SAP® MaxDB™ Error Diagnosis Version 7.8

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THE BEST-RUN BUSINESSES RUN SAP™

Overview

Types of errors / classification of errors

Errors during installation

Log files / traces / dumps

Check table / check backup

Analysis examples

- Connection problems
- DB full / log full situations
- Hanger situations
- Backup/restore problems
- Analyzing system errors -9028 / -9026

Extracting pages (x_diagnose)

Types of errors

Installation problems

Connect problems

Crash situations

Hanger situations

System errors (-10000 < error number <= -9000)

- with or without crash; reproducible ?

SQL errors (e.g. wrong result sets)

- reproducible effect ?

Save / restore errors

- valid backup ?

When an error occurs, the first step is to categorize it, as different types of errors call for different corrective measures. In some of the cases described here, categorization is simple. In some cases, however, it may not be immediately clear which of the active components is responsible for the undesirable system behavior. It may not even be clear whether the problem has to do with the database, and thus whether the diagnosis options described in this chapter will be helpful.

Problems arising from the installation of the software are easy to identify as such.

In an SAP environment, connection problems generally manifest themselves in that the database is, in principle, ready for operation, but the client processes cannot get a connection.

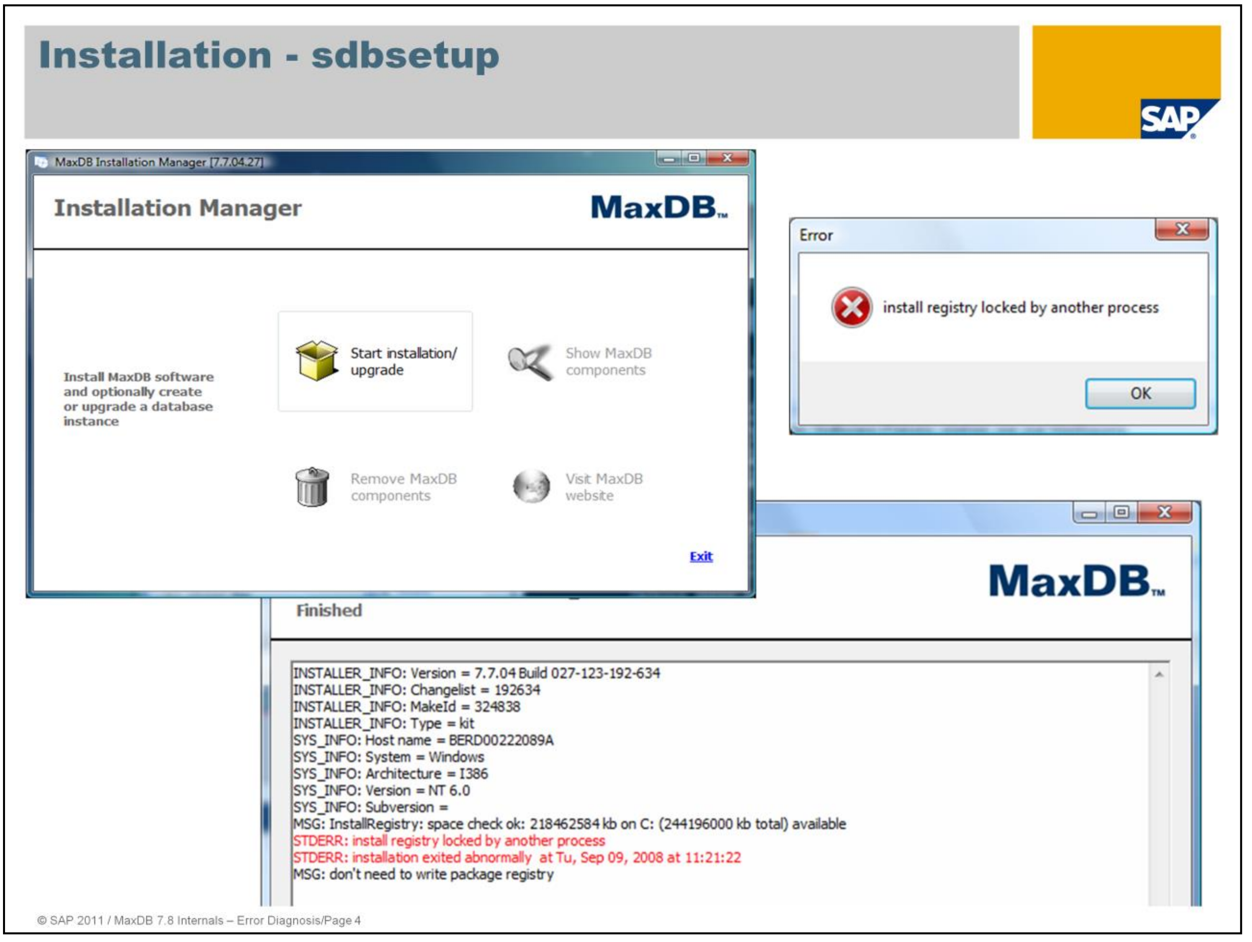
If the database, without any conscious action having been taken, is no longer ready for operation, it may have crashed. However, it is also possible that the database has consciously performed an emergency shutdown due to an existing error situation.

In the SAP environment, a hang situation is indicated by the presence of an hourglass. Determining the area in which a problem exists (lock collision, "blockage" of the system resources, etc.) is not necessarily insignificant.

System errors are serious errors and in the SAP system are often logged as error -602. The unique error number can be found in the ***KnlMsg (knldiag)*** file.

As a rule, transactions terminate with a short dump if an SQL error occurs.

Backup or restore problems are recognizable as such; however, problems in this area frequently are due not to the database itself, but rather have an external cause operating system, external backup tool).



As of version 7.6 the software installation for MaxDB is done with the installation manager ***(sdbsetup).*** It is available for use after unpacking the software package provided on the Service Marketplace.

Both initial installations and software updates can be done by choosing “Start Installation/Upgrade”.

Deinstallations of MaxDB software can be done via “Remove MaxDB components”. Do not delete the MaxDB software with operating system resources under any circumstances!

“Show MaxDB components” provides information about installation directories, versions of the installed software elements, databases and additionally guides you to the installation log files.

Installation logs are stored in the directory <globaldatapath>/wrk ; these can be useful, even at a later point in time. The name contains the type of installation as well as a time stamp, which makes it possible to determine the corresponding package.

The <globaldatapath> can be determined by using the following dbmcli command:

- dbmcli –d <SID> -u <dbm-user>,<password> dbm_getpath globaldatapath

More extensive migration work may be necessary if you are making a big release-jump; the procedure is described in the corresponding notes.

In the example shown above at the beginning of the installation an error occurred. The installation manager guides the user to the log file where he finds a more exact and often self-explaining error message. The installation failed as another ***sdbupd*** was started at the same time.

Installation

Call: sdbinst/sdbupd

Option –help lists valuable options.

Installation logs are written in <indepdatapath>/wrk.

```
MaxDBCPrecompiler_install-13.09.2004-11.34.log
MaxDBRuntimeForSAPAS_install-26.07.2004-14.47.log
MaxDBServer_install-02.03.2004-18.42.log
MaxDBServer_install-29.07.2004-14.32.log
MaxDBUninstall_install-02.12.2004-15.23.log
MaxDBUpdate_install-01.09.2004-09.13.log
```

Deinstallation of MaxDB software: sdbuninst or SDBSETUP

No deletion with operating system!

As of version 7.6, the tool SDBSETUP with GUI interface is available for all supported platforms

Installation of the MaxDB software in versions 7.5 and smaller is done with the tools ***sdbinst*** and ***sdbupd***. In the higher versions they are also part of the delivered software and can be used if the installation is not done interactively. For an initial installation, ***sbdinst*** is used; overwriting an older version with a current one is done with ***sdbupd****.*

You get the call options by entering the option *-help*.

If you encounter problems during installation, a corresponding message is issued. The message should inform you as to what error has occurred and how to fix it.

Installation logs are stored in the directory <globaldatapath>/wrk.

(Up to version 7.7 the installation logs can be found in the directory <indepdatapath>/wrk as the so-called isolated installation had not been introduced in those versions.)

sdbinst/sdbupd enable you to install individual components from the overall package. You use the *–package* option to specify the component(s).

You use ***sdbuninst*** or ***SDBSETUP*** to deinstall the software.

Errors during the Installation

Examples (look for STDERR):

```
STDOUT: start extraction test run of "SAPDBBAS.TGZ"
STDERR: test run failed: cannot extract bin/dbmrfc: cannot write to /sapdb/pro
grams/bin/dbmrfc: Text file busy - no file(s) of "SAPDBBAS.TGZ" extracted!
STDERR: maybe any sap db software is running... please stop all
STDERR: installation exited abnormally  at Th, Aug 14, 2003 at 14:46:41
```

```
...
STDOUT: start extraction test run of "SAPDBUTL.TGZ"
STDERR: maybe any sap db software is running... please stop all
STDERR: installation exited abnormally  at Th, Aug 14, 2003 at 14:48:30
...
```

```
WRN: try to install release "7.3.00.32" over existing "7.3.0.36"
MSG: update test: installed release newer
MSG:  update from "7.3.0.36" to "7.3.00.32" not allowed
STDERR: cannot downgrade package
STDOUT: skipping package
```

The option - -force_extract also substitutes files being in use.

To quickly find errors in the installation logs, look for the key word STDERR.

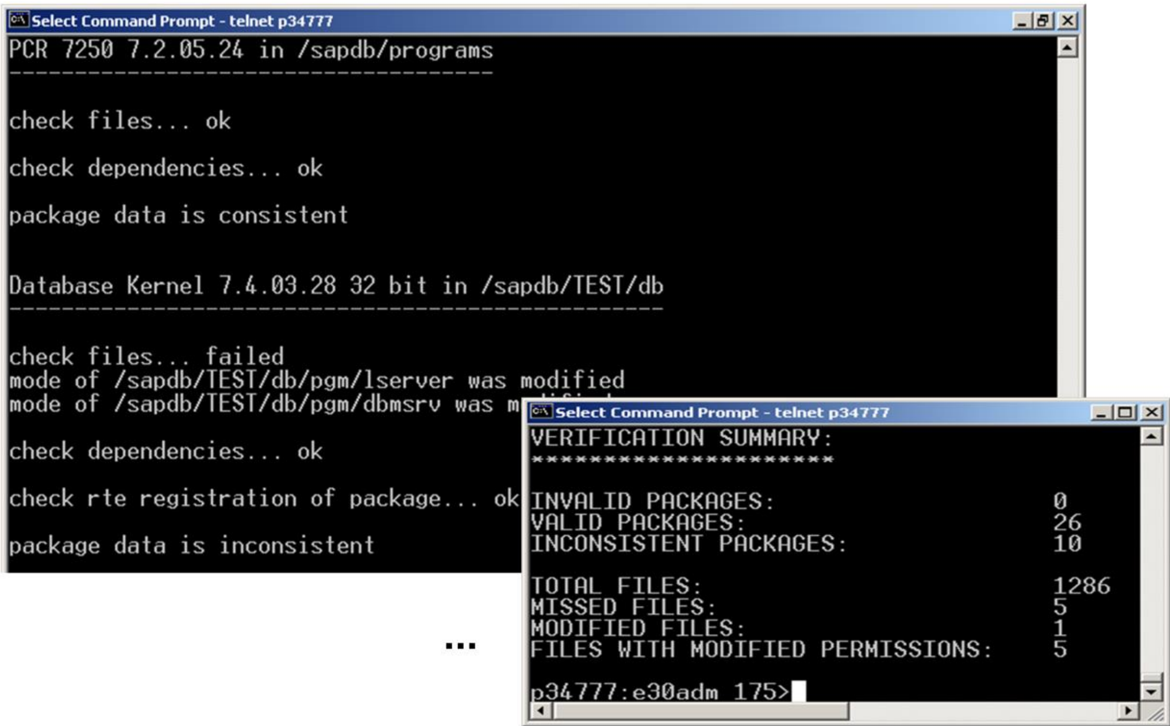
A common cause of errors in Windows systems is that DLLs cannot be overwritten or - more generally - that a component to be overwritten is still running (for example the x_server).

In the first two cases you get the message that the database software has not been completely stopped, so a re-installation would fail. To identify such problems ahead of time and avoid having the installation fail half-way through, the actual installation is preceded by a test run.

As of version 7.6.01 the option –force_extract cares for the substitution of programs and libraries being in use by copying the existing files.

In the third example, the attempt was made to install an older version over a newer one. This is not permitted since downward compatibility cannot be ensured, for instance when loading the system tables.

sdbverify



sdbverify is a tool that checks all installations on a computer for completeness. During the check, any inconsistencies due to impermissible software combinations are detected.

Using the registry entries, *sdbverify* checks whether the status in the file system still corresponds to the contents of the installation package.

In the example above, it is noted that the access rights (under Unix) were subsequently changed.

The result is a summary of the installations that have been checked.

As of version 7.8.02 an option repair_permissions has been introduced. Inconsistencies concerning user rights can automatically be repaired.

Start ***sdbverify*** with user root under Linux/UNIX.

To get an overview of the registered installations, you can also use the tool ***sdbregview***. If you call it with the option -l, it outputs a short list; without the option it outputs comprehensive information about every installation.

xinstinfo, inst_enum, db_enum

e70adm on ld1032: /home/e70adm - Shell No. 2 - Konsole

Session Edit View Bookmarks Settings Help

```
ld1032:e70adm 73> xinstinfo E70
IndepData           : /sapdb/data
IndepPrograms       : /sapdb/programs
InstallationPath    : /sapdb/E70/db
Kernelversion       : KERNEL    7.6.00   BUILD 026-123-123-737
Rundirectory        : /sapdb/data/wrk/E70
ld1032:e70adm 74> dbmcli inst_enum
OK
7.6.00.26    /sapdb/MYWEBDAV/db
7.6.00.26    /sapdb/E70/db
7.6.00.27    /sapdb/SHADOW/db
7.5.00.35    /sapdb/SHADOW75/db
7.6.00.26    /sapdb/XYZ/db
ld1032:e70adm 75> dbmcli db_enum
OK
MYWEBDAV        /sapdb/MYWEBDAV/db                  7.6.00.26       fast    running
MYWEBDAV        /sapdb/MYWEBDAV/db                  7.6.00.26       quick   offline
MYWEBDAV        /sapdb/MYWEBDAV/db                  7.6.00.26       slow    offline
MYWEBDAV        /sapdb/MYWEBDAV/db                  7.6.00.26       test    offline
E70     /sapdb/E70/db                       7.6.00.26       fast    running
E70     /sapdb/E70/db                       7.6.00.26       quick   offline
E70     /sapdb/E70/db                       7.6.00.26       slow    offline
E70     /sapdb/E70/db                       7.6.00.26       test    offline
SHADOW2 /sapdb/SHADOW/db                    7.6.00.27       fast    offline
SHADOW2 /sapdb/SHADOW/db                    7.6.00.27       quick   offline
SHADOW2 /sapdb/SHADOW/db                    7.6.00.27       slow    offline
SHADOW2 /sapdb/SHADOW/db                    7.6.00.27       test    offline
SHADOW1 /sapdb/SHADOW75/db                  7.5.00.35       fast    running
SHADOW1 /sapdb/SHADOW75/db                  7.5.00.35       quick   offline
SHADOW1 /sapdb/SHADOW75/db                  7.5.00.35       slow    offline
SHADOW1 /sapdb/SHADOW75/db                  7.5.00.35       test    offline
XYZ     /sapdb/XYZ/db                       7.6.00.26       fast    running
XYZ     /sapdb/XYZ/db                       7.6.00.26       quick   offline
XYZ     /sapdb/XYZ/db                       7.6.00.26       slow    offline
XYZ     /sapdb/XYZ/db                       7.6.00.26       test    offline
ld1032:e70adm 76>
```

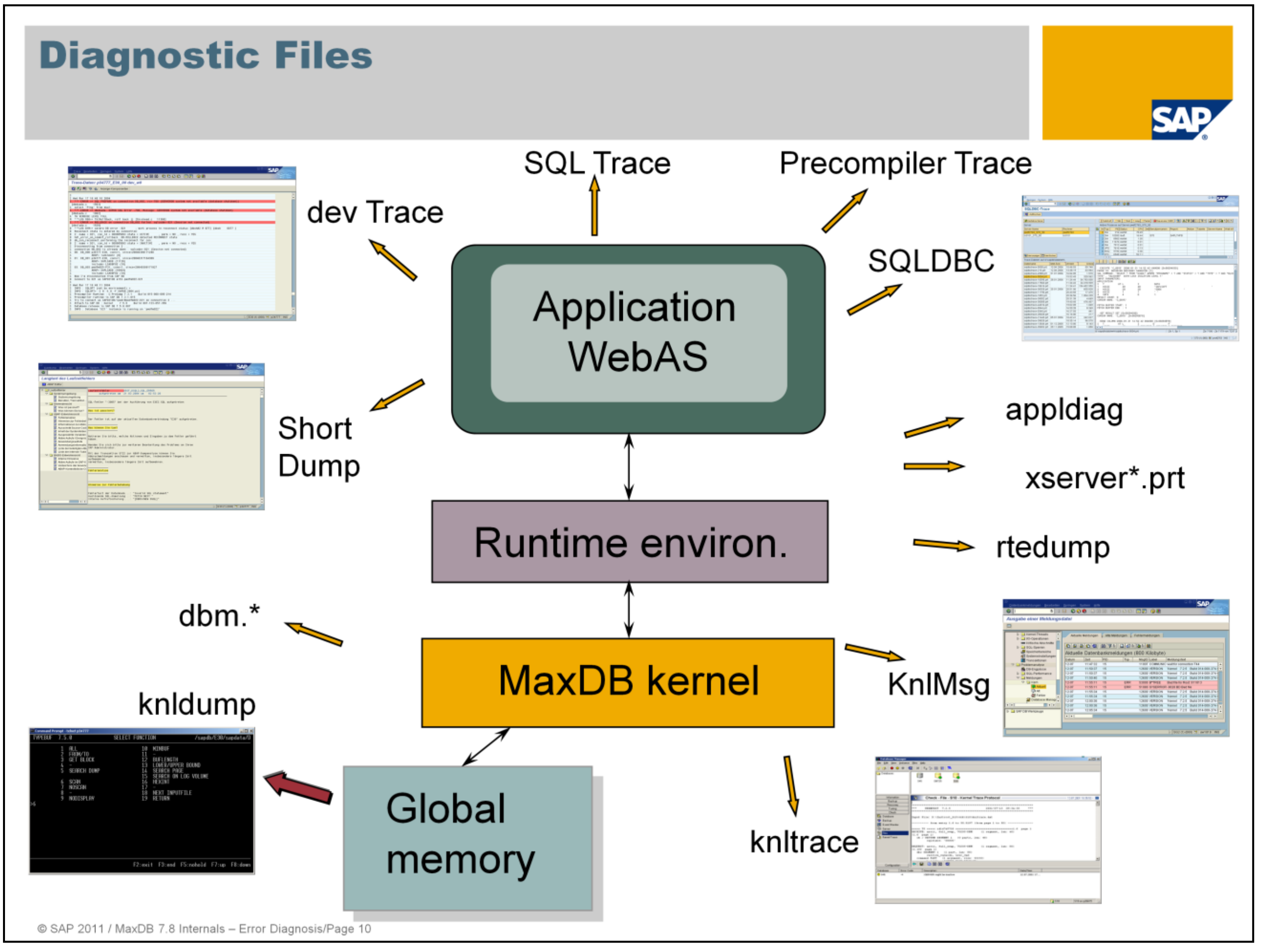

The tool ***xinstinfo*** provides a quick overview of the installation paths used on a system. It displays the "Independent Data Path" and the "Independent Program Path", or in other words, the paths that are valid for all the databases installed on the computer. The programs found there are always operated in the highest installed version (for example the x_server).

If ***xinstinfo*** is called with a database name, you also get database-specific information.

Using ***dbmcli*** with the entry ***inst_enum***, you get a list of the versions installed on the computer (dependent paths). The command ***db_enum*** lists the databases in their different variants (fast, quick, slow, test) as well as their current operational states.

Overview (Diagnostic and Trace Files)

- System log (SM21)
- ABAP Short Dump (ST22)
- dev logs
- SQL Trace (ST05)
- Precompiler Trace
- SQLDBC
- appldiag
- xserver_<hostname>.prt
- dbm.prt, dbm.utl, dbm.knl, dbm.ebp, dbm.ebl
- KnlMsg (knldiag)
- Event Viewer
- knltrace
- knldump
- rtedump



Short Dump
ABAP short dumps are generated by the WebAS or R/3 system when unexpected return codes occur in the SQL environment.

dev-Trace
The Developer Traces are logs of the disp+work processes of the SAP system.

SQL Trace
SQL commands and their runtimes are logged.

Precompiler Trace
SQL trace of the order interface.

SQLDBC
Trace for the SQLDBC (SQL Database Connectivity) interface.

appldiag
If errors between the runtime environment and the kernel occur, they are entered in the *appldiag* file. This file is created for each operating system user.

xserver_<hostname>.prt
If errors occur during communications via the x_server, they are entered in the *xserver_<hostname>.prt* file.

rtedump
If a crash occurs, the runtime environment writes its status in the *rtedump* file. It is an ASCII output of the command

```
x_cons <SERVERDB> show all
```

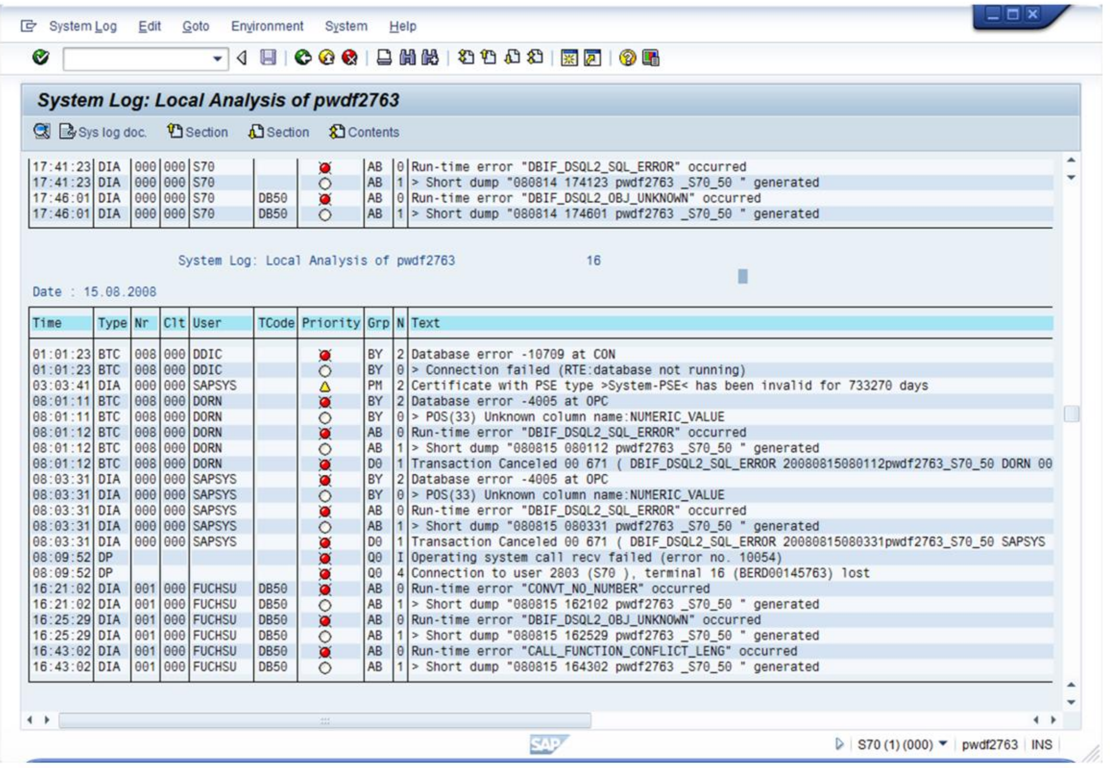
dbm.*
Various log files for the backup environment or for logging DBM server commands.

KnlMsg (knldiag)
The kernel writes information and messages to the *KnlMsg* file. It has a fixed size and is overwritten cyclically. After a crash, it also contains the backtrace.

knltrace
This file is written by the kernel when the Vtrace is activated and following a crash. It has a predefined, fixed length.

