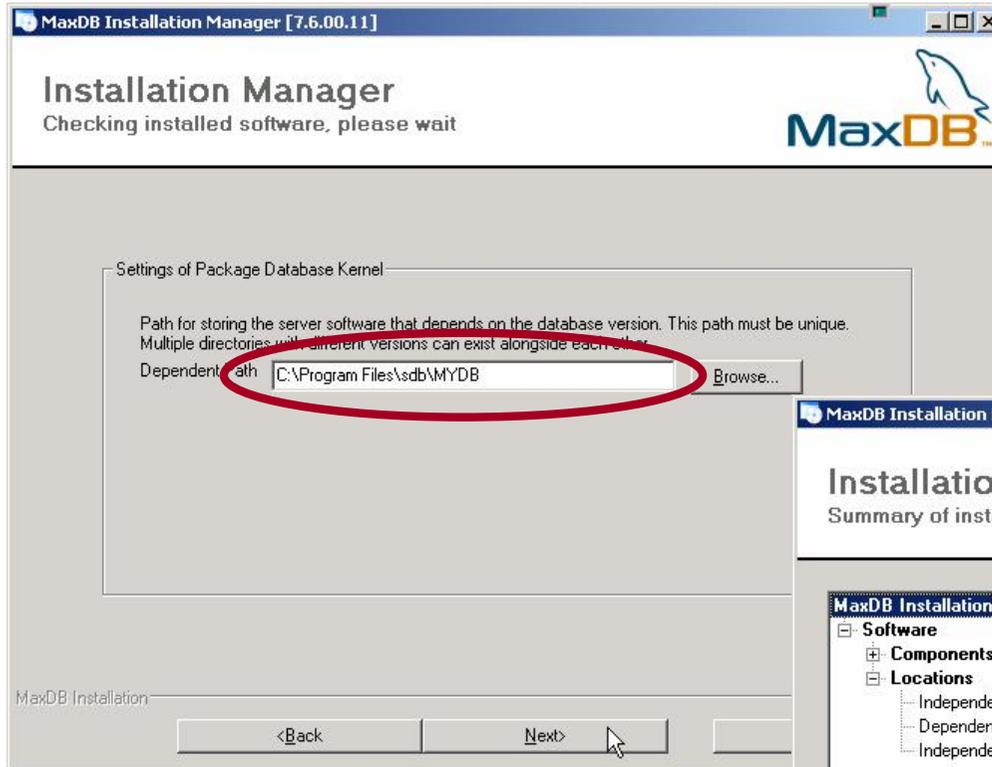
- install new software or
- update existing software

It is possible to install a new or upgrade an existing database instance.



You have to choose if you would like to upgrade an existing software installation or if you would like to install the software into a new directory.

Standby Database: Installing Database Software III



If you would like to install the software into a new directory, you have to enter this directory.



Then you'll get an overview of the selected/entered information and you can start the installation.

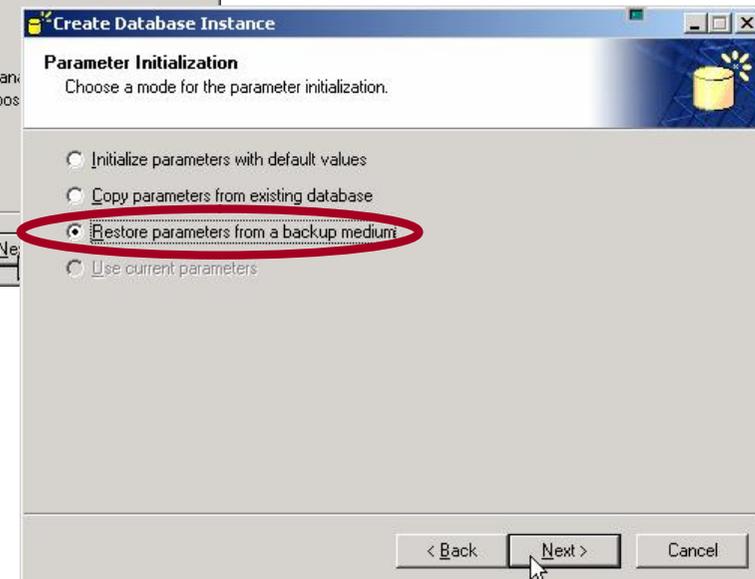
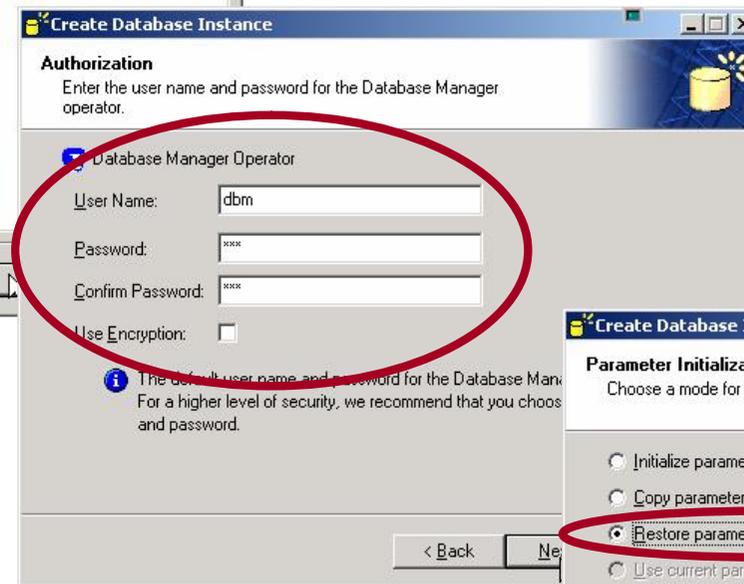
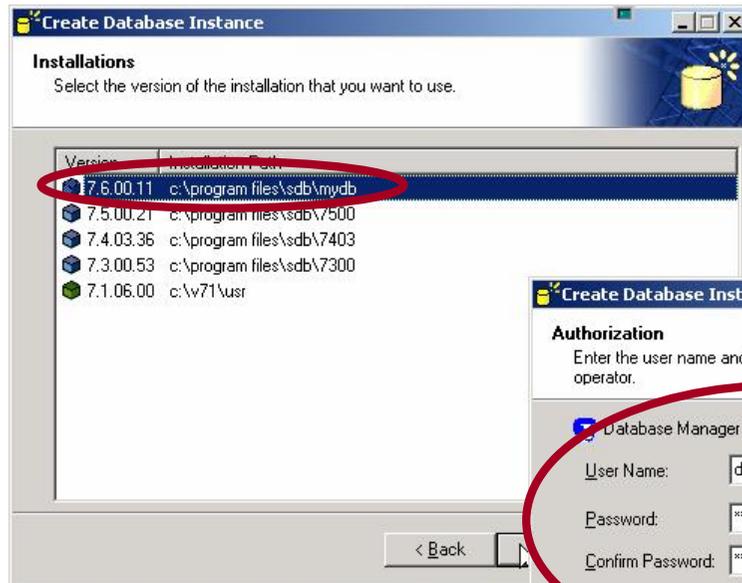
Standby Database: Installing Database Instance I



The screenshot displays the Database Manager interface. On the left, a tree view shows 'Servers' under '<Local>'. The main pane shows a 'Database Instance:' section with buttons for 'Add...', 'Create...', 'Backup...', and 'Recover...'. The 'Create...' button is circled in red. A 'Create Database Instance' dialog box is open, showing the 'Configuration Type' section with 'Custom' selected. A second 'Create Database Instance' dialog box is also open, showing the 'Database Instance Name' section with fields for 'Database Server' (set to '<Local>'), 'Database Name' (set to 'MYDB'), 'Login Name', and 'Password'. The 'Next >' button is highlighted with a mouse cursor.

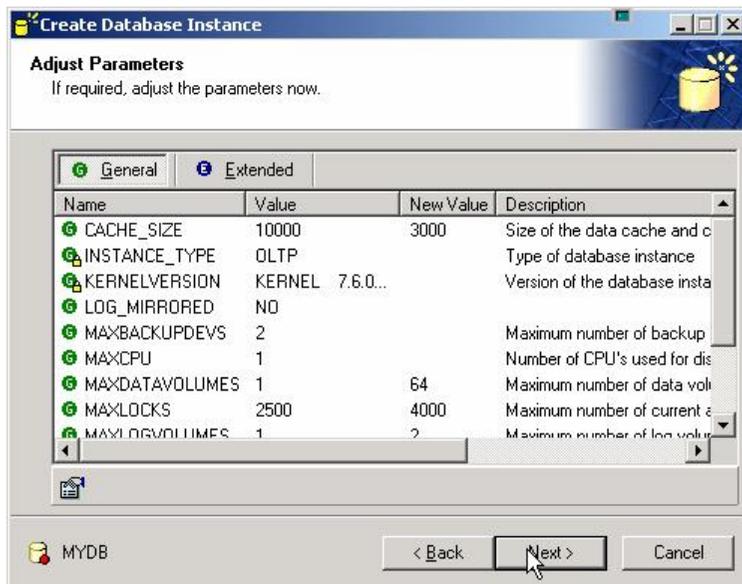
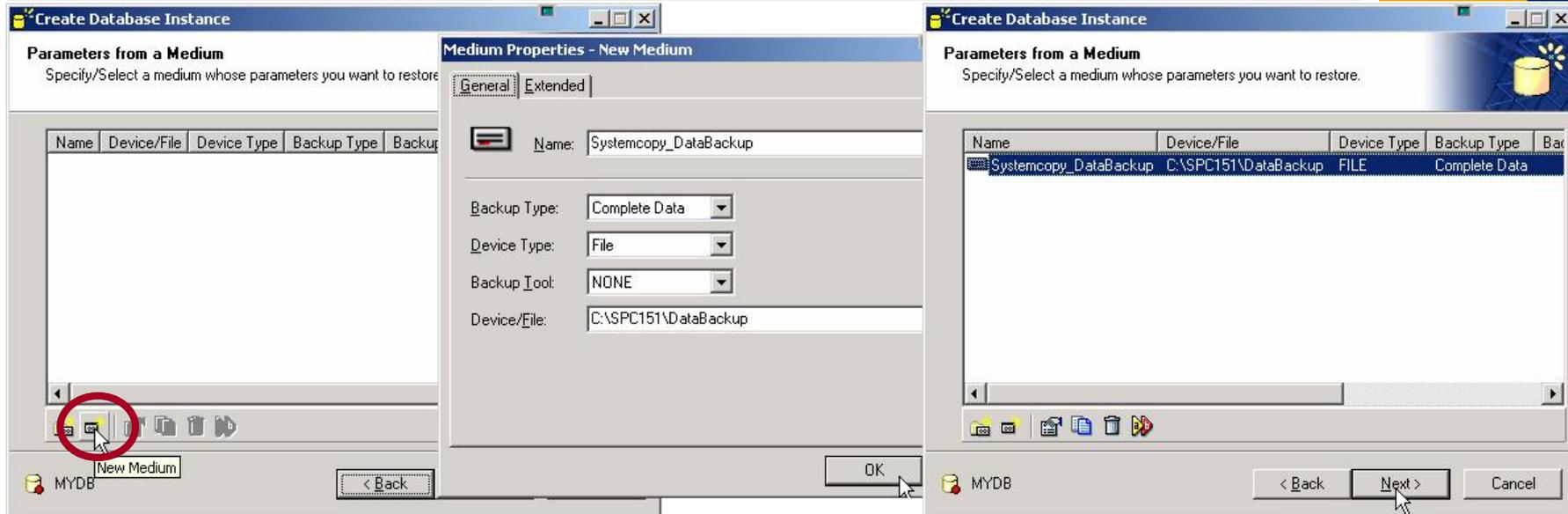
To install the database instance for the shadow database, use *DBMGUI*.
To open the *Installation Wizard*, choose *Create...*
In the *Installation Wizard*, you can select a configuration template so that you have to edit only a few parameter values.
Next you have to specify a database name.

Standby Database: Installing Database Instance II



After you have selected the software version for your database instance, you have to specify the *Database Manager Operator*. This is the user used to connect with the *DBMGUI* to the database instance. Then you have to decide how to initialize the database parameters.

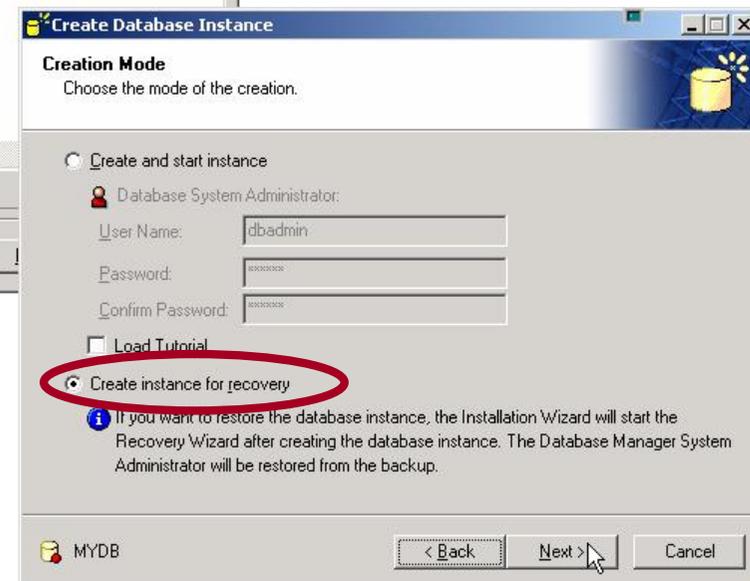
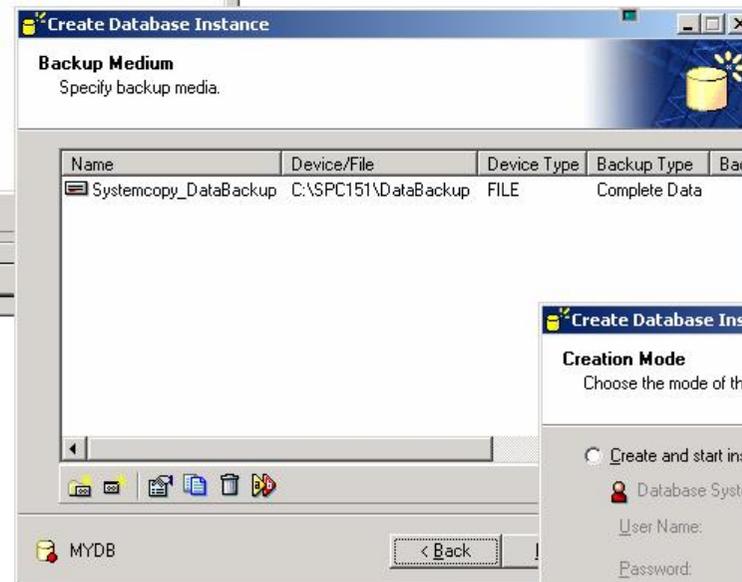
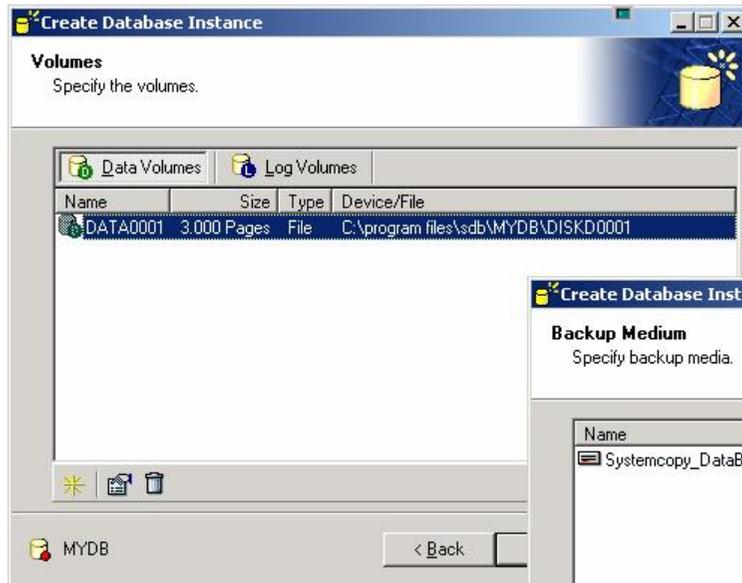
Standby Database: Installing Database Instance III



If you would like to get the parameter values from a backup, you have to specify the backup medium for that.

Afterwards you get a list with the parameter values that you can adapt if necessary.

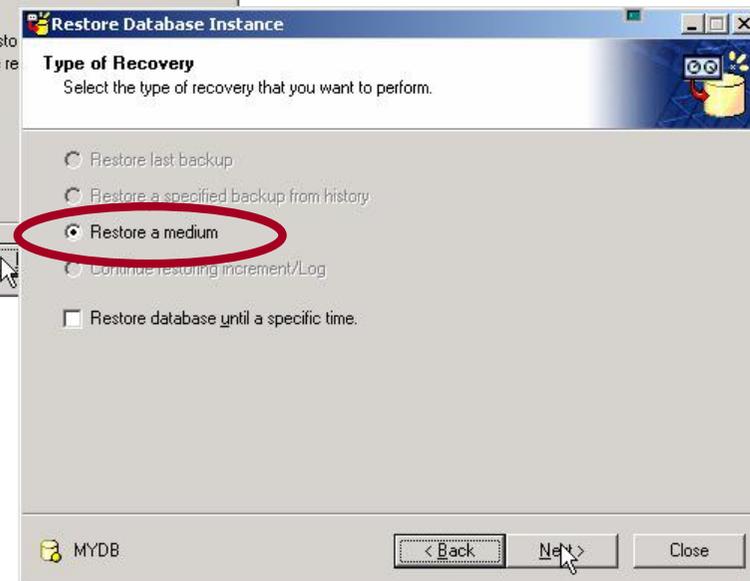
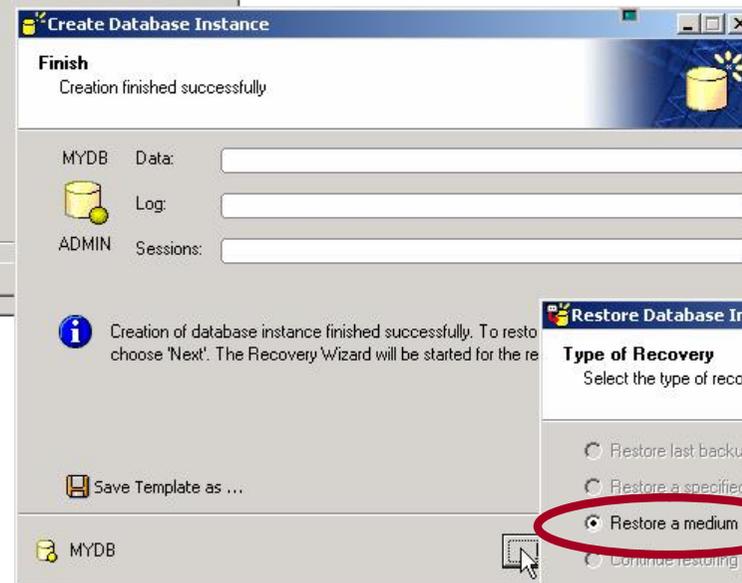
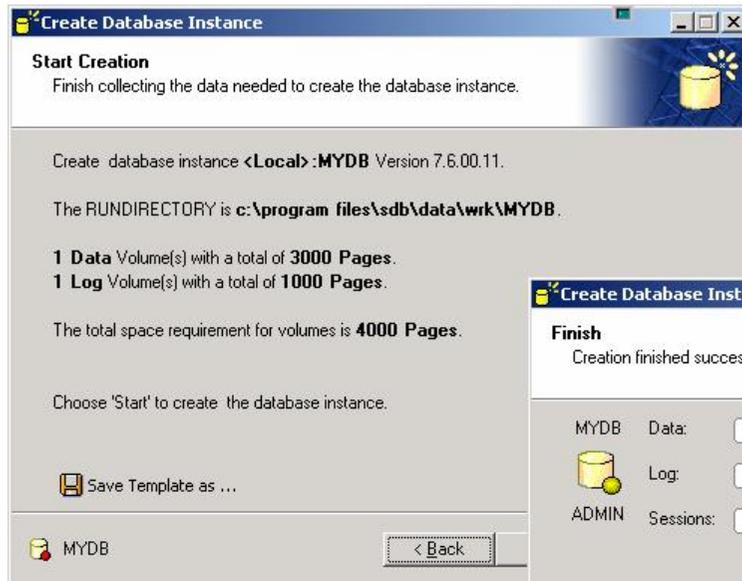
Standby Database: Installing Database Instance IV



After you checked the configuration of the data and log volumes, you can create further backup media.

Next you have to specify if you would like to create an empty database instance or if you would like to restore the data from an existing backup.

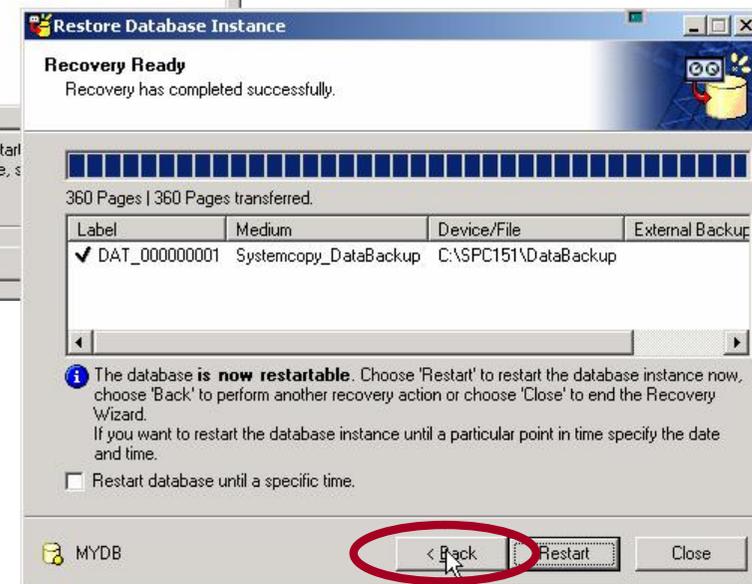
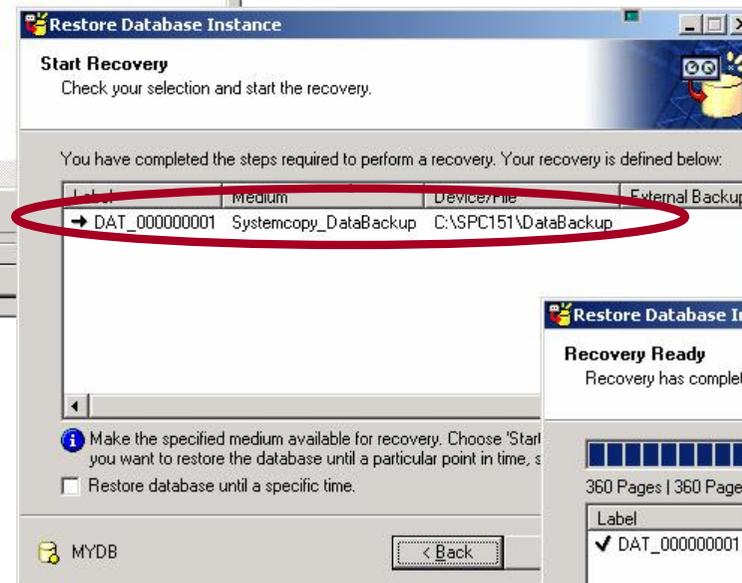
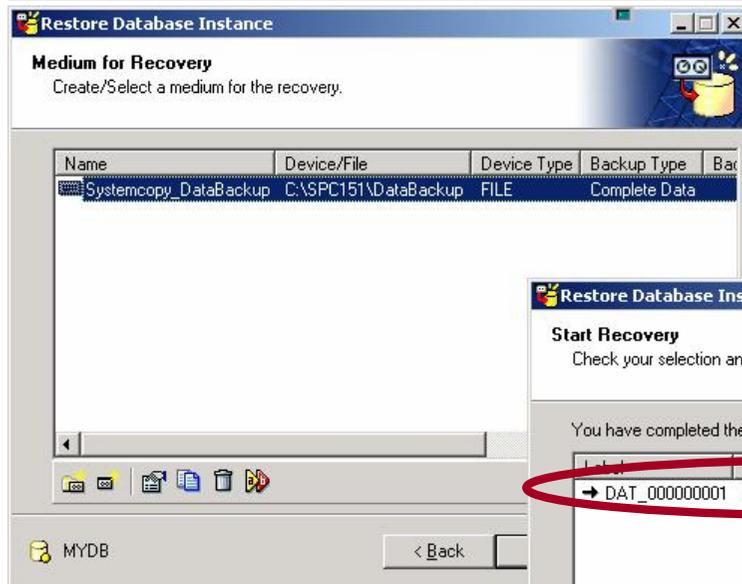
Standby Database: Installing Database Instance V



Before you start the installation double-check the entered information.