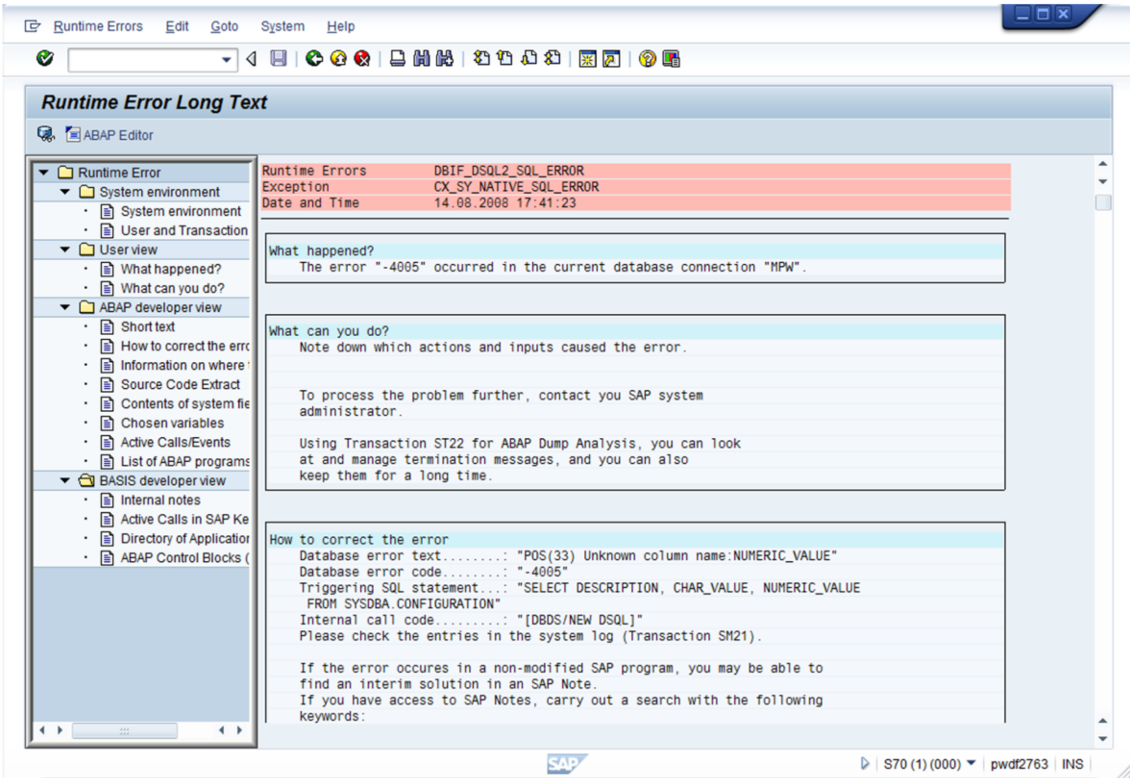
knldump
During an emergency shutdown, the global memory is written to the *knldump* file. The corresponding file system should be sufficiently large.

SM21 – System Log



Transaction sm21 displays the system log of the SAP system. The system log is not written under the control of the database, but it does contain information about database errors.

ABAP – Short Dump



In the SAP system, SQL errors in the database result in APAB short dumps when unexpected return codes occur.

They are not written under the control of the database, but they can be useful for analyzing error situations because they present a full picture of the error. SQL errors are otherwise not logged by the database, unless the Vtrace has been explicitly activated.

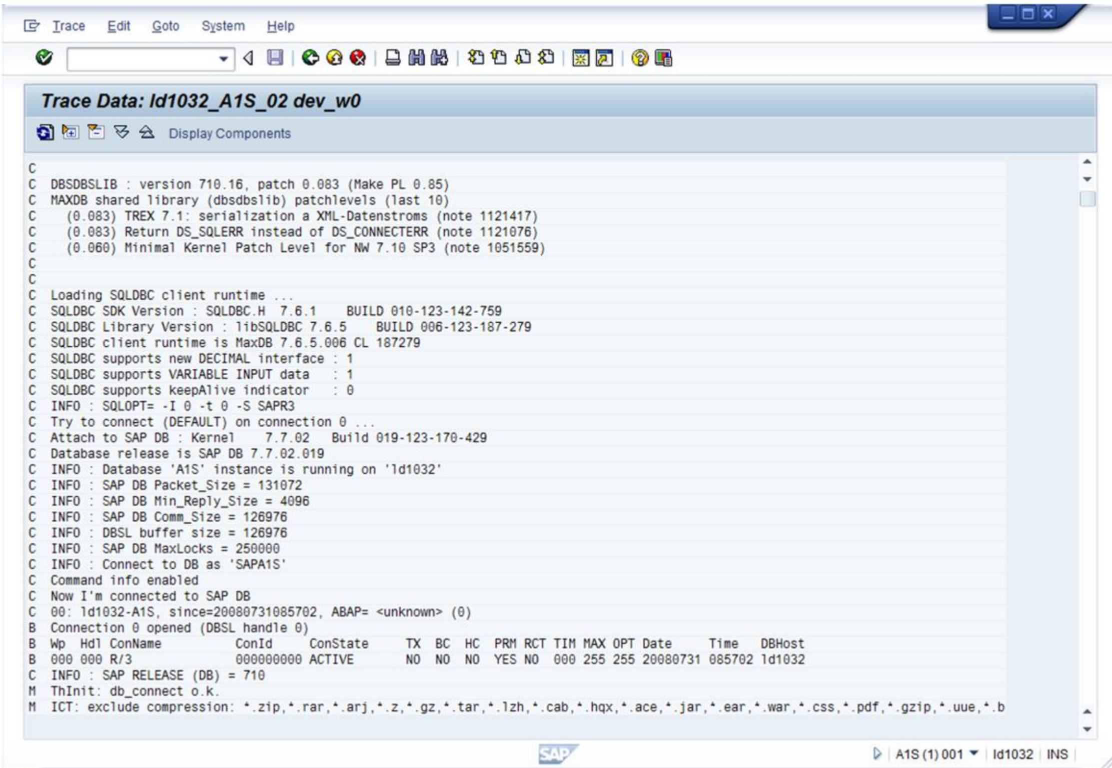
You can get a list of the short dumps that have occurred with transaction st22.

The short dump itself records which program and which ABAP command within it caused the error. You can then search for the error code in the notes.

If an unknown error occurs, it is often desirable to identify the command in "native SQL." To do this, in a reproducible case the SQL trace must then be activated with st05. At the same time, an analysis with the Vtrace may also be useful.

If necessary, you can find helpful information about the versions you are using in the section “How to correct the error”.

Dev Logs (1)




```
C
C  DBSDBSLIB : version 710.16, patch 0.083 (Make PL 0.85)
C  MAXDB shared library (dbsdbslib) patchlevels (last 10)
C    (0.083) TREX 7.1: serialization a XML-Datenstroms (note 1121417)
C    (0.083) Return DS_SQLERR instead of DS_CONNECTERR (note 1121076)
C    (0.060) Minimal Kernel Patch Level for NW 7.10 SP3 (note 1051559)
C
C
C  Loading SQLDBC client runtime ...
C  SQLDBC SDK Version : SQLDBC.H  7.6.1    BUILD 010-123-142-759
C  SQLDBC Library Version : libSQLDBC 7.6.5    BUILD 006-123-187-279
C  SQLDBC client runtime is MaxDB 7.6.5.006 CL 187279
C  SQLDBC supports new DECIMAL interface : 1
C  SQLDBC supports VARIABLE INPUT data   : 1
C  SQLDBC supports keepAlive indicator   : 0
C  INFO : SQLOPT= -I 0 -t 0 -S SAPR3
C  Try to connect (DEFAULT) on connection 0 ...
C  Attach to SAP DB : Kernel    7.7.02   Build 019-123-170-429
C  Database release is SAP DB 7.7.02.019
C  INFO : Database 'A1S' instance is running on 'ld1032'
C  INFO : SAP DB Packet_Size = 131072
C  INFO : SAP DB Min_Reply_Size = 4096
C  INFO : SAP DB Comm_Size = 126976
C  INFO : DBSL buffer size = 126976
C  INFO : SAP DB MaxLocks = 250000
C  INFO : Connect to DB as 'SAPA1S'
C  Command info enabled
C  Now I'm connected to SAP DB
C  00: ld1032-A1S, since=20080731085702, ABAP= <unknown> (0)
B  Connection 0 opened (DBSL handle 0)
B  Wp  Hdl ConName          ConId     ConState     TX  BC  HC  PRM RCT TIM MAX OPT Date     Time   DBHost
B  000 000 R/3              000000000 ACTIVE       NO  NO  NO  YES NO  000 255 255 20080731 085702 ld1032
C  INFO : SAP RELEASE (DB) = 710
M  ThInit: db_connect o.k.
M  ICT: exclude compression: *.zip,*.rar,*.arj,*.z,*.gz,*.tar,*.lzh,*.cab,*.hqx,*.ace,*.jar,*.ear,*.war,*.css,*.pdf,*.gzip,*.uue,*.b
```


The developer traces are not written directly by the database, but rather log actions of the disp+work processes of the SAP system.

The dev logs are stored in the work directory of the SAP system and have the designation ***dev_w*.*** You can access them directly with transaction st11.

They are active by default; only higher trace levels have to be activated explicitly. This is generally done by the developers themselves.

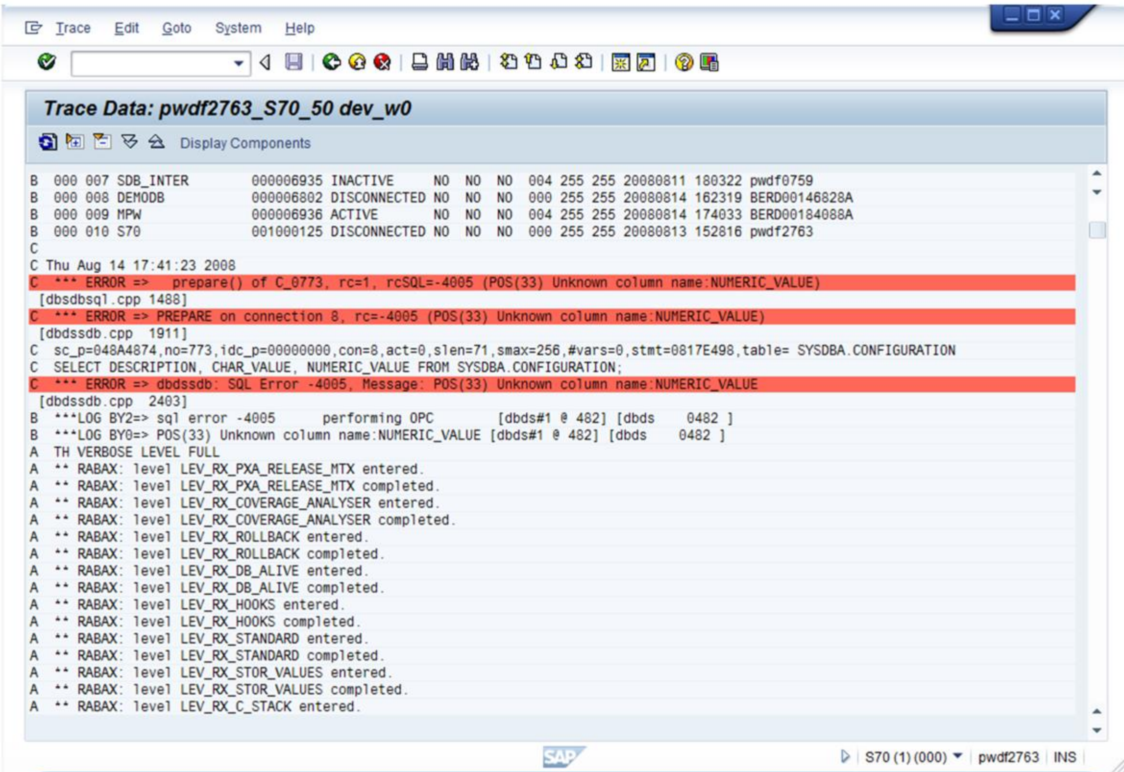
However, they were included in this unit because other information relevant for the database is also stored there.

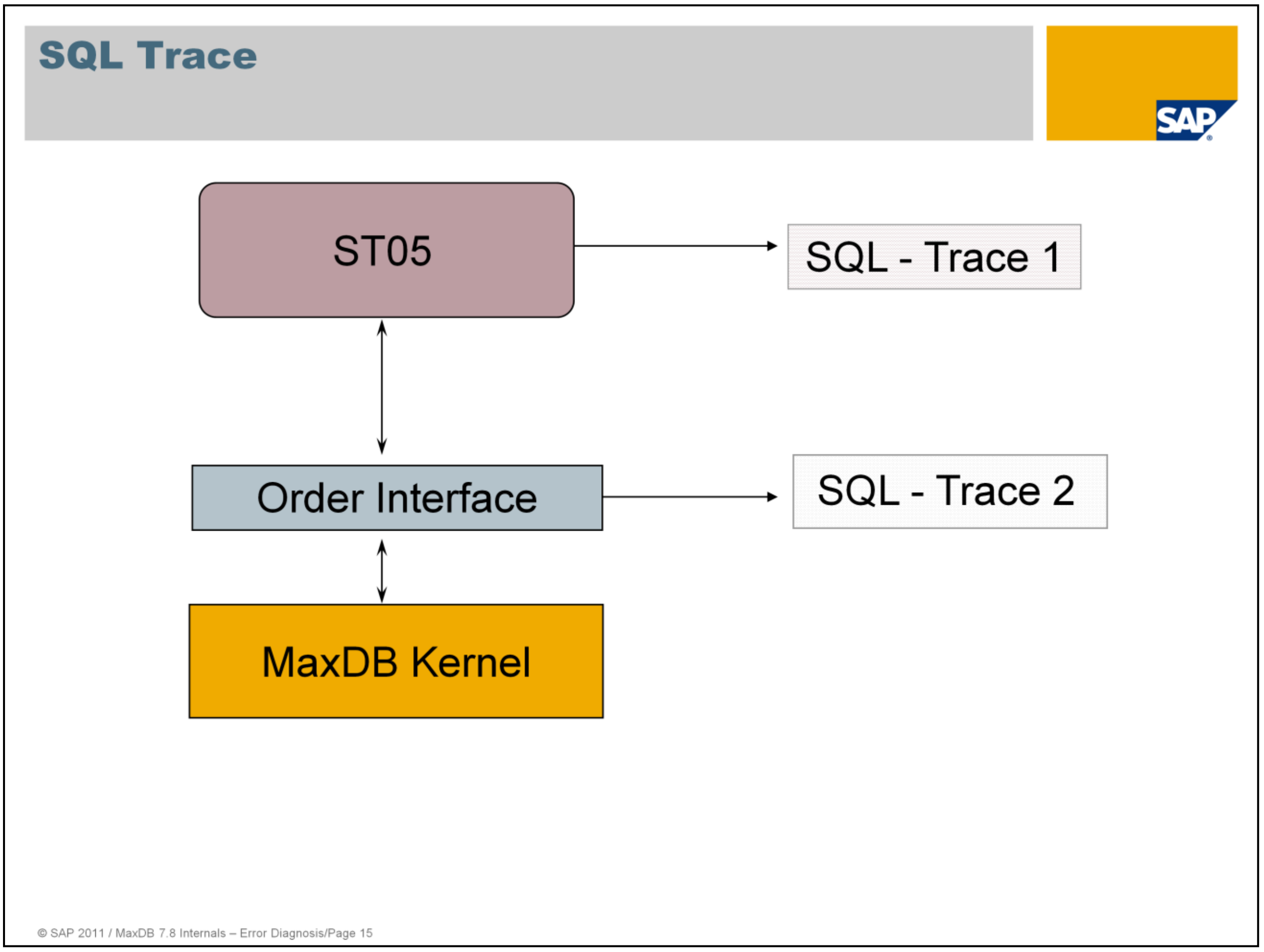
If connection problems between the disp+work processes and the DB occur, developer traces are often helpful.

Errors have a red background and thus are easy to find.

Among other things, it is easy to find the version of SQLDBC or the precompiler environment being used.

Dev Logs (2)


Trace Edit Goto System Help
Trace Data: pwdf2763_S70_50 dev_w0
Display Components
B 000 007 SDB_INTER 000006935 INACTIVE NO NO NO 004 255 255 20080811 180322 pwdf0759
B 000 008 DEMODB 000006802 DISCONNECTED NO NO NO 000 255 255 20080814 162319 BERD00146828A
B 000 009 MPW 000006936 ACTIVE NO NO NO 004 255 255 20080814 174033 BERD00184088A
B 000 010 S70 001000125 DISCONNECTED NO NO NO 000 255 255 20080813 152816 pwdf2763
C
C Thu Aug 14 17:41:23 2008
C *** ERROR => prepare() of C_0773, rc=1, rcSQL=-4005 (POS(33) Unknown column name:NUMERIC_VALUE)
[dbsdbsql.cpp 1488]
C *** ERROR => PREPARE on connection 8, rc=-4005 (POS(33) Unknown column name:NUMERIC_VALUE)
[dbdssdb.cpp 1911]
C sc_p=048A4874,no=773,idc_p=00000000,con=8,act=0,slen=71,smax=256,#vars=0,stmt=0817E498,table= SYSDBA.CONFIGURATION
C SELECT DESCRIPTION, CHAR_VALUE, NUMERIC_VALUE FROM SYSDBA.CONFIGURATION;
C *** ERROR => dbdssdb: SQL Error -4005, Message: POS(33) Unknown column name:NUMERIC_VALUE
[dbdssdb.cpp 2403]
B ***LOG BY2=> sql error -4005 performing OPC [dbds#1 @ 482] [dbds 0482]
B ***LOG BY0=> POS(33) Unknown column name:NUMERIC_VALUE [dbds#1 @ 482] [dbds 0482]
A TH VERBOSE LEVEL FULL
A ** RABAX: level LEV_RX_PXA_RELEASE_MTX entered.
A ** RABAX: level LEV_RX_PXA_RELEASE_MTX completed.
A ** RABAX: level LEV_RX_COVERAGE_ANALYSER entered.
A ** RABAX: level LEV_RX_COVERAGE_ANALYSER completed.
A ** RABAX: level LEV_RX_ROLLBACK entered.
A ** RABAX: level LEV_RX_ROLLBACK completed.
A ** RABAX: level LEV_RX_DB_ALIVE entered.
A ** RABAX: level LEV_RX_DB_ALIVE completed.
A ** RABAX: level LEV_RX_HOOKS entered.
A ** RABAX: level LEV_RX_HOOKS completed.
A ** RABAX: level LEV_RX_STANDARD entered.
A ** RABAX: level LEV_RX_STANDARD completed.
A ** RABAX: level LEV_RX_STOR_VALUES entered.
A ** RABAX: level LEV_RX_STOR_VALUES completed.
A ** RABAX: level LEV_RX_C_STACK entered.
S70 (1) (000) pwdf2763 INS

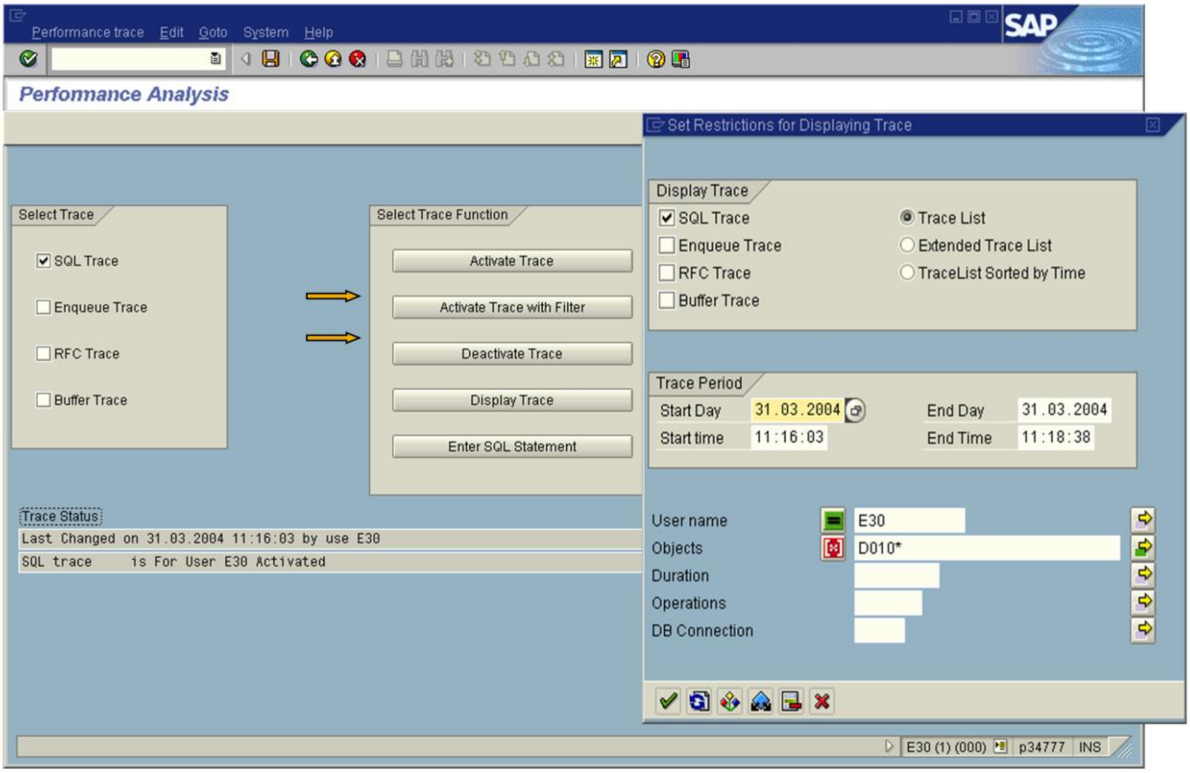


In the SAP system, you activate the SQL trace with transaction st05. The log is written by the database interface. Along with the statements, you'll find the variables, their values and the runtime. The Explain button in transaction st05 displays the database's Optimizer strategy for the command.

This transaction is discussed further in the section on SAP system transactions that are useful for error analysis.

The order interface of the database also writes an SQL trace. New versions of the WebAS ABAP kernel use the new interface SQLDBC instead of the Precompiler starting with version 6.20.

ST05 – SQL Trace



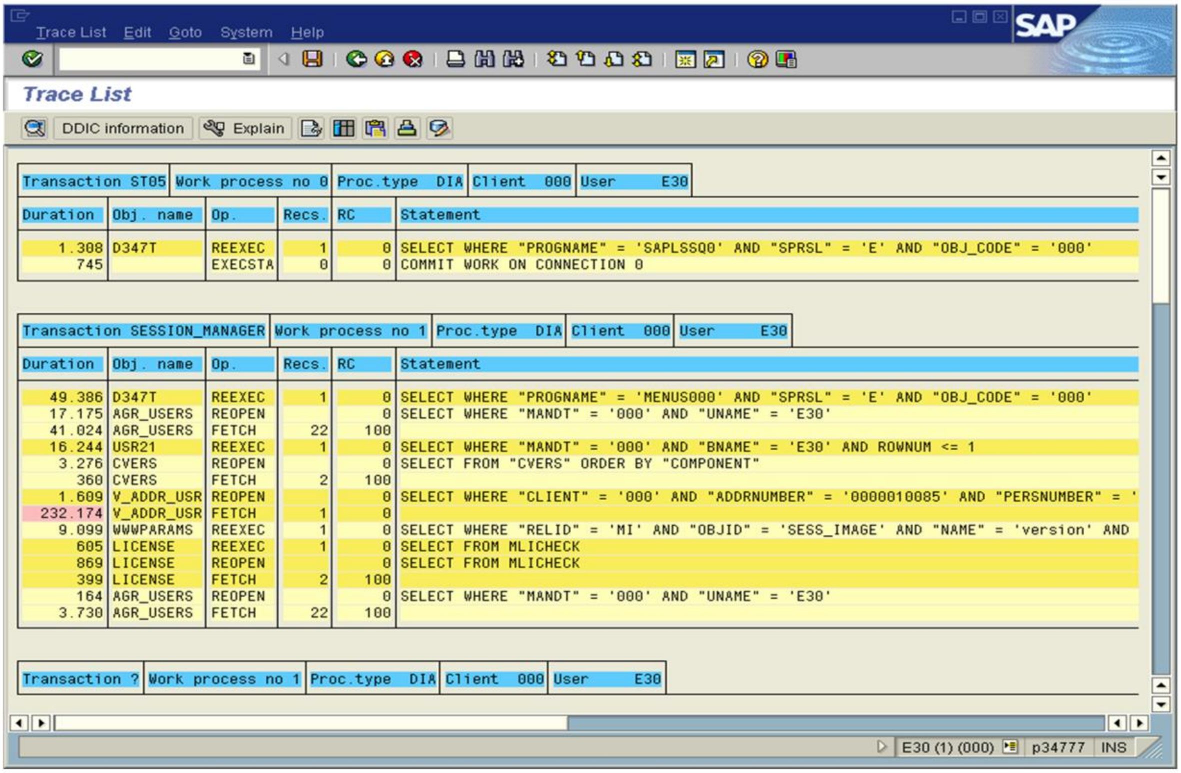
You can use transaction st05 to activate an SQL trace. This is useful for performance analyses or for identifying a command that leads to incorrect result sets.

The SQL trace displays all SQL statements in the form in which they were sent to the database.

Note that when you use the button shown here, the trace must be deactivated before being displayed so that it can be formatted. You can display the trace directly by choosing *Performance Trace->Display Trace Or Deactivate First*

For a more manageable amount of information, you can restrict the display to a specific time period or a particular user or by omitting information about specified tables.

ST05 – SQL Trace (2)



The list of commands identifies which transaction was started, which work process is affected, its type, as well as the client and user.

The command list contains

- information about the duration of the command, where the long-running ones are marked red,
- the affected database object,
- the number of records found,
- the return code of the database and
- the statement.

The statement can be expanded by double-click. It is also possible to insert parameter values in the placeholders so that the statement can be used directly for further testing, for example in the SQL Studio.

The 'Explain' button displays the execution plan of the Optimizer.

Precompiler Trace (1)

SQL – Trace of the order interface:

Profile parameter

- dbs/ada/sql_trace = 0 no trace
  - 1 short trace
  - 2 long trace

Environment variable

- SQLOPT =
  - -F file name
  - -T short trace
  - -X long trace
  - -Y statement count

Irtrace

- irtrace –p all –t <trace type>
- irtrace –p <prozess-id> -t <trace type>

The order interface trace is set for Disp+Work processes using a profile parameter. On Windows systems, after changing the profile parameter, only the work process has to be restarted. On Unix systems, the SAP system or the affected application server has to be restarted. The trace files are stored in the work directory of the SAP instance. The name is comprised of the process ID of the work process and the ending **`pct`**.

Other tools that utilize the order interface read the environment variable SQLOPT. Unless otherwise specified with the -F option, the trace file is written to the current directory. The name is comprised of the name of the corresponding C module and the ending **`pct`**.

You can use irtrace to activate the trace without needing to restart the system/application server.

The tool gives you the following options for changing the trace:

- Activate/deactivate/switch trace for a particular process:
  irtrace –p <process id> –t <trace type>
- The following trace types are available:
  long
  short
  off
- Activating/deactivating the trace for all interface processes on the application server:
  irtrace –p all –t <trace type>

Precompiler Trace (2)

```
PRODUCT : liveCache C/C++ Precompiler Runtime
VERSION : 7.1.4
BUILD   : 032-000-055-840

version  :P_1, P_2
SQL STATEMENT  :  FROM MODULE : dbslada           AT LINE : 4186
OUTPUT :  LZU  :  NT/INTEL  7.1.4    Build 032-000-055-840
OUTPUT :  PCR  :  C-PreComp 7.1.4    Build 032-000-055-840
START  :  DATE :  2001-07-13    TIME :  0013:01:01
END    :  DATE :  2001-07-13    TIME :  0013:01:01

SESSION    : 1;
SQLMODE    : SAPR3   AT DATABASE :  DB_000
SERVERDB   : S10
SERVERNODE:
OPTION-CONNECT :
CONNECT "SAPR3             " IDENTIFIED BY :A  SQLMODE SAPR3  ISOLATION LEVEL 0
 TIMEOUT 0
SQL STATEMENT  :  FROM MODULE : dbslada           AT LINE : 6390
START  :  DATE :  2001-07-13    TIME :  0013:01:01
END    :  DATE :  2001-07-13    TIME :  0013:01:01
```

SQLDBC

Runtime library libSQLDBC for the development of database applications and interfaces

- Version-independent runtime library libSQLDBC.dll or libSQLDBC.so
- Version-dependent, e.g. libSQLDBC76.dll
- Runtime library libSQLDBC_C.dll for the support of native C applications
- Stored in directory <indep_program_path>/pgm

Software Development Kit SQLBDC SDK

- Header file SQLDBC.h for C++
- Header file SQLDBC_C.h for C
- Static and dynamic link libraries for C and C++
- Stored in directory <indep_program_path>/sdk/sqldbc

sqldbc_cons

- Creation and control of traces

SQL Database Connectivity (SQLDBC) is a runtime environment for the development of database applications and database interfaces for MaxDB. Through SQLDBC, applications can access MaxDB database instances, execute SQL statements and edit data. SQLDBC is comprised of the three abovementioned components, which are part of the standard and stored in the said directories.

Traces can be created either directly with sqldbc_cons or using transaction db50.

sqldbc_cons

Configuration and creation of traces for the SQLDBC interface

Properties of the traces:

- sqldbctrace_<pid>.prt
- The trace files are overwritten cyclically.

Traces storage in the following directories:

- <user_home>\Application Data\sdb (Windows)
- <user_home>/.sdb (UNIX, Linux)

Trace types:

- SQL: SQL statements (sufficient for most analyses)
- Short: method calls
- Long: method calls with call parameters (most comprehensive trace)
- Packet: communication packages

Syntax: sqldbc_cons [<command>] [<option>]

sqldbc_cons is a tool for the configuration and control of traces.

The trace files contain a file name of the form sqldbctrace-<pid>.prt, where <pid> is the process ID. It is also possible to choose a name; %p in the name is replaced by the process ID. Traces are stored in the directories <user_home>\Application Data\sdb (Windows) and <user_home>\.sdb (UNIX, Linux). When the configured trace size is reached, the trace is cyclically overwritten.

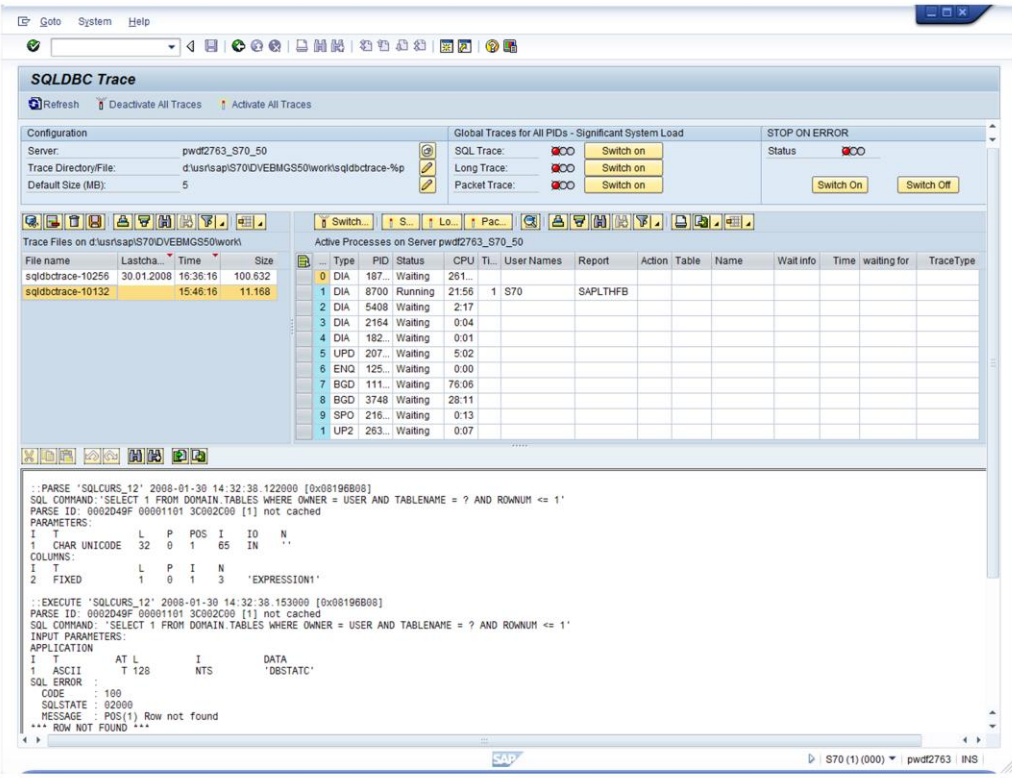
Possible commands for sqldbc_cons:

TRACE SQL ON/OFF:	Turns the SQL trace on/off
TRACE PACKET ON/OFF:	Turns the PACKET trace on/off
TRACE SHORT ON/OFF:	Turns the SHORT trace on/off
TRACE LONG ON/OFF:	Switches the detailed LONG trace on/off
TRACE OFF:	Switches all SQLDBC traces off
TRACE FILENAME <file_name>:	determines the name of the trace file
TRACE SIZE <size>:	defines the size (in Bytes) of the trace file
SHOW ALL:	displays the configuration of the traces and current information about the traces
SHOW CONFIG:	displays the configuration of the traces
SHOW TRACESETTINGS	displays current information about the traces

Possible options for sqldbc_cons:

-f:	forces the execution of the command
-h:	Help information
-p <pid>:	executes the command only for the process with the process ID <pid>
-v:	displays detailed information (verbose)
	(These options cannot be combined, but only used individually.)

SQLDBC Trace



In transaction db50, choose the path *Tools-> SQLDBC Trace.*

Activating the trace involves three steps:

- Selection of the desired process
- Selection of the trace type (SQL, Short, Long, Packet)
- Specification of trace size (*Goto-> Maximum File Size*)

To switch the trace off, select the process and press the button *Switch off*.

Via menu item *Goto-> Trace Directory* you can choose a trace file name that differs from the default.

To display the trace, select the trace file and press the button *Display File.*

appldiag

Example 1:

```
06.01 12:53:46  18286 -11205 sqlexec: system error, not enough space
06.01 12:58:25  18286 -11205 sqlexec: system error, not enough space
06.01 18:46:23  19025 -11109 database 'S10' is not running
07.01 11:47:37  10959 -11987 sql33_con_msl: task limit
07.01 11:47:59  12031 -11987 sql33_request: connection broken, kernel
                             cleared
08.02 13:11:07  18899 -11987 connection closed by communication partner
08.29 13:13:13  11199 -11987 comseg given away, assuming timeout
```

process ID

Example 2:

```
2008-01-25 10:28:55  8323 ERR -11987 COMMUNIC kernel aborted connection!
2008-01-25 10:28:55  8325 ERR -11987 COMMUNIC kernel aborted connection!
2008-02-18 10:03:13 18474 ERR -11608 COMMUNIC sql03_request: wrong connection st
ate, state is 'requested'
2008-03-17 16:00:07 26429 ERR -11987 COMMUNIC semid 206602379 disappeared!
2008-03-17 16:00:13  9231 ERR -11987 COMMUNIC semctl (setval 1084391433) error: Invalid argument
2008-03-17 16:00:13  9232 ERR -11987 COMMUNIC semctl (setval 1084391433) error: Invalid argument
2008-03-17 16:01:55  9237 ERR -11987 COMMUNIC semctl (setval 1084391433) error:
Identifier removed
2008-04-11 08:00:43 16194 ERR -11608 COMMUNIC sql03_request: wrong connection st
ate, state is 'requested'
2008-06-06 19:00:34  5216 ERR -11608 COMMUNIC sql03_request: wrong connection st
ate, state is 'requested'
```


The file ***appldiag*** contains error messages that can occur during communication between the applications and the runtime environment.

The file ***appldiag*** or ***<pid>.dia*** (SAP WebAS) is stored in the directory

<globaldatapath>/wrk/<unix user>	(UNIX)
<globaldatapath>\wrk	(Windows)
/usr/sap/<SID>/D*/work	(SAP WebAS)

The <globaldatapath> can be determined using the following dbmcli command:

dbmcli –d <SID> -u <dbm-user>,<password> dbm_getpath globaldatapath

(As of version 7.7 the appldiag can be found in the directory <indepdatapath>/wrk/<unix user>. The isolated installation had not been introduced in those versions.)

Under Windows, ***appldiag*** is only activated if the environment variable is set to DIAGFILE=yes.

The file ***appldiag*** can get very large since it is not cyclically overwritten.

If this file already exists, further messages are added to it; otherwise it is created.

xserver_<hostname>_<port>.prt

xserver.prt - Notepad

File Edit Format Help

```
Directory  /sapdb/data/wrk
Name: xserver_p34777.prt
------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------
Date        Time       PID Typ MsgID  Label    Message-Text
---------------------------------------------------------------------------------
2004-03-09 16:44:54  1504      12902  XSERVER  started, 'X32/LINUX 7.5.0    Build 010-111-066-035'
2004-03-09 16:44:54  1504      12904  XSERVER  Service port is 7210
2004-03-09 16:44:54  1504      12922  ENVIRON  Command line arguments
2004-03-09 16:44:54  1504      12923  ENVIRON  Command line argument dump completed
2004-03-09 16:44:54  1504      12898  ENVIRON  Resource limit dump start
2004-03-09 16:44:54  1504      12898  ENVIRON  Started by user id 1724 group id 79
2004-03-09 16:44:54  1504      12898  ENVIRON  Current user id 3488 effective id 3488
2004-03-09 16:44:54  1504      12898  ENVIRON  Current group id 1008 effective id 1008
2004-03-09 16:44:54  1504      12898  ENVIRON   cpu time unlimited
2004-03-09 16:44:54  1504      12898  ENVIRON   number of processes 4096
2004-03-09 16:44:54  1504      12898  ENVIRON   number of open files 1024
2004-03-09 16:44:54  1504      12898  ENVIRON   core size 0 KBytes
2004-03-09 16:44:54  1504      12898  ENVIRON   file size unlimited
2004-03-09 16:44:54  1504      12898  ENVIRON   heap memory size unlimited
2004-03-09 16:44:54  1504      12898  ENVIRON   stack memory size unlimited
2004-03-09 16:44:54  1504      12898  ENVIRON   lockable memory size unlimited
2004-03-09 16:44:54  1504      12898  ENVIRON   virtual memory size unlimited
2004-03-09 16:44:54  1504      12898  ENVIRON   resident set size unlimited
2004-03-09 16:44:54  1504      12898  ENVIRON  Resource limit dump completed
2004-03-09 16:44:54  1504      12898  ENVIRON  Environment dump start
2004-03-09 16:44:54  1504      12898  ENVIRON   LESSKEY=/etc/lesskey.bin
2004-03-09 16:44:54  1504      12898  ENVIRON   DIR_LIBRARY=/usr/sap/E30/SYS/exe/run
2004-03-09 16:44:54  1504      12898  ENVIRON   NNTPSERVER=news
2004-03-09 16:44:54  1504      12898  ENVIRON   INFODIR=/usr/share/info:/usr/local/info
2004-03-09 16:44:54  1504      12898  ENVIRON   MANPATH=/opt/gnome/man:/usr/share/man:/u
2004-03-09 16:44:54  1504      12898  ENVIRON    sr/X11R6/man:/usr/local/man
2004-03-09 16:44:54  1504      12898  ENVIRON   KDE_MULTIHEAD=false
2004-03-09 16:44:54  1504      12898  ENVIRON   HOSTNAME=p34777
2004-03-09 16:44:54  1504      12898  ENVIRON   XKEYSYMDB=/usr/X11R6/lib/X11/XKeysymDB
2004-03-09 16:44:54  1504      12898  ENVIRON   SAPDBHOST=p34777
2004-03-09 16:44:54  1504      12898  ENVIRON   dbms_type=ADA
2004-03-09 16:44:54  1504      12898  ENVIRON   HOST=p34777
2004-03-09 16:44:54  1504      12898  ENVIRON   TERM=xterm
2004-03-09 16:44:54  1504      12898  ENVIRON   SHELL=/bin/tcsh
2004-03-09 16:44:54  1504      12898  ENVIRON   PROFILEREAD=true
2004-03-09 16:44:54  1504      12898  ENVIRON   XDM_MANAGED=/var/run/xdmctl/xdmctl-:0
2004-03-09 16:44:54  1504      12898  ENVIRON   GS_LIB=/share/fonts
2004-03-09 16:44:54  1504      12898  ENVIRON   GNOME_PATH=/opt/gnome:/usr
2004-03-09 16:44:54  1504      12898  ENVIRON   GTK_RC_FILES=/etc/gtk/gtkrc:/home/e30adm
2004-03-09 16:44:54  1504      12898  ENVIRON    /.gtkrc
2004-03-09 16:44:54  1504      12898  ENVIRON   KDEHOME=/home/e30adm/.kde
2004-03-09 16:44:54  1504      12898  ENVIRON   MORE=-sl
2004-03-09 16:44:54  1504      12898  ENVIRON   DBNAME=p34777:E30
2004-03-09 16:44:54  1504      12898  ENVIRON   XSESSION_IS_UP=yes
2004-03-09 16:44:54  1504      12898  ENVIRON   JRE_HOME=/usr/lib/java/jre
2004-03-09 16:44:54  1504      12898  ENVIRON   USER=e30adm
2004-03-09 16:44:54  1504      12898  ENVIRON   GROUP=sapsys
2004-03-09 16:44:54  1504      12898  ENVIRON   LS_COLORS=no=00:fi=00:di=01;34:ln=00;36:
```


The files ***xserver_<hostname>_<port>.prt*** contain error messages involving the communication via **x_server**. x_server are used for remote communication and start vserver processes for each new user who connects to the database remotely. When the isolated installation was introduced in 7.8 each server installation got an own x_server with its own port.

If multiple database software versions (<= 7.7) are installed on a computer, the x_server must always be started with the highest version.

You can display the highest version with

x_server –V

You can display the possible options for installing, starting and stopping with

x_server –h

If, f.e., there are network problems between the application and database server error messages are written to this log file.

The start information (see slide) contains additional information about operating system settings that are significant for database operation.

A time stamp, a process ID, in the label the affected software component and an explanatory message text are delivered.

If a return code is reported by the operating system, its meaning can be determined with

xsysrc <rc>

The ***xserver_<hostname>_<port>.prt*** are stored in the directory <globaldatapath>/wrk. The port can be determined with the following dbmcli command:

dbmcli inst_enum <InstallationPath>

Access via DB50: ***Problem Analysis -> Messages -> Kernel – Remote SQL Server***

Access via Database Studio: ***Diagnosis Files – XServer Messages / Xserver Messages (OLD)***

dbm.prt

dbm.prt - Notepad

File Edit Format Help

```
--------------------------------------------------------------------------------
Date         Time      TID(hex)    Typ MsgID        Label     Message
--------------------------------------------------------------------------------

[...]

                    0x00004999 ERR     -24964 DBM       32512,/sapdb/E30/db/bin/xload -S INTERNAL -n p34777 -d E30 -u SUPERDBA,* -b /sapdb/E30/db/
2003-08-06 09:43:17 0x000049a0              0 DBM       command load_r3tab
2003-08-06 09:43:18 0x000049a0 ERR     -24964 DBM       ERR_EXECUTE: error in program execution
                    0x000049a0 ERR     -24964 DBM       32512,/sapdb/E30/db/bin/xload -S INTERNAL -n p34777 -d E30 -u SUPERDBA,* -b /sapdb/E30/db/
2003-08-06 17:24:36 0x000053e2              0 DBM       command backup_save "Data_tmp" DATA RECOVERY
2003-08-07 11:21:27 0x00002d00              0 DBM       command param_startsession
2003-08-07 11:21:33 0x00002d00              0 DBM       command param_abortsession
2003-08-07 16:56:30 0x000062a2              0 DBM       command backup_media_put "save_data" "d:\tmp\data" FILE DATA 0 0 NO NO ""
2003-08-07 16:58:50 0x000062a2              0 DBM       command backup_label
2003-08-07 16:58:50 0x000062a2 ERR     -24988 DBM       ERR_SQL: sql error
                    0x000062a2 ERR     -24988 DBM       -903,Host file I/O error,Could not open devspace
2003-08-08 07:40:11 0x00006b48              0 DBM       command backup_save "Data" DATA RECOVERY
2003-08-08 07:41:35 0x00006b48 ERR     -24988 DBM       ERR_SQL: sql error
                    0x00006b48 ERR     -24988 DBM       -903,Message not available,Could not open devspace
2003-08-08 07:41:57 0x00006b70              0 DBM       command backup_save "Data_tmp" DATA RECOVERY
2003-08-13 10:43:23 0x00001574              0 DBM       command sql_updatestat * ESTIMATE SAMPLE 1000 ROWS
2003-08-13 10:50:30 0x00001574              0 DBM |     command sql_updatestat * ESTIMATE SAMPLE 20000 ROWS
2003-08-13 11:09:27 0x00001574              0 DBM       command sql_updatestat * ESTIMATE SAMPLE 20000 ROWS
2003-08-14 12:40:31 0x00002645              0 DBM       command param_startsession
2003-08-14 12:40:59 0x00002645              0 DBM       command param_directput CACHESIZE 21000
2003-08-14 12:40:59 0x00002645 ERR     -24974 DBM       ERR_XPSESSION: param session active
2003-08-14 12:41:17 0x00002645              0 DBM       command param_put CACHE_SIZE 21000
2003-08-14 12:41:41 0x00002645              0 DBM       command param_commitsession
2003-08-14 12:41:41 0x00002645 ERR     -24973 DBM       ERR_XPCHECK: param check failure/request

[...]

2003-10-24 10:57:13 0x0000478a              0 DBM       command db_offline
2003-10-24 11:37:55 0x00004b46              0 DBM       command db_clear
2003-10-24 11:37:55 0x00004b49              0 DBM       command db_start
2003-10-24 11:38:02 0x00004bad              0 DBM       command db_warm
2003-10-24 11:45:28 0x00004ec3              0 DBM       command file_getfirst
2003-10-24 11:45:28 0x00004ec3 ERR     -24994 DBM       ERR_RTE: runtime environment error
                    0x00004ec3 ERR     -24994 DBM       1,OS error: 'No such file or directory'
2003-10-24 11:45:44 0x00004e6f              0 DBM       command dban_stop
2003-10-24 11:45:44 0x00004e6f ERR     -24964 DBM       ERR_EXECUTE: error in program execution
                    0x00004e6f ERR     -24964 DBM       256,dbanalyzer -d E30 -u *,* -stop

[...]

2003-11-27 16:21:46 0x00002001              0 DBM       command util_execute diagnose monitor CLEAR
2003-11-27 16:22:12 0x00002005              0 DBM       command util_execute diagnose monitor READ OFF
2003-11-27 16:22:13 0x00002009              0 DBM       command util_execute diagnose monitor TIME OFF
2003-11-27 16:22:14 0x0000200d              0 DBM       command util_execute diagnose monitor SELECTIVITY 100
2003-11-27 16:22:15 0x00002011              0 DBM       command util_execute diagnose monitor DATA ON
2003-11-27 16:22:16 0x00002015              0 DBM       command util_execute diagnose monitor ROWNO 255 100
2003-11-27 16:28:22 0x00002019              0 DBM       command util_execute diagnose monitor OFF
```


The Database Manager log ***dbm.prt*** comprises the command history of the Database Manager. All change actions and all actions that return error messages are logged.

Because messages show the exact date and time, they can easily be referenced against the outputs of other log files.

If errors occur in the action being executed, they are marked ERR.

The file is stored in the run directory (default: <indepdatapath>/wrk/<SID>).