When the database instance has been created successfully it is not yet startable. You have to continue with the restore of the backup in the *Recovery Wizard* (just press *Next* in the *Installation Wizard...*).

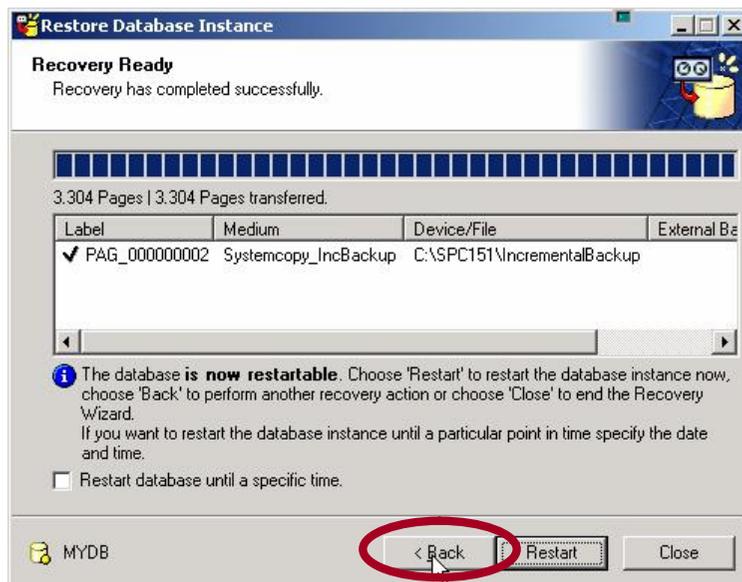
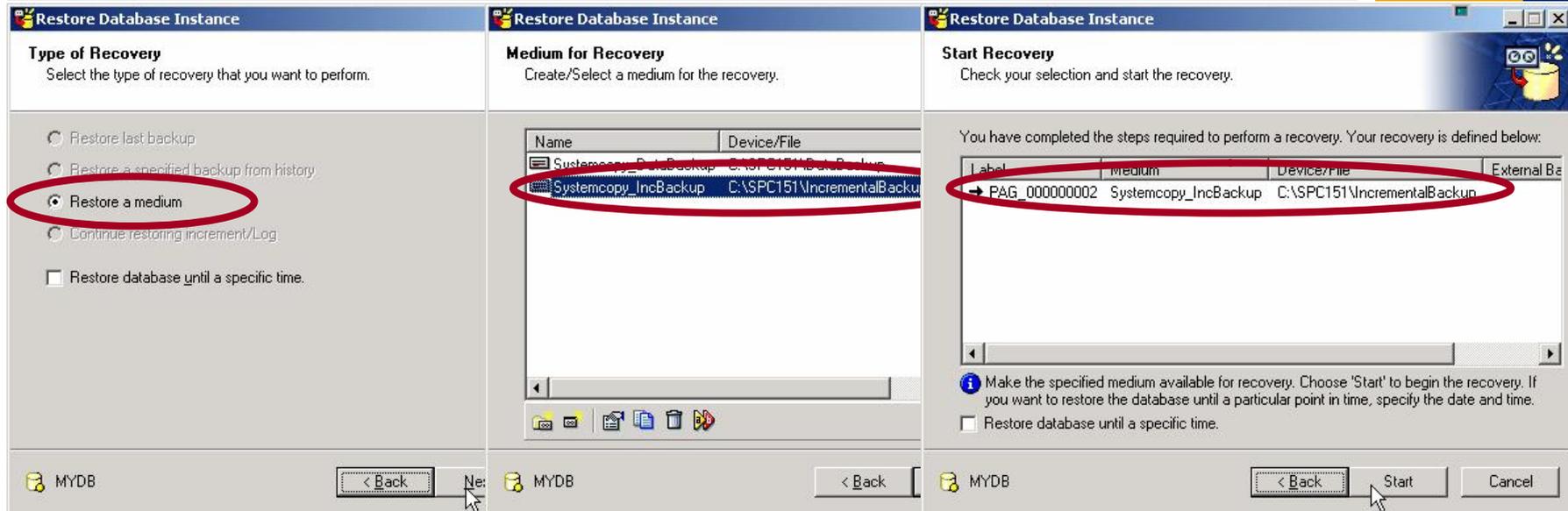
Standby Database: Restoring the Initial Backup



Select/create a backup medium for the Recovery. Make sure that the backup of your master instance is available at the specified location.

After you restored the complete data backup, choose *Back* in the *Recovery Wizard* to be able to restore further backups.

Standby Database: Restoring an Incremental Backup

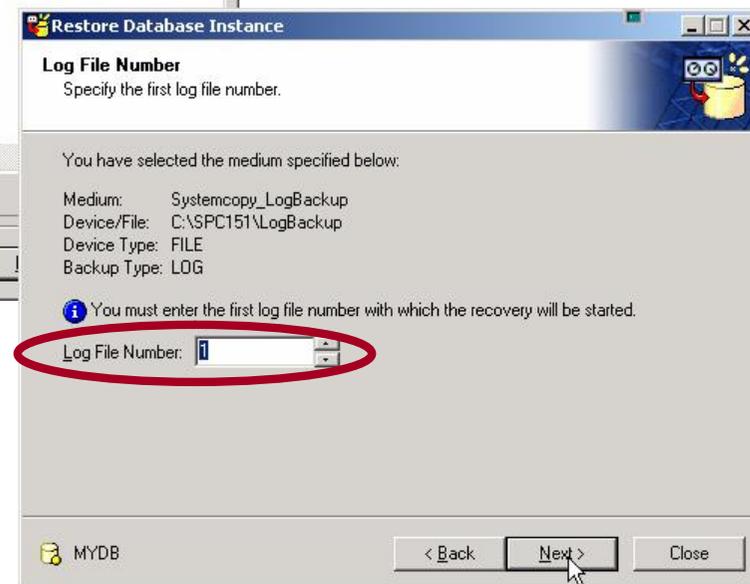
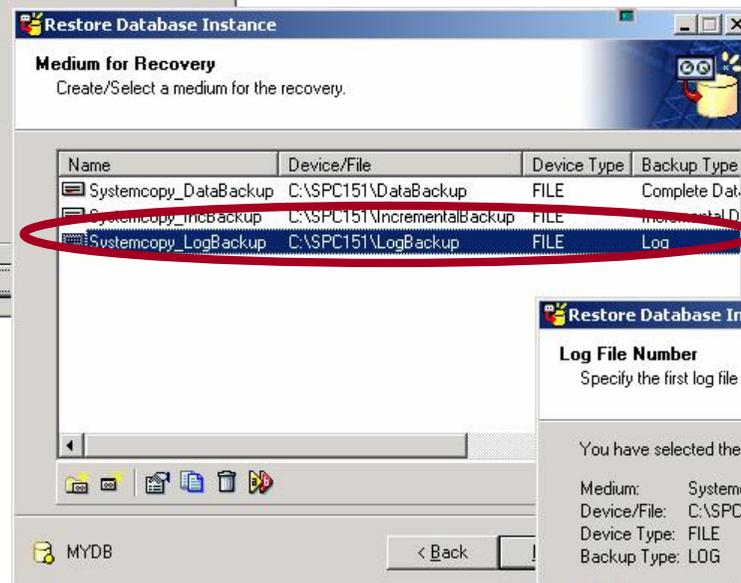
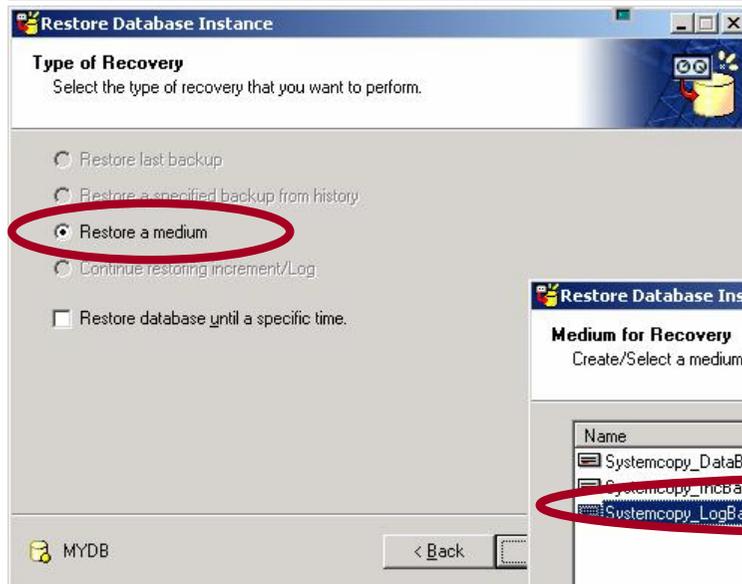


Depending on the available backups you can now continue with the restore of an incremental backup or with the restore of log backups.

You have to define a new backup medium for the incremental backup.

After you restored the incremental backup, choose *Back* to be able to restore further log backups.

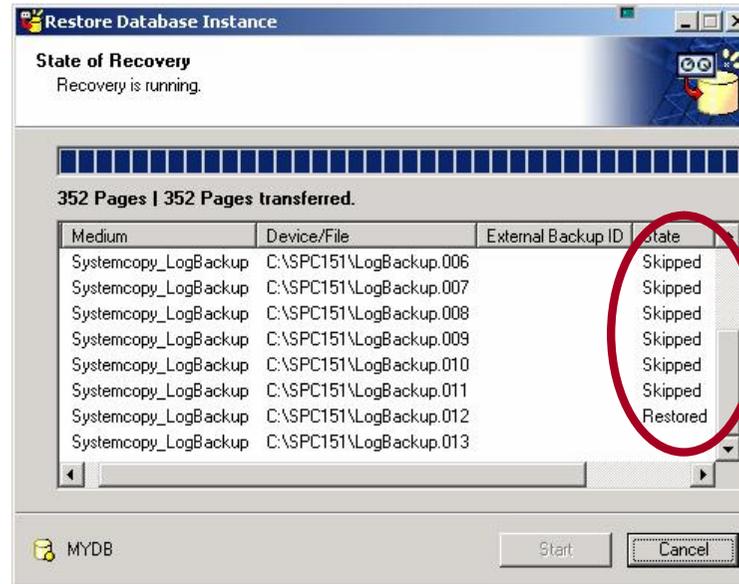
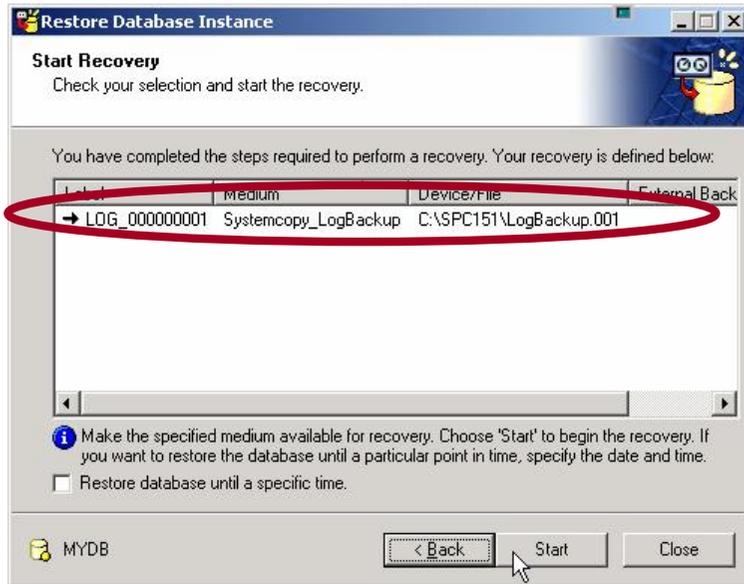
Standby Database: Restoring Log Backups I



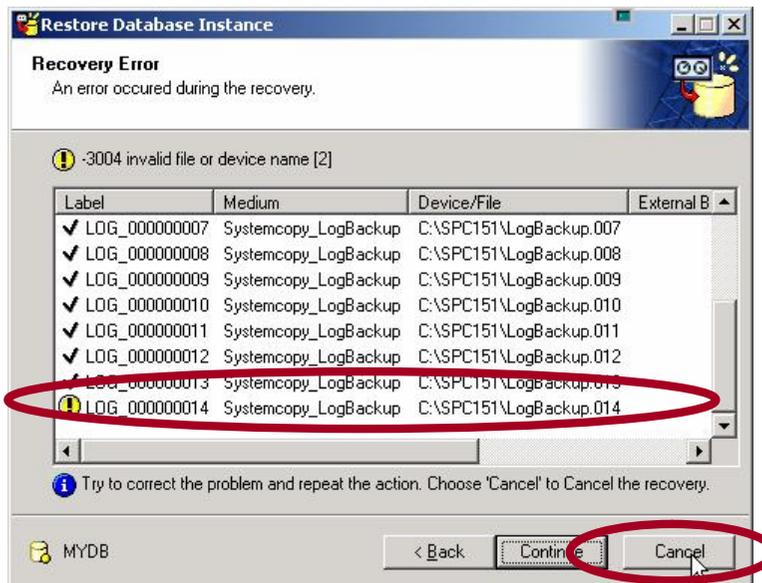
You have to define a new backup medium for the log backups.

Then you have to specify with which log backup the restore should begin. It is always possible to enter the number of the first available log backup file – the database will skip all log backups which are not needed for the restore. However, this check increases the restore time. So specify the actually needed log backup number if you know it.

Standby Database: Restoring Log Backups II



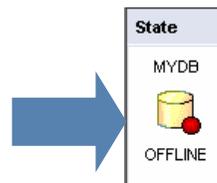
All available log backup files are restored one after another automatically. When the Database Manager tries to restore a log backup which is not



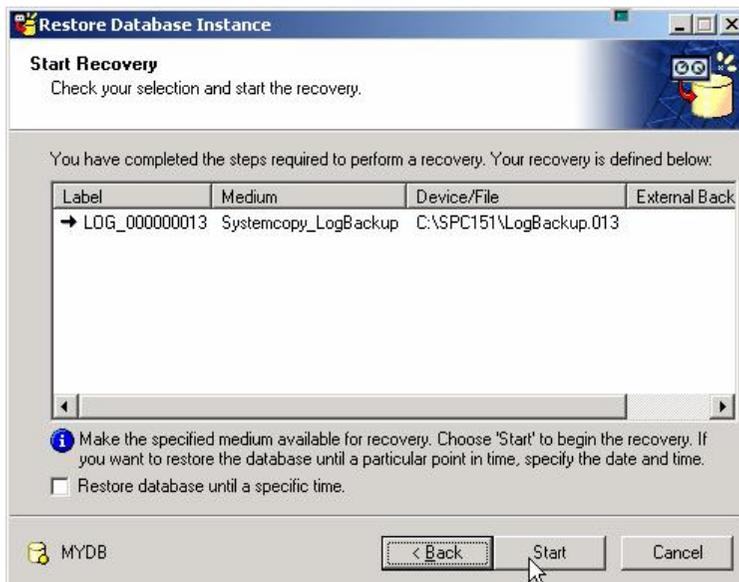
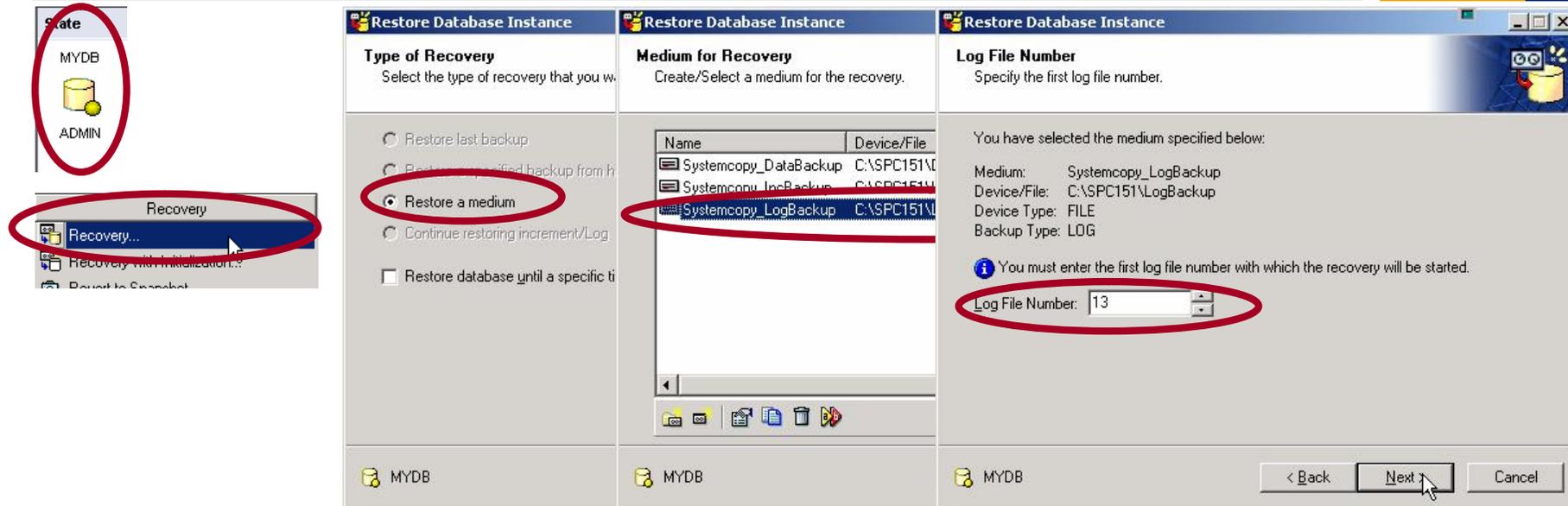
available, an error is reported. Then you have to decide

- if you have restored all needed data,
- if you would like to continue the restore later or
- if you can make the needed log backup file available and continue then with the restore.

Attention: *Back* can be used to change the media definition or to start the database. *Continue* tries to restore the backup file again. *Cancel* aborts the restore and stops the database instance.



Standby Database: Restoring Log Backups III

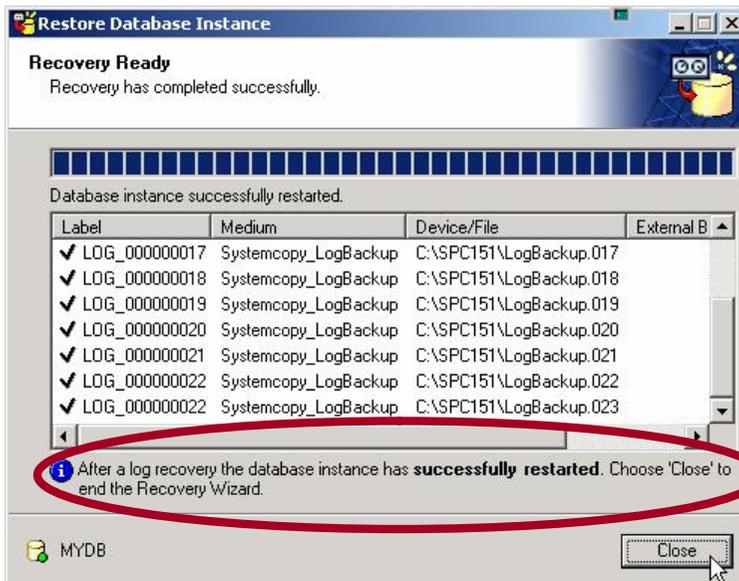
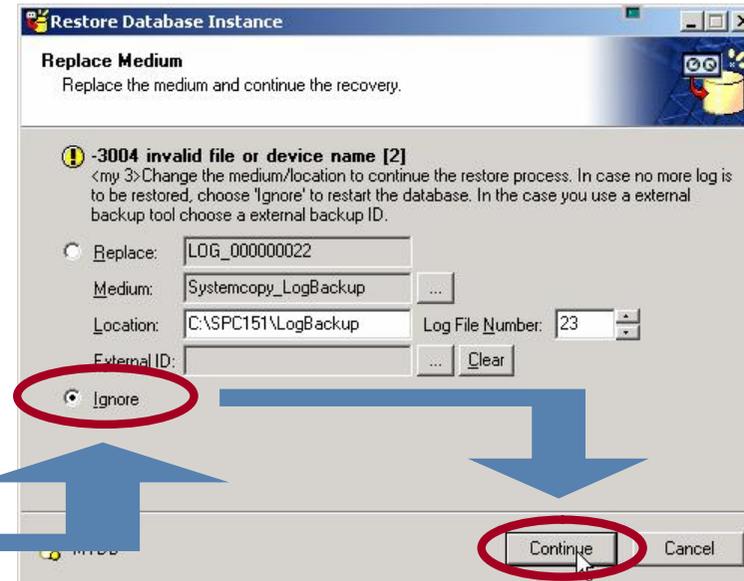
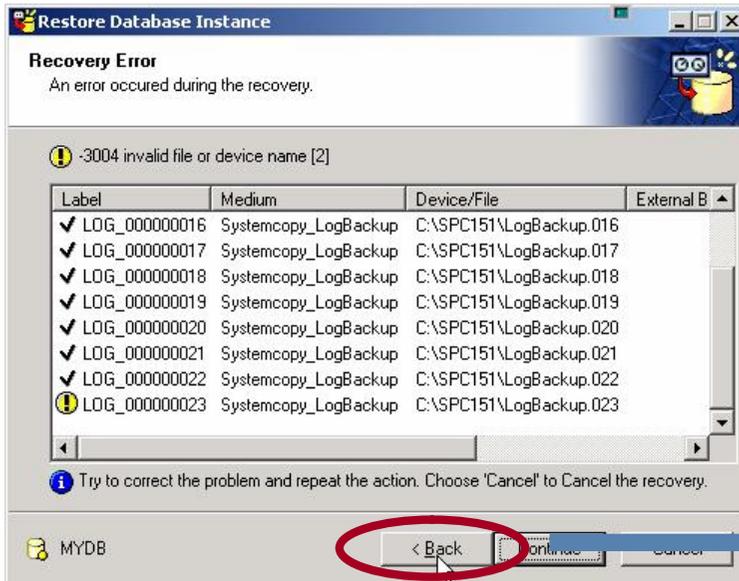


When you would like to continue with the restore, you have to start the database instance into ADMIN mode.

Attention: Do not start the database instance in ONLINE mode if you would like to continue the restore. When the database instance was ONLINE, you'll have to start with the initialization and restore of a complete backup again!

To continue the restore you have to specify the last log backup file which was already restored successfully.

Standby Database: Restoring Log Backups IV



When all log backups have been restored successfully and you *would like to start the standby instance*, you have to choose *Back*. To start the database select *Ignore* and press *Continue*.

Standby Database: ONLINE



The screenshot shows the Database Manager interface for instance MYDB. The instance is in ONLINE mode. The main table displays the following data:

Name	State	Data	Log	Sessions	Data Cache Hit...	Auto Log
7300	Not connected					
7500	Not connected					
MYDB	Online	73 %	0 %	3 %	100 %	Off

The State window provides detailed information for instance MYDB:

- Data:** 73% (Total: 8,994 Pages Perm; 6,586 Pages Temp; 11 Pages Used; 6,597 Pages Free; 2,397 Pages)
- Log:** 0% (Total: 875 Pages Used; 1 Pages Free; 874 Pages)
- ONLINE Sessions:** 3% (Used: 2; Free: 68)

General Information:

Property	Value	Property	Value
Name	MYDB	Auto Log	Off
Version	7.6.00.11	Command Monitor	Off
Operating System	Windows 2000 (WIN32)	Resource Monitor	Off
Run Directory	c:\program files\sdb\data\wrk\MYDB	Database Trace	On
Start	7/14/2005 4:15:17 PM	Database Analyzer	Unknown

Data Cache Information:

Property	Value
Total	2,872 Pages
Hit Rate	100 %

The standby instance is in ONLINE mode now. Please remember to load the system tables (*Configuration* → *Upgrade System Tables*). Then the database can be used as the production instance and it can be administered and monitored using DBMGUI or transaction DB50.

What Has to be Monitored?

Standby Database

Central Monitoring – Transaction DB59

Database Assistant – Transaction DB50

Performance Analysis Tools

Alert Monitor – Transaction RZ20

Snapshot

Central Monitoring – Transaction DB59



Name	Database T...	Description	Database N...	Database S...	Cen...	Alert M...	Inte...	Last Changed On/By
LCA	liveCache		LCF	us0064	X	X	✓	17.02.2004 11:09:57
LDA	liveCache		LCF	us0064	X	X	✓	17.02.2004 11:10:32
QP8	MaxDB		QP8	ld0156	X	X	✓	09.06.2004 16:39:11

DB Connection Name: MH_MYDB

Database Type:

- liveCache
- MaxDB

Initially transaction DB59 contains only an entry for the system's own MaxDB instance and - in case of an APO/SCM system - the two liveCache connection identifiers LCA and LDA. As of SCM 5.0 the connection identifier LEA is used as well.

To be able to monitor other MaxDB instances within this system, you have to integrate the corresponding database instance - i.e. you have to enter the user information to connect to this database instance.

Database Integration



Maintain Database Integration

Database Connection Information

Name of Database Connection	MH_MYDB
Database name	MYDB
Database Server	10.29.14.173
Description	TechEd Demo

User Data

DBM Operator

User Name	DBM
Password	*****
Repeat Password	*****

Central Authorization

Standard Database User

User Name	MONA
Password	*****
Repeat Password	*****

To be able to connect to the database instance you have to enter:

- The name of the database instance.
- The hostname or IP address of the server on which the database instance runs.
- The DBM operator and his password. This is the user used to connect to the Database Manager GUI or CLI. Default: control with password control.
- The Standard Database User, which for SAP applications is SAPR3 or SAP<SID> as the default.

Make sure that the checkbox for the central authorization is marked, that the connect information is stored in tables DBCON and DBCONUSR of the monitoring system.

Connection Test



Database System Edit Goto System Help

MaxDB/liveCache System Overview

Connection Test Define Type Assistant Integrate Database Integration Data

Name	Database T...	Description	Database N...	Database S...	Cen...	Alert M...	Inte...	Last Changed On/By
LCA	liveCache		LCF	us0064	X	X	✓	17.02.2004 11:09:57
LDA	liveCache		LCF	us0064	X	X	✓	17.02.2004 11:10:32
MH_MYDB	MaxDB	TechEd Demo	MYDB	10.29.14.173	X	X	✓	02.07.2004 15:45:38
QP8	MaxDB		QP8	Id0156	X	X	✓	09.06.2004 16:39:11

To check, if the entered connect information works, mark the entry of the concerning database instance and choose *Connection Test*.

Application Server Edit Goto System Help

Connection Test: Application Server <--> Database Connection

Connection Test Log

Connection Test for Selected Database Connection: MH_MYDB

Server Name	Host	Che...	Kernel R...	Kernel P...	DBSL Re...	DBSL Pa...	Precompiler Rele...	Precompiler Runti...	DBMRFC Release	DBMCLI Release
Id0002_QP8_4	Id0002		640_REL	19	640.00	19	007.004.003.005	007.004.003.029	007.005.000.008	000.000.000.000

You'll get a list of all application servers. Select one and choose *Connection Test* to check one after another if the connection works from all application servers.

Connection Test



Application Server Edit Goto System Help

Connection Test: Application Server <--> Database Connection

Connection Test Log

Connection Test for Selected Database Connection: MH_MYDB

Server Name	Host	Che...	Kernel R...	Kernel P...	DBSL Re...	DBSL Pa...	Precompiler Rele...	Precompiler Runti...	DBMRFC Release	DBMCLI Release
Id0002_QP8_46	Id0002	✓	640_REL	19	640.00	19	007.004.003.005	007.004.003.029	007.005.000.008	000.000.000.000

Application Server Edit Goto System Help

Connection Test: Application Server <--> Database Connection

Connection Test Log

Connection Test for Selected Database Connection: MH_MYDB

Server Name	Host	Che...	Kernel R...	Kernel P...	DBSL Re...	DBSL Pa...	Precompiler Rele...	Precompiler Runti...	DBMRFC Release	DBMCLI Release
Id0002_QP8_46	Id0002	✗	640_REL	19	640.00	19	007.004.003.005	007.004.003.029	007.005.000.008	000.000.000.000

The connection test first checks the DBMCLI connection, then the command and session mode of DBMRFC and afterwards the SQL connection. If everything is OK, a green check mark appears for this application server, otherwise a red cross is shown. In this case you have to check the log file.

X-Server Not Running



The screenshot shows a SAP window titled "Connection Test Log". The window has a menu bar with "System" and "Help", and a toolbar with various icons. The main content area is divided into sections: "General Connection Data", "Test Scope", and "Application Server: 1d0002_QP8_46 (Linux)".

General Connection Data

- Connection Name: MH_MYDB
- Database Name: MYDB
- Database Server: 10.29.14.173
- tp Profiles: /usr/sap/transhot640/bin/TP_DOMAIN_AP6.PFL
- DBM User: DBM

Test Scope

- Execute an external operating system command (DBMCLI)
- Determine status using TCP/IP connection SAPDB_DBM (DBMRFC command mode)
- Determine status using TCP/IP connection SAPDB_DBM_DAEMON (DBMRFC session mode)
- Test the SQL connection (Native SQL at CON_NAME)

Application Server: 1d0002_QP8_46 (Linux)

- Connect. test with "dbmcli db_state"
Error! Connection failed to node 10.29.14.173 for database MYDB: connection refused: x_server not running#
External program terminated with exit code 2
- Connect. test with command mode "dbmrfc db_state"
Name and Server : MYDB - 10.29.14.173
DBMRFC Function : DBM_EXECUTE
Command : db_state
Error : DBM Error
Return Code : -4
Error Message : connection refused: x_server not running0z##
- Connect. test with session mode "dbmrfc db_state"
Name and Server : MYDB - 10.29.14.173
DBMRFC Function : DBM_CONNECT
Error : DBM Error
Return Code : -4
Error Message : connection refused: x_server not runninga
- Connect. test with "native SQL" (MH_MYDB)
For detailed information, see the developer trace for work process: 1

One possible problem is that the X-Server is not running on the database server. The X-Server is the TCP/IP listener of MaxDB which handles remote connections to the database instance.

Wrong DBM Operator Password



The screenshot shows the SAP Connection Test Log interface. The window title is 'System Help' and the SAP logo is visible in the top right corner. The main content area is titled 'Connection Test Log' and contains the following sections:

- General Connection Data**
 - Connection Name: MH_MYDB
 - Database Name: MYDB
 - Database Server: 10.29.14.173
 - tp Profiles: /usr/sap/transhot640/bin/TPPARAM
 - DBM User: DBM
- Test Scope**
 - Execute an external operating system command (DBMCLI)
 - Determine status using TCP/IP connection SAPDB_DBM (DBMRFC command mode)
 - Determine status using TCP/IP connection SAPDB_DBM_DAEMON (DBMRFC session mode)
 - Test the SQL connection (Native SQL at CON_NAME)
- Application Server: 1d0002_QP8_46 (Linux)**
 - Connect. test with "dbmcli db_state"
 - Error! Connection failed to node 10.29.14.173 for database MYDB: ERR_USRFAIL: user authorization failed
 - External program terminated with exit code 2
 - Connect. test with command mode "dbmrfc db_state"
 - Name and Server : MYDB - 10.29.14.173
 - DBMRFC Function : DBM_EXECUTE
 - Command : db_state
 - Error : DBM Error
 - Return Code : -2
 - Error Message : ERR_USRFAIL: user authorization failed
 - Connect. test with session mode "dbmrfc db_state"
 - Name and Server : MYDB - 10.29.14.173
 - DBMRFC Function : DBM_CONNECT
 - Error : DBM Error
 - Return Code : -2
 - Error Message : ERR_USRFAIL: user authorization failed
 - Connect. test with "native SQL" (MH_MYDB)
 - For detailed information, see the developer trace for work process: 1

The connection test also fails if the DBM operator user and/or password has not been entered correctly.

Wrong Standard Database User Password



If the DBM Operator and his password have been entered correctly, the DBMCLI and DBMRFC connection work.

Then the native SQL test may fail because the standard database user has not been entered correctly.

```
A ABAP/4 Program SAPLSADB
A Source LSADBU34 Line 14.
A Error Code DBIF_DSQ2_SQL_ERROR.
A Module $Id: //bas/640_REL/src/krn/runt/abexsql.c#5 $ SAP.
A Function DsqlErrorHandler Line 1986.
A An SQL error occurred when executing Native SQL..
E Wed Jul 7 16:34:59 2004
E Replication is disabled
B
B Wed Jul 7 16:35:01 2004
B Connect to MH_MYDB as MONA with 10.29.14.173-MYDB
C INFO : SQLOPT (set by environment) =
C INFO : SQLOPT= -I 0 -t 0 -F SAPDB.23612.pct
C Precompiler Runtime : C-PreComp 7.4.3 Build 029-121-050-967
C Precompiler runtime is SAP DB 7.4.3.029
C Try to connect as MONA/<pwd>@10.29.14.173-MYDB on connection 1 ...
C Wed Jul 7 16:35:02 2004
C *** ERROR => CONNECT failed : sqlcode=-4008 (Unknown user name/password combination)
[dbdsout] c 325]
B ***LOG BY2=> sql error -4008 performing CON [dbds#3 @ 1044] [dbds 1044 ]
B ***LOG BY0=> Unknown user name/password combination [dbds#3 @ 1044] [dbds 1044 ]
S
```

Application Server: 1d0002_QP8_46 (Linux)

1. Connect. test with "dbmcli db_state"	✓	
2. Connect. test with command mode "dbmrfc db_state"	✓	
3. Connect. test with session mode "dbmrfc db_state"	✓	
4. Connect. test with "native SQL" (MH_MYDB)	✗	No connection

For detailed information, see the developer trace for work process: 1

In this case you can find more information in the corresponding dev_w# file.

Error -4008 (Unknown user name/ password combination) indicates that the user data for the standard database user is not correct.

Remote Monitoring



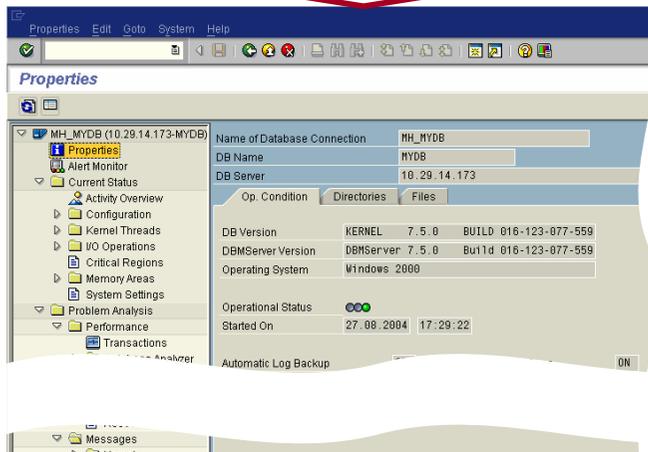
Transaction DB59:
Central entry point to monitor MaxDB & liveCache instances

The screenshot shows the 'MaxDB/liveCache System Overview' table in SAP. The table lists various database instances with columns for Name, Database Type, Description, Database Number, Database S..., Cen..., Alert M..., Inte..., and Last Changed On/By. A red arrow points from the 'E30' row to the 'MaxDB Monitoring DB50' text, and another red arrow points from the 'LCF' row to the 'liveCache Monitoring LC10' text.

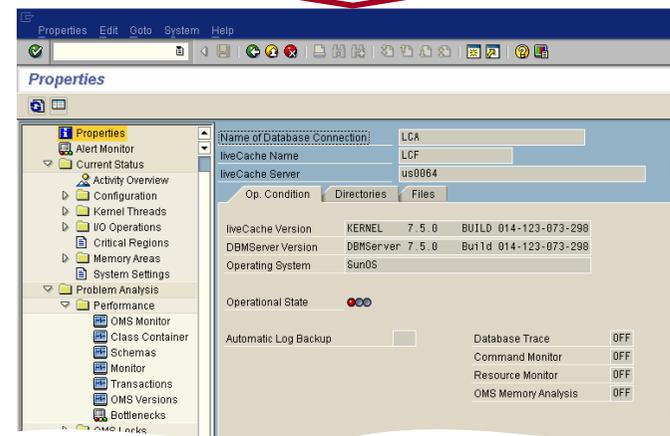
Name	Database T...	Description	Database N...	Database S...	Cen...	Alert M...	Inte...	Last Changed On/By
E30	MaxDB		E30	p34777	X	X	✓	23.12.2003 10:25:29
HS13_W	liveCache		LCW	hs0013	X	X	✓	13.10.2003 17:50:16
IA27_W	liveCache		LCW	itanium27	X	X	✓	04.11.2003 19:00:58
IS41_W	liveCache		LCW	is0041	X	X	✓	13.10.2003 17:47:46
LC_AS	liveCache		LCA	10.18.104.17	X	X	✓	21.01.2004 19:56:19
LC_MEASUR	liveCa		LCI	p70774	X	X	✓	20.02.2004 13:28:12
LCA	liveCa		LCF	us0064	X	X	✓	17.02.2004 11:09:57
LCA	liveCa		LCIR 759	10.18.107.75				

**MaxDB
Monitoring
DB50**

**liveCache
Monitoring
LC10**



Monitoring of remote instances is possible. Even stand-alone databases like small test databases can be monitored in the SAP system.



What Has to be Monitored?

Standby Database

Central Monitoring – Transaction DB59

Database Assistant – Transaction DB50

Performance Analysis Tools

Alert Monitor – Transaction RZ20

Snapshot

Starting Transaction DB50

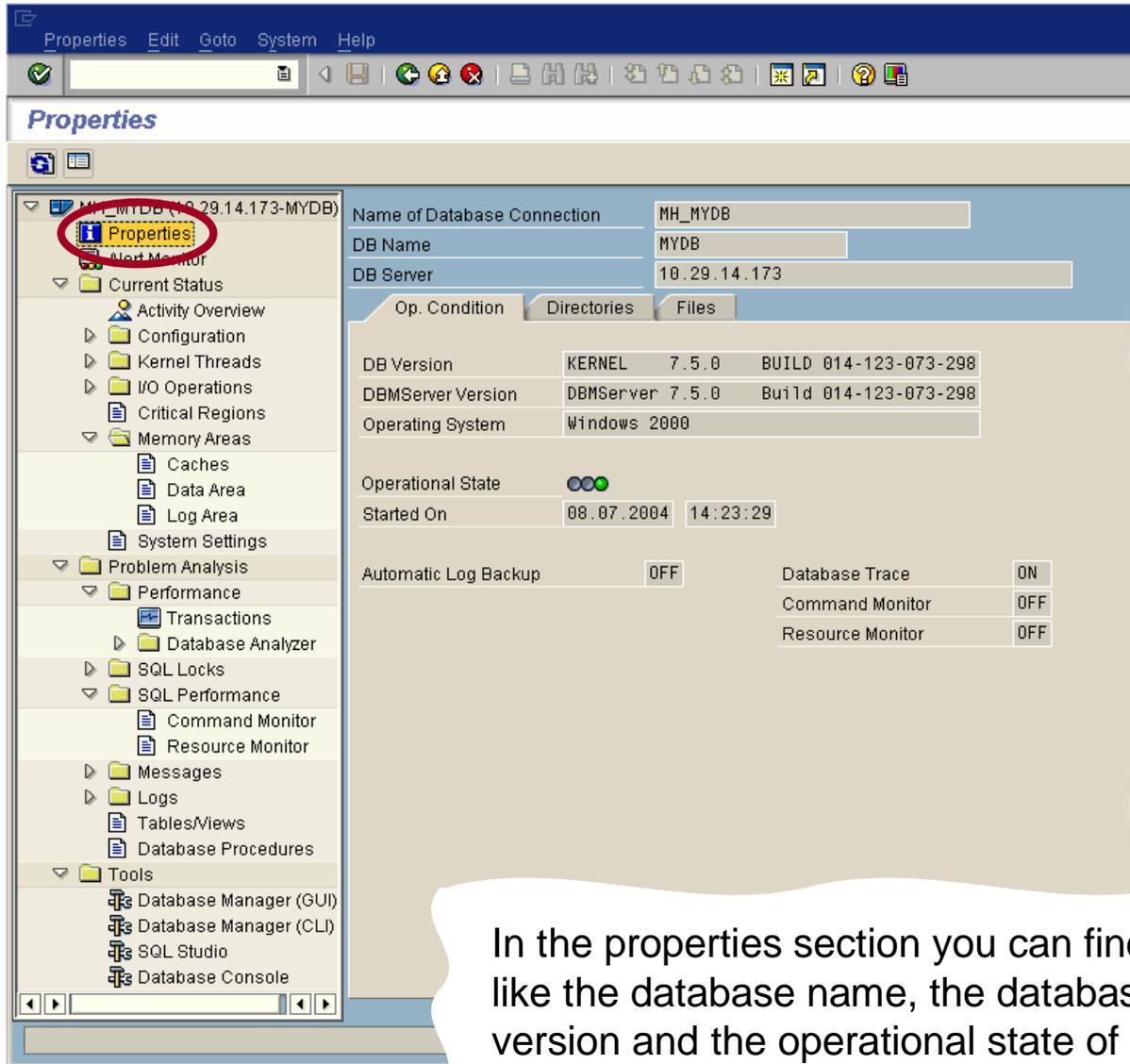


The screenshot shows the SAP MaxDB/liveCache System Overview interface. The 'Assistant' button is circled in red. Below it is a table of database entries.

Name	Database T...	Description	Database N...	Database S...	Cen...	Alert M...	Inte...	Last Changed On/By
LCA	liveCache		LCF	us0064	X	X	✓	17.02.2004 11:09:57
LDA	liveCache		LCF	us0064	X	X	✓	17.02.2004 11:10:32
MH_MYDB	MaxDB	TechEd Demo	MYDB	10.29.14.173	X	X	✓	02.07.2004 15:45:38
QP8	MaxDB		QP8	Id0156	X	X	✓	09.06.2004 16:39:11

After you entered the connect information for your database instance you can start the database assistant. Select the newly created entry in the list of databases and choose *Assistant*.

Transaction DB50 – Properties



This is the *Properties* section of transaction DB50N.

Transaction DB50 can only connect to the system's database instance.

Transaction DB50N is started from transaction DB59 as it is able to connect to different database instances.

DB50 and DB50N are nearly identical. In this presentation always DB50N is used, although the slides say DB50.

In the properties section you can find some general information like the database name, the database server, the database version and the operational state of the database instance.

Operational States



There are three possible operational states of MaxDB and liveCache:

OFFLINE:

**MaxDB kernel processes and caches do not exist.
No user can use the database.**



ADMIN:

The MaxDB kernel is active (processes are started, caches are initialized). Users cannot connect to the database. Only the DBM operator can connect and perform administrative tasks.



ONLINE:

The MaxDB kernel is active and ready to work. Users can connect to the database.



MaxDB And liveCache Directory Structure



Name of Database Connection	MH_MYDB
DB Name	MYDB
DB Server	10.29.14.173
Op. Condition Directories Files	
IndepPrograms	c:\program files\sdb\programs
IndepData	c:\program files\sdb\data
InstallationPath	c:\Program Files\sdb\MYDB\DB
Rundirectory	c:\program files\sdb\data\wrk\MYDB

The IndepPrograms directory contains programs and libraries shared by the MaxDB instances and MaxDB applications.

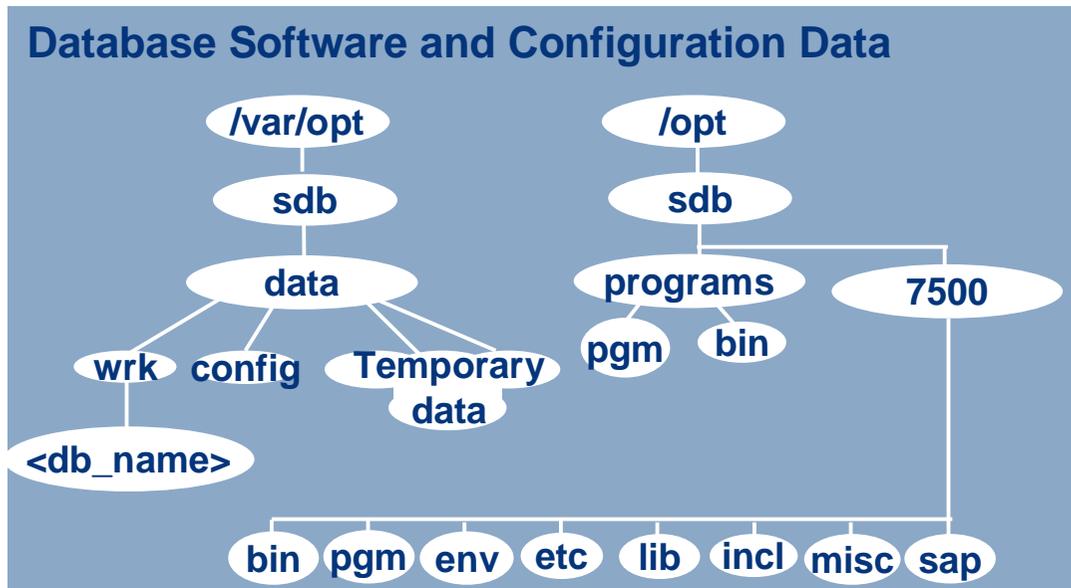
These programs are downwards compatible.

The IndepData directory contains the configuration data and rundirectories of MaxDB instances.

The location of these directories is specified during the first installation of MaxDB software. They exist only once on the server.

The InstallationPath contains the server software that depends on the database version (e.g. kernel). Several dependent directories can exist alongside each other.

The rundirectory contains the status files of a MaxDB instance.