Access via DBMGUI: ***Check -> Diagnosis Files -> Database Manager Log File (DBMPRT)***

Access via DB50: ***Problem Analysis -> Messages -> Database Manager***

Access via Database Studio: ***Diagnosis Files – Database Manager Log File***

dbm.utl

ld1032_e70_dbm.utl.txt - Notepad

File Edit Format View Help

```
-------------------------------------------------------------------------------
Date        Time      Message-Text
-------------------------------------------------------------------------------
2006-03-20 18:07:58 441EE16E0001 0000   IC1 CREATE INSTANCE SYSDBA SUPERDBA
2006-03-20 18:15:05 441EE16E0001 0001   RET RETURNCODE      0
2006-03-20 18:17:11 441EE3970004 0000   SHT SHUTDOWN
2006-03-20 18:17:19 441EE39F0001 0000   REQ SET LOG WRITER OFF
2006-03-20 18:17:19 441EE39F0001 0001   RET RETURNCODE      0
2006-03-20 18:17:19 441EE39F0003 0000   RST RESTART
2006-03-20 18:17:20 441EE39F0003 0001   RET RETURNCODE      0
2006-03-20 18:41:58 441EE9660004 0000   SHT SHUTDOWN
2006-03-20 18:42:07 441EE96F0001 0000   REQ SET LOG WRITER ON
2006-03-20 18:42:07 441EE96F0001 0001   RET RETURNCODE      0

[...]

2006-03-24 17:25:21 44241D710003 0000   SDB SAVE DATA QUICK TO '/sapdb/E70/saparch/E70_COM' FILE BLOCKSIZE 8 NO CHECKPOINT MEDIANAME
2006-03-24 17:25:21 44241D710003 0001   RET RETURNCODE   -903
2006-03-24 17:25:40              0000   SDB SAVE DATA CANCEL
2006-03-24 17:25:40              0001   RET RETURNCODE   -104
2006-03-24 17:25:40 44241D840004 0000   SDB SAVE DATA QUICK TO '/sapdb/E70/saparch/E70_COM' FILE BLOCKSIZE 8 NO CHECKPOINT MEDIANAME
2006-03-24 17:33:46 44241D840004 0001   RET RETURNCODE      0
2006-03-24 17:33:46 44241D840004 0002   TAP DATE.............. 2006-03-24
2006-03-24 17:33:46 44241D840004 0003   TAP TIME.............. 17:25:40
2006-03-24 17:33:46 44241D840004 0004   TAP SERVERDB.......... E70
2006-03-24 17:33:46 44241D840004 0005   TAP SERVERNODE........ ld1032
2006-03-24 17:33:46 44241D840004 0006   TAP KERNEL VERSION.... Kernel    7.6.00 Build 018-123-119-055
2006-03-24 17:33:46 44241D840004 0007   TAP PAGES TRANSFERRED.       856784
2006-03-24 17:33:46 44241D840004 0008   TAP PAGES LEFT........            0
2006-03-24 17:33:46 44241D840004 0009   TAP NO OF VOLUMES.....            1
2006-03-24 17:33:46 44241D840004 000A   TAP MEDIA NAME........ Full
2006-03-24 17:33:46 44241D840004 000B   TAP TAPE NAME......... /sapdb/E70/saparch/E70_COM
2006-03-24 17:33:46 44241D840004 000C   TAP TAPE ERRORTEXT.... UNDEF
2006-03-24 17:33:46 44241D840004 000D   TAP TAPE LABEL........ DAT_000000002
2006-03-24 17:33:46 44241D840004 000E   TAP IS CONSISTENT..... TRUE
2006-03-24 17:33:46 44241D840004 000F   TAP FIRST IO SEQUENCE.       128017
2006-03-24 17:33:46 44241D840004 0010   TAP LAST IO SEQUENCE.. UNDEF
2006-03-24 17:33:46 44241D840004 0011   TAP DBSTAMP1 DATE..... 2006-03-24
2006-03-24 17:33:46 44241D840004 0012   TAP DBSTAMP1 TIME..... 17:25:40
2006-03-24 17:33:46 44241D840004 0013   TAP DBSTAMP2 DATE..... UNDEF
2006-03-24 17:33:46 44241D840004 0014   TAP DBSTAMP2 TIME..... UNDEF
2006-03-24 17:33:46 44241D840004 0015   TAP BD PAGE COUNT.....       856760
2006-03-24 17:33:46 44241D840004 0016   TAP TAPEDEVICES USED..            1
2006-03-24 17:33:46 44241D840004 0017   TAP DB_IDENT.......... ld1032:E70_20060324_172540
2006-03-24 17:33:46 44241D840004 0018   TAP MAX USED DATA PNO.            0
2006-03-24 17:33:46 44241D840004 0019   TAP CONV PAGE COUNT...          464
2006-03-24 17:34:37 44241F9D0005 0000   SHT SHUTDOWN
2006-03-24 17:35:41 44241FDD0001 0000   RST RESTART
2006-03-24 17:35:45 44241FDD0001 0001   RET RETURNCODE      0
```


As of version 7.7 no special utility log file is written. The information is now written to the ***dbm.prt***.

Up to version 7.6 all commands sent to the database kernel by the utility task are logged in the file ***dbm.utl***. As of 7.5 user tasks executing utility statements also write into this file. The file is written by the database kernel.

This file contains detailed information about backup and restore processes, configuration changes such as the addition of volumes, information about update-statistics processes and so on.

In ***dbm.utl*** you can see whether operations have been successful from the point of view of the database kernel. When using external backup tools, it is important to take account of the corresponding log files as well, since errors can also occur on other levels during the transfer of backup information from the kernel to the tools.

The file is stored in the run directory of the database (default: <indepdatapath>/wrk/<SID>).

Access via DBMGUI: ***Check -> Diagnosis Files -> Utility Statements (UTLPRT)***

Access via DB50: ***Problem Analysis -> Logs -> Kernel Administration***

Access via Database Studio: ***Diagnosis Files -> Utility Statements***

dbm.knl

bsp_dbmknl.txt - Notepad

File Edit Format Help

```
3ED21A1D0003|         |HISTLOST |                   |                   |2003-05-26 15:43:57|                   |        |        |   |
3EE5FA7B0004|DAT_00001|SAVE WARM|2003-06-10 17:34:19|2003-06-10 17:34:19|2003-06-10 17:34:21|2003-06-10 18:59:15|   20981|        |NO |Data
3EE891540002|DAT_00001|RESTORE  |2003-06-10 17:34:19|2003-06-10 17:34:19|2003-06-12 16:42:28|2003-06-12 16:53:37|   20981|        |NO |Data_tmp
3EE8947A0004|         |HISTLOST |                   |                   |2003-06-12 16:55:54|                   |        |        |   |
3EE894B70001|DAT_00002|SAVE COLD|2003-06-12 16:56:22|2003-06-12 16:56:22|2003-06-12 16:56:57|2003-06-12 17:01:46|   21057|        |NO |Data
3EE896F20001|DAT_00003|SAVE COLD|2003-06-12 17:06:03|2003-06-12 17:06:03|2003-06-12 17:06:28|2003-06-12 17:10:58|   21596|        |NO |Data
3EE89AB60001|         |HISTLOST |                   |                   |2003-06-12 17:22:30|                   |        |        |   |
            |LOG_00000|SAVE WARM|?          ?       |?          ?       |2003-06-12 17:22:40|2003-06-12 17:25:15|      -1|      -1|   |
3EE89B860002|         |HISTLOST |                   |                   |2003-06-12 17:25:58|                   |        |        |   |
            |LOG_00000|SAVE WARM|?          ?       |?          ?       |2003-06-12 17:38:34|2003-06-12 17:38:38|      -1|      -1|   |
            |LOG_00000|SAVE WARM|?          ?       |?          ?       |2003-06-12 17:41:11|2003-06-12 17:41:15|      -1|      -1|   |
3EE8A8EE0003|DAT_00004|SAVE WARM|2003-06-12 18:23:10|2003-06-12 18:23:10|2003-06-12 18:23:12|2003-06-12 18:34:05|    1394|        |NO |Data_tmp
3F268EE70004|DAT_00005|SAVE WARM|2003-07-29 17:12:40|2003-07-29 17:12:40|2003-07-29 17:12:43|2003-07-29 17:23:17|  287309|        |NO |Data_tmp
3F2A01690006|LOG_00001|SAVE WARM|2003-06-12 17:22:48|2003-06-29 02:12:56|2003-08-01 07:58:01|2003-08-01 07:58:46|       0|  103014|   |Log
3F2A01970007|LOG_00002|SAVE WARM|2003-06-29 02:12:56|2003-07-16 07:33:39|2003-08-01 07:58:47|2003-08-01 07:59:35|  103015|  206147|   |Log
3F2A04430008|LOG_00003|SAVE WARM|2003-07-16 07:38:39|2003-08-01 08:10:00|2003-08-01 08:10:11|2003-08-01 08:11:05|  206148|  312572|   |Log
3F2FA4DA0003|LOG_00004|SAVE WARM|2003-08-01 08:10:01|2003-08-05 14:36:16|2003-08-05 14:36:42|2003-08-05 14:37:32|  312573|  388723|   |Log
3F30C9B40004|LOG_00005|SAVE WARM|2003-08-05 14:36:16|2003-08-06 11:25:41|2003-08-06 11:26:12|2003-08-06 11:27:15|  388724|  466692|   |Log
3F30FD800005|LOG_00006|SAVE WARM|2003-08-06 11:25:43|2003-08-06 15:06:45|2003-08-06 15:07:12|2003-08-06 15:08:07|  466693|  529822|   |Log
3F311DB40006|DAT_00006|SAVE WARM|2003-08-06 17:24:52|2003-08-06 17:24:52|2003-08-06 17:24:55|2003-08-06 17:39:47|  542988|        |NO |Data_tmp
3F3337BB0007|DAT_00007|SAVE WARM|2003-08-08 07:40:12|2003-08-08 07:40:12|2003-08-08 07:40:14|2003-08-08 07:41:35|  549971|        |NO |Data
3F3338250008|DAT_00008|SAVE WARM|2003-08-08 07:41:57|2003-08-08 07:41:57|2003-08-08 07:41:59|2003-08-08 07:56:27|  549976|        |NO |Data_tmp
3F67A4480003|LOG_00007|SAVE WARM|2003-08-06 15:06:45|2003-09-17 02:00:55|2003-09-17 02:01:12|2003-09-17 02:02:07|  529823|  749096|   |Log
3FC37C160003|LOG_00008|SAVE WARM|2003-09-17 02:00:55|2003-11-25 16:57:49|2003-11-25 16:58:14|2003-11-25 16:59:12|  749097| 1007218|   |Log
401687F70004|LOG_00009|SAVE WARM|2003-11-25 16:57:49|2004-01-27 16:46:42|2004-01-27 16:47:03|2004-01-27 16:48:04| 1007219| 1247065|   |Log
404074D40003|LOG_00010|SAVE WARM|2004-01-27 16:46:42|2004-02-28 12:00:29|2004-02-28 12:00:36|2004-02-28 12:01:30| 1247066| 1399878|   |Log
404F0F090003|DAT_00009|SAVE WARM|2004-03-10 13:50:37|2004-03-10 13:50:37|2004-03-10 13:50:41|2004-03-10 14:05:44| 1435397|        |NO |Data_tmp
```

Two examples of complete lines:
==============================

```
|LOG_00000|SAVE WARM|?     ?     |?     ?     |2003-06-12 17:22:40|2003-06-12 17:25:15|     -1|     -1|  |
          |     0|     0|    -123|

3F3337BB0007|DAT_00007|SAVE WARM|2003-08-08 07:40:12|2003-08-08 07:40:12|2003-08-08 07:40:14|2003-08-08 07:41:35|  549971|       |NO |Data
          |     0|     0|    -903|Could not open dev
```


The file ***dbm.knl*** contains a list of the backup and restore actions that have been executed.

The file is written by the database kernel.

You can identify what type of backup (DATA, LOG) was executed, in which time period the execution took place, up to which log page number the data was backed up, which medium was used and whether any errors occurred.

When using external backup tools, it is important to observe their logs as well, which are described in the following pages.

The file is stored in the run directory (default: <indepdatapath>/wrk/<SID>).

Access via DBMGUI: ***Information -> Backup History*** or ***Check -> Diagnosis Files -> Backup History (BACKHIST)***

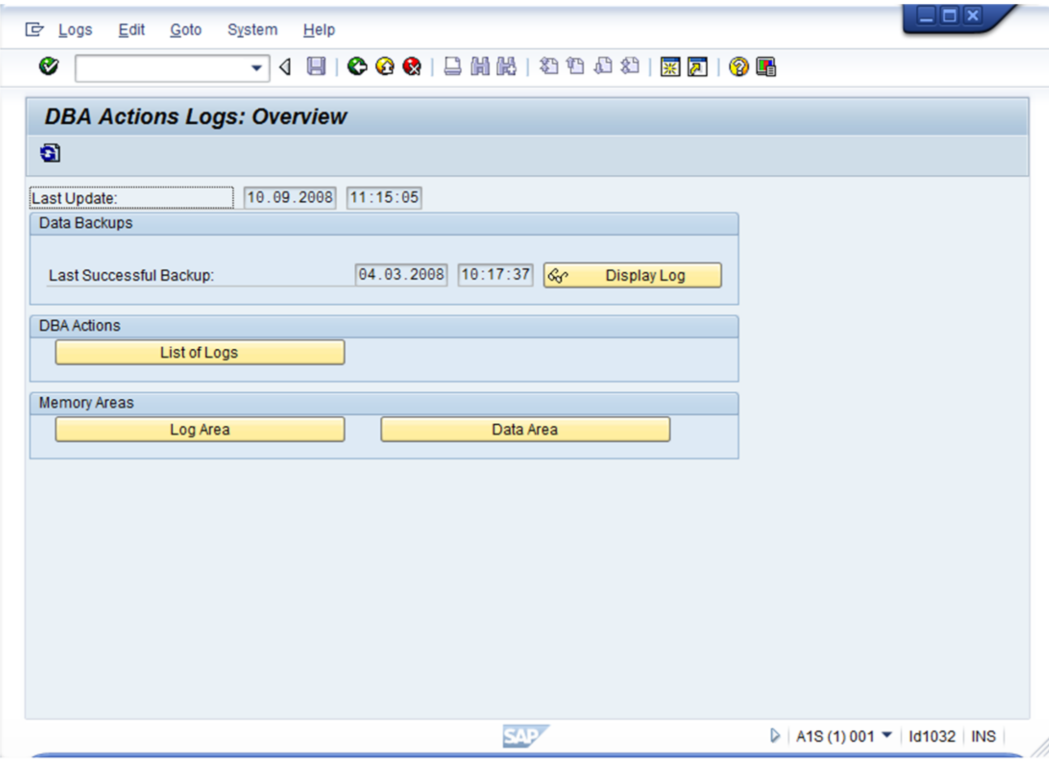
Access via DB50: ***Problem Analysis -> Logs -> DBA History -> Backup/Restore (Kernel)***

Access via Database Studio: ***Diagnosis Files -> Backup History***

Because of the length of the output line, the file is somewhat difficult to work with; it is therefore a good idea to get a formatted display of the backup history with the Database Studio (Administration -> Backup) or transaction DB50. Errors are noted at the end of the output line.

The transactions DBACockpit (as of version 7.0), db12 and db13(c) use this information about backups to, for example, propose a recovery procedure.

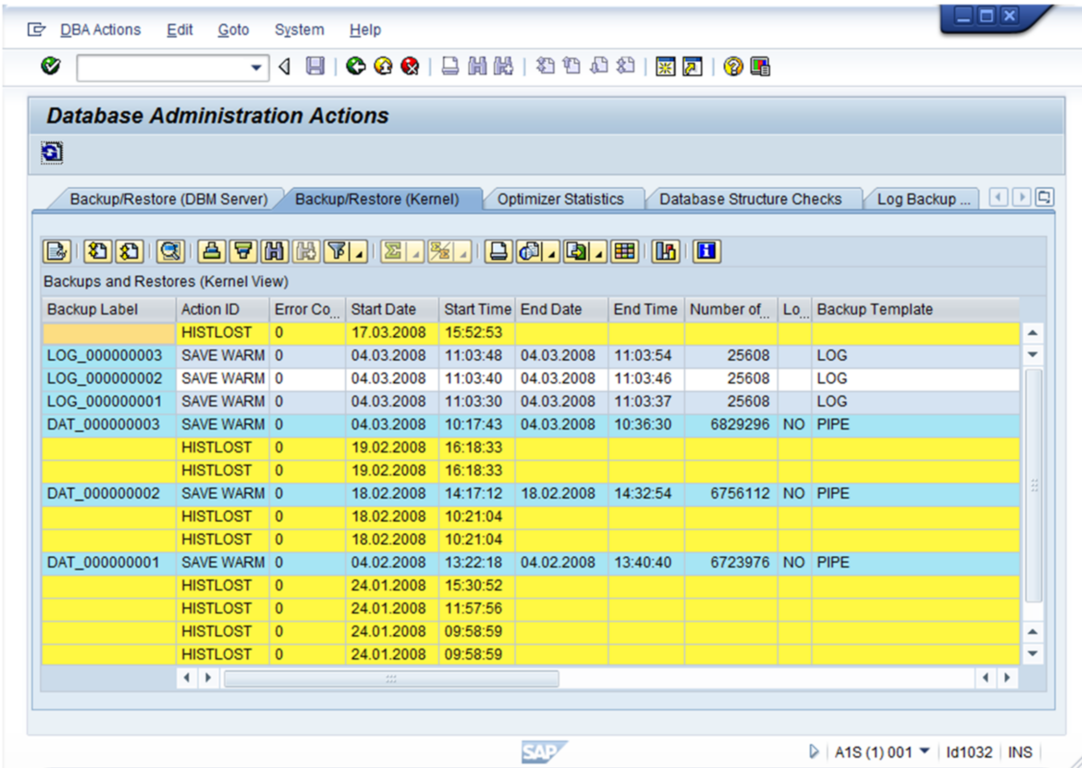
DB12 - Overview



SAP transaction db12 can be used to get an overview of backup and restore actions that have been executed.

Here you can also get information about the scope and frequency of Update Statistics operations as well as a history of consistency checks.

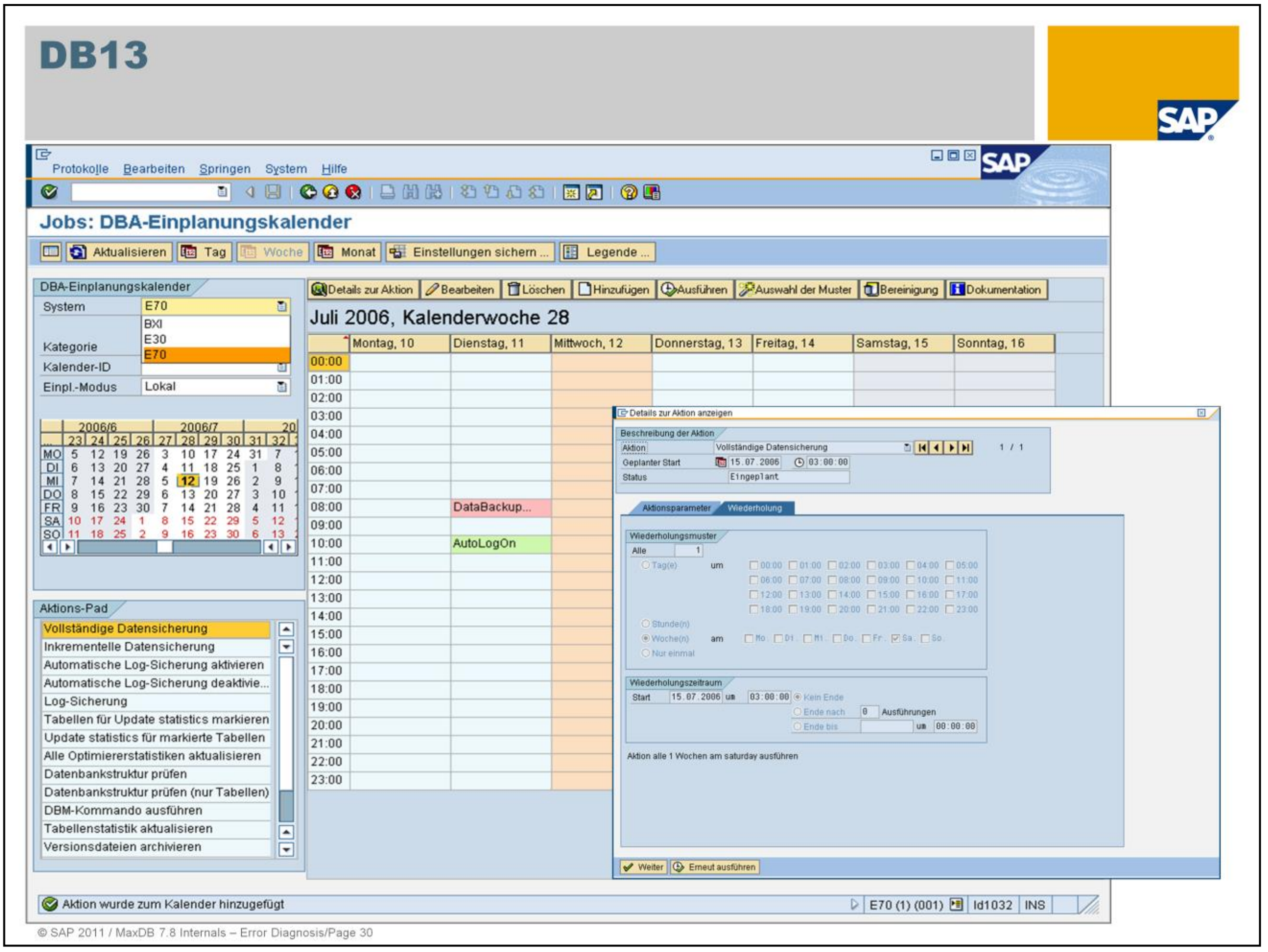
DB12 – Overview



Backup Label	Action ID	Error Co...	Start Date	Start Time	End Date	End Time	Number of...	Lo...	Backup Template
	HISTLOST	0	17.03.2008	15:52:53					
LOG_000000003	SAVE WARM	0	04.03.2008	11:03:48	04.03.2008	11:03:54	25608		LOG
LOG_000000002	SAVE WARM	0	04.03.2008	11:03:40	04.03.2008	11:03:46	25608		LOG
LOG_000000001	SAVE WARM	0	04.03.2008	11:03:30	04.03.2008	11:03:37	25608		LOG
DAT_000000003	SAVE WARM	0	04.03.2008	10:17:43	04.03.2008	10:36:30	6829296	NO	PIPE
	HISTLOST	0	19.02.2008	16:18:33					
	HISTLOST	0	19.02.2008	16:18:33					
DAT_000000002	SAVE WARM	0	18.02.2008	14:17:12	18.02.2008	14:32:54	6756112	NO	PIPE
	HISTLOST	0	18.02.2008	10:21:04					
	HISTLOST	0	18.02.2008	10:21:04					
DAT_000000001	SAVE WARM	0	04.02.2008	13:22:18	04.02.2008	13:40:40	6723976	NO	PIPE
	HISTLOST	0	24.01.2008	15:30:52					
	HISTLOST	0	24.01.2008	11:57:56					
	HISTLOST	0	24.01.2008	09:58:59					
	HISTLOST	0	24.01.2008	09:58:59					

Information from the file ***dbm.knl*** is optically presented which allows to recognize directly if there are failed backups or gaps in the backup history.

The output is generated when the DBM parameter DBATL is set to 1. For further information, see the Note **431508**.



db13 is the scheduling calendar for backups, Update Statistics runs and consistency checks. A weekly schedule can be used to plan the regular execution of activities.

Transaction DB13C is no longer required with WebAS 7.0 since transaction DB13 allows scheduling of activities for various instances. Integrate an instance with transaction DB59. Double-click to go to the database monitoring and via Tools -> DBA Planning Calendar to transaction DB13. Now the new instance will henceforth be known in transaction DB13.

Further information can be found in note **431508**.

It is also possible to call the scheduling calendar with transaction DBACockpit (Jobs -> DBA Planning Calendar).

If an error occurs during an action, it is displayed with a red background.

The causes of errors can be determined with the familiar diagnosis files. The job logs may also contain information that is useful in this regard.

dbm.ebp

External Backup Protocol (dbm.ebp)

- Is created by each action using a supported backup tool.
- Is overwritten with every start of the DBM server, if it communicates with an external backup tool.

Contents

- Configuration values
- Commands of the database kernel
- Call of the backup tools
- Returncodes of the backup tools and of the database kernel
- Output of the backup tools

For diagnosing problems with backups using external backup tools, the log file ***dbm.ebp*** plays a decisive role.