MaxDB Status And Log files



Name of Database Connection: MH_MYDB
 Database Name: MYDB
 Database Server: 10.29.14.173

Op. Condition Directories Files

File Overview

File ID	File Name	Size	Date	Time	Description
KNLNDIAG	knldiag	819.200	25.06.2004	11:54:16	Database Messages
KNLNDIAGERR	knldiag.err	70.359	22.06.2004	14:20:57	Database Errors
KNLNDIAGOLD	knldiag.old	819.200	22.06.2004	14:20:49	Database Messages (
KNLTRC	knltrace	2.080.768	25.06.2004	11:54:42	Database Trace
UTLPRT	dbm.utl	102.400	22.06.2004	14:20:39	Utility Statements
BACKHIST	dbm.knl	42.847	22.06.2004	15:07:11	Backup History
BACKMDF	dbm.mdf	56.210	22.06.2004	15:07:11	Backup Media Histor
DBMPRT	dbm.prt	134.893	25.06.2004	11:58:40	Database Manager
DBMMDF	dbm.mmm	921	03.02.2004	14:45:55	Database Manager
DBMPAHI	MYDB.pah	213.012	22.06.2004	14:20:44	Database Paramet
LCINITCMD	lcinit.bat	16.121	24.05.2004	17:45:15	LiveCache Initialis
INSTPRT	dbm.ins	810.745	22.06.2004	14:20:35	Installation Protoc
KNLTRCPRT	MYDB.prt	225	28.04.2004	09:24:01	Kernel Trace Prot
DIAGDIR	File	0	25.06.2004	11:54:19	Diagnose History
ANALYZER	analyzer	0	24.06.2004	00:00:10	DB Analyzer File
EVTDISPRT	dbmevtdisp.prt	213.441	02.07.2004	16:54:05	Event Dispatcher I
EXTDBPRT	dbmevthndl_exte	224	24.03.2004	18:36:59	Event Handler Ext

Most important log files:

KNLNDIAG - contains status and error messages of the database kernel

KNLNDIAGERR - contains all error messages since database installation

UTLPRT - contains administrative commands sent to the database kernel (e.g. SHUTDOWN, BACKUP, CHECK DATA) including their return code(s)

BACKHIST - contains all backup and recovery actions

DBMPRT - contains all (administrative) commands sent to the dbmsserver

Database Activity



Overview of Database Activity

MH_MYDB (10.29.14.173-MYDB)

- Properties
- Alert Monitor
- Current Status
- Activity Overview**
- Configuration
- Control Thread
- I/O Operations
- Critical Regions
- Memory Areas
 - Caches
 - Data Area
 - Log Area
- System Settings
- Problem Analysis
 - Performance
 - Transactions
 - Database Analyzer
 - SQL Locks
 - SQL Performance
 - Command Monitor
 - Resource Monitor
 - Messages
 - Logs
 - Tables/Views/Synonyms
 - Database Procedures
 - Tools
 - Database Manager (GUI)
 - Database Manager (CLI)
 - SQL Studio
 - Database Console

Commands			
SQL Commands	501	Creates	0
Prepares	44	Alters	0
Executes	368	Drops	0
Rollbacks	1	DB Procedure Calls (External)	0
Commits	8	DB Procedure Calls (Internal)	0
Updates	0	Deletes	1
Rows Read	0	Rows Read	0
Rows Changed	0	Deleted Rows	0
Selects and Fetches	435	Inserts	9
Rows Read	218	Rows Added	9
Qualified Rows	5		
I/O Activity			
Physical Reads	21	Logical Reads	7.897
Physical Writes	1	Logical Writes	1.640
Lock Activity			
Available Entries	6.200	Row Locks	0
Maximum set	1.200	Table Locks	1
Average set	0		
Lock Owner	0	Collisions	0
Lock Requester	0	Escalations	0
Log Activity			
Log Pages Written	1	Group commits	0
Waiting for Log Writer	1	Log I/O Queue Overflow	0
Scan and Sort Activity			
Table Scans	6	Cache Sorts	0
Index Scans	0	Row Sorts	0

The *Activity Overview* gives an overview of the database activity since it was started. E.g. you can see:

- the number of SQL statements executed,
- the number of lock collisions,
- the number of lock escalations

Parameter Settings



Parameter / Time	New Value	Description
▶ CACHE_SIZE	3000	Size of the data cache and converter in pages
▶ INSTANCE_TYPE	OLTP	Type of database instance
▼ KERNELVERSION		Version of the database installation
22.06.2004 12:56:04	KERNEL 7.5.0 BUILD 014-123-073...	
10.06.2004 14:00:21	KERNEL 7.5.0 BUILD 014-123-073...	
16.03.2004 08:32:59	KERNEL 7.5.0 BUILD 011-113-067...	
15.03.2004 18:22:47	KERNEL 7.5.0 BUILD 010-123-066...	
25.02.2004 13:05:03	KERNEL 7.5.0 BUILD 009-123-064...	
11.11.2003 09:45:23	KERNEL 7.5.0 BUILD 006-123-055...	
▼ LOG_MIRRORED	NO	
22.06.2004 12:56:05	NO	
12.02.2004 10:18:20	YES	
12.02.2004 10:11:40	NO	
03.02.2004 14:18:02	YES	
11.11.2003 09:45:23	NO	
▶ LOG_SEGMENT_SIZE	333	Size of a log segment in pages
▶ MAXBACKUPDEVS	2	Maximum number of backup devices used in parallel for backup
▶ MAXCPU	1	

You can check the current parameter settings and the change history of each parameter. The most important parameters are listed in the *General Parameters* section. All other parameters should only be changed if requested by the MaxDB support.

Parameters can be changed using the Database Manager GUI. Whenever a parameter has been changed, the database has to be restarted that the new parameter settings take effect (see note #814704 for online changeable parameters).

Parameter Change History



The screenshot shows the SAP Database Parameter History tool interface. The left sidebar contains a tree view with 'Change History' highlighted. The main window displays a table of parameter changes.

Date / (Time)	Parameter	New Value	Old value
05.08.2004	00:12:29 : KERNELTRACESIZE	733	653
	00:12:29 : MAXLOCKS	3320	2920
	00:12:29 : MAXPAGER	21	11
	00:12:29 : MAXSERVERTASKS	31	21
	00:12:29 : MAXVOLUMES	25	15
	00:12:29 : _MAXTRANS	332	292
	00:12:29 : _MIN_SERVER_DESC	31	21
	00:12:29 : _SERVER_CMD_CACHE	32	22
	00:12:29 : _SERVER_DESC_CACH	84	74
	00:12:29 : _SHAREDYNDATA	3450	3280
	00:12:29 : _SHAREDDYNPOOL	3531	3046
	00:12:28 : MAXDATAVOLUMES	21	11
08.07.2004			
22.06.2004			
10.06.2004			
02.04.2004			
16.03.2004			
15.03.2004			
25.02.2004			
12.02.2004			
03.02.2004			
12.11.2003			
11.11.2003			

It is also possible to get an overview of the parameter changes by date. You can see

- which parameters have been changed on which day
- the old as well as the new parameter values.

Volume Configuration



The screenshot shows the SAP Devspace Configuration GUI for a database instance. The left sidebar contains a tree view with the 'Volumes' option highlighted in red. The main area is divided into sections for Log Area, Data Area, and System and Data Volumes.

Log Area

No. of Volumes	2	Total Size	16.000 KB
Extendable Online to	3		

Log Volumes

ID	Name	Size in KB	Physical Name
1	LOG001	8.000	LOG_001
2	LOG002	8.000	LOG_002

Data Area

No. of Data Volumes	11	Total Size	264.000 KB
Extendable Online to	21		

System and Data Volumes

ID	Name	Size in KB	Physical Name
1	DATA0001	24.000	DAT_0001
2	DATA0002	24.000	DAT_0002
3	DATA0003	24.000	DAT_0003
4	DATA0004	24.000	DAT_0004
5	DATA0005	24.000	DAT_0005
6	DATA0006	24.000	DAT_0006
7	DATA0007	24.000	DAT_0007

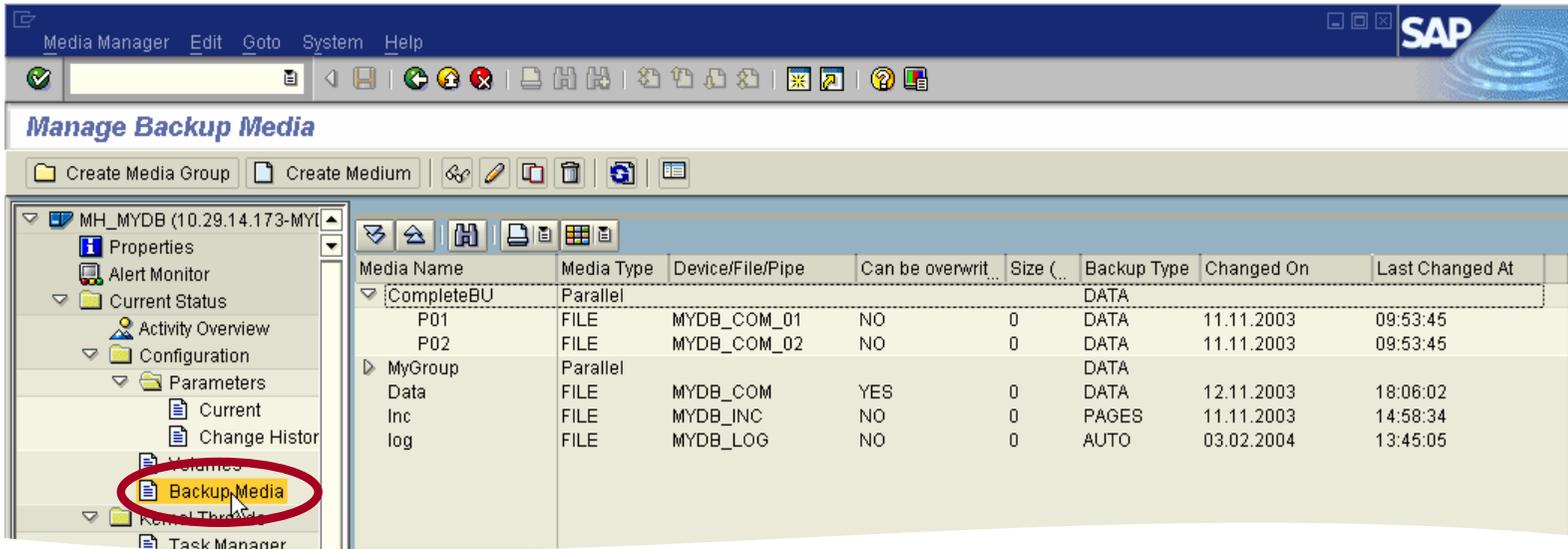
The *Volumes* section shows all configured log and data volumes including their locations and sizes.

You can also see, how many data volumes could be added while the database is **ONLINE**.

This is limited by the database parameter **MAXDATAVOLUMES**.

New volumes can be added using the Database Manager GUI.

Backup Media



The *Backup Media* section provides an overview of all defined backup media. It is also possible to define new backup media.

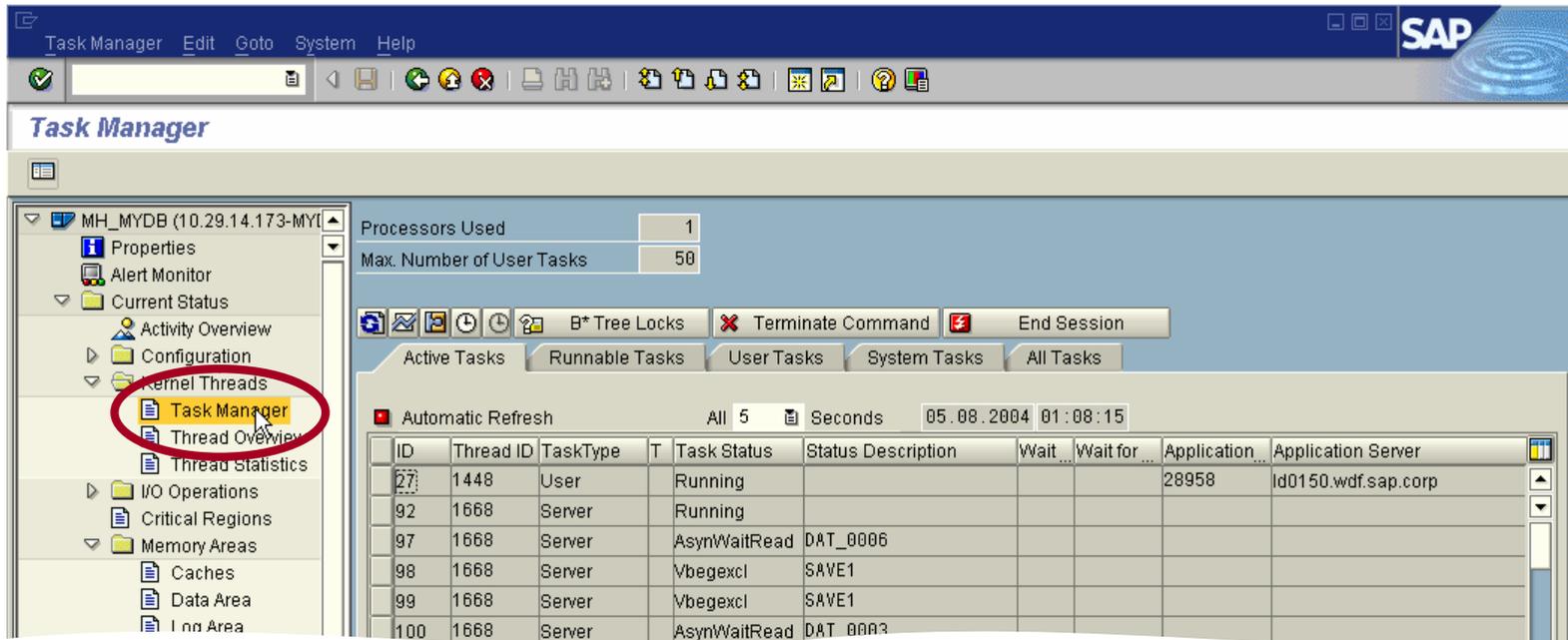
MaxDB supports parallel backups to several files/tapes/pipes.

Therefore a media group has to be defined which consists of several single backup media. The following external backup tools can be used to create backups:

- **Tivoli Storage Manager**
- **Networker**
- **Tools which support the Interface BackInt for Oracle**

The backup media can also be defined with Database Manager GUI. Backups are created using this tool as well or with transaction DB13/DB13C or the DBACOCKPIT.

Task Manager



The *Task Manager* shows the status of all currently active database tasks. In a running system, possible states are:

Running – task is in kernel code of MaxDB and uses CPU

Runnable, Vsleep – task is in kernel code of MaxDB and waiting for a free slot in its thread (UKT)

LogIOWait – task waits for completion of its log request by the archive log writer

IOWait (R) or IOWait (W) – task waits for data I/O completion (read or write)

Vbegexcl or Vsuspend – task waits to acquire an internal lock in MaxDB

Vwait – task waits for an SQL lock held by another application process to be released (locks are released after a COMMIT or ROLLBACK)

Memory Areas: Caches



The screenshot displays the SAP Cache Overview interface. The left sidebar shows a tree view with 'Caches' highlighted under 'Memory Areas'. The main area shows the following information:

DB server: 10.29.14.173
DB Name: MYDB
Date / Time: 05.08.2004 01:10:58

Cache Sizes			
	Size in KB	Size in pages	
I/O Buffer Cache	24.000	3.000	
Data Cache	23.656	2.957	
Converter	144	18	
Other	200	25	
Catalog Cache	26.112	3.264	
Sequence Cache	8	1	

Cache Accesses				
	Accesses	Successful	Unsuccessful	Hit Rate
Data Cache	14.502	14.479	23	99,84%
Undo	12	12	0	100,00%
SQL Data	14.490	14.467	23	99,84%
Catalog Cache	3.565	3.285	280	92,15%
Sequence Cache	0	0	0	100,00%

Cache-Specific Parameter Settings	
CACHE_SIZE	3000
CAT_CACHE_SUPPLY	3264
USE_MEM_ENHANCE	NO
MEM_ENHANCE_LIMIT	0

The *Caches* area shows the configured sizes of the different memory areas and the hit rates of these caches. The Data Cache hit rate should always be $\geq 98\%$.

Memory Areas: Data Area



The screenshot shows the SAP Memory Areas tool interface. The left sidebar contains a tree view with 'Data Area' highlighted. The main window displays a table titled 'Data Area Usage' with the following data:

	in KB	in Pages	in %
Total Size	264.000	33.000	100
Used Area	30.208	3.776	11
Permanent used Area	29.936	3.742	11
Temporary Used Area	272	34	0
Free Area	233.792	29.224	89
Changed Since Last DB Backup	18.136	2.267	7
Snapshot vom: 14.07.2004 14:49:19	29.896	3.737	11

The data area can consist of several data volumes.

The *Total Size* shows the sum of the sizes of all data volumes.

You can see the filling level of the data area as well as the proportion of temporary data.

The data is automatically distributed to all volumes equally. You don't have to define table spaces.

Empty data pages are reused by the database automatically. No reorganization is necessary.

Memory Areas: Log Area



	in kB	in Pages	in %
Total Size	7.408	926	100
Log Segment Size	2.664	333	36
Used Log Area	1.736	217	23
Unsaved Log Area	1.736	217	23
Log Since Last Data Backup	0	0	0

Mirroring of Log Area:	Not activated
Automatic Overwriting of Log Area	Not activated
Redo Log Administration	Switched on

Last Log I/O Sequence Number: 14.364

The log area can consist of several log volumes - however they are used as one single log area.

The *Log Segment Size* determines how large the log backups are created by the autosave log.

Whenever *Log Segment Size* log pages are written, they are copied to the log backup file and the pages in the log volume can be overwritten.

For test or demo systems it is possible to activate an overwrite mode for the log volumes - then you don't have to take log backups before the information on the log volume can be overwritten.

It is also possible to switch off the writing of log information.

Both of these possibilities are not recommended for productive systems as you won't be able to restore the database to the latest state.

Database Messages



The screenshot shows the SAP Database Messages tool interface. The left sidebar contains a tree view with categories like I/O Operations, Memory Areas, System Settings, Problem Analysis, Performance, SQL Locks, SQL Performance, Messages, and Logs. The 'Messages' folder is expanded, and the 'Current' sub-folder is selected and circled in red. The main window displays a table of 'Current database messages (800 KB)' with columns for Date, Time, TID(hex), Typ, MsgID, Label, and Message Text. The table contains several rows of log entries, including 'Pager' messages for DataCacheSegment and 'RTE' messages for kernel state changes and DBSTATE.

Date	Time	TID(hex)	Typ	MsgID	Label	Message Text
2004-08-05	00:12:49	0x788		15	Pager	First DataCacheSegment:7
2004-08-05	00:12:49	0x788		14	Pager	Start TaskId: 10
2004-08-05	00:12:49	0x788		15	Pager	First DataCacheSegment:0
2004-08-05	00:12:49	0x788		14	Pager	Start TaskId: 9
2004-08-05	00:12:49	0x788		15	Pager	First DataCacheSegment:1
2004-08-05	00:12:49	0x788		14	Pager	Start TaskId: 8
2004-08-05	00:12:49	0x788		15	Pager	First DataCacheSegment:2
2004-08-05	00:12:49	0x788		14	Pager	Start TaskId: 7
2004-08-05	00:12:49	0x788		15	Pager	First DataCacheSegment:3
2004-08-05	00:12:49	0x788		14	Pager	Start TaskId: 6
2004-08-05	00:12:49	0x788		15	Pager	First DataCacheSegment:4
2004-08-05	00:12:50	0x70C		201	RTE	Kernel state changed from STARTING to ADMIN
2004-08-05	00:12:50	0x70C		19801	DBSTATE	SERVERDB is ready
=====						
== begin of write cycle =====						
2004-08-05	00:12:51	0x554		19633	CONNECT	Connect req. (T4, Node:", PID:2120)
2004-08-05	00:12:51	0x554		19651	CONNECT	Connection released, T4
2004-08-05	00:12:51	0x554		19652	CONNECT	Connect req. (T4, Node:", PID:2120)

File knldiag has a fixed size.

It is initialized when the database is started.

The last version of this file is then copied to knldiag.old.

Knldiag consists of two parts: the first part contains information about the database start and is not overwritten.

In the second part information is logged during the runtime of the database. This part is overwritten cyclically. The current write position is marked with

'--- current write position ---'

In case of problems with the database you should always check file knldiag for error messages.

Database Error Messages



The screenshot shows the SAP Database Messages window. The left sidebar contains a tree view with categories like I/O Operations, Memory Areas, System Settings, Problem Analysis, Performance, Transactions, Database Analyzer, SQL Locks, SQL Performance, Command Monitor, Resource Monitor, Messages, and Kernel. The 'Errors' folder under 'Messages' is highlighted with a red circle. The main window displays a table of database error messages with columns for Date, Time, TID(hex), Typ, MsgID, Label, and Message Text. The table shows several messages, including 'Starting GMT' messages and error messages like 'Could not write to event log, rc = 1717' and 'Assertion of state OpenTransFile.Create() failed!'.

Date	Time	TID(hex)	Typ	MsgID	Label	Message Text
2004-07-08	14:23:10					--- Starting GMT 2004-07-08 14:23:10 7.5.0 Build 014-123-07
2004-07-12	14:27:53					--- Starting GMT 2004-07-12 14:27:53 7.5.0 Build 014-123-07
2004-07-12	14:33:22					--- Starting GMT 2004-07-12 14:33:22 7.5.0 Build 014-123-07
2004-07-14	14:20:28					--- Starting GMT 2004-07-14 14:20:28 7.5.0 Build 014-123-07
2004-07-14	14:49:38					--- Starting GMT 2004-07-14 14:49:38 7.5.0 Build 014-123-07
2004-07-14	17:21:05	0xB14	ERR	18431	MESSAGES	Could not write to event log, rc = 1717
2004-07-14	17:26:57					--- Starting GMT 2004-07-14 17:26:57 7.5.0 Build 014-123-07
2004-08-05	00:10:42	0x5C8	ERR	0	SAPDBErr	Assertion of state OpenTransFile.Create() failed!
2004-08-05	00:10:42	0x5C8	ERR	18196	DBCRAsh	vabort:Emergency Shutdown, Log_Savepoint.cpp: 770
2004-08-05	00:10:42	0x5C8	ERR	19999	BTRACE	SymbolSearchPath: C:\Program Files\sapdb\indep_data\wrk\MYDB;
2004-08-05	00:10:42	0x5C8	ERR	19999	BTRACE	00\symbols;C:\PROGRAM FILES\SDB\7500\sap;C:\WINNT;C:\PROG
2004-08-05	00:10:42	0x5C8	ERR	19999	BTRACE	----> Register Dump <----
2004-08-05	00:10:42	0x5C8	ERR	19999	BTRACE	Eax=0x02f8f6a4 Ebx=0x02f8fc08 Ecx=0x00000000 Edx=0x008aca6c
2004-08-05	00:10:42	0x5C8	ERR	19999	BTRACE	Eip=0x7c57e592 Esp=0x02f8f69c Ebp=0x02f8f6f4
2004-08-05	00:10:42	0x5C8	ERR	19999	BTRACE	Cs=0x001b Ss=0x0023 Ds=0x0023 Es=0x0023 Fs=0x0038 Gs=0

File knldiag.err contains message '--- Starting...' whenever the database has been started from state OFFLINE to state ADMIN.
All other messages are error messages - e.g. information about a crash, including a back trace which can be used by the developers to find the cause of the crash.

Database Terminations



The screenshot shows the SAP Termination Analysis tool interface. The title bar reads "Termination Analysis Edit Goto System Help". Below the title bar is a menu bar and a toolbar. The main window is titled "History of Terminations". On the left is a tree view showing a hierarchy of system components. The "Terminations" folder under the "Kernel" section is highlighted with a red circle. The main pane displays a table of log files.

Time of Save / File	Type	Size	Date	Time
05.08.2004 00:12:34				
knldiag		819.200	05.08.2004	00:11:04
knldump		24.911.872	05.08.2004	00:11:03
knltrace		5.357.568	05.08.2004	00:11:50
rtedump			05.08.2004	00:10:45

If the database is not stopped correctly the most important log files are saved in the **DIAGHISTORY** folder during the next start of the database instance.

This ensures that they are not overwritten and can still be analyzed to determine the cause of the crash.

These files can be seen in the *Terminations* section.

As a default only two sets of log files are held in the diaghistry.

Database Manager Messages



The screenshot shows the SAP Database Manager interface. The left sidebar contains a tree view with categories like I/O Operations, Memory Areas, System Settings, Problem Analysis, Performance, Transactions, Database Analyzer, SQL Locks, SQL Performance, Command Monitor, Resource Monitor, Messages, Kernel, Current, Old, Errors, and Logs. The 'Database Manager' folder is highlighted with a red circle. The main window displays a table of messages:

Date	Time	TID(hex)	Typ	MsgID	Label	Message Text
2004-07-14	14:49:20	0x00000b1c		0	DBM	command param_startsession
2004-07-14	14:49:21	0x00000b1c		0	DBM	command param_abortsession
2004-07-14	14:52:01	0x00000838		0	DBM	command db_execute create snapshot
2004-07-14	14:53:57	0x000007d4		0	DBM	command db_warm
2004-07-14	16:10:13	0x000003fc		0	DBM	command db_online
2004-07-14	16:26:04	0x000009a4		0	DBM	command util_execute diagnose monitor READ 1000
2004-07-14	16:26:05	0x000007f8		0	DBM	command util_execute diagnose monitor TIME 1000
2004-07-14	16:26:05	0x00000500		0	DBM	command util_execute diagnose monitor SELECTIVITY 100
2004-07-14	16:26:06	0x00000a90		0	DBM	command util_execute diagnose monitor DATA ON
2004-07-14	16:26:06	0x000007f8		0	DBM	command util_execute diagnose monitor ROWNO 3000
2004-07-14	16:26:21	0x00000500		0	DBM	command util_execute diagnose monitor READ 1000
2004-07-14	16:26:21	0x00000a90		0	DBM	command util_execute diagnose monitor TIME 1
2004-07-14	16:26:22	0x000007f8		0	DBM	command util_execute diagnose monitor SELECTIVITY 100
2004-07-14	16:26:22	0x00000500		0	DBM	command util_execute diagnose monitor DATA ON
2004-07-14	16:26:23	0x00000a90		0	DBM	command util_execute diagnose monitor ROWNO 3000
2004-07-14	16:28:19	0x00000948		0	DBM	command util_execute diagnose monitor READ 1
2004-07-14	16:28:20	0x000007ec		0	DBM	command util_execute diagnose monitor TIME 1
2004-07-14	16:28:20	0x000007cc		0	DBM	command util_execute diagnose monitor SELECTIVITY 100
2004-07-14	16:28:21	0x00000948		0	DBM	command util_execute diagnose monitor DATA ON

File dbm.prt contains statements sent to the dbmserver.

Whenever an administrative command has been executed using Database Manager GUI or CLI this is logged in this file, including the error code (if an error occurred).

E.g. you can see, when a start or stop command has been executed.

Remote SQL Server Messages



Date	Time	TID(hex)	Typ	MsgID	Label	Message Text
2004-08-04	20:41:42	0x538		19898	ENVIRON	ProgramFiles=C:\Program Files
2004-08-04	20:41:42	0x538		19898	ENVIRON	PYTHON=C:\DevTool\Python
2004-08-04	20:41:42	0x538		19898	ENVIRON	SMS_LOCAL_DIR=C:\WINNT
2004-08-04	20:41:42	0x538		19898	ENVIRON	SNC_LIB=C:\Program Files\SECUDE\SECUDE for R3\secode.dll
2004-08-04	20:41:42	0x538		19898	ENVIRON	SSF_LIBRARY_PATH=\dwd\pset\tools\libssf.dll
2004-08-04	20:41:42	0x538		19898	ENVIRON	SystemDrive=C:
2004-08-04	20:41:42	0x538		19898	ENVIRON	SystemRoot=C:\WINNT
2004-08-04	20:41:42	0x538		19898	ENVIRON	TEMP=C:\WINNT\TEMP
2004-08-04	20:41:42	0x538		19898	ENVIRON	TMP=C:\WINNT\TEMP
2004-08-04	20:41:42	0x538		19898	ENVIRON	TOOL=C:\DevTool
2004-08-04	20:41:42	0x538		19898	ENVIRON	USERPROFILE=C:\Documents and Settings\Default User
2004-08-04	20:41:42	0x538		19898	ENVIRON	windir=C:\WINNT
2004-08-04	20:41:42	0x538		19898	ENVIRON	_NT_ALT_SYMBOL_PATH=C:\Program Files\sapdb\indep_prog\symbo
2004-08-04	20:41:42	0x538		19898	ENVIRON	Environment dump completed
=====						
2004-08-04	20:41:55	0x5EC		19839	XSERVER	'ld0048.wdf.sap.corp' connected, Reference: 1516
2004-08-04	20:41:55	0x5EC		19840	XSERVER	'ld0048.wdf.sap.corp' disconnect, Reference: 1516

File xserver.prt has a fixed size. The first part of this file contains startup information of the X-Server, including an environment dump. There you can see the relevant environment variable settings of the user who started the X-Server. This part is not overwritten. The second part contains runtime information like e.g. connect errors.

DBA History: Backup/Restore (DBMServer)

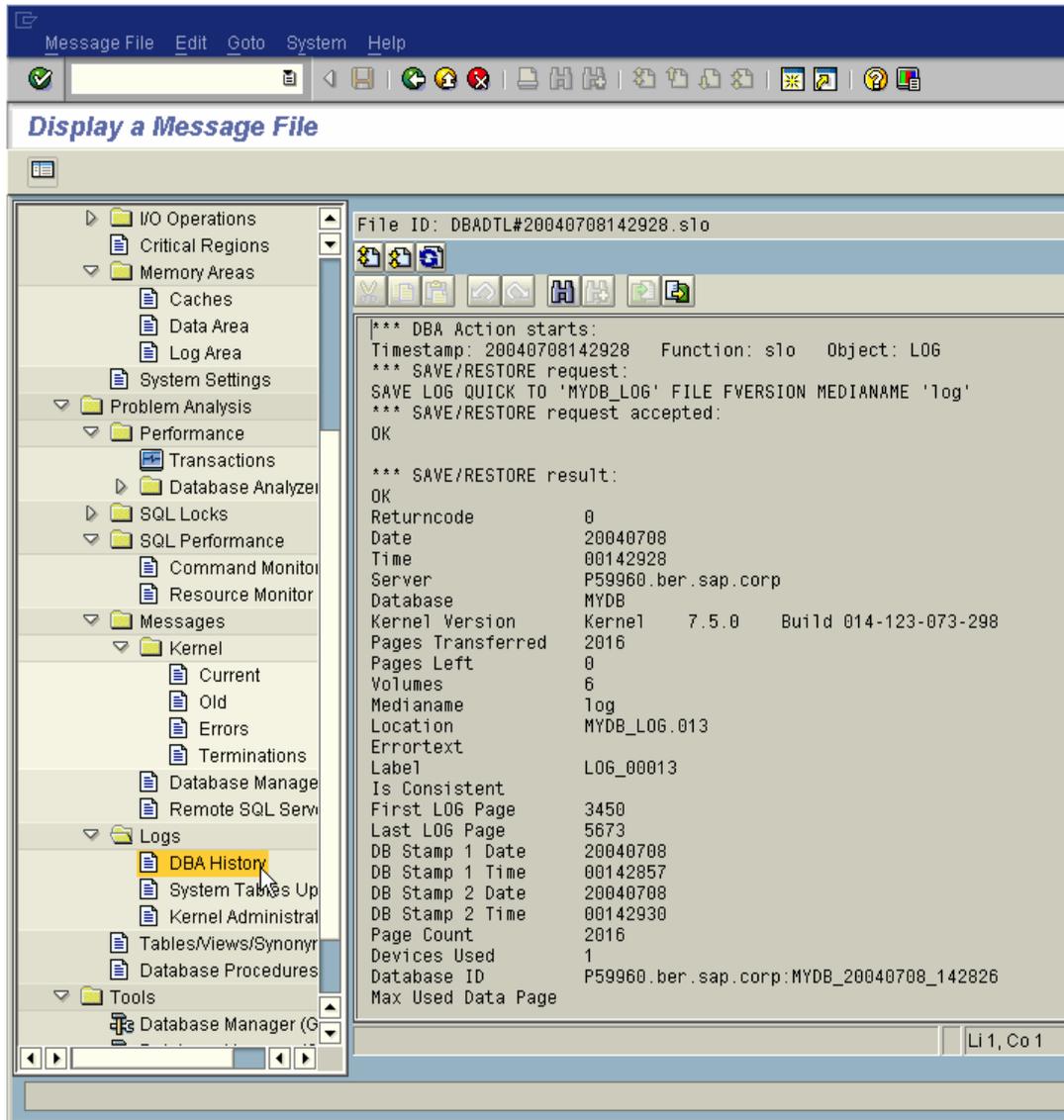


The screenshot shows the SAP DB Administration Actions window. The left sidebar contains a tree view with 'DBA History' highlighted. The main window displays a table of backup and restore actions.

Action	Ret...	Start Date	Time	End Date	Time
Incremental Backup	0000	05.08.2004	01:08:13	05.08.2004	01:08:25
Log Backup	0000	08.07.2004	14:29:28	08.07.2004	14:29:34
Log Backup	0000	08.07.2004	14:28:50	08.07.2004	14:28:58
Data Backup	0000	08.07.2004	14:28:25	08.07.2004	14:28:34

The DBA History contains information about administrative tasks.
E.g. you can see information about executed backup and recovery actions or consistency checks.
You can display a detailed log file for each of these actions.

DBA History: Backup/Restore Log File



The log file of a backup contains the backup command and its return code and detailed information like:

- the creation date of the backup
- the number of pages transferred
- the backup label
- the location of the backup file

DBA History: Backup/Restore (Kernel)



Backup label	DBA action	Return c...	Date	Start time	Date	Start time	No. of pages	Lo...	Backup media
PAG_00002	SAVE WARM	0	05.08.2004	01:08:14	05.08.2004	01:08:25	2328	NO	Inc
LOG_00013	SAVE WARM	0	08.07.2004	14:29:33	08.07.2004	14:29:34	256		log
LOG_00012	SAVE WARM	0	08.07.2004	14:29:33	08.07.2004	14:29:33	352		log
LOG_00011	SAVE WARM	0	08.07.2004	14:29:32	08.07.2004	14:29:32	352		log
LOG_00010	SAVE WARM	0	08.07.2004	14:29:31	08.07.2004	14:29:32	352		log
LOG_00009	SAVE WARM	0	08.07.2004	14:29:30	08.07.2004	14:29:31	352		log
LOG_00008	SAVE WARM	0	08.07.2004	14:29:28	08.07.2004	14:29:29	352		log
LOG_00007	SAVE WARM	0	08.07.2004	14:28:57	08.07.2004	14:28:57	160		log
LOG_00006	SAVE WARM	0	08.07.2004	14:28:55	08.07.2004	14:28:57	352		log
LOG_00005	SAVE WARM	0	08.07.2004	14:28:54	08.07.2004	14:28:55	352		log
LOG_00004	SAVE WARM	0	08.07.2004	14:28:53	08.07.2004	14:28:54	352		log
LOG_00003	SAVE WARM	0	08.07.2004	14:28:52	08.07.2004	14:28:53	352		log
LOG_00002	SAVE WARM	0	08.07.2004	14:28:51	08.07.2004	14:28:52	352		log
LOG_00001	SAVE WARM	0	08.07.2004	14:28:50	08.07.2004	14:28:51	352		log
DAT_00001	SAVE WARM	0	08.07.2004	14:28:26	08.07.2004	14:28:33	1768	NO	CompleteBU
	HISTLOST	0	08.07.2004	14:23:26					
	HISTLOST	0	08.07.2004	14:23:26					

This is the backup history from the point of view of the database kernel.

Each log backup action might create several log backup files - each of the size of one log segment.

The HISTLOST entries are created whenever the log volumes are initialized - e.g. during the installation. Then you have to create a complete backup again to start a new backup history.

Kernel Administration Log File



Database Kernel Log File

Date	Time	Command ID	Row	Ty.	Message Text
2004-08-05	01:08:13	41116C5D0002	0000	SPG	SAVE PAGES QUICK TO 'MYDB_INC' FILE NO CHECK
2004-08-05	01:08:25	41116C5D0002	0001	RET	RETURNCODE 0
2004-08-05	01:08:25	41116C5D0002	0002	TAP	DATE..... 2004-08-05
2004-08-05	01:08:25	41116C5D0002	0003	TAP	TIME..... 01:08:14
2004-08-05	01:08:25	41116C5D0002	0004	TAP	SERVERDB..... MYDB
2004-08-05	01:08:25	41116C5D0002	0005	TAP	SERVERNODE..... P59960.ber.sap.corp
2004-08-05	01:08:25	41116C5D0002	0006	TAP	KERNEL VERSION.... Kernel 7.5.0 Build 014-123-0
2004-08-05	01:08:25	41116C5D0002	0007	TAP	PAGES TRANSFERRED. 2328
2004-08-05	01:08:25	41116C5D0002	0008	TAP	PAGES LEFT..... 0
2004-08-05	01:08:25	41116C5D0002	0009	TAP	NO OF VOLUMES..... 1
2004-08-05	01:08:25	41116C5D0002	000A	TAP	MEDIA NAME..... Inc
2004-08-05	01:08:25	41116C5D0002	000B	TAP	TAPE NAME..... MYDB_INC
2004-08-05	01:08:25	41116C5D0002	000C	TAP	TAPE ERRORTXT.... UNDEF
2004-08-05	01:08:25	41116C5D0002	000D	TAP	TAPE LABEL..... PAG_00002
2004-08-05	01:08:25	41116C5D0002	000E	TAP	IS CONSISTENT.... TRUE
2004-08-05	01:08:25	41116C5D0002	000F	TAP	FIRST IO SEQUENCE. 5798
2004-08-05	01:08:25	41116C5D0002	0010	TAP	LAST IO SEQUENCE.. UNDEF
2004-08-05	01:08:25	41116C5D0002	0011	TAP	DBSTAMP1 DATE.... 2004-08-05
2004-08-05	01:08:25	41116C5D0002	0012	TAP	DBSTAMP1 TIME.... 01:08:13
2004-08-05	01:08:25	41116C5D0002	0013	TAP	DBSTAMP2 DATE.... UNDEF
2004-08-05	01:08:25	41116C5D0002	0014	TAP	DBSTAMP2 TIME.... UNDEF
2004-08-05	01:08:25	41116C5D0002	0015	TAP	BD PAGE COUNT.... 2267
2004-08-05	01:08:25	41116C5D0002	0016	TAP	TAPEDEVICES USED.. 1
2004-08-05	01:08:25	41116C5D0002	0017	TAP	DB_IDENT..... P59960.ber.sap.corp:MYDB_200407
2004-08-05	01:08:25	41116C5D0002	0018	TAP	MAX_USED_DATA_PNO 0

File dbm.utl contains information about all administrative tasks sent to the database kernel.

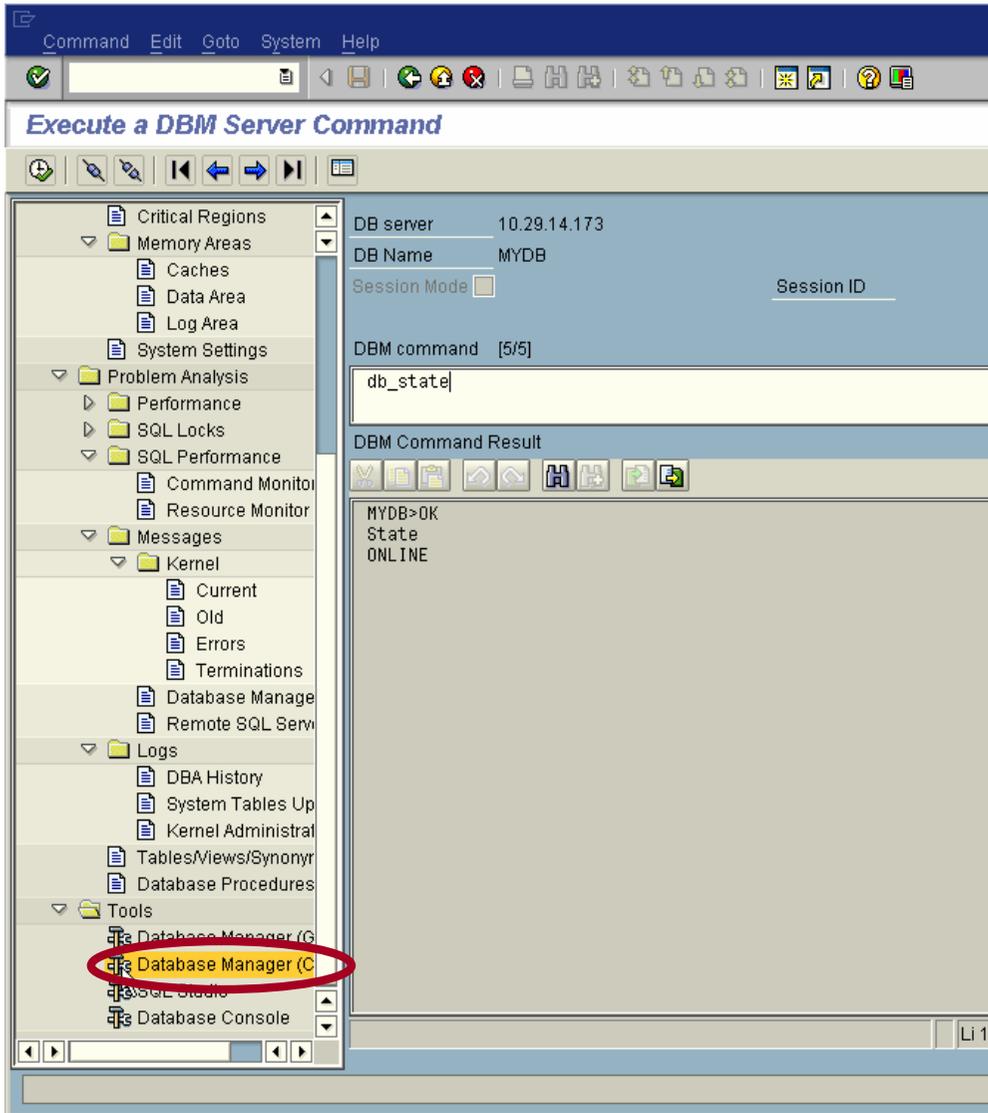
This log file is written by the database kernel itself.

It contains information about

- backups,
- consistency checks and
- starts/stops of the database instance

including the return codes of these commands.

Database Manager (CLI)



Using the Database Manager CLI dbmsrv commands can be executed.

Some of the most important commands are:

- **db_state** – determines the database state
- **dbm_version** – determines the version of the dbmsrv
- **db_offline** – stops the database instance – should not be executed for the systems own database instance!
- **db_online** - starts the database instance

DBA Planning Calendar



The screenshot displays the SAP DBA Planning Calendar interface. A 'Tools' menu is open, highlighting 'DBA Planning Calendar'. The main window shows a calendar for July 2005, Week 30. The calendar grid has columns for Monday, 25; Tuesday, 26; Wednesday, 27; Thursday, 28; Friday, 29; and Saturday. The time slots range from 00:00 to 20:00. A task named 'DataBackup' is scheduled for Tuesday, 26th at 13:00. The 'Action Pad' at the bottom left lists several tasks, with 'Complete data backup' selected. A red circle highlights the 'DataBackup' task in the calendar grid.

	Monday, 25	Tuesday, 26	Wednesday, 27	Thursday, 28	Friday, 29	Saturday
00:00						
01:00						
02:00						
03:00						
04:00						
05:00						
06:00						
07:00						
08:00						
09:00						
10:00						
11:00						
12:00						
13:00		DataBackup				
14:00						
15:00						
16:00						
17:00						
18:00						
19:00						
20:00						

The DBA Planning Calendar allows to schedule important database tasks like backups or consistency checks (like transaction DB13/DB13C in earlier SAP releases). Double-click a line in the calendar view or in the Action Pad to schedule a task.

Scheduling Tasks



The screenshot displays the 'Schedule a New Action' dialog box in SAP. The 'Action' field is set to 'Mark tables requiring statistics update'. A dropdown menu is open, showing options: 'Update statistics for marked tables' (highlighted), 'Update all optimizer statistics', 'Check database structure', 'Check database structure (only tables)', 'Execute DBM command', and 'Refresh table statistics'. The 'Add' button at the bottom left of the dialog is circled in red. In the background, a calendar for '2005, Calendar Week 30' is visible, with a task named 'DataBackup' scheduled for Tuesday, 26. The task details show 'PrepUpdStat' and 'UpdStats' as sub-tasks, which are also circled in red.

For some tasks parameters are necessary – e.g the backup medium for a backup. These parameters can be specified in this window. Furthermore you can specify if the task should be executed immediately or if it should be executed at a specific date/time and if it should be executed in a certain interval (daily, weekly, every few hours, ...)

DBA Planning Calendar



The screenshot shows the 'Display Details of Action' window in SAP. The 'Action Description' tab is active, displaying the following information:

Action	Complete data backup	1 / 1
Planned Start	25.07.2005 12:10:14	
Status	Finished successfully	
Action Started	25.07.2005 12:10:14	
Action Finished	25.07.2005 13:32:26	

Below the description, the 'Program Log' tab is active, showing the following log output:

```
*** DBA Action starts:  
Timestamp: 20050725121014  Function: sdc  Object: DATA  
2005-07-25 12:10:14  
%.98s:Setting environment variable 'TEMP' for the directory for temporary files and pipes to defa  
%.97s:Setting environment variable 'TMP' for the directory for temporary files and pipes to defa  
%.69s:Using connection to Legato's NetWorker with save, recover and mminfo.  
  
2005-07-25 12:10:16  
%.50s:Checking existence and configuration of NetWorker.  
  
%.120s:Using configuration variable 'NSR_ENV' = '/sapdb/LTA/sapscrippts/monitor2/env' as path  
%.50s:Found NetWorker setting for 'NSR_HOST': 'usb104a'.  
%.61s:Found NetWorker setting for 'NSR_HOME': '/opt/networker/bin'.  
%.45s:Found NetWorker setting for 'NSR_POOL': 'DB'.  
%.50s:Found NetWorker setting for 'NSR_EXPIRE': 'Month'.
```

If you perform a double-click on a finished action you can have a look at the log files of this task.

What Has to be Monitored?

Standby Database

Central Monitoring – Transaction DB59

Database Assistant – Transaction DB50

Performance Analysis Tools

Alert Monitor – Transaction RZ20

Snapshot

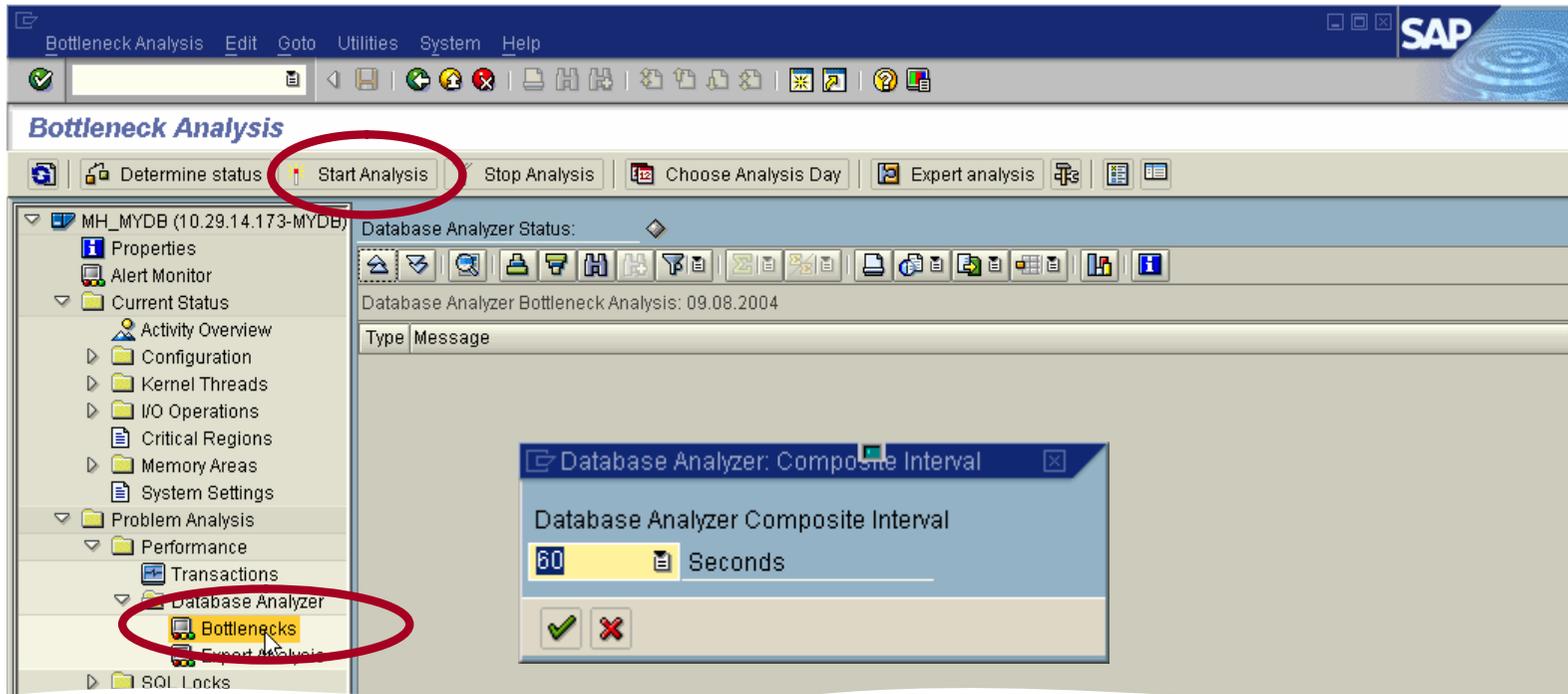
If you have performance problems you can start the MaxDB performance analysis tools

- Database Analyzer
- Command Monitor
- Resource Monitor

In case you have problems with special transactions you can run these afterwards and analyze the collected data concerning these transactions.