In addition to information about the configuration parameter of the tool, *dbm.ebp* contains information about the commands sent to the database kernel as well as the backup tool call. The error position makes it possible to identify who was responsible for the problem.

dbm.ebp is stored in the run directory of the database (default: <indepdatapath>/wrk/<SID>.

Access via DBMGUI: ***Check -> Diagnosis Files -> External Backup Protocol***

Access via DB50: ***Properties -> Files -> BACKEBP***

Access via Database Studio: ***Diagnosis Files -> External Backup Protocol***

Note that this file is overwritten after each start of the DBM server when it communicates with the external backup tool. A new DBM server is started with each dbmcli call, to name one example.

dbm.ebl (1)

External Backup Log

- Contains a summary of the last <n> dbm.ebp files.
- The number is configurable.

```
2004-01-16 18:10:51
---------- Start of a new external backup tool action ------------------
2004-01-16 18:10:51
Setting environment variable 'TEMP' for the directory for temporary
files and pipes to default ''.
Setting environment variable 'TMP' for the directory for temporary files
 and pipes to default ''.
Using connection to Legato's NetWorker with save, recover and mminfo.

2004-01-16 18:10:51
Checking existence and configuration of NetWorker.
    Setting environment variable 'NSR_ENV' for the path of NetWorker's
configuration file to default '/nsr/sapdb/env'.
    Found NetWorker setting for 'NSR_HOME': '/opt/nsr'.
    Found NetWorker setting for 'NSR_HOST': 'hges100'.
    Found NetWorker setting for 'NSR_FULL': 'SAVEDTNCHK'.
    Found NetWorker setting for 'NSR_EXPIRE': '30 days'.
    Found NetWorker setting for 'NSR_IGNOREERROR': 'NSR server hges100.
sz.gesis.
de: busy'.
    Found NetWorker setting for 'NSR_IGNOREERROR': 'save: waiting 30
seconds the
n retrying'.
    Found NetWorker setting for 'NSR_SIZEROUNDUP': 'NORMAL'.
    Found NetWorker setting for 'NSR_SIZEROUNDUP': 'NORMAL'.
    Using NetWorker programs:
        '/opt/nsr/save'
        '/opt/nsr/recover'
        '/opt/nsr/mminfo'
Check passed successfully.
```


Because the file ***dbm.ebp*** is promptly overwritten, there is a summary of it called ***dbm.ebl***. This log file contains the last <n> logs, the number of which can be configured with the DBM parameter DBM_EBLSIZE.

The file ***dbm.ebl*** is stored in the run directory of the database ((default: <indepdatapath>/wrk/<SID>).

Access via DBMGUI: ***Check -> Diagnosis Files -> External Backup Log***

Access via DB50: ***Properties -> Files -> DBMEBL***

Access via Database Studio: ***Diagnosis Files -> External Backup Log***

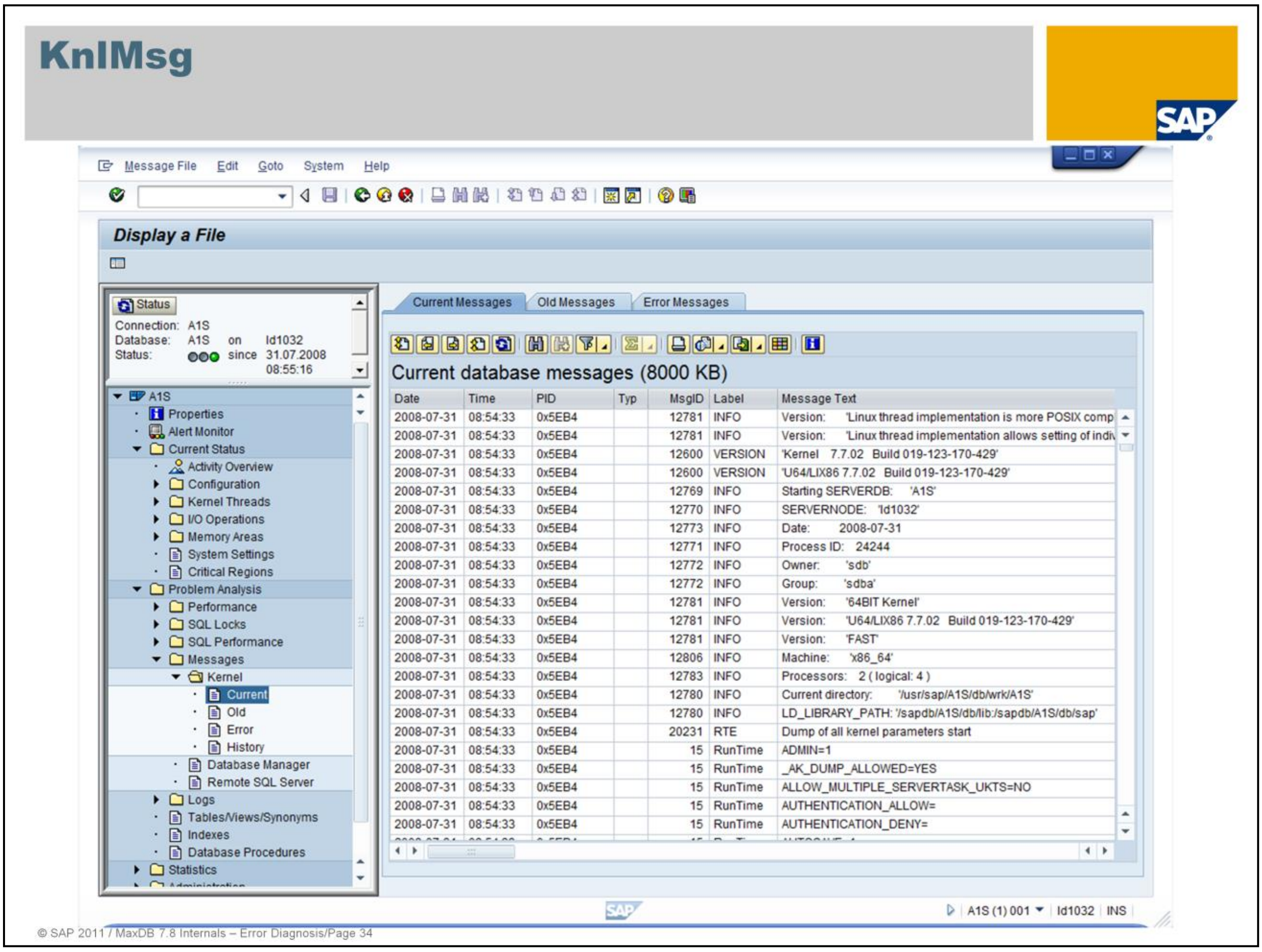
dbm.ebl (2)

Backup-Fehler.txt - Notepad

File Edit Format Help

```
2004-01-16 18:10:51
Checking medium.
Check passed successfully.

2004-01-16 18:10:51
Preparing restore.
    Constructed NetWorker call '/opt/nsr/recover -v
1074124992
-c hgessq01 -iY /nsr/sapdb/pipeS6F'.
    Created temporary file '/var/tmp/temp1074273051
NetWorker.
    Created temporary file '/var/tmp/temp1074273051
for NetWorker.
Prepare passed successfully.

2004-01-16 18:10:51
Creating pipes for data transfer.
    Creating pipe '/nsr/sapdb/pipeS6F' ... Done.
All data transfer pipes have been created.
All data transfer pipes have been created.

2004-01-16 18:10:51
Starting database action for the restore.
    Requesting 'RESTORE DATA QUICK FROM '/nsr/sapdb
BLOCKSIZE 8 M
EDIANAME 'nsr_full'' from db-kernel.
The database is working on the request.

2004-01-16 18:10:51
Starting NetWorker.
    Starting NetWorker process '/opt/nsr/recover -v
1074124992
-c hgessq01 -iY /nsr/sapdb/pipeS6F >>/var/tmp/temp1
2>>/var/tmp/temp1
074273051-1'.
    Process was started successfully.
NetWorker has been started successfully.
```

```
2004-01-16 18:10:51
Waiting for end of the restore operation.
   2004-01-16 18:10:51 The backup tool is running.
   2004-01-16 18:10:51 The database is working on the request.

   2004-01-16 18:10:56 The backup tool is running.
   2004-01-16 18:10:56 The database is working on the request.

   2004-01-16 18:11:06 The backup tool is running.
   2004-01-16 18:11:06 The database is working on the request.
[...]
   2004-01-16 20:26:54 The database has finished work on the
                       request.
   Receiving a reply from the database kernel.
   Got the following reply from db-kernel:
        SQL-Code              :-9026

   2004-01-16 20:26:54 The backup tool is running.

   2004-01-16 20:27:00 The backup tool is running.
[...]
   2004-01-16 20:27:45 The backup tool is running.

   2004-01-16 20:27:54 Canceling tool after the timeout
                       of 60 seconds elapsed.
   Trying to break pipe '/nsr/sapdb/pipeS6F'.
   Pipe has been broken successfully.
   The pipe '/nsr/sapdb/pipeS6F' was removed.

   2004-01-16 20:27:57 The backup tool is running.
[...]
   2004-01-16 20:28:50 The backup tool is running.
```



The file ***KnlMsg*** contains messages of the database kernel.It is recreated each time the database instance is started. The previous file is renamed to ***KnlMsg.old***. The messages - apart from the header (start messages) - are overwritten cyclically.

Error messages are recorded in ***KnlMsg*** but also - due to the risk that they will be overwritten there - in the file ***KnlMsgArchive*** (***knldiag.err)***. This file is written continuously.

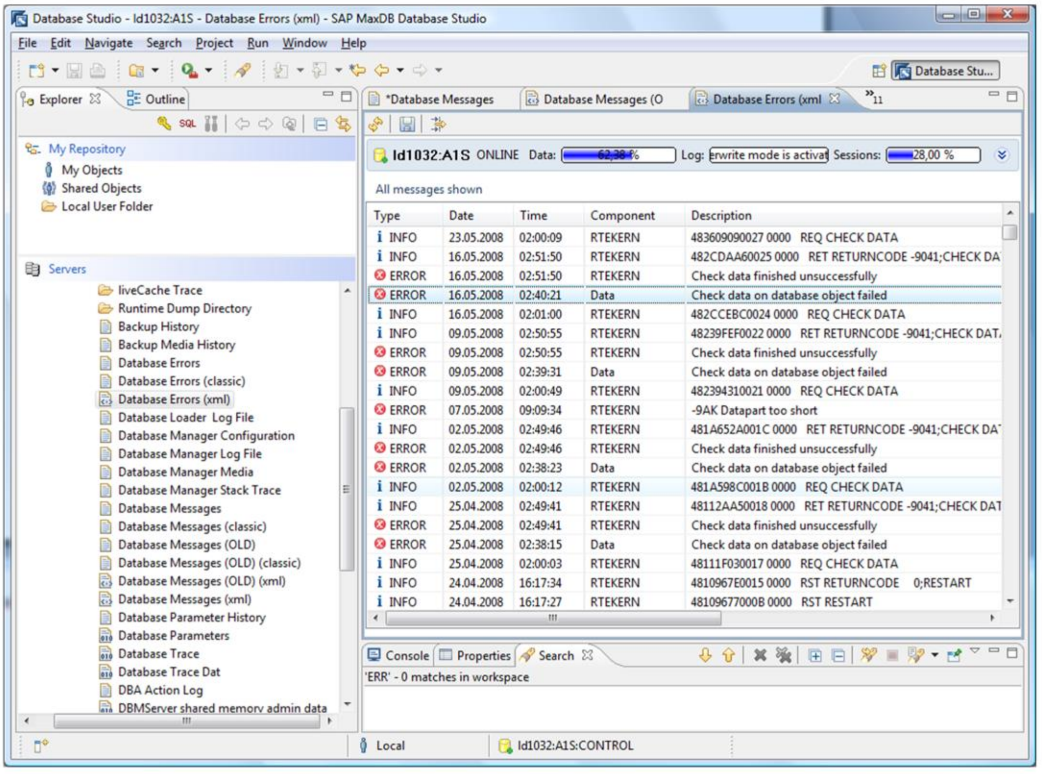
As of version 7.7 ***KnlMsg*** files replace the files ***knldiag*.*** A specialty of the new files is that they are stored in an XML-like representation to make it possible in further states of expansion that together with the error messages directly instructions are delivered. This implies that the files – if you look at them on operating system level – have to be prepared before they can be displayed properly (see slide ***protconv***). If you choose Database Studio, DBMGUI or transaction DB50 to display the ***KnlMsg*** the conversion to a readable format is done automatically.

The files ***KnlMsg**** are stored in the run directory of the database ((default: <indepdatapath>/wrk/<SID>). The size of ***KnlMsg*** can be changed by setting the parameter KernelMessageFileSize.

(In versions 7.5 and 7.6 location, size and name of the file can be changed with the setting for the parameters _KERNELDIAGFILE and KERNELDIAGSIZE.)

Access via DBMGUI: ***Check -> Diagnosis Files -> Database Messages***
Access via DB50: ***Problem Analysis -> Logs -> Kernel Administration***
Access via Database Studio: ***Diagnosis Files -> Database Messages***

KnlMsg 2



Database Studio offers to the user to either display the file ***KnlMsg*** in the familiar classical way or in the XML representation (see above). By double-clicking a line in the XML representation you can get more information about the error (see next slide).

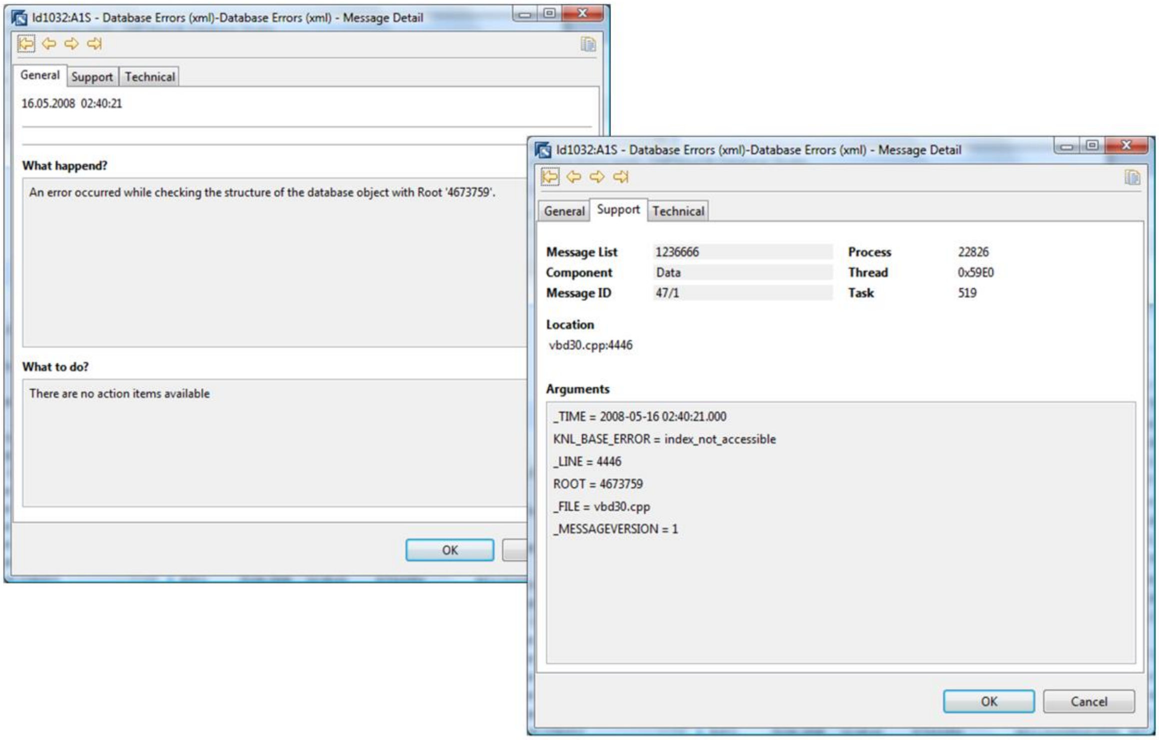
Access via Database Studio:

Diagnosis Files -> Database Messages

Diagnosis Files -> Database Messages (OLD)

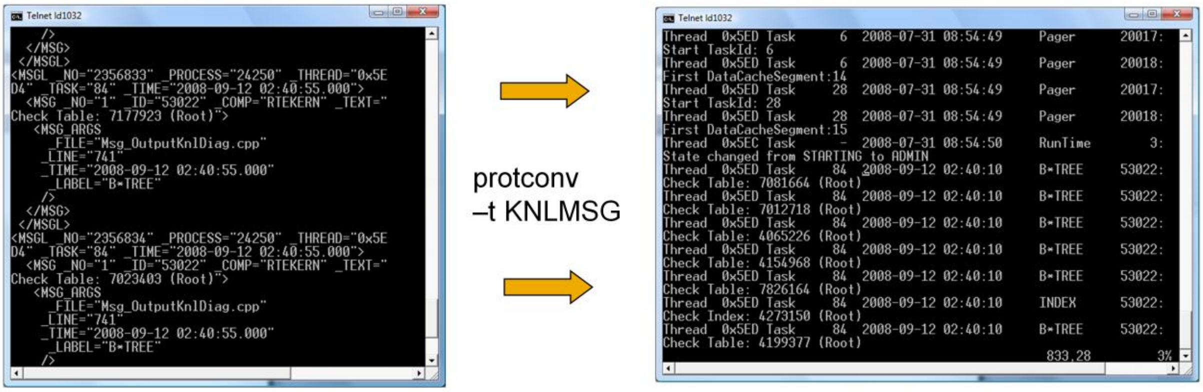
Diagnosis Files -> Database Errors

KnlMsg 3



The following windows are displayed delivering more information about the error and proposing possibilities to correct the error. As mentioned above the windows are still partially empty and some more content is required.

KnlMsg 4 - protconv



Examples:
protconv –d A1S –t KNLMSGARCHIVE –o KnlMsgArchive.prt
protconv –p /sapdb/data/wrk/A1S –t KNLMSGOLD

The tool ***protconv*** (with the options shown below) is provided to allow access to the ***KnlMsg*** on operating system level in a readable form. If no output file is specified the text is shown directly on the screen. You can use KNLMSG, KNLMSGOLD and KNLMSGARCHIVE als filekey (tag).

protconv -help
Usage: [-h [[<Option> | LONG]]] [-? [[<Option> | LONG]]] [-d <DBName>]
[-o <OutputFile>] [-f <OutputFormat>] [-t <FileKey>]
[-p <InputFilePath>] [-s <SortMode>] [-v] [-b <TimeStamp>]
[-e <TimeStamp>]

-h <...>	- help
-? <...>	- help
-d <DBName>	- name of the database
-o <OutputFile>	- output file
-f <OutputFormat>	- output format (classic|plain(default)|xml)
-t <FileKey>	- file key
-p <InputFilePath>	- path to read input files from
-s <SortMode>	- sort mode (!ignored!)
-v	- display message description from supplied files
-b <TimeStamp>	- output messages that were written after this time stamp only
-e <TimeStamp>	- output messages that were written before this time stamp only

Stack Backtrace in knldiag

Check - Diagnosis Files - Database Messages

```
2004-04-28 17:26:48 19849 ERR 11599 BTRACE   ----> Symbolic Stack Back Trace <----
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     0: 0x08491782 eo670_CTraceStack +0x0012
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed260] (0x0,0x0,0x5000000c,0x1)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     1: 0x08495709 vabort +0x0019
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed280] (0x402015d0,0x0,0x875a700,0x4002dd51)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     2: 0x085d5977 RTE_Crash__FRC20SAPDBErr_MessageList +0x00f7
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed2b0] (0x40000001,0x2a0,0x40fed2c8,0x85d50fd)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     3: 0x084e0ca2 WriteVector__12IOMan_VolumeiR18IOMan_IKernelPagesRC20IOMan_ClusterA
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed2e0] (0x40fed320,0x0,0x0,0x86c4382)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     4: 0x086174b3 WritePages__21IOMan_SingleLogDeviceiR18IOMan_IKernelPagesRC20IOMan_
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed550] (0x42a3119c,0x2,0x42afc938,0x40fed688)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     5: 0x084d58b9 WriteLogPages__13IOMan_ManageriRt11IOMan_Pages1Z8Log_PageRC18Log_Cl
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed590] (0x42a31198,0x2,0x42afc938,0x40fed688)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     6: 0x08588b69 FlushPages__10Log_WriterRt11IOMan_Pages1Z8Log_Page +0x003d
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed694] (0x42a30ed0,0x2,0x42afc938,0x40fed6cc)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     7: 0x08587e75 PrepareAndFlushPageVector__10Log_WriterbR21Log_RawDeviceIterator +C
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed6d4] (0x42afc91c,0x42afc938,0x5000000c,0x84a2c29)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     8: 0x08587806 Run__10Log_Writer +0x05d6
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed7a4] (0x42afc91c,0x2101,0x40fed830,0x30)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE     9: 0x08327572 kb560LogWriter +0x002a
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed844] (0x42afc91c,0x2,0x40fed894,0x85ec594)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE    10: 0x08104f47 ak91run_non_user_process +0x004f
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed864] (0x2,0x401dae98,0x40fed8f4,0x8104f3b)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE    11: 0x0810558d a91mainprogam_with_allocator +0x0041
2004-04-28 17:26:49 19849 ERR 11599 BTRACE         /raid/sapdb/E30/db/pgm/kernel
2004-04-28 17:26:49 19849 ERR 11599 BTRACE        Frameinfo [0x40fed8f4] (0x40feda34,0x5,0x401db31c,0x401dae98)
2004-04-28 17:26:49 19849 ERR 11599 BTRACE    12: 0x084732d0 ag941CreateAllocatorAndCallMainprog +0x01c0
```


When the database crashes, support often needs to know at which point in the source code the database was when the crash occurred.

On Unix/Linux, this information is usually generated from a core dump with a debugger. On Windows, this information is found in the file drwtsn32.log, but only if Dr Watson is registered as the system debugger.

Core dumps can be very large. Writing a core dump delays the crash of the process.

For that reason, when a crash occurs the MaxDB kernel automatically writes the backtrace stack and values of the CPU register to the ***KnlMsg (knldiag)*** file.

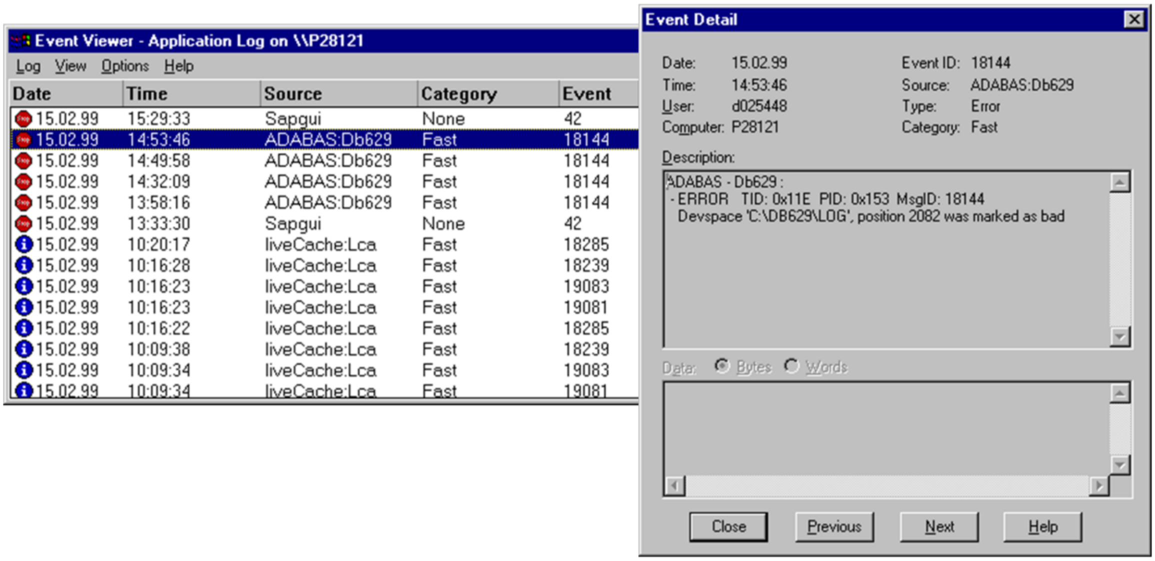
If the problem is due to an error in the database software, the cause can usually be found using this information.

In the present example we see a simulation of an I/O error during writing to a log volume. It is not a software error.

Event Viewer

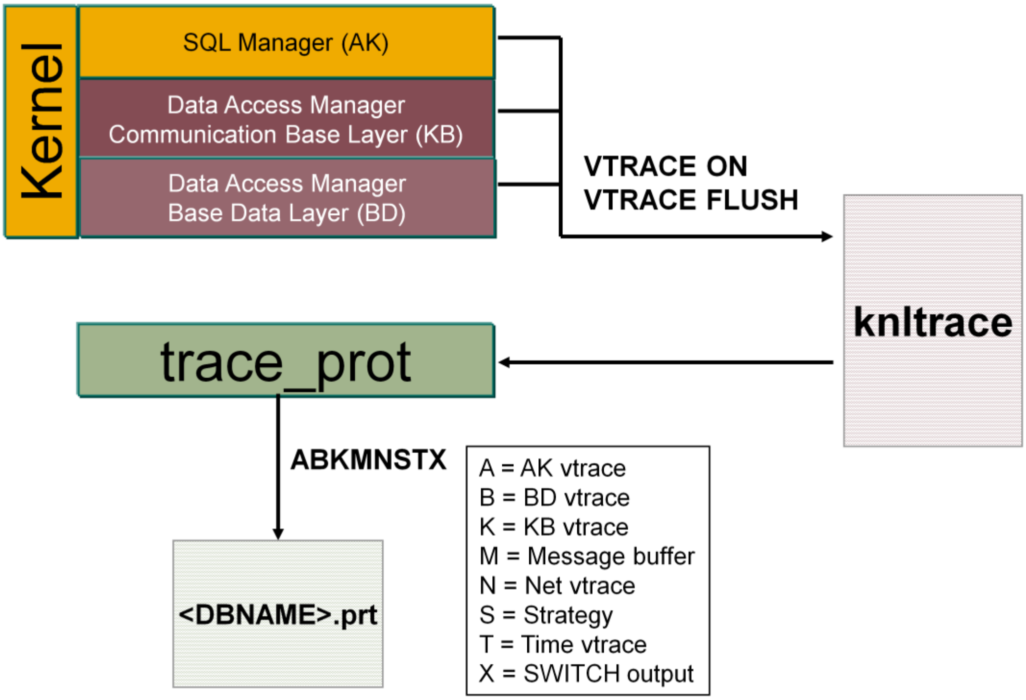
Under WINDOWS important messages are additionally written to the event log.

Example:



If the file ***KnlMsg*** has already been overwritten, you may still find useful information here**.**

knltrace (1)



The kernel trace, or Vtrace, is used for analyzing executed SQL statements.

When you activate Vtrace, you specify which areas of the kernel the file ***knltrace*** is written from. Generally a default setting is taken.

The kernel trace is not active by default. The default trace has a minimal effect on system performance. Each UKT writes to its own main memory buffer, precluding collisions during trace writing. If you select other options, however, writing the trace can be resource intensive and should be done only where needed for problem analysis.

For the trace output, you specify the levels or modules of the kernel for which the logs are to be extracted.

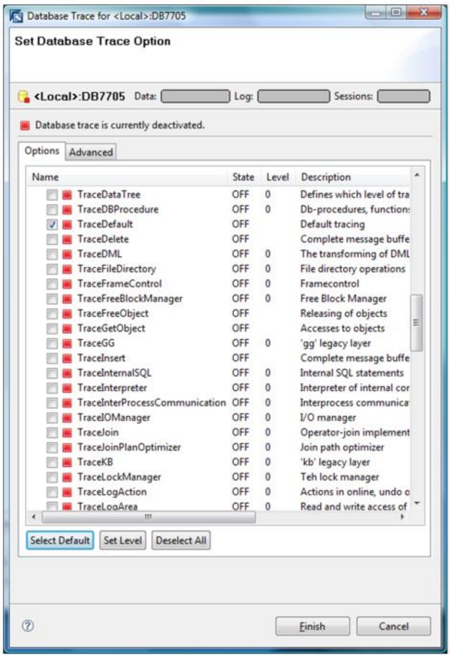
Data concerning strategies and times is only output if the options OPTIMIZER or TIME, respectively, are active for the Vtrace.

The SWITCH output contains data from the trace of a so-called slow kernel. A slow kernel is a special MaxDB debugging kernel. It is only used upon the special request of development or support.

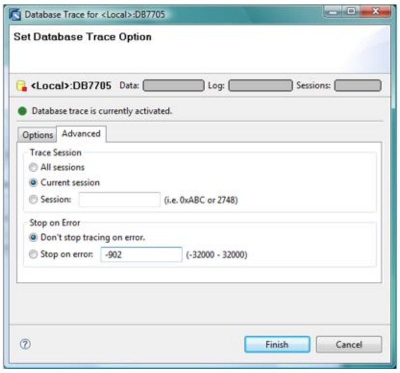
The Vtrace can be activated for a single user session (FOR SESSION).

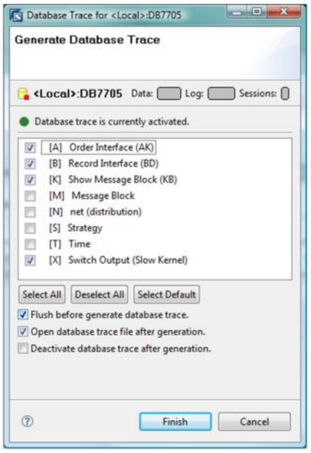
To prevent cyclical overwriting, the writing of the trace can be switched off automatically when a specified error code occurs (STOP ON ERROR).

knltrace (2) - Procedure



1. Switch on the VTRACE
   (if required for a specified session)
2. Execute database action
3. VTRACE FLUSH
4. Switch off the VTRACE
5. Convert the file to ASCII format





Switching the Vtrace on or off as well as flushing it can be done with the dbmcli, the Database Studio or DBMGUI and with transaction db50. Flushing the Vtrace can also be done with the SQLSTUDIO.

Required dbmcli commands:

Activate:

dbmcli –d <SID> -u <dbm-user>,<password> trace_on default

Flush:

dbmcli –d <SID> -u <dbm-user>,<password> trace_flush

Deactivate:

dbmcli –d <SID> -u <dbm-user>,<password> trace_off

Evaluate:

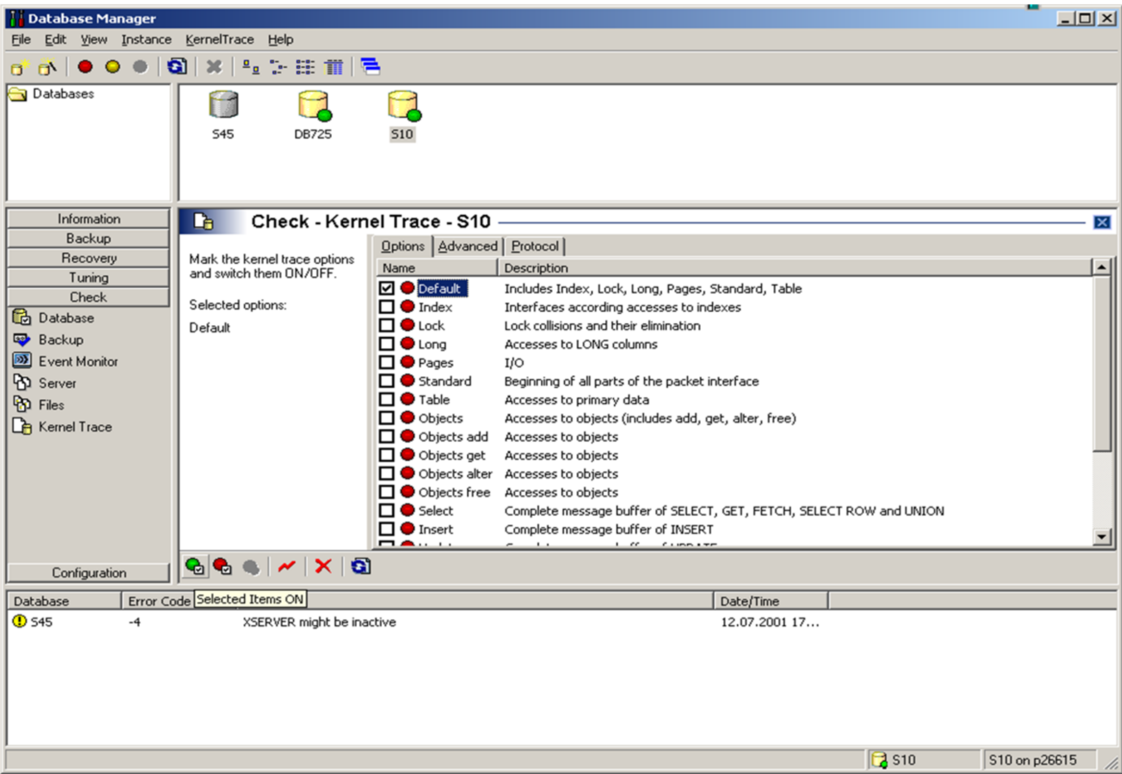
dbmcli –d <SID> -u <dbm-user>,<password> trace_prot <options>

In the context menu of the installed databases the trace can be switched on and generated as a readable file with.

Database Trace -> Options

Database Trace -> Generate

DBMGUI Kernel Trace (1)



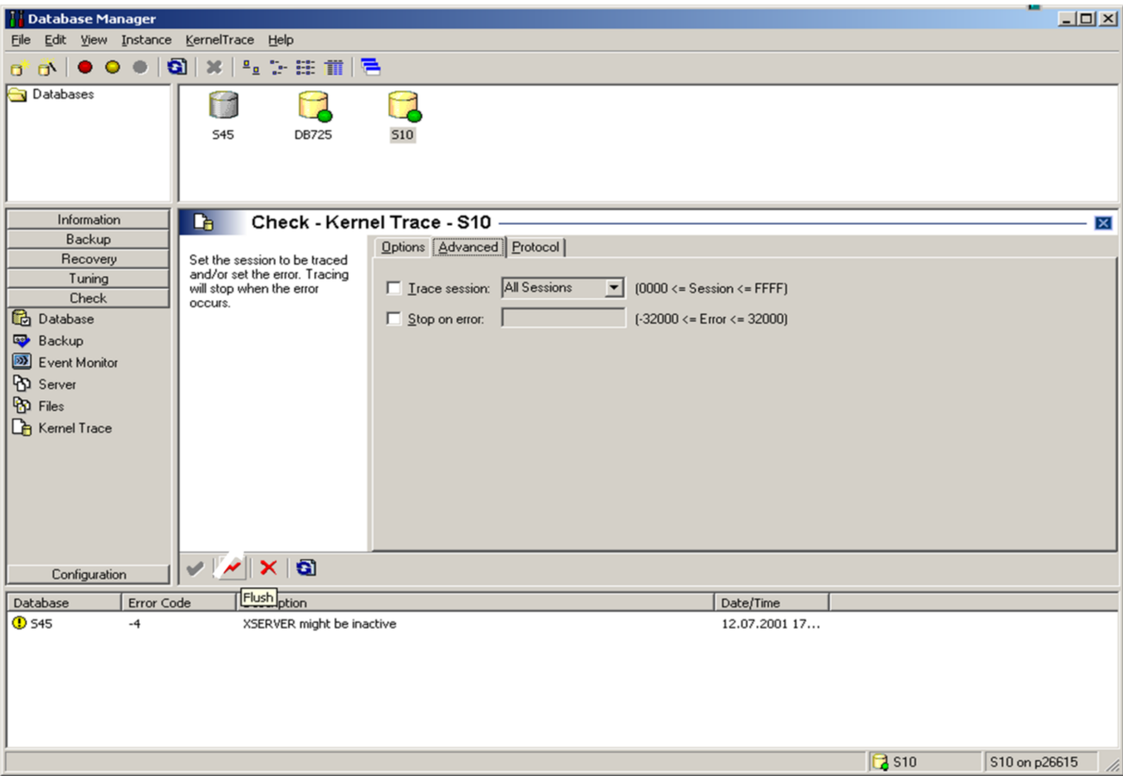
You can administer the database kernel trace with the DBMGUI.

Unless otherwise specified by development or support, the default Vtrace is sufficient.

You can also activate information about DELETE, INSERT, UPDATE, SELECT and Optimizer operations.

The Vtrace can be activated and deactivated, flushed, initialized and displayed using the buttons. During initialization, all information in the trace buffer is deleted.

Kernel Trace (2)

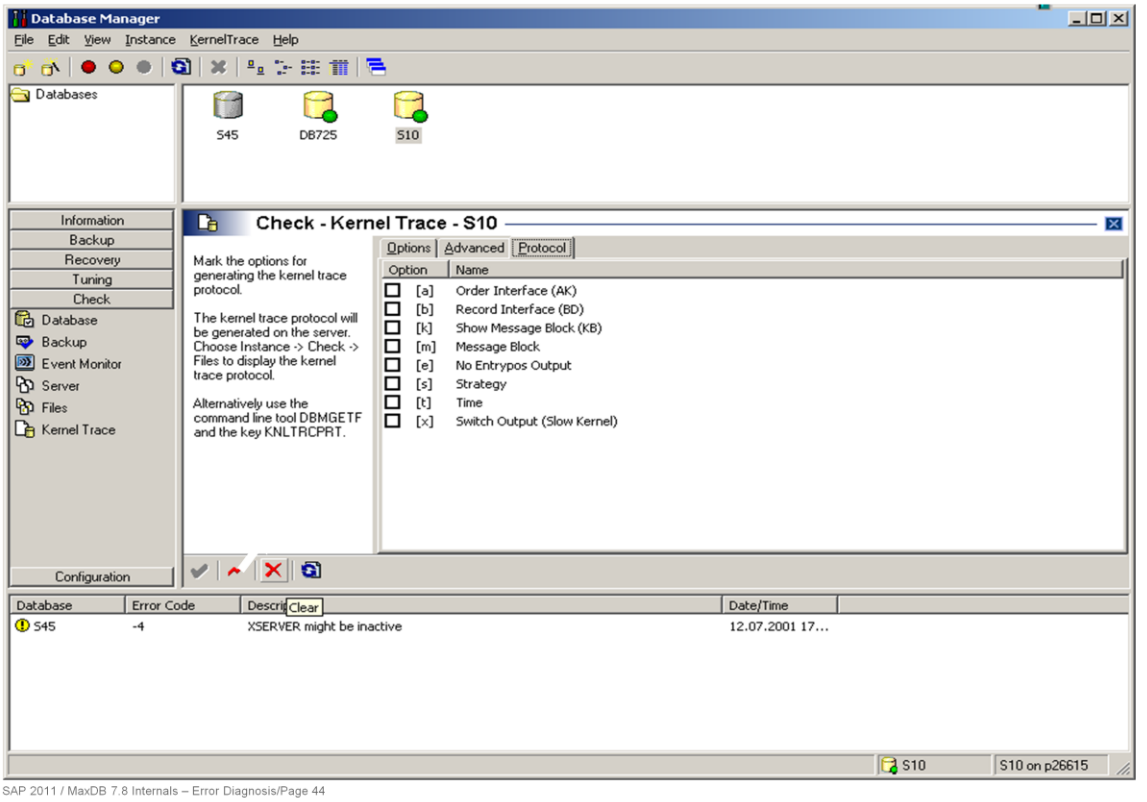


TRACE SESSION
The Vtrace can be activated for particular database sessions. To do so, however, the database session must be known.

The ouputs of
  x_cons <SID> show active and
  SELECT * FROM TRANSACTIONS
are helpful in this regard.

STOP ON ERROR
You can set the Vtrace so that it is automatically switched off when a certain error occurs. This is useful when you want to reproduce a particular problem and know which error will occur. This function prevents relevant information from being overwritten.

Kernel Trace (3)



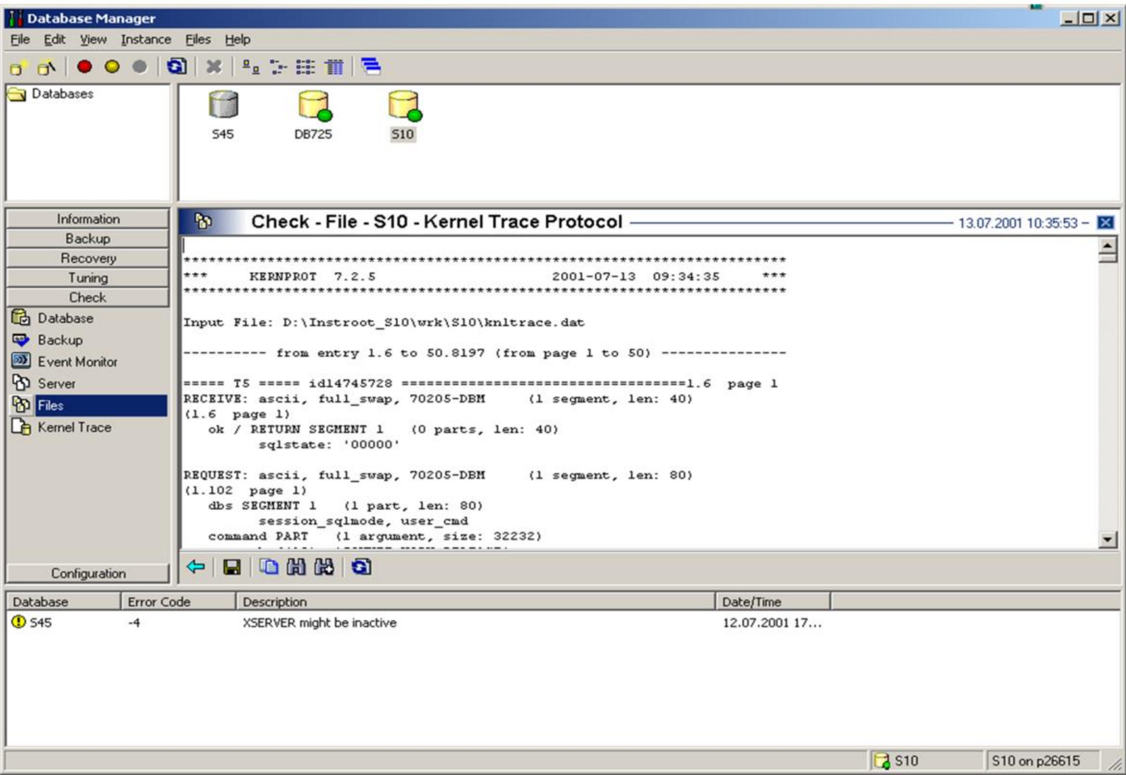
On the ***'Protocol'*** tab, you can sort the information from the ***knltrace*** file and extract desired areas to an ASCII file.

You specify the layers or modules of the kernel for which you want to extract the trace outputs; DEFAULT: abkmx.

Data concerning strategies and times is only output if the options OPTIMIZER or TIME, respectively, are active for the Vtrace.

The SWITCH output contains data from the trace of a so-called slow kernel. A slow kernel is a special MaxDB debugging kernel. It is only used upon the special request of development or support.

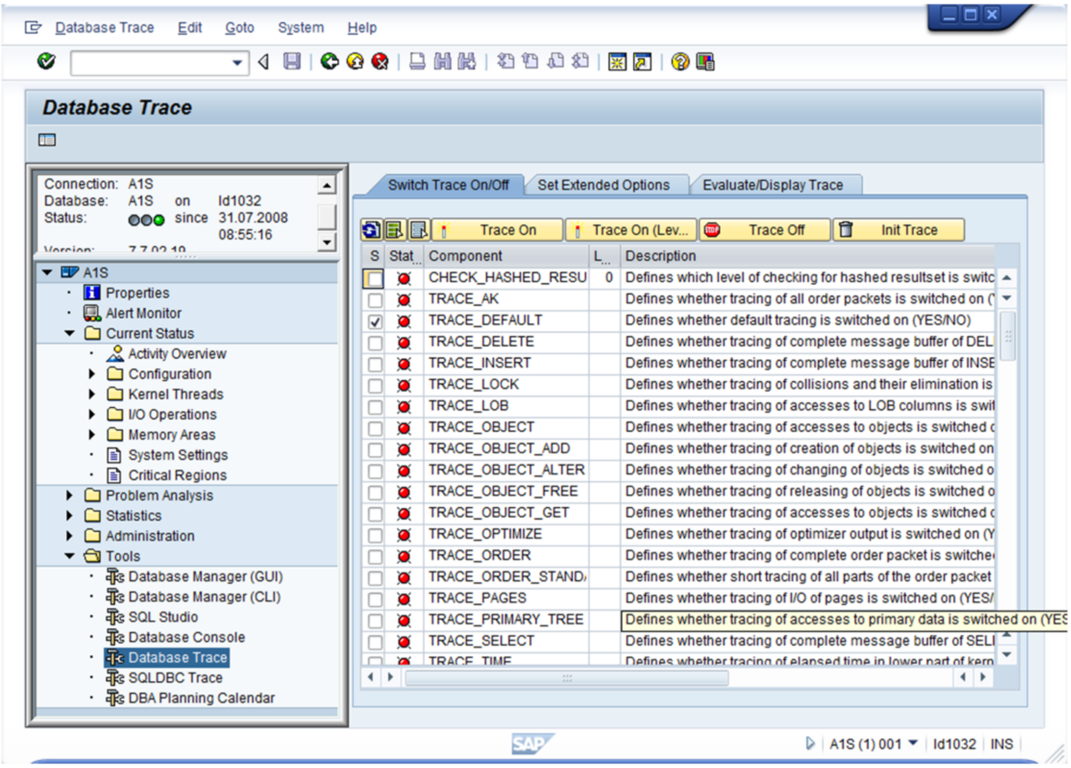
Kernel Trace (4)



You can display the contents of the Vtrace via the menu path ***‚Check -> Files -> Kernel Trace Protocol‘***

Even if you can find the evaluated error using the search function, it is all but impossible for a customer to form an independent interpretation of this trace. Errors can be found here only with knowledge of the source code. Thus the trace file should be provided to development.

DB50: Problem Analysis – Kernel Trace (1)



Administering the kernel trace (vtrace) can also be done with transaction db50.

Initialize Trace: If you want to be sure that only subsequent database actions are logged, choose ***'Init Trace'.***

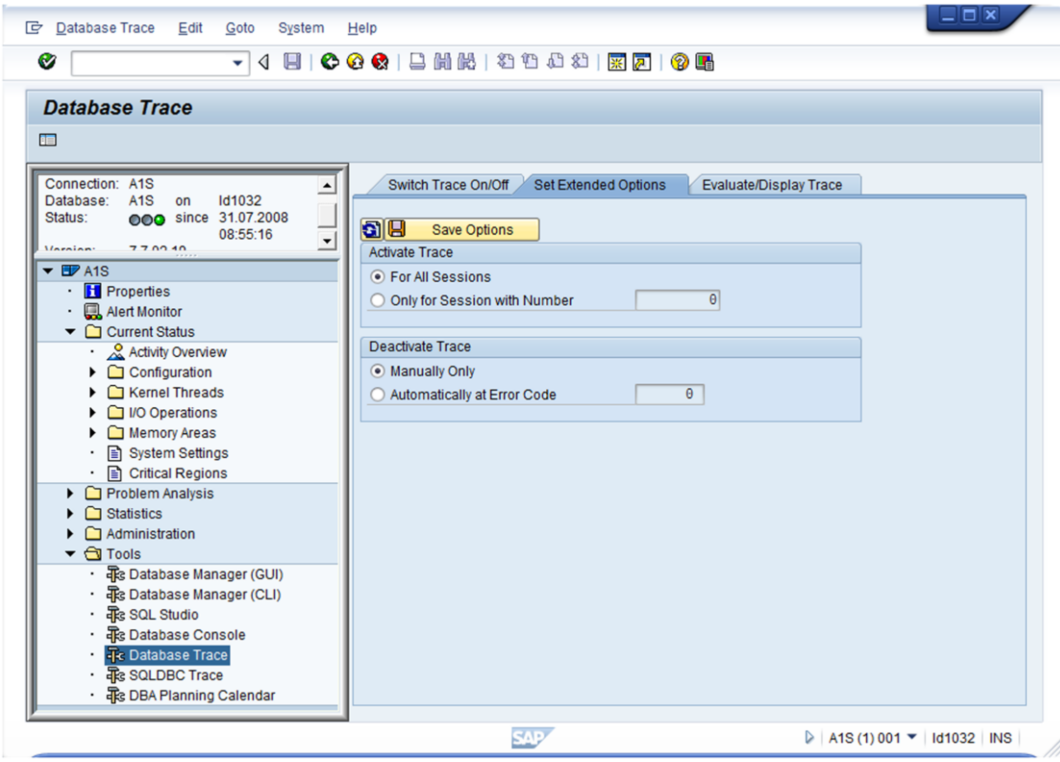
Activate Trace: To activate the trace, first choose your trace options, (usually default options) and then ***'Trace On'.***

You can activate more trace options while the trace is running by selecting them and choosing ***'Trace On'*** again.