In case of general performance problems the tools should run for a while and you should check the output of these tools regularly for any problems.

Starting the Database Analyzer

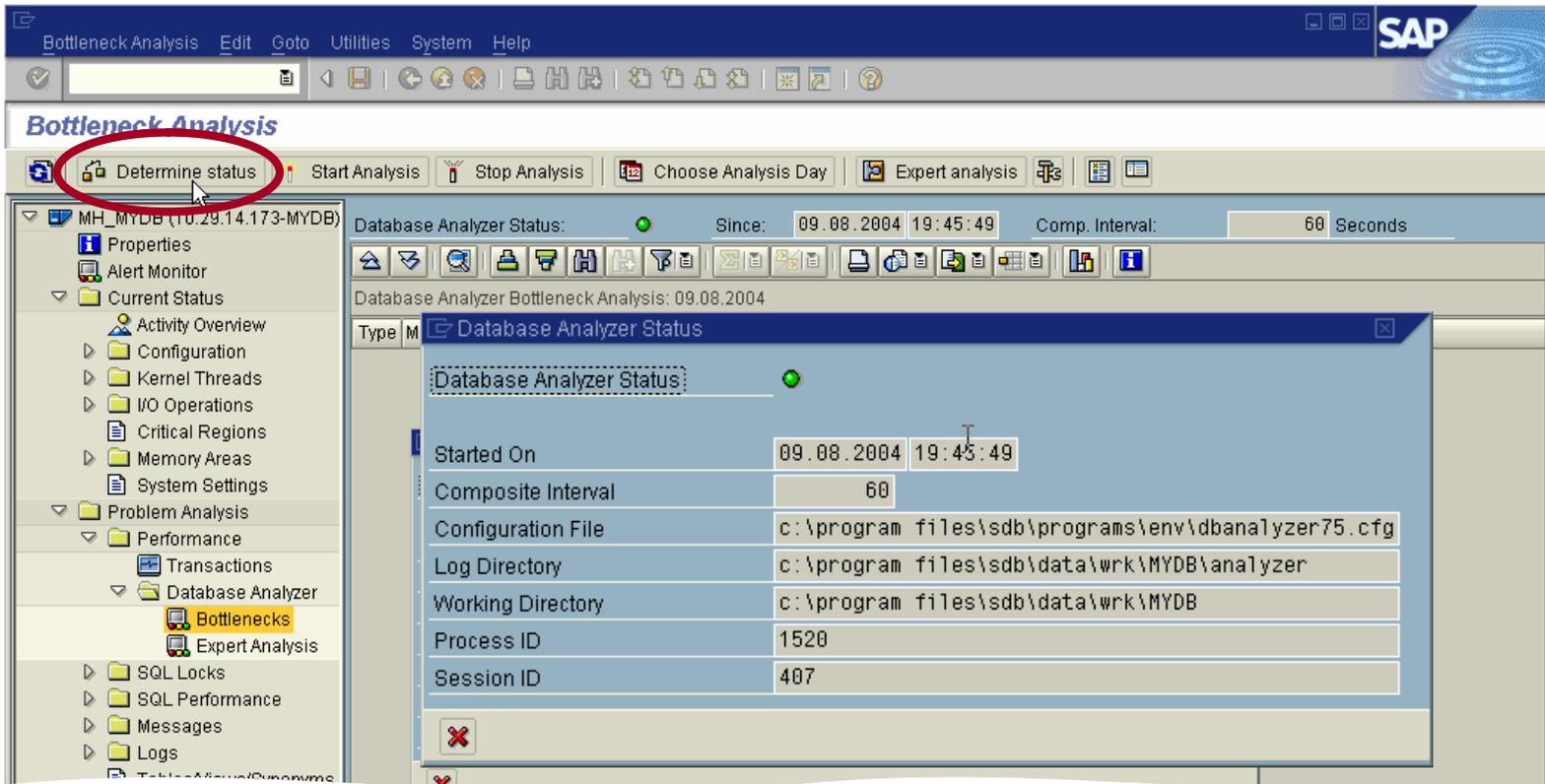


The database analyzer is a rule-based expert system for performance analysis. It collects statistical and monitoring data as well as system messages. It detects and reports e.g.

- Low cache hit ratio
- High I/O load
- Low hit ratio of DML commands (SELECT, UPDATE, DELETE)

For a short time analysis the interval should be set to 60 - 120 seconds.
For long time monitoring it should be set to 900 seconds.

Database Analyzer Status



Database Analyzer uses a set of sophisticated rules to classify the current state of MaxDB by analyzing several MaxDB parameters.

These rules and the source of collected data are delivered in file dbanalyzer.cfg. In the status window you can see which configuration file is used and where the log files are stored.

The log files of each day are stored in a separate directory where you can analyze them later on.

Database Analyzer Output



The screenshot shows the SAP Database Analyzer interface. The main window displays the 'Bottleneck Analysis' results for the database 'MH_MYDB'. The analysis was performed on 09.08.2004 at 19:45:49 with a 60-second interval. The results are presented in a table with columns for 'Type' and 'Message'. The messages include warnings (W1, W3) and information (I) regarding cache hit rates, selectivity, and physical reads.

Type	Message
* W1	Catalog cache hitrate (SQL Pages) 87.07%, 124 of 959 accesses failed
#52	at 2004-08-09 20:38:09
* W3	Data cache hitrate (SQL Pages) 83.08%, 2999 of 17722 accesses failed
* W1	Catalog cache hitrate (SQL Pages) 86.83%, 130 of 987 accesses failed
* W3	Selects and fetches selectivity 0.02%: 120 selects and fetches, 66928 rows read, 12 rows qualified
* I	Number of physical reads: 2998
* I	datawriter tasks activity: dispatches: 110, writes: 102, pages: 378
* W2	3005 physical reads for user task 15, 26 commands, application pid 1156
#53	at 2004-08-09 20:39:09

The Database Analyzer rates the information and bottlenecks:

I: General information, such as the number of executed commands

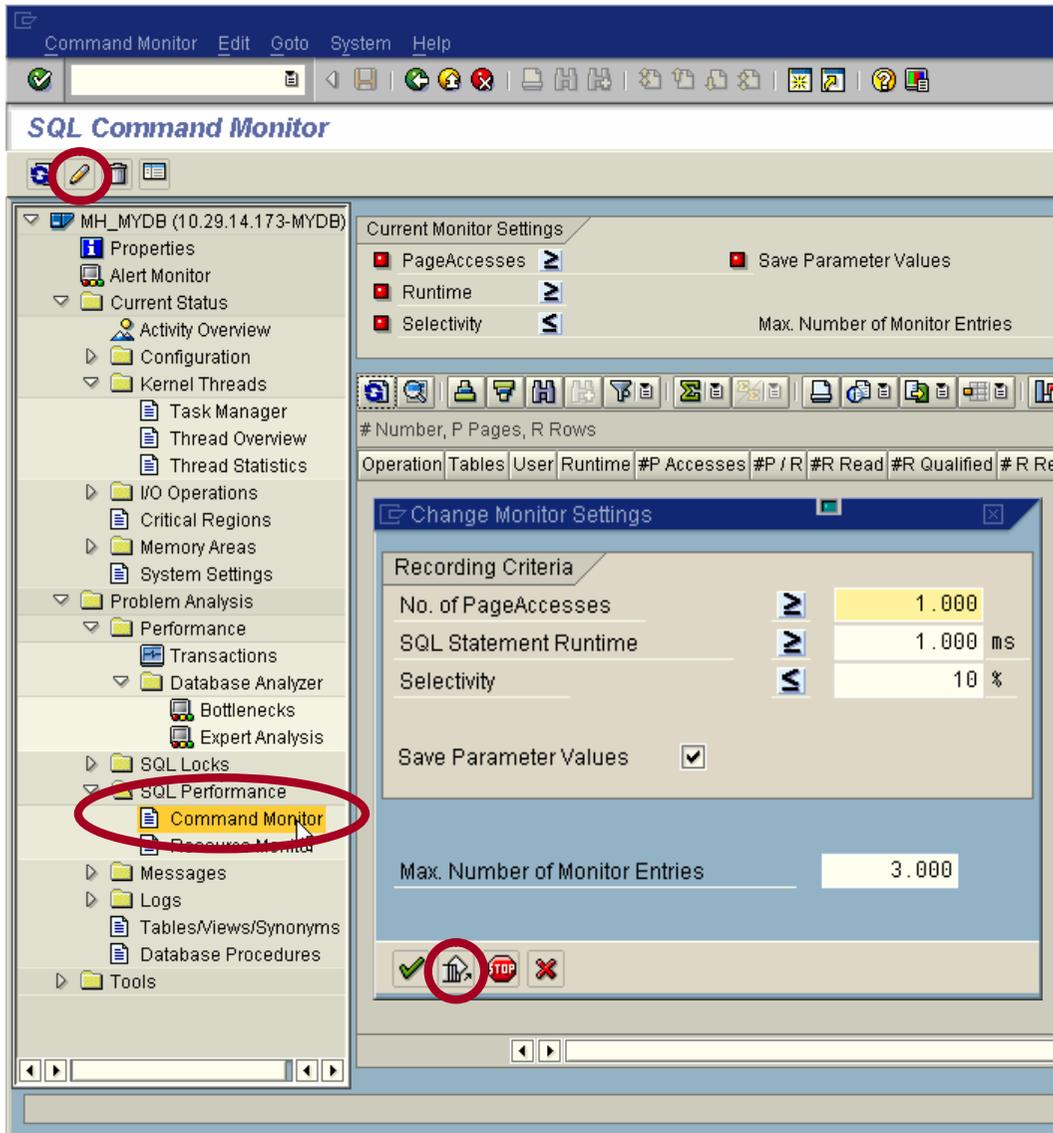
W1 to W3: Bottleneck warnings with low, medium, and high priority

An example for a warning might be

W3 Selects and fetches selectivity 0,02% -> rows read 66928, 12 rows qualified

That means that the access strategies to data in SQL tables is bad because a high number of table rows have to be read internally to find a small number of rows that meet the qualification in the WHERE clause.

Starting The Command Monitor



To identify long running statements or statements with a bad selectivity, the command monitor can be used. It collects specific data about SQL statements whose resource consumption violates configurable thresholds like runtime, page accesses or selectivity.

This monitor is mainly used to catch statements with high individual runtime.

The command monitor also collects the exact user input data used during statement execution. This is essential to create the correct execution plan used for statement execution.

The command monitor keeps only a specified number of statements - old statements are overwritten when this number is reached.

Command Monitor Output



Current Monitor Settings

- PageAccesses: 1.000
- Runtime: 1.000 ms
- Selectivity: 10 %
- Save Parameter Values:
- Max. Number of Monitor Entries: 3.000

Number, P Pages, R Rows ; 09.08.04 20:33:17 - 09.08.04 20:37:26

Operation	Tables	User	Runtime	#P Accesses	#P / R	#R Read	#R Qualified	# R Retrieved	# Disk I/O	Strategy	Structure	Shortened SQL Stat
SELECT	BKPF	MONA	66,916	17.975	2.246,88	99.937	8	9	4.489			SELECT * FROM BK
SELECT	BKPF	MONA	0,071	21	21,00	100	1	0	5	SCAN	NO	SELECT * FROM BK
SELECT	BKPF	MONA	0,041	13	13,00	130	1	0	2	SCAN	NO	SELECT * FROM BK

SQL Statement

```
SELECT
  MANDT, AWTYP, AWSYS, AWKEY
FROM
  MONA.BKPF
WHERE
  MANDT = '800' AND AWTYP = 'VBRK' AND AWKEY BETWEEN '0090000220' AND
  '0090000545'
```

In the command monitor you can see e.g.

- the runtime of the statement,
- the number of rows read and rows qualified and
- the number of disk I/O during statement execution.

To view the complete statement perform a double click on the corresponding entry.

Execution Plan



The screenshot shows the SAP interface for displaying the execution plan of a SQL statement. The title bar reads "Execution Plan of SQL Statement (Explain)". Below the title bar, there is a menu bar with "Execution Plan", "Edit", "Goto", "System", and "Help". A toolbar contains various icons for navigation and actions. The main content area is titled "Execution Plan for SQL Optimizer" and contains a table with the following data:

OWNER	TABLERNAME	COLUMN OR INDEX	STRATEGY	PAGECOUNT
MONA	BKPF	BKPF~2	RANGE CONDITION FOR INDEX	215
	SHOW	MANDT	(USED INDEX COLUMN)	
			RESULT IS NOT COPIED , COSTVALUE IS	3835

Below the table, the "SQL Statement" section contains the following SQL code:

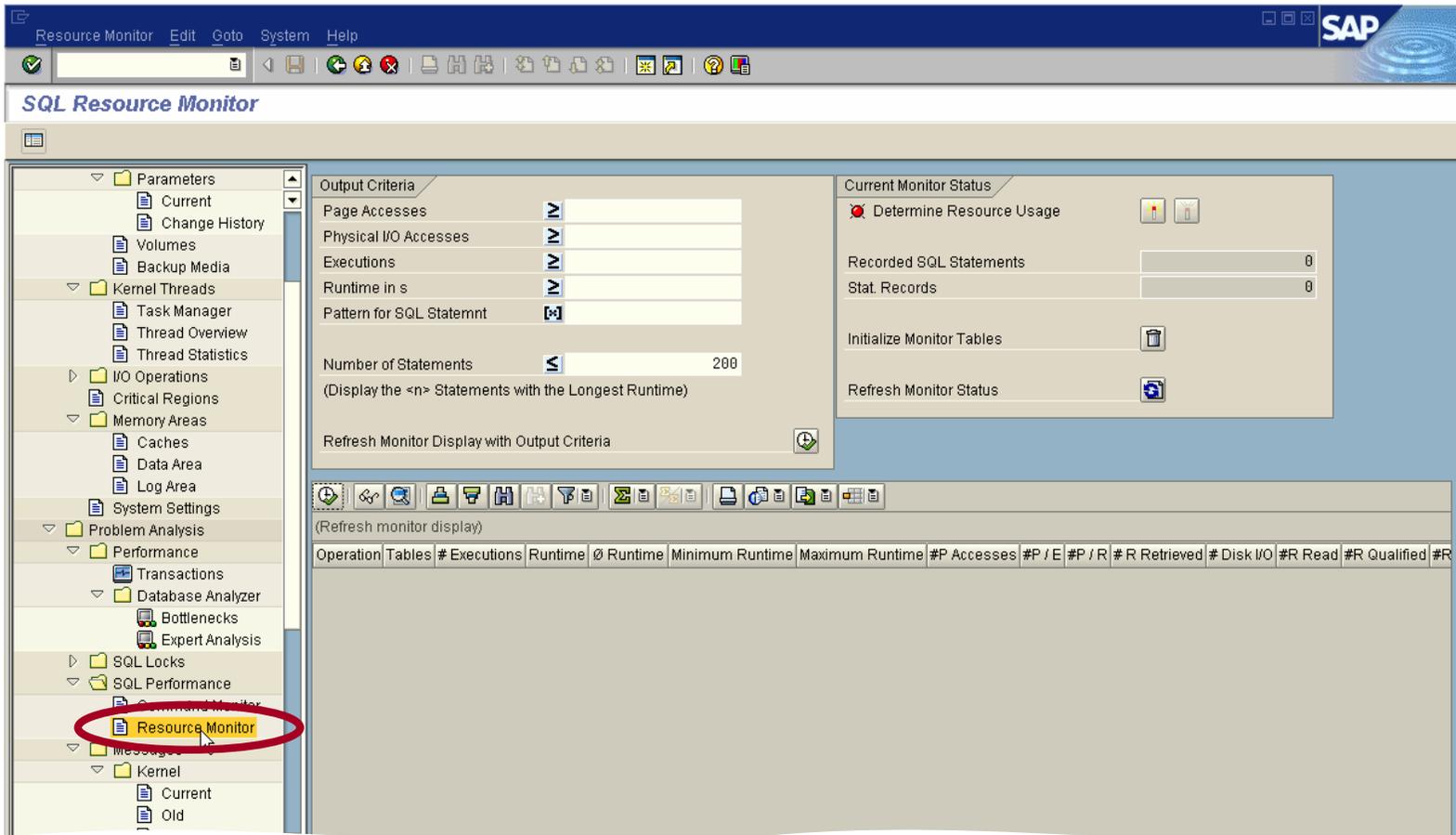
```
SELECT
  MANDT, AWTYP, AWSYS, AWKEY
FROM
  MONA.BKPF
WHERE
  MANDT = '800' AND AWTYP = 'VBRK' AND AWKEY BETWEEN '0090000220' AND
  '0090000545'
```

The execution plan of a SQL statement can be displayed by pressing *Display Execution Plan for SQL Statement*.

In this example the optimizer uses a table scan to get the requested results. A lot of rows have to be read to find the few matching rows.

That's the explanation for the entries in the database analyzer log file and in the command monitor.

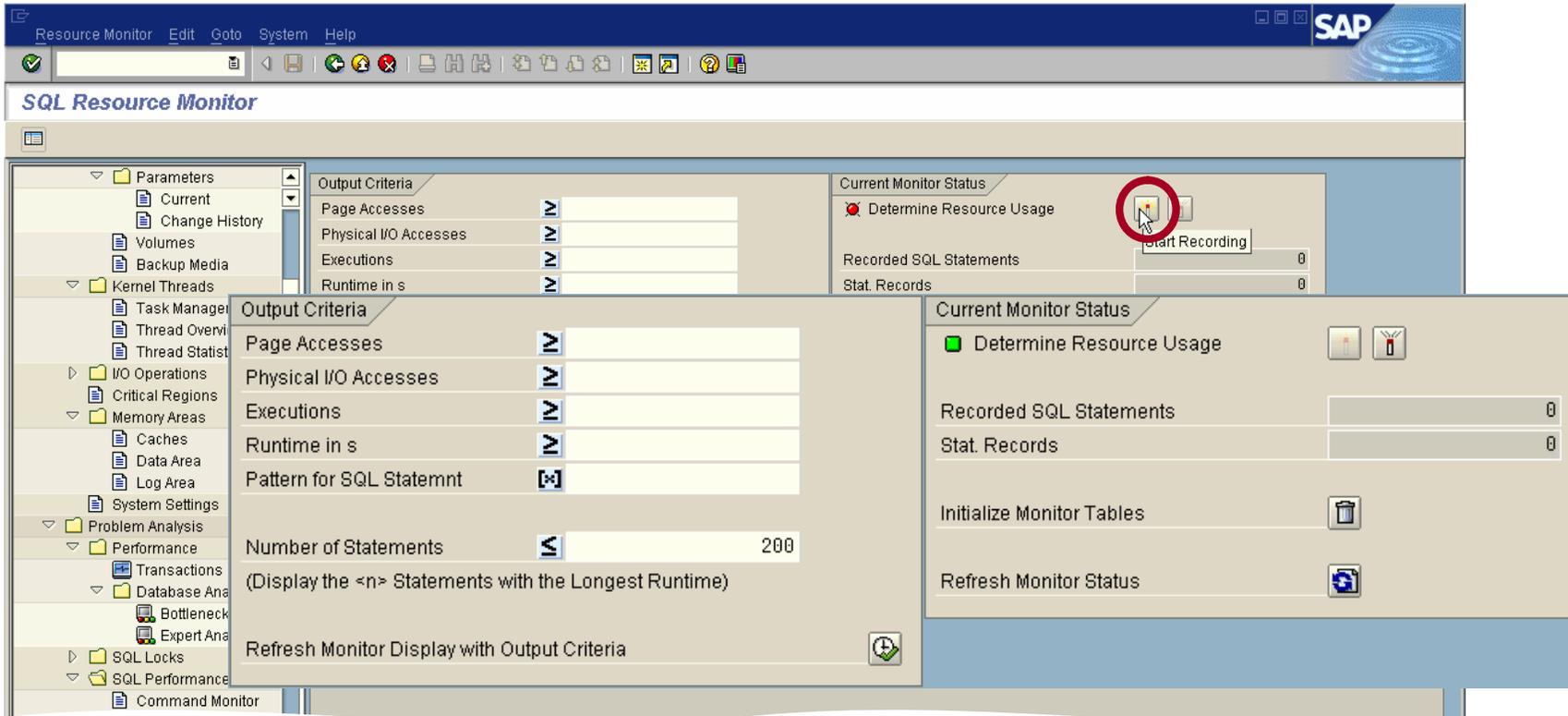
Resource Monitor



The resource monitor collects data of all executed statements independent of the single execution time.

You can restrict the number of displayed rows specifying lower limits e.g. for the runtime or the number of statement executions.

Starting the Resource Monitor



The resource monitor aggregates the resource consumption over all executions of a statement.

It helps to identify SQL statements with cheap individual execution (e.g. through primary key access), which are executed very often and therefore cause a high aggregated runtime and workload.

The optimization of these statements promises the highest overall effect.

Resource Monitor Output



The screenshot displays the SAP Resource Monitor interface. On the left, a tree view shows the database structure for 'MH_MYDB (10.29.14.173-MYDB)', including folders for 'Current Status', 'Kernel Threads', 'I/O Operations', 'Problem Analysis', and 'Performance'. The 'Performance' folder is expanded, showing a table of SQL statements. The table has columns for 'Operati...', 'Tables', '# Executions', 'Runti...', 'Average Runti...', 'Minimum Runti...', 'Maximum Runti...', '#P Accesses', '#P / ...', '#P / ...', '# R Retrie...', and '#'. Three rows are visible, with the second row highlighted in yellow:

Operati...	Tables	# Executions	Runti...	Average Runti...	Minimum Runti...	Maximum Runti...	#P Accesses	#P / ...	#P / ...	# R Retrie...	#
SELECT	BKPF	3	58,834	19,611	0,070	58,694	17,575	5,8...	1,7...	9	
SELECT	HOTEL	162	0,020	0,000	0,000	0,010	162	1	0,18	864	
SELECT	INFO_STA	36	0,000	0,000	0,000	0,000	0	0	0,00	24	

The main window shows the 'SQL Statement' editor with the following SQL code:

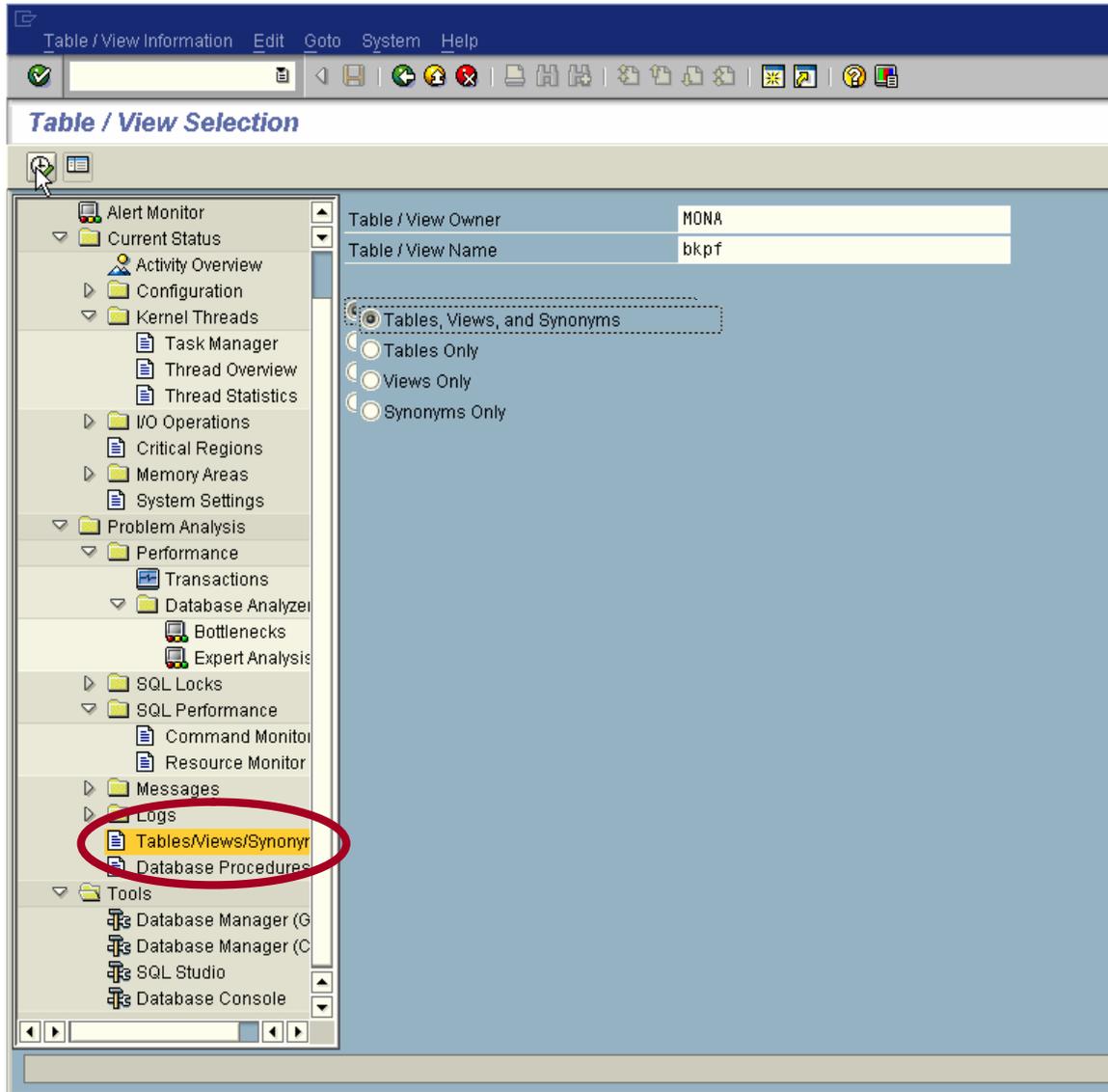
```
SELECT
*
FROM
HOTEL#
```

You can see e.g.

- the number of executions,
- the overall runtime and
- the number of page accesses.

To view the statement perform a double click on the corresponding entry. Often these statements cannot be optimized with database methods because they are already executed in the most efficient way. Then the application developer has to check if the statement has to be executed so often.

Tables/Views



To determine the best optimizer strategy for an SQL statement you have to analyze all tables involved.

You have to check

- the table definition (especially the primary key definition)
- the existing indexes and
- the optimizer statistics.

To decrease the runtime of a statement it might be necessary to update the optimizer statistics or to create a new index.

Tables/Views: Properties



The screenshot shows the SAP MaxDB Admin Workshop interface. The left sidebar contains a tree view with 'Tables/Views/Synonym' selected and circled in red. The main window displays 'Table / view information' for 'MONA' and 'BKPF'. The 'Properties' tab is selected and circled in red. Below the tabs, there are buttons for 'Table Consistency' and 'Default Sampl'. The 'Properties' section contains the following data:

Property	Value	Property	Value
Ty.	TABLE	Access Rights	SEL+UPD+DEL+INS+REF+IND+ALT+
Creation Date	09.08.2004	Creation Time	19:35:09
Changed On	09.08.2004	Last Chgd At	19:35:09
Stats Date	09.08.2004	Stats Time	19:35:09
Default Sample	110 Rows		
Cons. Checked On		Cons. Checked At	

In the *Properties* section you can see when the table has been created and altered and when the optimizer statistics have been updated the last time.

It is also possible to check the table consistency and to change the default sample value for the creation of the optimizer statistics.

For large tables the sample value should be set to 10% - for smaller tables a sample value of 20000 rows is sufficient (note #808060).

Tables/Views: Definition



Table / view information

Table / View Owner: MONA
Table / View Name: BKPF

Properties Definition Indexes Optimizer Statistics

Table Definition MONA.BKPF

Column Name	Type	Data Type	Code Type	Len...	D...	Acc...	Default	Po...	Ke...	Creation Date	Time	Changed On	T
MANDT	OPT	VARCHAR	ASCII	3		SEL+	000	1		09.08.2004	19:35:09	09.08.2004	1
BUKRS	OPT	VARCHAR	ASCII	4		SEL+		2		09.08.2004	19:35:09	09.08.2004	1
BELNR	OPT	VARCHAR	ASCII	10		SEL+		3		09.08.2004	19:35:09	09.08.2004	1
GJAHR	OPT	VARCHAR	ASCII	4		SEL+	0000	4		09.08.2004	19:35:09	09.08.2004	1
BLART	OPT	VARCHAR	ASCII	2		SEL+		5		09.08.2004	19:35:09	09.08.2004	1
BLDAT	OPT	VARCHAR	ASCII	8		SEL+	00000000	6		09.08.2004	19:35:09	09.08.2004	1
BUDAT	OPT	VARCHAR	ASCII	8		SEL+	00000000	7		09.08.2004	19:35:09	09.08.2004	1
MONAT	OPT	VARCHAR	ASCII	2		SEL+	00	8		09.08.2004	19:35:09	09.08.2004	1
CPUDT	OPT	VARCHAR	ASCII	8		SEL+	00000000	9		09.08.2004	19:35:09	09.08.2004	1
CPUTM	OPT	VARCHAR	ASCII	6		SEL+	000000	10		09.08.2004	19:35:09	09.08.2004	1
AEDAT	OPT	VARCHAR	ASCII	8		SEL+	00000000	11		09.08.2004	19:35:09	09.08.2004	1
UPDDT	OPT	VARCHAR	ASCII	8		SEL+	00000000	12		09.08.2004	19:35:09	09.08.2004	1
WWERT	OPT	VARCHAR	ASCII	8		SEL+	00000000	13		09.08.2004	19:35:09	09.08.2004	1
USNAM	OPT	VARCHAR	ASCII	12		SEL+		14		09.08.2004	19:35:09	09.08.2004	1
TCODE	OPT	VARCHAR	ASCII	4		SEL+		15		09.08.2004	19:35:09	09.08.2004	1
BUSPO	OPT	VARCHAR	ASCII	4		SEL+		16		09.08.2004	19:35:09	09.08.2004	1

Primary Key columns have the *Type* KEY, in column *Key Position* you can see if this is the first, second, ... key column.

Furthermore you can see the data type and length of a column.

Tables/Views: Indexes



Table / view information

Table/View Schema: MONA
Table / View Name: BKPF

Properties | Definition | **Indexes** | Optimizer Statistics

Inactive Indexes | Unused Indexes

Indexes of MONA.BKPF

Index Name	Type	C	A	U	# Acce	Reset Date	Time	Column
BKPF~1		■	■	▲	0	14.07.2006	10:35:29	MANDT
BKPF~2		■	■	▲	0	14.07.2006	10:35:29	BUKRS
		■	■	▲	0	14.07.2006	10:35:29	BSTAT
		■	■	▲	0	14.07.2006	10:35:29	XBLNR
		■	■	■	1	14.07.2006	10:35:29	MANDT
BKPF~3		■	■	■	1	14.07.2006	10:35:29	BUKRS
		■	■	▲	0	14.07.2006	10:35:29	BUDAT
		■	■	▲	0	14.07.2006	10:35:29	MANDT
BKPF~4		■	■	▲	0	14.07.2006	10:35:29	BUKRS
		■	■	▲	0	14.07.2006	10:35:29	BSTAT
		■	■	▲	0	14.07.2006	10:35:29	BLART
BKPF~5		■	■	▲	0	14.07.2006	10:35:29	MANDT
		■	■	▲	0	14.07.2006	10:35:29	AWTYP
		■	■	▲	0	14.07.2006	10:35:29	AWKEY
		■	■	▲	0	14.07.2006	10:35:29	AWSYS
		■	■	▲	0	14.07.2006	10:35:29	MANDT

All Indexes defined for a table are listed in the *Indexes* section. You can see

- of which columns the index consists,
- if it has already been used,
- if the index is activated,
- if the index is corrupted.

It is also possible to activate and deactivate indexes.

If an index is deactivated it is still maintained during insert, update or delete operations but it cannot be used to access the data.

Corrupted indexes can be recreated.

Tables/Views: Restore Index



If an index is corrupted it cannot be used to access the data.

Mark the corrupted index and choose *Restore Index* to recreate it.

Attention: During the index rebuild the corresponding table is locked for write transactions. Depending on the size of the table the rebuild might take a long time.

The screenshot shows the SAP MaxDB Admin Workshop interface. The main window displays 'Table / view information' for schema 'MONA' and table/view 'BKPF'. The 'Indexes' tab is active, showing a list of indexes for 'MONA.BKPF'. A red circle highlights the 'Restore Index' button in the toolbar. A dialog box titled 'Restore Bad Indexes' is open, displaying a warning message: 'Restoring indexes can take a long time, depending on the table size. While an index is being restored, the associated table cannot be accessed. Restoring indexes should therefore be performed at a time of minimal workload. You should restore indexes of large tables in the background. Do you want to restore the selected bad index now?'. The dialog has buttons for 'In Dialog' and 'In the Background'. Below the dialog, a table lists the indexes for 'MONA.BKPF'.

Index Name	Index Type	Index Status	Index Size	Index Date	Index Time	Index Owner
BKPF~1	Primary	OK	0	14.07.2006	10:35:29	BSTAT
BKPF~2	Secondary	OK	0	14.07.2006	10:35:29	BLART
BKPF~4	Secondary	Corrupted	0	14.07.2006	10:35:29	MANDT
BKPF~3	Secondary	OK	0	14.07.2006	10:35:29	AWTYP
BKPF~5	Secondary	OK	0	14.07.2006	10:35:29	AWKEY
BKPF~6	Secondary	OK	0	14.07.2006	10:35:29	AWSYS
BKPF~7	Secondary	OK	0	14.07.2006	10:35:29	MANDT

Showing the Execution Plan



The screenshot shows the SAP 'Execution Plan of SQL Statement (Explain)' window. It features a menu bar with 'Execution Plan', 'Edit', 'Goto', 'System', and 'Help'. Below the menu is a toolbar with various icons. The main content area is titled 'Execution Plan for SQL Optimizer' and contains a table with the following data:

OWNER	TABlename	COLUMN OR INDEX	STRATEGY	PAGECOUNT
MONA	BKPF	BKPF~4	RANGE CONDITION FOR INDEX	539
		MANDT	ONLY INDEX ACCESSED	
		AWTYP	(USED INDEX COLUMN)	
		AWKEY	(USED INDEX COLUMN)	
	SHOW		RESULT IS NOT COPIED , COSTVALUE IS	3

Below the table, the 'SQL Statement' section displays the following SQL query:

```
SELECT
  MANDT, AWTYP, AWSYS, AWKEY
FROM
  MONA.BKPF
WHERE
  MANDT = '800' AND AWTYP = 'VBRK' AND AWKEY BETWEEN '0090000220' AND
  '0090000545'
```

After the index has been recreated it is used by the optimizer when the statement found in the command monitor is executed again.

Now the execution of this statement is much faster.

Tables/Views: Optimizer Statistics



The screenshot shows the SAP Table/View Information tool interface. The 'Table / view information' window is open for schema 'MONA' and table/view 'BKPF'. The 'Optimizer Statistics' tab is selected, and the 'Update (Standard)' button is highlighted with a red circle. An 'Update Statistics' dialog box is open, showing the 'Sample' section with 'No. of Rows' set to 110 and 'Percentage' set to 0%. The dialog also has buttons for 'In Dialog', 'In the Background', and a close button.

Column Name	Index Name	No. of differ...	No. of pages	Exact Num...
AWKEY		11104		
AWSYS		2		
AWTYP		3		
BLART		4		
BLDAT		495		
BSTAT		1		
BUDAT		495		
BUKRS		2		
CPUDT		397		
GJAHR		2		
MANDT		1		
MONAT		77		

To determine the best access strategy for a JOIN the optimizer needs statistical data. If this data is not updated regularly the optimizer might not choose the best strategy.

UPDATE STATISTICS determines information about the size and the value distribution of tables and indexes. These values are not counted but estimated on the basis of sample rows.

What Has to be Monitored?

Standby Database

Central Monitoring – Transaction DB59

Database Assistant – Transaction DB50

Performance Analysis Tools

Alert Monitor – Transaction RZ20

Snapshot

Alert Monitor – RZ20



The screenshot shows the SAP Alert Monitor interface. The main window displays a tree view of components under 'MH_MYDB'. The 'Last Backup' node is selected, and a dialog box titled 'Backup Actions History' is open, showing a table of backup actions.

Backup Lab...	Action ID	Error Code	Start Date	StartTime	End Date	EndTime
	HISTLOST	0	09.08.2004	19:30:47		
	HISTLOST	0	09.08.2004	19:30:47		

The alert monitor collects e.g. data concerning the filling level of the log and the data area, the cache hit ratio and the creation of backups. If you perform a double-click on a node in the tree, you get detailed information about this node - e.g. the backup history. In this example no data backup exists.

Creating a Complete Backup I



The screenshot displays the SAP Database Manager GUI for instance 10.29.14.173:MYDB. The left sidebar shows the navigation menu with 'Backup Wizard...' selected. The main window shows the 'Backup Database Instance' wizard with the following steps:

- Backup Type:** Select which type of backup you want to perform. The 'Complete Data Backup' radio button is selected. Other options are 'Incremental Data Backup' and 'Log Backup'. A checkbox for 'Activate/deactivate automatic' is present.
- Backup Medium:** Create/select a medium for Complete Data backup. A table lists available media:

Name	Device/File	Device Type	Backup
CompleteBU	MYDB_COM_01, ...	FILE	Comple
MyGroup	c:\tmp\Med1, ...	FILE	Comple
Data	MYDB_COM	FILE	Comple

- State of Backup:** Complete Data backup is running. A progress bar shows 6.336 KB | 792 Pages transferred. The status window displays the following details:
 - Database: 10.29.14.173:MYDB
 - Version: 7.5.00.14
 - Rundirectory: C:\Program Files\sapdb\indep_data\wrk\MYDB
 - Backup Type: Complete Data
 - Backup Device: CompleteBU
 - Device Type: FILE
 - Device/File #1: MYDB_COM_01
 - Device/File #2: MYDB_COM_02

Navigation buttons at the bottom include '< Back', 'Next >', and 'Cancel'. The 'Start' and 'Cancel' buttons are visible in the 'State of Backup' window.

To create a data backup use the Database Manager GUI and choose *Backup* → *Database*. The Backup Wizard will guide you through the backup process – including the creation of a backup medium, if there is none.

Creating a Complete Backup II



The screenshot shows the SAP DBA Planning Calendar interface. The main window displays a calendar for August 2005, with a list of actions on the left. The 'Complete data backup' action is highlighted with a red circle. A dialog box titled 'Schedule a New Action' is open, showing the action details and parameters.

Action Description

- Action: Complete data backup
- Planned Start: 24.08.2005 16:57:32
- Status: 0 / 0

Action Parameters

- Backup Medium: Comp
- Buttons: Read backup media again, Create new backup medium

Recurrence

Buttons: Add, Cancel, Execute

It is also possible to use the DBA Planning Calendar to create the backup. With this transaction you can schedule different actions or execute them immediately.

Data Collector



View: Current system status (18.08.2004 , 00:08:41)

Display MTE Description

MTE name:	QP8\MaxDB Monitoring: MH_MYDB\...Last Backup>Last successf
Description	Time of the last successful complete data backup

Continue >> Long text

MH_MYDB

- Properties
- Space Management
- Performance
- Backup/Recovery
 - Last Backup
 - Last successful Complete Data Backup 9999 Days
 - Last Complete Data Backup Return Code No data backup in
 - Last Recovery
- Health
- External Analysis Tools

Performance Assistant

Time of the last successful complete data backup

Message no. SDBALM099

Description

The system displays how many days ago the last successful complete data backup was performed. If the system does not find a successful data backup in the last three months, it displays 9999 days.

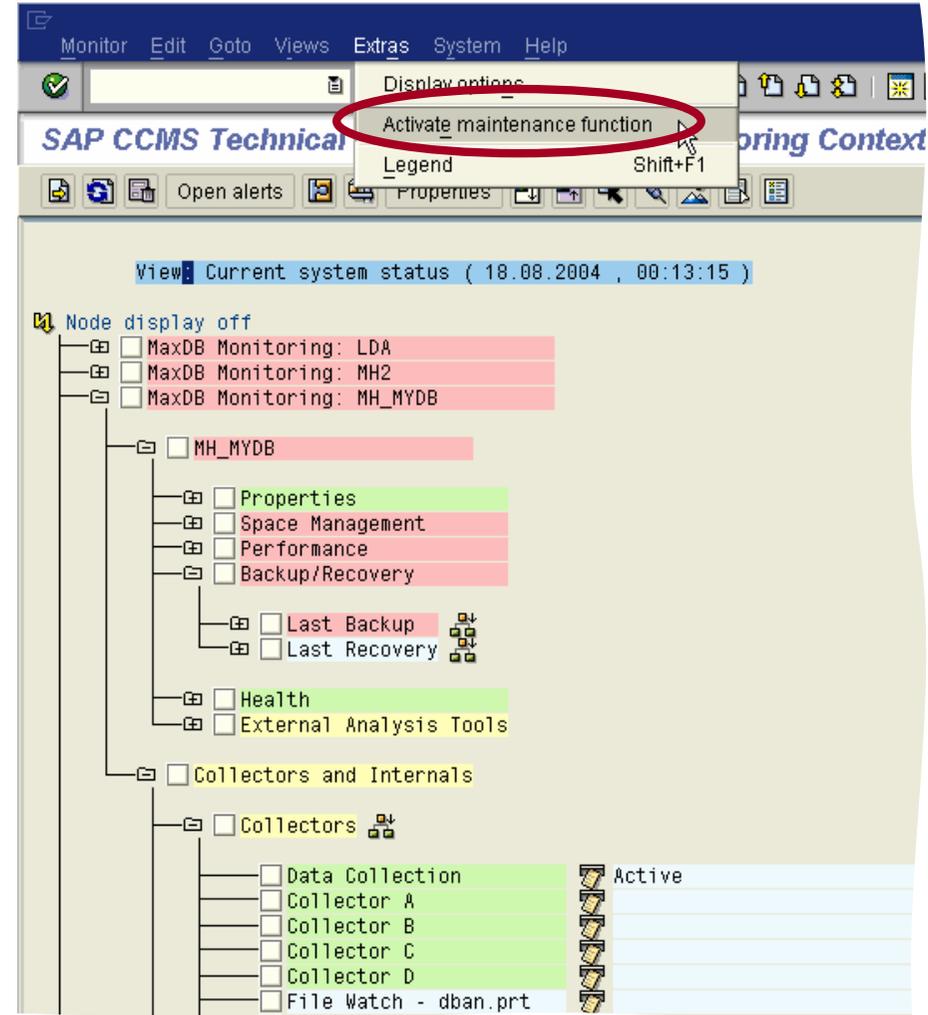
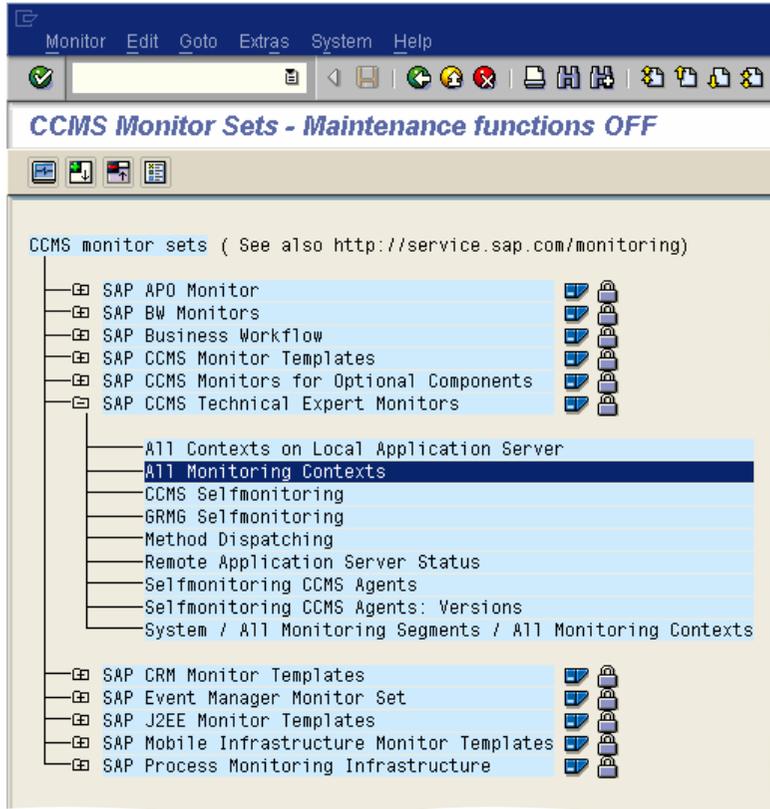
Data Collector

Collector B
(RZ20 -> SAP CCMS Technical Experts Monitors -> All Monitoring Contexts -> <Name of the database connection> -> Collectors and Internals -> Collectors -> Collector B)

Preset runtime interval of Collector B: 15 minutes

After you have solved the problem, you can either wait until the data collector runs the next time or start the data collector manually. To figure out which data collector is responsible for this node, place the cursor on this node and press *F1* then choose *Long Text*.