Then the program that received the short dump, for example, is restarted.

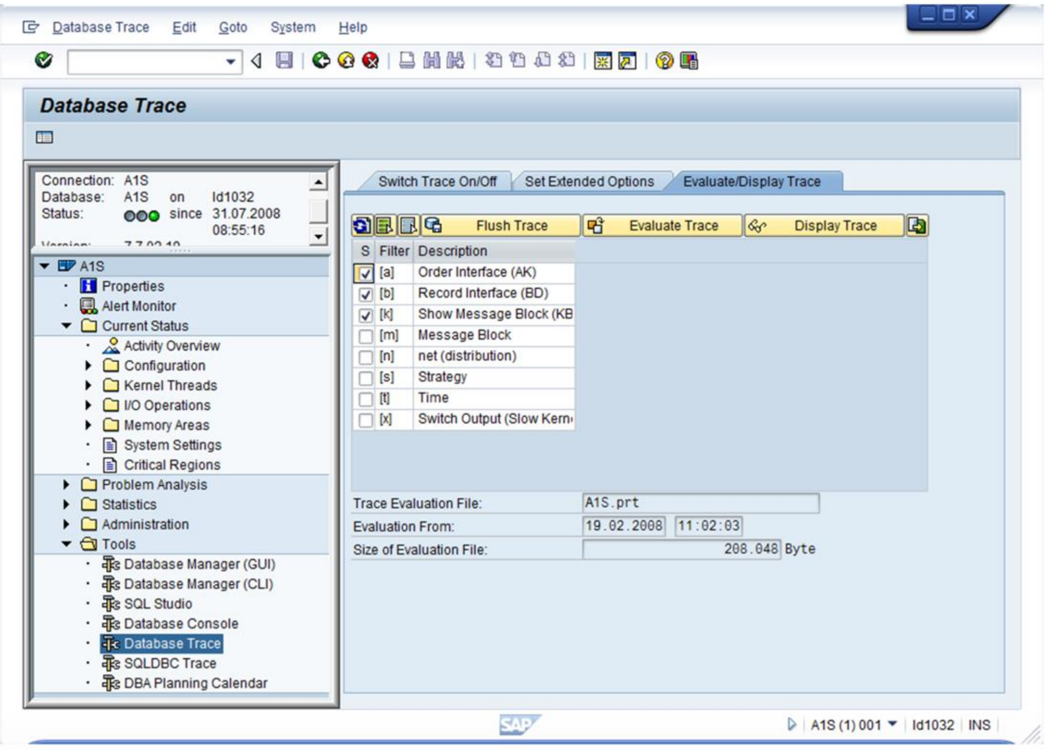
The "Status" column shows whether the trace is currently activated, and with which options. The activated options are displayed in green.

DB50: Problem Analysis – Kernel Trace (2)



On the ***'Set Extended Options'*** tab, you can determine whether the kernel trace should be written only for a selected session and whether it should be stopped automatically in case of a selected error code in order to prevent overwriting.

DB50: Problem Analysis – Kernel Trace (3)

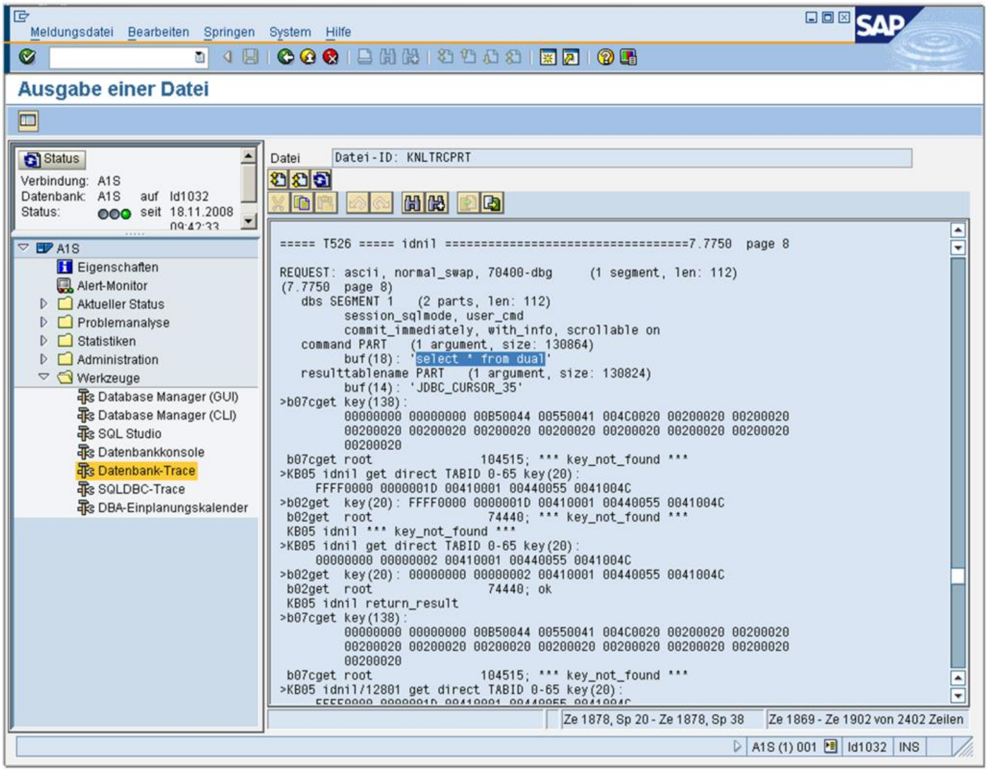


When the program you want to check has been terminated, the Vtrace has to be flushed so that the information in the buffer is written to the disk.

Flush Trace Buffer : To analyze the trace, choose ***‚Flush Trace‘.***

Format Trace : To format the trace to a legible form, first select the desired layers and then ***‘Evaluate Trace‘***

DB50: Problemanalyse – Kernel Trace (4)



Display Trace : Immediate display can be effectuated with ***'Display Trace'***.

As the resulting file <SID>.prt can attain a considerable size, you can use the right-hand button to save to a local file.

The extracted trace is then read and analyzed by support and development. Knowledge about the source code is required for further interpretation.

knldump

Contains the global memory, e.g.:

- Lock lists, data cache, catalog cache, ...
- Administration structures of these caches

The file is created in the following ways:

- DIAGNOSE: by a user with DBA rights
- dbmcli: db_stop –dump
- when the database crashes

The file ‘knldump’ might become very huge. It contains binary data which can be transferred to a readable form with DIAGNOSE.

In case of crash or hanger situations due to manual interventions, the database generates a dump that contains the information from the global memory.

UNIX: No dump is written if the database crashes due to a UNIX signal.

The file ***knldump*** is stored in the run directory of the database ((default: <indepdatapath>/wrk/<SID>).

If there's not enough space in the filesystem here, for example, you can change the location and name of the file with the parameter KernelDumpFileName (_KERNELDUMPFILE).

As this is a binary file, displaying it with the Database Studio, DBMGUI or transaction db50 is not useful.

As default the parameter AbortHandlingMode is set to BacktraceOnly. This has the effect that MaxDB does not write a knldump in case of a crash; the output of a core file is also suppressed.

rtedump (1)

Status of the runtime environment in case of crash

- x_cons <SID> show all
- helps to identify previously active tasks
- detailed information about the individual tasks
- region statuses, suspend reasons, counter statistics

Additional analysis for KnlMsg output

No formatting necessary (legible file)

Storage in run directory

If a crash occurs, the status of the runtime environment is recorded in an ***rtedump***.

The data corresponds to that in the output of *x_cons <SID> show all*

The file can be viewed directly in a system editor; no further formatting with a tool is required.

The file ***rtedump*** is stored in the run directory of the database ((default: <indepdatapath>/wrk/<SID>). Location and name of the file can be changed with the setting for the parameter RTEDumpFileName (_RTEDUMPFILE).

Access via Database Studio: ***Diagnosis Files -> Runtime Environment Dump***

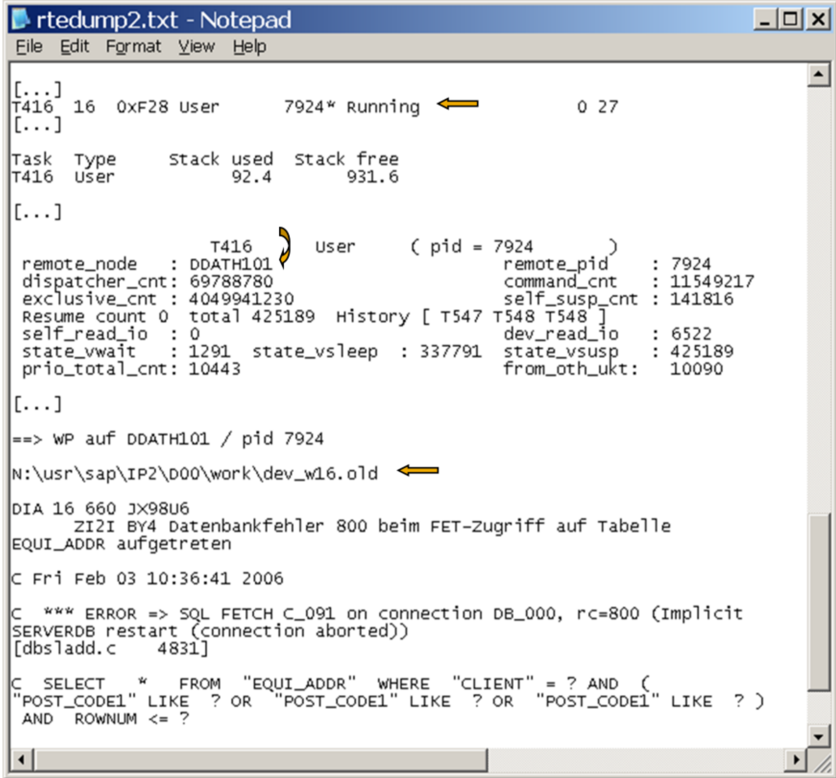
Access via DBMGUI: ***Check -> Diagnosis Files -> Runtime Environment Dump (RTEDUMP)***

Access via DB50: ***Properties -> Files -> RTEDUMP***

rtedump (2)

Example:

- Identification of the active task (status "Running")
- Detailed information about this task
- Identification of the affected application server
- If necessary, additional information in the system log as well as in the dev log tell you more about the triggering command.



rtedump2.txt - Notepad

```
[...]
T416  16  0xF28 User      7924* Running              0 27
[...]

Task  Type      Stack used  Stack free
T416  User            92.4       931.6

[...]

                  T416      User     ( pid = 7924        )
 remote_node    : DDATH101                      remote_pid    : 7924
 dispatcher_cnt: 69788780                       command_cnt   : 11549217
 exclusive_cnt : 4049941230                     self_susp_cnt : 141816
 Resume count 0  total 425189  History [ T547 T548 T548 ]
 self_read_io   : 0                             dev_read_io   : 6522
 state_vwait    : 1291  state_vsleep  : 337791  state_vsusp   : 425189
 prio_total_cnt: 10443                          from_oth_ukt:   10090

[...]

==> WP auf DDATH101 / pid 7924

N:\usr\sap\IP2\D00\work\dev_w16.old

DIA 16 660 JX98U6
      ZI2I BY4 Datenbankfehler 800 beim FET-Zugriff auf Tabelle
EQUI_ADDR aufgetreten

C Fri Feb 03 10:36:41 2006

C  *** ERROR => SQL FETCH C_091 on connection DB_000, rc=800 (Implicit
SERVERDB restart (connection aborted))
[dbsladd.c    4831]

C  SELECT   *   FROM  "EQUI_ADDR"  WHERE  "CLIENT" = ? AND  (
"POST_CODE1" LIKE  ? OR  "POST_CODE1" LIKE  ? OR  "POST_CODE1" LIKE  ? )
 AND  ROWNUM <= ?
```


In addition to the information from ***KnlMsg (knldiag)*** , the output of ***rtedump*** can be of use in analyzing crashes. This can be the case for a variety of reasons as this dump contains a plethora of information from the runtime environment. But these special cases will not be discussed further here.

An example is shown on the slide. ***rtedump*** can help identify the command that caused a crash by determining the tasks that were active at the time. They are in the *x_cons <SID> show task* part of the output and marked "Running". In the detailed information for each individual task you'll find the application server under “remote_node”. In the system log or the dev logs of this application server, commands are logged that led to some problem. Even if it cannot be guaranteed that the identified command was solely responsible for the crash, it is still worthwhile to try to reproduce the crash and (for instance with activated traces) determine the cause of the error.

*.bad, *.cor

Dump of corrupt pages

- Checksum error: *.bad
- Problem with page content identified: *.cor

Storage in run directory

Formatting done with x_diagnose

If corrupt pages are identified, they are written to the file system so they can be subjected to further analysis.

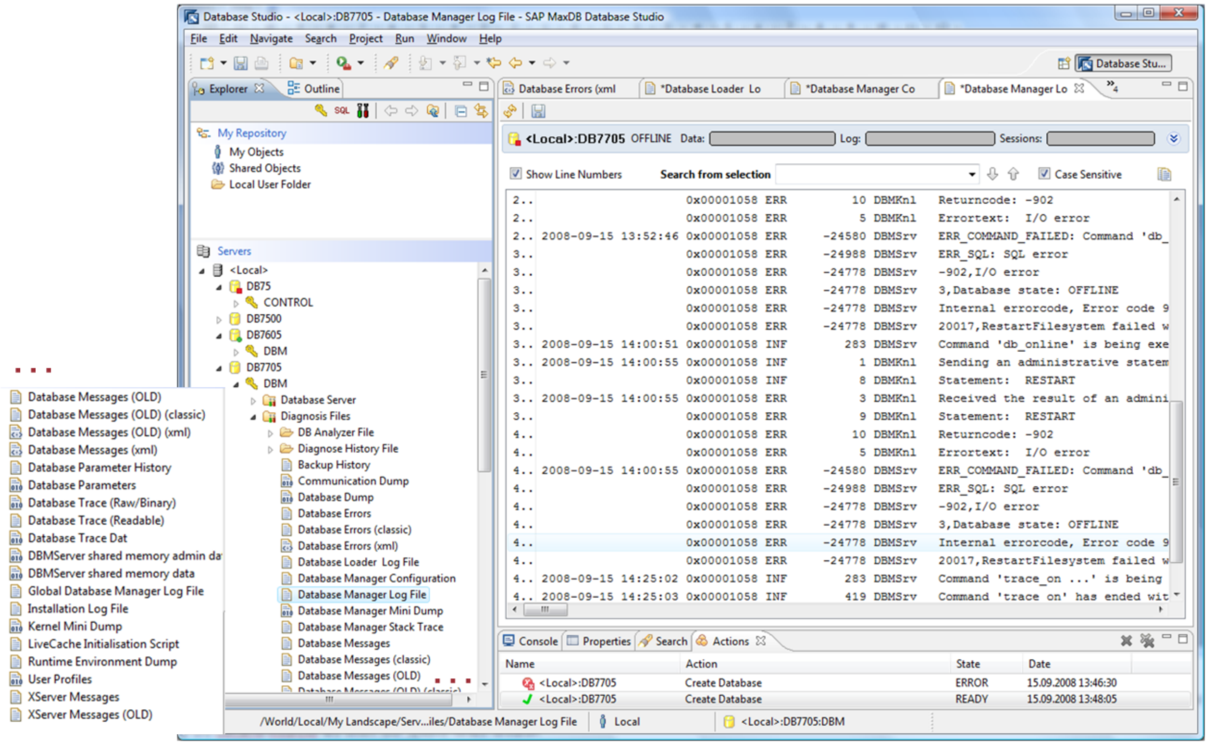
A corrupt page is dumped as a *.bad file if the I/O check found an error while importing a page (check sum error).

A *.cor file is generated if a content problem is identified with the available context knowledge while working with a page in the cache.

The files are generated in the run directory of the database ((default: <indepdatapath>/wrk/<SID>.

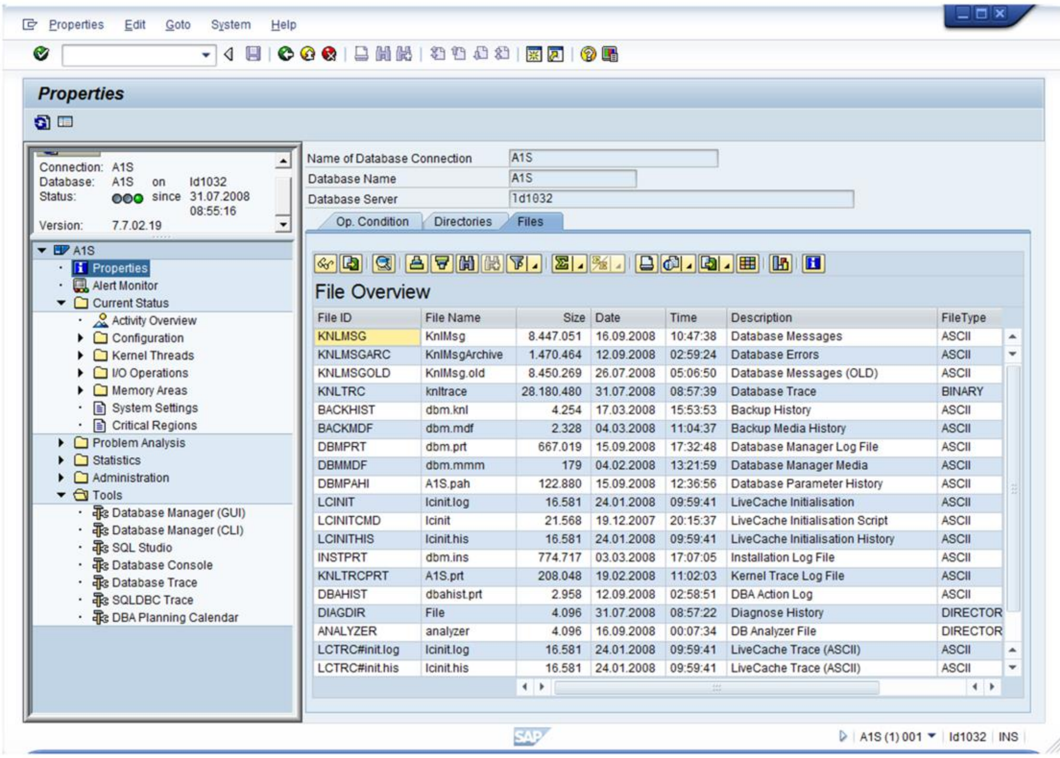
As these are binary files, display with Database Studio, DBMGUI or transaction db50 is not useful. Evaluation is done with the tool x_diagnose.

Database Studio – Access to Diagnosis Files



With Database Studio you can access via context menu for the selected database to the presentable diagnosis files. Binary files like Database Dump (knldump) or Database Trace (Raw/Binary) cannot be displayed without former evaluation. The Kernel Messages (KnlMsg) files stored in XML format are directly shown in a readable form.

DB50 – Access to Diagnosis Files

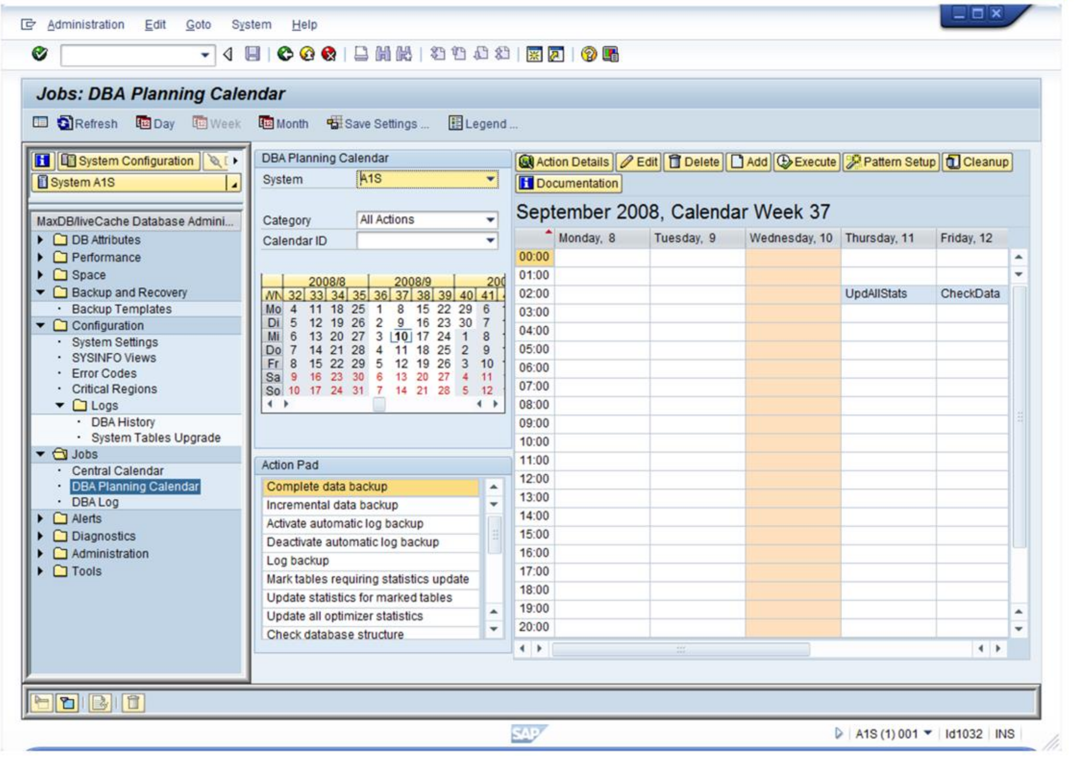


With SAP transaction db50, error diagnosis can be performed for a running (online) database using the SAPGUI. Which tool you use is a matter of personal preference; however, this redundance is often useful, for instance if only certain activity types or not all passwords for the various access types are available to you.

db50, then, also allows simple access to all diagnosis files of the database via the menu option *Properties* and the *Files* tab. Here you see an unarranged list; the actual contents of the most important diagnosis files are still located on the various menu paths.

Using transaction db59, you can administer multiple MaxDB and liveCache instances from a SAP WebAS.