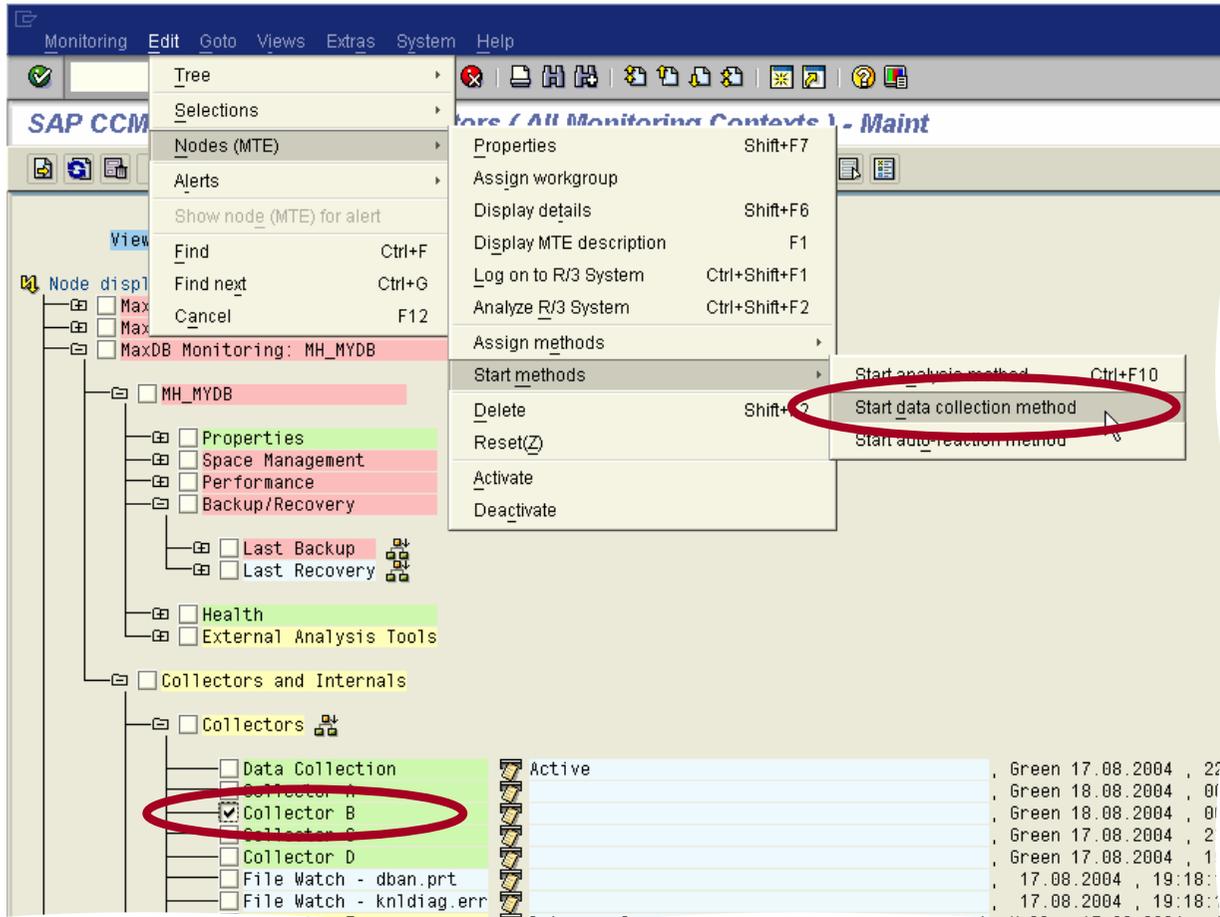
Manual Start of Data Collection for Alert Monitor



To be able to start the data collector, you have to activate the maintenance function in

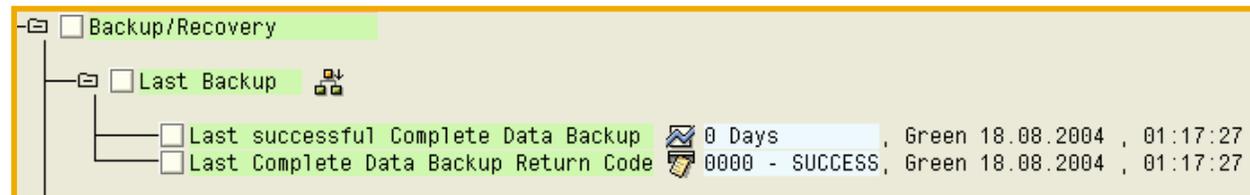
transaction RZ20. Choose *CCMS monitor sets* → *SAP CCMS Technical Expert Monitors* → *All Monitoring Contexts*. Then choose *Extras* → *Activate maintenance function*.

Start Data Collection Method



Then you can select the data collector (make sure the checkbox is marked) and choose *Edit → Nodes (MTE) → Start methods → Start data collection method.*

If you refresh the display in RZ20 then, the backup node will be green.



Changing Threshold Values



The screenshot shows the SAP MaxDB monitoring interface. On the left, a tree view displays the monitoring structure. The 'Free Log Space' node is highlighted with a red circle. On the right, the 'Monitoring: Properties and Methods' dialog is open, showing the 'PerformanceAttribute' tab. The 'Comparison Value' section has 'Last reported value' selected. The 'Threshold values' section shows the following table:

Change from	Value	Unit
Change from GREEN to YELLOW	12	MB
Change from YELLOW to RED	8	MB
Reset from RED to YELLOW	9	MB
Reset from YELLOW to GREEN	13	MB

The 'Alert is triggered if the comparative value' section has 'falls below threshold value' selected.

Sometimes the default threshold values for the nodes do not fit your requirements.

In this example a very small test database is monitored.

The log volume is nearly empty but the alert is red.

Mark the concerning node and choose *Properties* to adapt the threshold values.

Green Alerts



Monitor Edit Goto Views Extras System Help

SAP CCMS Monitors for Optional Components (MaxDB Monitoring) - Mai

Open alerts Properties

View: Current system status (08.07.2004 , 14:36:52)

Node display off

- MaxDB Monitoring
 - liveCache
 - Archive
 - OLTP
 - E30
 - MH_MYDB
 - Properties
 - Space Management
 - Data Area
 - Log Area
 - Total Log Space: 15 MB, Green 08.07.2004, 14:36:48
 - Free Log Space: 13 MB, Green 08.07.2004, 14:36:48
 - Used Log Space: 15 %, Green 08.07.2004, 14:36:48
 - Log Writing: Active, Green 08.07.2004, 14:36:48
 - Autosave Log: Not activated, Yellow 08.07.2004, 14:36:48
 - Last Log I/O Sequence Number: 5.616, Green 08.07.2004, 14:36:48
 - Performance
 - Backup/Recovery
 - Last Backup
 - Last successful Complete Data Backup: 0 Days, Green 08.07.2004, 14:34:05
 - Last Complete Data Backup Return Code: 0000 - SUCCESS, Green 08.07.2004, 14:34:05
 - Last Recovery

After changing the threshold values the node concerning the Free Log Space is green.

What Has to be Monitored?

Standby Database

Central Monitoring – Transaction DB59

Database Assistant – Transaction DB50

Performance Analysis Tools

Alert Monitor – Transaction RZ20

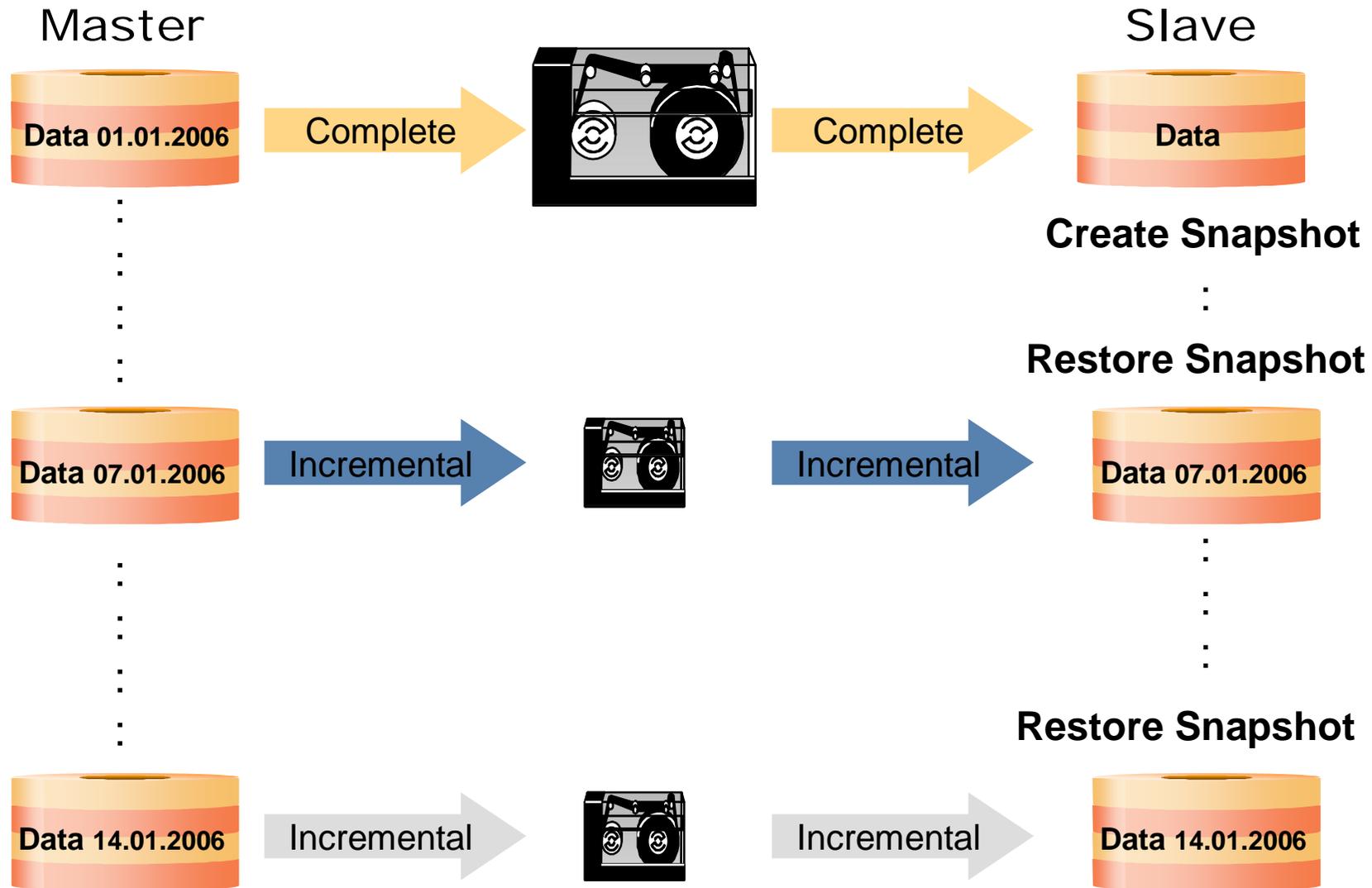
Snapshot

Freezing a database image

- Create Snapshot (ADMIN)
- Revert to Snapshot (ADMIN)
- Drop Snapshot (ADMIN)

- Ideas of use:
 - Very fast point in time resetting (e.g. during upgrades)
 - Restoring training-systems to a defined status

Master - Slave Support w/ Snapshots



Snapshots: Database After Setup



Database Manager

File Edit View Instance Actions Tools Help

My Folders Servers <Local> Hot-Standbys All

Name	State	Data	Log	Sessions	Data Cache Hit...	Auto Log
MAXDB1	Offline					
MAXDB2	Offline					
MAXSNAP	Online	2 %	Auto Overwrite	20 %	100 %	Off
MDMASTER	Not connected					
MDSLAVE	Not connected					

MAXSNAP

- Information
- Backup
- Recovery
- Tuning
- Check
- Configuration
- DBM Operator...
- Log Settings...
- Hot Standby...
- Mapchar Sets
- Termchar Sets
- Upgrade System T...

State

MAXSNAP Data: 2 %
Total: 95.984 KB Perm: 1.816 KB Temp: 88 KB Used: 1.904 KB Free: 94.080 KB

ONLINE Log: 8 %
Total: 39.400 KB Used: 3.136 KB Free: 36.264 KB

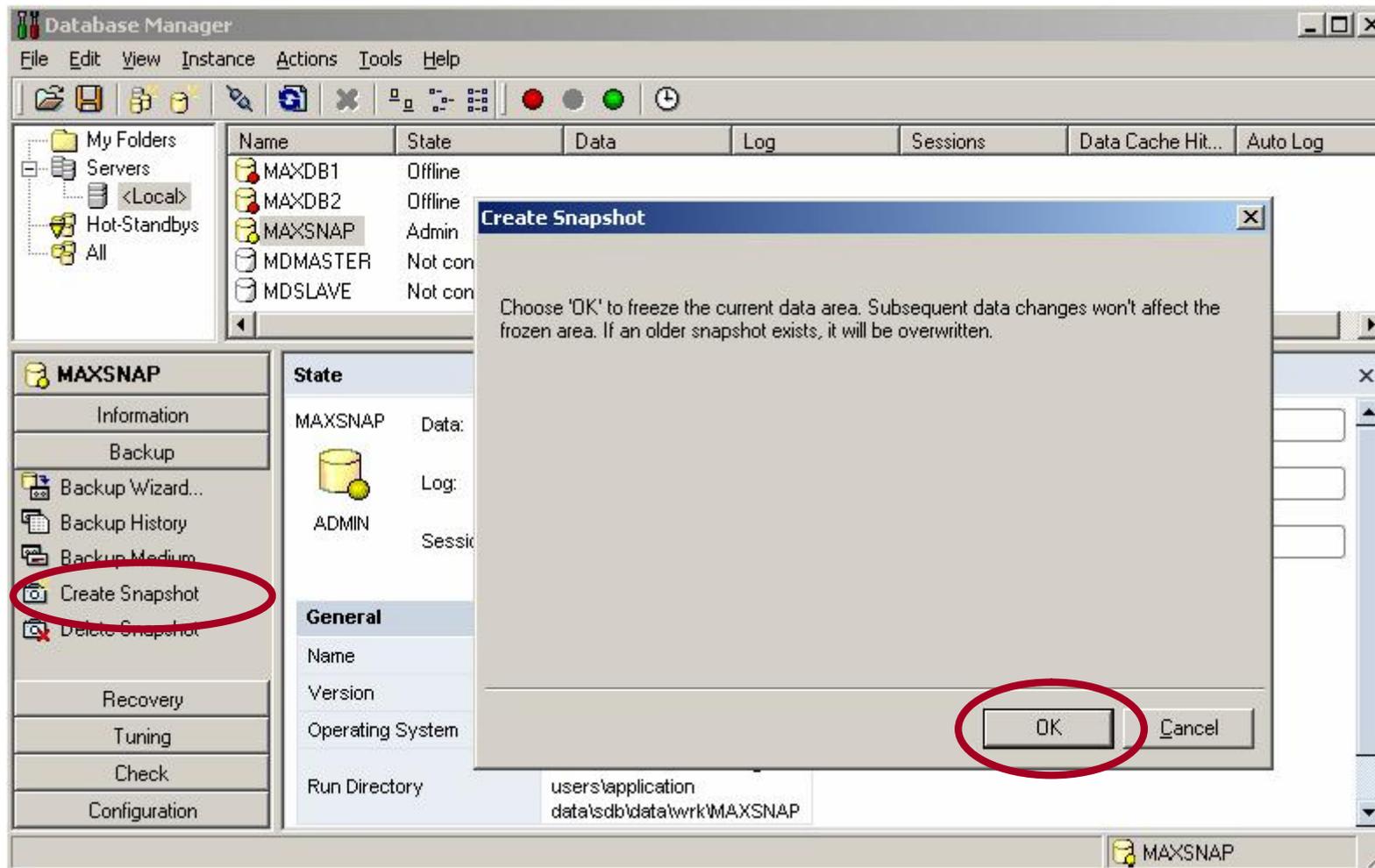
Sessions: 20 %
Used: 2 Free: 8

General

Name	MAXSNAP	Auto Log	Off
Version	7.6.00.07	Command Monitor	Off
Operating System	Windows XP (WIN32)	Resource Monitor	Off
Run Directory	c:\documents and settings\all users\application data\sdb\data\wrk\MAXSNAP	Database Trace	Off
		Database Analyzer	Off

MAXSNAP

Taking a Snapshot



If you would like to create a snapshot, the database has to be in ADMIN mode. *DBMGUI* allows to create the snapshot with menu *Backup g Create Snapshot*.

Some Data Has Been Loaded



The screenshot shows the SAP Database Manager interface. The main table lists database instances: MAXDB1 (Offline), MAXDB2 (Offline), MAXSNAP (Online), MDMASTER (Not connected), and MDSLAVE (Not connected). The MAXSNAP instance is selected, and its details are shown in the 'State' pane. The 'Data' section shows 38% usage (36,080 KB used, 59,904 KB free). The 'Log' section shows 0% usage (8 KB used, 39,392 KB free). The 'Sessions' section shows 30% usage (3 used, 7 free). The 'General' section provides instance details: Name: MAXSNAP, Version: 7.6.00.07, Operating System: Windows XP (WIN32), Run Directory: c:\documents and settings\all users\application data\sdb\data\wrk\MAXSNAP. The 'Configuration' section shows Auto Log, Command Monitor, Resource Monitor, Database Trace, and Database Analyzer are all Off.

Name	State	Data	Log	Sessions	Data Cache Hit...	Auto Log
MAXDB1	Offline					
MAXDB2	Offline					
MAXSNAP	Online	38 %	Auto Overwrite	30 %	100 %	Off
MDMASTER	Not connected					
MDSLAVE	Not connected					

MAXSNAP State	Value
Data	38 % Total: 95.984 KB Perm: 35.976 KB Temp: 104 KB Used: 36.080 KB Free: 59.904 KB
Log	0 % Total: 39.400 KB Used: 8 KB Free: 39.392 KB
Sessions	30 % Used: 3 Free: 7

General	
Name	MAXSNAP
Version	7.6.00.07
Operating System	Windows XP (WIN32)
Run Directory	c:\documents and settings\all users\application data\sdb\data\wrk\MAXSNAP
Auto Log	Off
Command Monitor	Off
Resource Monitor	Off
Database Trace	Off
Database Analyzer	Off

Then you can use your database instance normally – e.g. you can load some data.

Checking Data in SQL Studio



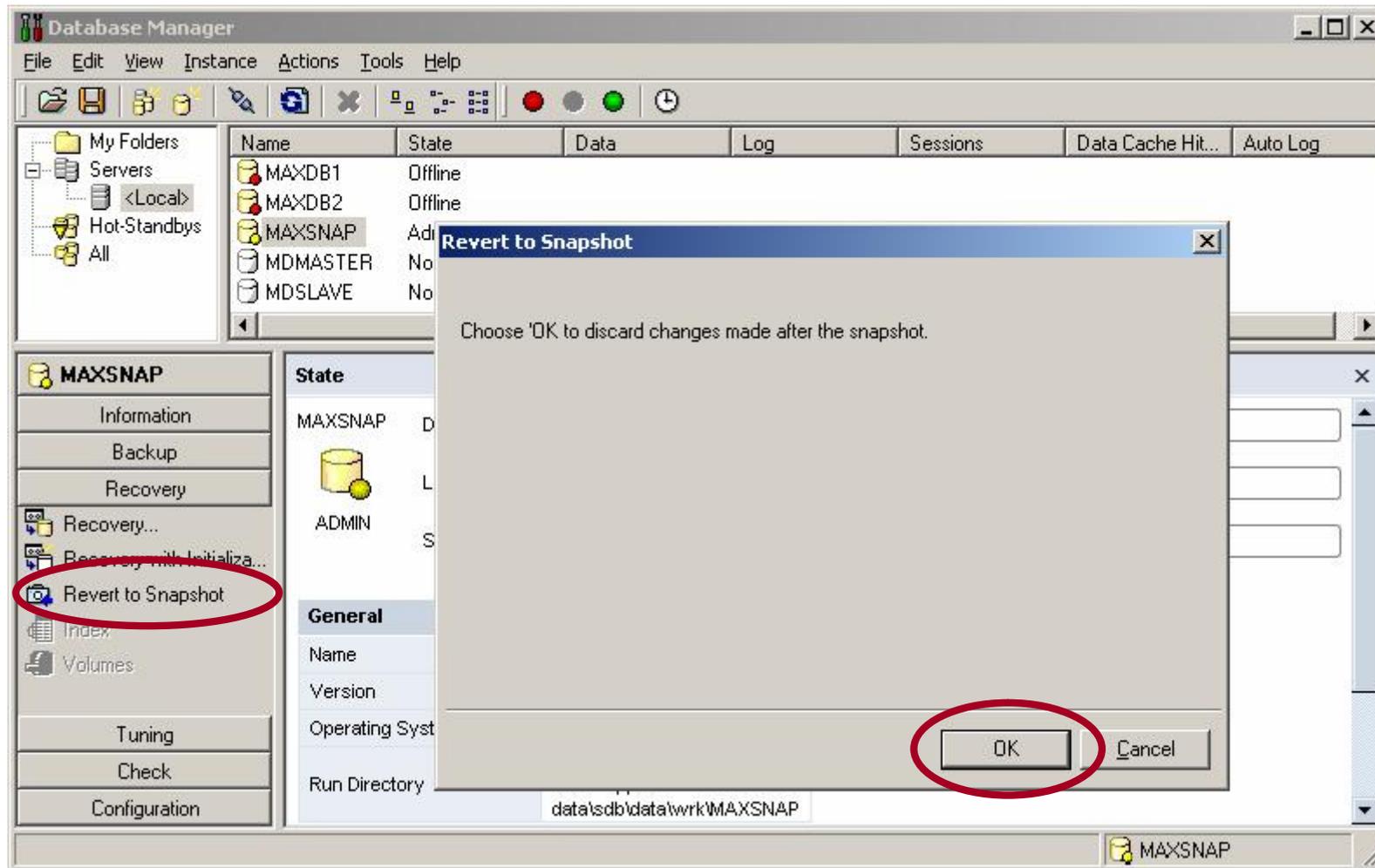
The screenshot shows the SQL Studio interface with the following components:

- Session:** TEST, maxsnap, Local Host
- Menu:** Session, View, Result, Window, Help
- Toolbar:** SQL, No Timeout
- Left Panel (maxsnap):**
 - SQL Studio Objects
 - Tables
 - DBADMIN
 - DOMAIN
 - SYSINFO
 - TEST
 - BKPF
 - Indexes
 - Sequences
 - Owned Users
 - Procedures
 - Triggers
- SQL Dialog 1:**

```
SELECT * FROM "TEST"."BKPF"
```
- Result Table:**

	MANDT	BUKRS	BELNR	GJAHR	BLART
1	800	0001	010000000	1995	SA
2	800	1000	010000000	1994	AA
3	800	1000	010000001	1994	AA
4	800	1000	010000002	1994	AA
5	800	1000	010000003	1994	AA
6	800	1000	010000004	1994	AA
7	800	1000	010000005	1994	AA
8	800	1000	010000006	1994	AA
9	800	1000	010000007	1994	AA
10	800	1000	010000008	1994	AA
11	800	1000	010000009	1994	AA
- Rows in Result:** Unknown
- Query:** SELECT * FROM "TEST"."BKPF"
- Trace All:**
- Execution Time:** 22:37:56.147 - 22:37:56.156 (00.009 sec)
- Session Info:** TEST, maxsnap, Local Host

Admin Mode: Revert to Snapshot



If you would like to revert to the snapshot, choose menu Recovery → Revert to Snapshot. This can be done in ADMIN mode, only.

After Reverting to Initial State



The screenshot shows the SAP Database Manager interface. The main table lists the state of various databases:

Name	State	Data	Log	Sessions	Data Cache Hit...	Auto Log
MAXDB1	Offline					
MAXDB2	Offline					
MAXSNAP	Online	2 %	Auto Overwrite	20 %	92 %	Off
MDMASTER	Not connected					
MDSLAVE	Not connected					

The MAXSNAP database details are shown in the 'State' window:

MAXSNAP State

- Data:** 2 %
Total: 95.984 KB Perm: 1.936 KB Temp: 88 KB Used: 2.024 KB Free: 93.960 KB
- Log:** 0 %
Total: 39.400 KB Used: 8 KB Free: 39.392 KB
- ONLINE**
- Sessions:** 20 %
Used: 2 Free: 8

General

Name	MAXSNAP	Auto Log	Off
Version	7.6.00.07	Command Monitor	Off
Operating System	Windows XP (WIN32)	Resource Monitor	Off
Run Directory	c:\documents and settings\all users\application data\sdb\data\wrk\MAXSNAP	Database Trace	Off
		Database Analyzer	Off

After you restored the snapshot, all data loaded after the creation of the snapshot is gone, data which was deleted, is available again.

Transactions DB59, DB50 and RZ20 help you to monitor and administer all MaxDB database instances in your system landscape.

- Transaction DB59 is the central entry point where the instances can be integrated into the monitoring system. Using this transaction you can easily switch to the Database Assistant for each of your database instances.
- Transaction DB50 is the Database Assistant which allows to monitor your MaxDB instance. Performance problems can be analyzed and solved using this transaction.
- The DBA Planning Calendar enables you to schedule important database tasks like backups or consistency checks.
- In transaction RZ20 a special branch for the MaxDB instances can be created, so that critical situations are reported using the SAP Alert concept.

Database Manager (GUI) provides all necessary functions to administer existing database instances and to create new instances – e.g. standby databases.

Thank you!

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