DBACockpit – DBA Planning Calendar



As of WebAS version 7.0 the transaction DBACockpit can be used as a central tool for database administration. In addition to several administrative tasks that are also provided by transaction db50, in the cockpit the planning calender is maintained. Backup activities, update statistics and consistency checks can be scheduled here.

dbmcli

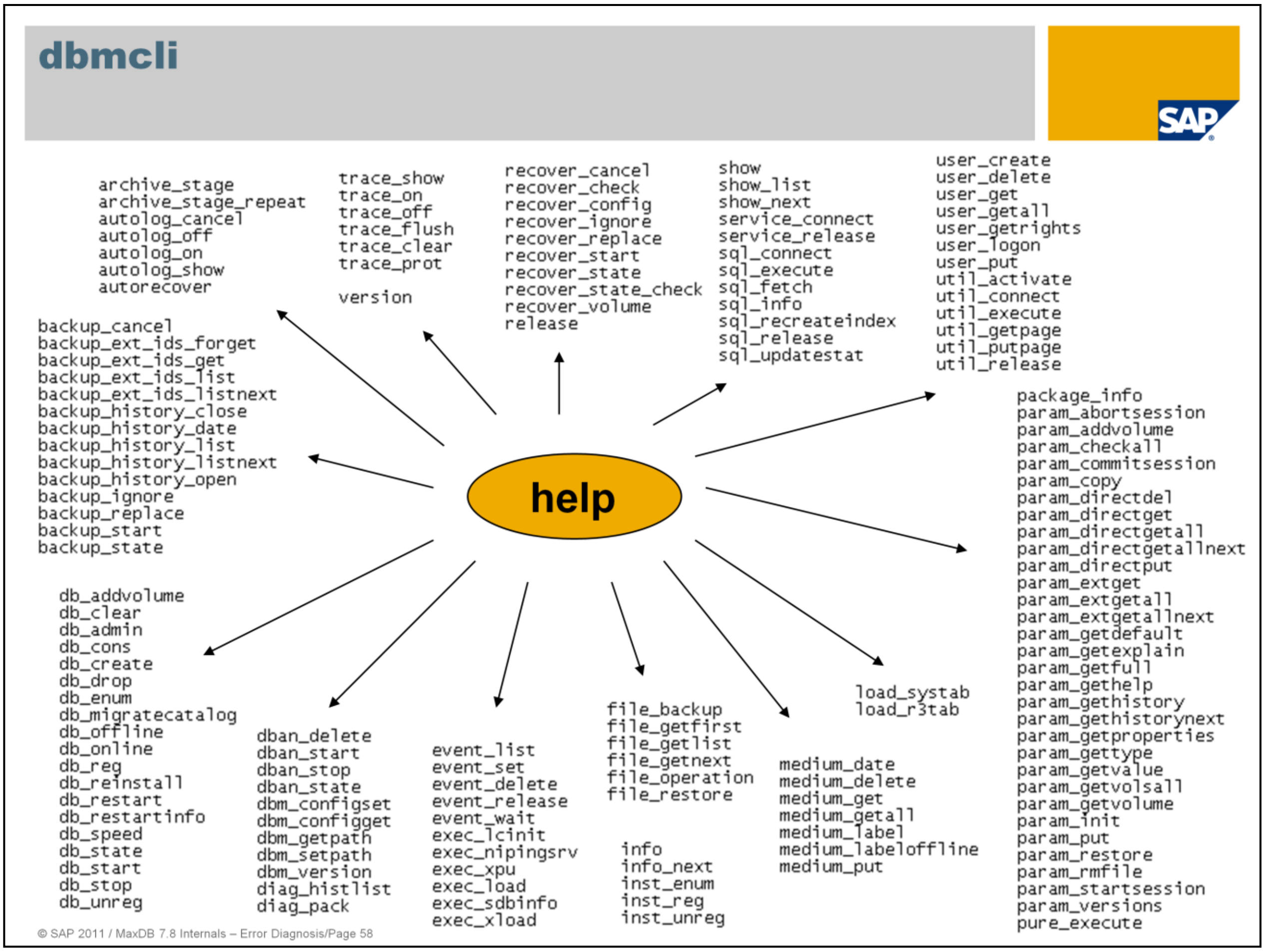
```
Command Prompt - telnet p34777
p34777:e30adm 87> dbmcli -help
usage: dbmcli [<options>] [[-c] <DBMServer-Command>]
    <options>:
        -u     username,passwd    (DBM user)
        -U     [userkey]          (default DBMUSR)
        -uUTL  [username,passwd]  (UTILITY session)
        -uSQL  [username,passwd]  (SQL session)
        -uSRV                     (Service session)
        -V                        (show version of server)
        -d     dbname             (set dbname)
        -R     dbroot             (set dbroot)
        -n     node               (name of servernode)
        -i     inputfile          (Default stdin)
        -ic    inputfile          (Default stdin)
        -o     outputfile         (Default stdout)
        -t     protocolfile       (writes subsequent protocol)
        -s                        (local mode, don't use with -n)
    <DBMServer-Command>:
        Everything after the options will be sent to DBMServer.
        For more information about the DBMServer-Commands use
        the DBMServer-Command help.

p34777:e30adm 88>
p34777:e30adm 88>
p34777:e30adm 88> _
```


dbmcli is used for line-based database administration work; the name is an acronym for Database Manager Command Line Interface.

It can be useful for short ad hoc queries in a telnet session or for use in scripts. For more extensive administration tasks, the DBMGUI is preferable as it initiates the action and does not require precise knowledge of the command sequences, which can be very complex.

Commands are sent to the DBM server, which processes the requests; the commands that have been sent are logged in the file ***dbm.prt*** .

The ***dbmcli*** allows you to open a utility or an SQL session, which means that SQL queries can be sent to a database in the online operational state. The utility session is meaningless and only exists because of compatibility reasons.



The ***dbmcli***, as the illustration makes clear, has an extensive range of functions. You can display the list of possible commands in a dbmcli session with ***help***. The help information contains additional information about which parameters have to be entered and what type of logon is required.

Some commands cannot be used alone, but only make sense as part of a command sequence.

dbmcli - Examples

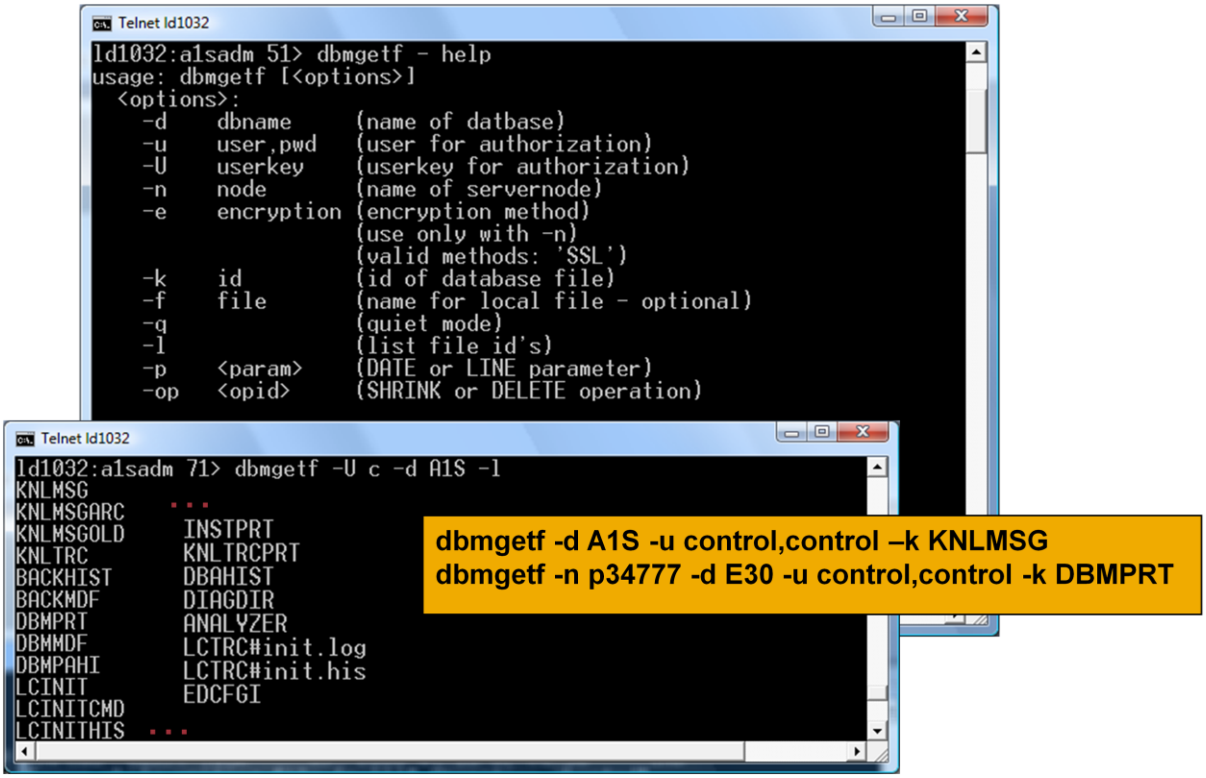
Select Command Prompt - telnet p34777

```
OK
State
ONLINE
p34777:e30adm 56> dbmcli -u control,control -d E30 dbm_getpath IndepDataPath
OK
/sapdb/data
p34777:e30adm 57> dbmcli -u control,control -d E30 param_directget RUNDIRECTORY
OK
RUNDIRECTORY    /sapdb/data/wrk/E30
p34777:e30adm 58> dbmcli -u control,control -d E30 version
OK
version,os,dbroot,logon,code,swap
"7.4.3","UNIX","/sapdb/E30/db",False,ASCII,2
p34777:e30adm 59> dbmcli -u control,control -d E30 param_gethelp LRU_FOR_SCAN
OK
Specification of scan performance in the data cache
p34777:e30adm 60> dbmcli -u control,control -d E30 -uSQL sape30,sap sql_execute
"select * from messages where msgno = -9026"
OK
END
-9026;'ENG';'System error: BD Bad datapage'
p34777:e30adm 61> dbmcli -u control,control -d E30 medium_get Data_tmp
OK
Data_tmp        /tmp/E30.backup FILE    DATA    0       8       YES     NO
        20030612182306  20030612182306
p34777:e30adm 62> dbmcli -u control,control -d E30 db_speed
OK
Speed
FAST
p34777:e30adm 63>
```


The examples show some commands that are useful for diagnosis; these are stand-alone commands that can provide an initial overview of the situation.

In command 60, in addition to logging on with the DBM operator, you must also specify a user authorized to access database objects.

dbmgetf

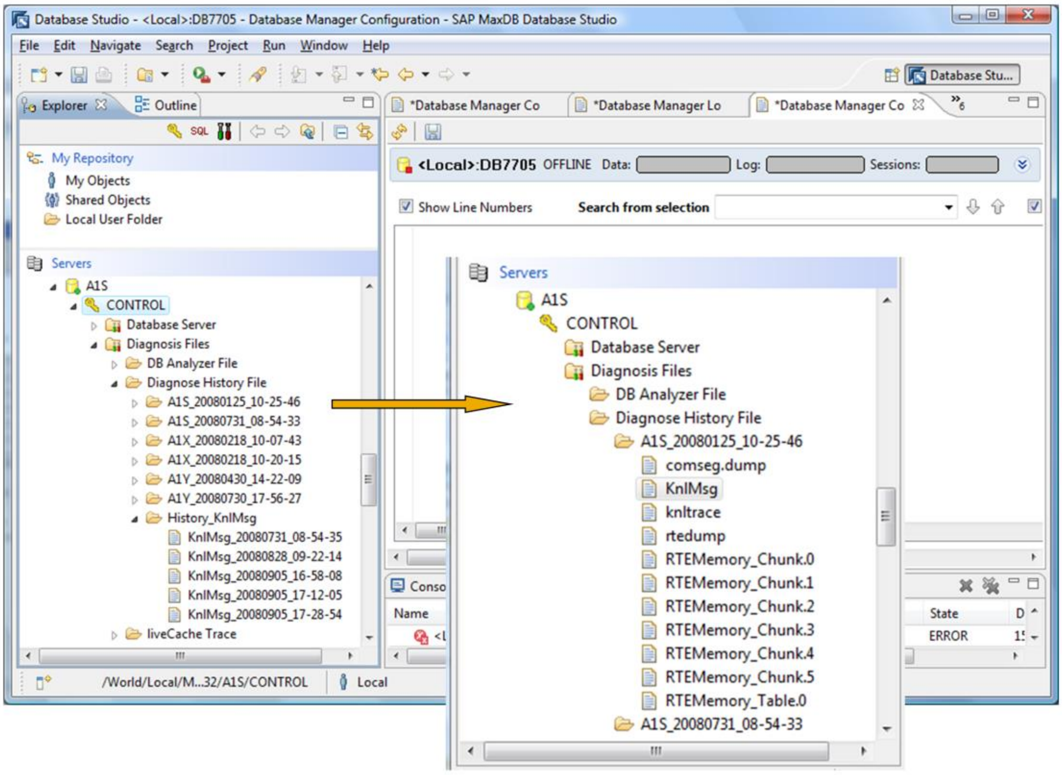


dbmgetf is a tool that enables quick access to log files, for instance in a telnet session. It is mainly used internally since, in general, the GUI-supported display options are more convenient.The KnlMsg files are automatically transformed to a readable format.

With the -n option, you can specify a computer on which you want to enable remote access.

The log files are not addressed by the names stored in the operating system, but rather by abbreviations, which can be displayed using the -l option.

DIAG_HISTORY



There is an automatic procedure for receiving important information about crash situations.

The following files do not have to be explicitly backed up after a crash since they are automatically copied to a backup directory:
KnlMsg (knldiag), knltrace, knldump, rtedump, *.dmp, *.buf, *.stm

If the database recognizes that it is being restarted after a crash, then the necessary files are backed up to a directory with the following naming convention:

- *<DB-NAME>_<DATUM>_<ZEIT>,* e.g.: *S10_20001114_12-09-45*

The backed up diagnosis files are deleted from the original directory.

The backup directory is under the directory **DiagnoseHistoryPath (DIAG_HISTORY_PATH)** (which must be configured) and is referred to as the history in the following.

You can also configure the number of histories with parameter **DiagnoseHistoryCount (DIAG_HISTORY_NUM).** If you exceed this number of histories, then the oldest history is deleted when a new backup is made.

The database can still be restarted if a backup cannot be made correctly.

CHECK DATA / CHECK TABLE

CHECK DATA [Options]

- Checks structural consistency of the whole database. If no errors are found, „bad flags" in the so-called filedirectory and the root page are reset.

CHECK TABLE <OWNER>.<TABLENAME> [Options]

- Checks all pointers within the specified table tree.

Mirroring

- If data volumes are mirrored by means of the operating system or by hardware, the database cannot influence which disk is used for reading pages. CHECK TABLE may not find any errors.

Errors

- If CHECK TABLE delivers an error, hardware problems must be solved and a backup must be restored.

Check Data (previously Verify) checks the structural consistency of the entire database. It considers tables as well as indexes and LOB columns.

The semantics of the data model is not taken into account. Logical errors are not found, but only errors caused by hardware defects.

Every page contains a check number. This is calculated with each read-I/O and compared with the value stored on the page. If the values are different, there is an error.

One typical error that may be detected is BAD DATA PAGE.

Check Table checks all dependencies and links within the specified table tree. Indexes are not taken into account.

CHECK Options

CHECK DATA

- EXTENDED
  Extended check of the key sequence
- EXCEPT INDEX
  Indexes are not checked
- WITH UPDATE
  Execution in DB mode ADMIN
  Additional maintenance of the converter: page numbers with no references are removed.

CHECK TABLE

- WITH LONG CHECK
  Additional check of LONG columns
  Share lock is set

Another diagnosis option is calling

CHECK DATA EXTENDED.

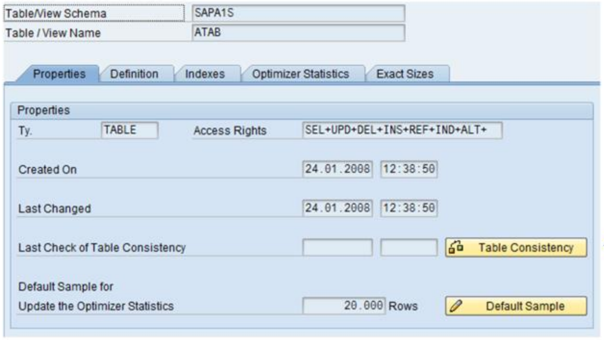
This performs a more precise check of the key lengths and checks the sequence of the primary keys on all levels of the B* tree. Because this option is CPU-intensive, execution was not standard in older versions. As of version 7.6.01 it is standard behaviour for CHECK DATA and CHECK TABLE, because CPU load can now be neglected due to the performance of modern CPUs.

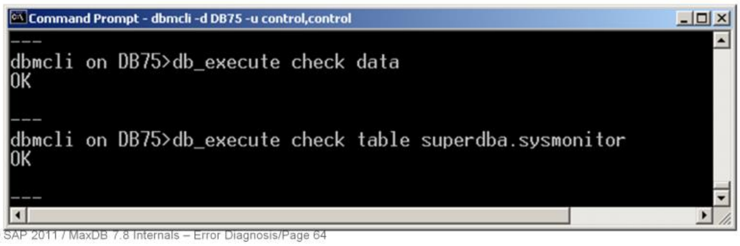
The option **WITH LONG CHECK** makes an additional check of BLOBs. As the name in older releases suggests, a lock is set on tables while the command is executed.

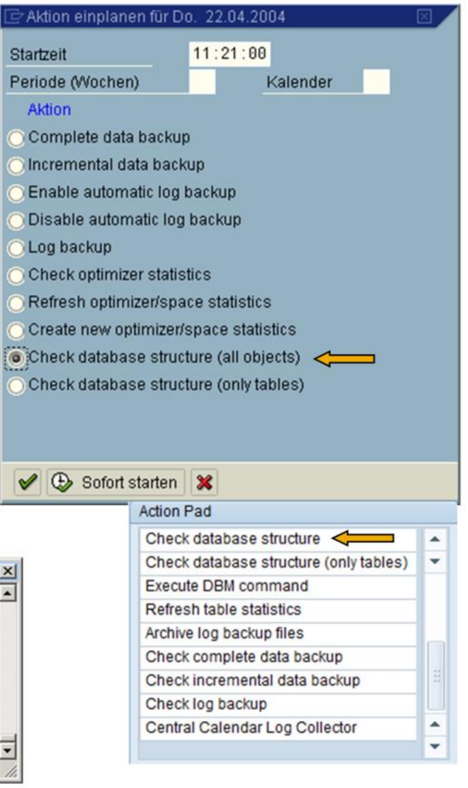
To save time when checking the database, you can use the option **EXCEPT INDEX**. Secondary indexes are not checked in that case.

Consistency Checks (1)

- Transactions DBACockpit, db13
- dbmcli: db_execute check data
- Check Table (f.e. via transaction db50 -> Tables/Indexes)







The structural consistency of the database can be checked in different ways.

If you choose **'*Check database structure (all objects)*'** transaction db13, all B* trees, including indexes, are checked. **‚*Check database structure (only tables)*'** checks only the tables.

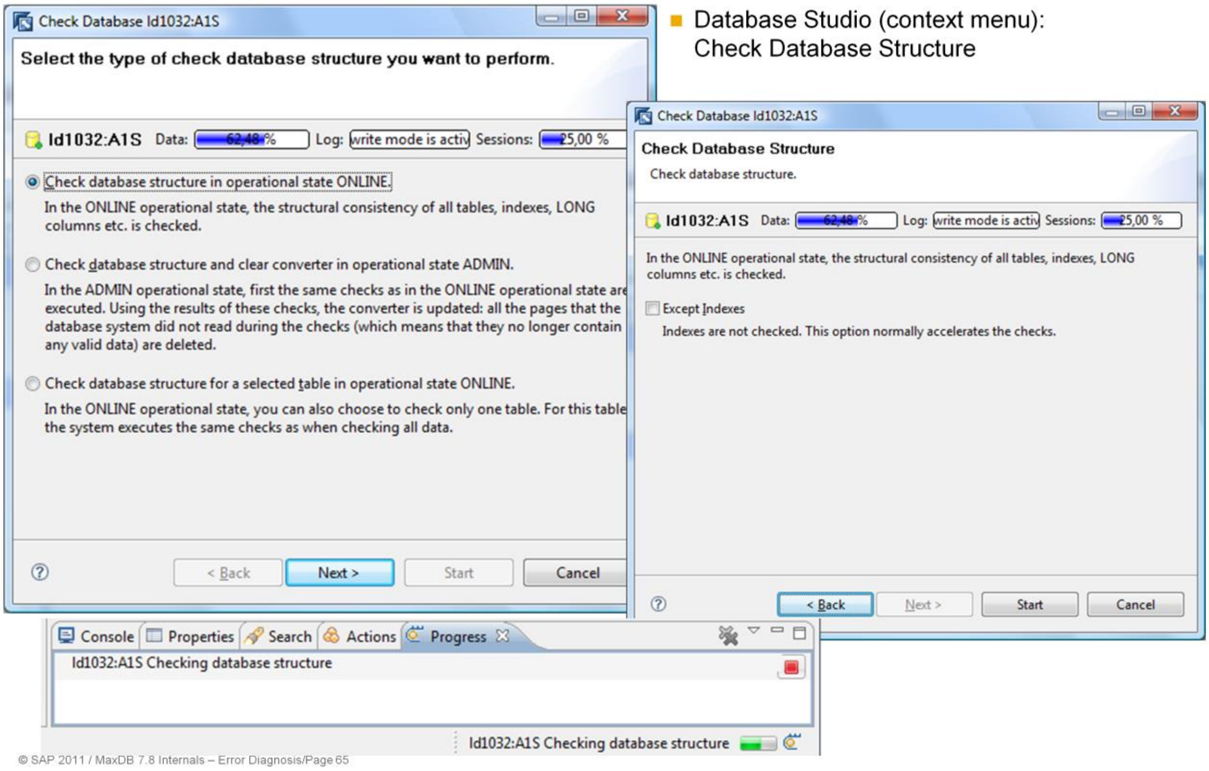
You can also start consistency checks with the dbmcli:
- dbmcli > db_execute check data (checks all tables and indexes)

- dbmcli > db_execute check table <owner>.<tablename> (selection of a table)

Transaction db50 enables you to select a table for which ‚*Check Table*' (see next slide) is then initiated.

Consistency Checks (2)

- Database Studio (context menu): Check Database Structure



In Database Studio choose ***‚Check Database Structure‘*** in the context menu of the database. There are different choices.

A consistency check can be executed in different operational states of the database. In ONLINE state the structural consistency of all tables, indexes and LOB columns is checked. In ADMIN mode additionally the converter is updated; pages with no more references are deleted.

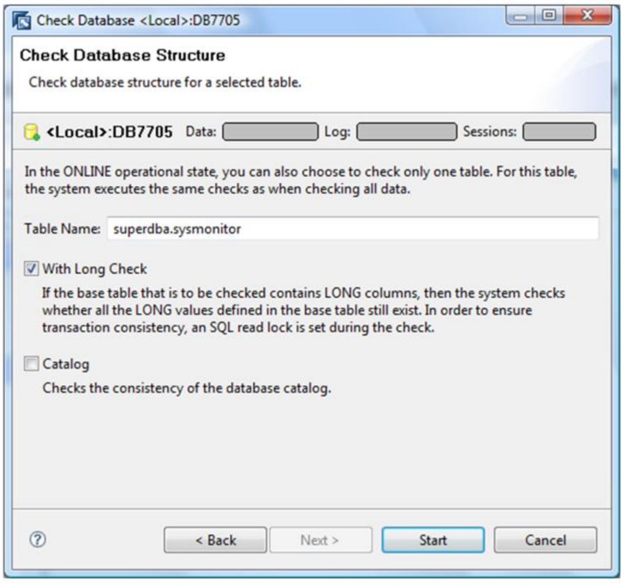
The check can be restricted to one table.

The amount of data to be checked can be restricted with the option ‚Except Indexes‘. As of version 7.6.01 an EXTENDED check is automatically done; so there is no more need for the database studio to provide this as an option.

Database Studio shows in the status information (Progress) that a CHECK DATA is executed right now. There is no feedback given if the execution was successful. In case of errors a popup is shown describing the first error.

A check of the database structure is time-consuming and CPU-intensive. For a productive system the check should be planned for times of low workload (f.e. on weekends) or. if possible, the check should be done on a separate system copy.

Consistency Checks (3)



The check can be restricted to a specified table.

With **CHECK CATALOG** the catalog information of a chosen table can be checked.

Consistency Checks (4) – Check Success

- dbm.prt

2004-11-30 11:11:31 0x000009c0 0 DBM command db_execute CHECK DATA
2004-11-30 11:17:37 0x0000079c 0 DBM command db_execute CHECK TABLE

dbm.prt - Notepad

File Edit Format View Help

```
2008-09-17 10:10:41 0x00001058 INF       419 DBMSrv   Command 'db_online' has ended with return code 0.
2008-09-17 10:15:00 0x00001058 INF         1 DBMKnl   Sending an administrative statement to the database
                    0x00001058 INF         8 DBMKnl   Statement:  CHECK DATA
2008-09-17 10:15:00 0x00001058 INF         3 DBMKnl   Received the result of an administrative statement from the database
                    0x00001058 INF         9 DBMKnl   Statement:  CHECK DATA
                    0x00001058 INF        10 DBMKnl   Returncode: 0
```

- KnlMsg

KnlMsg.prt - Notepad

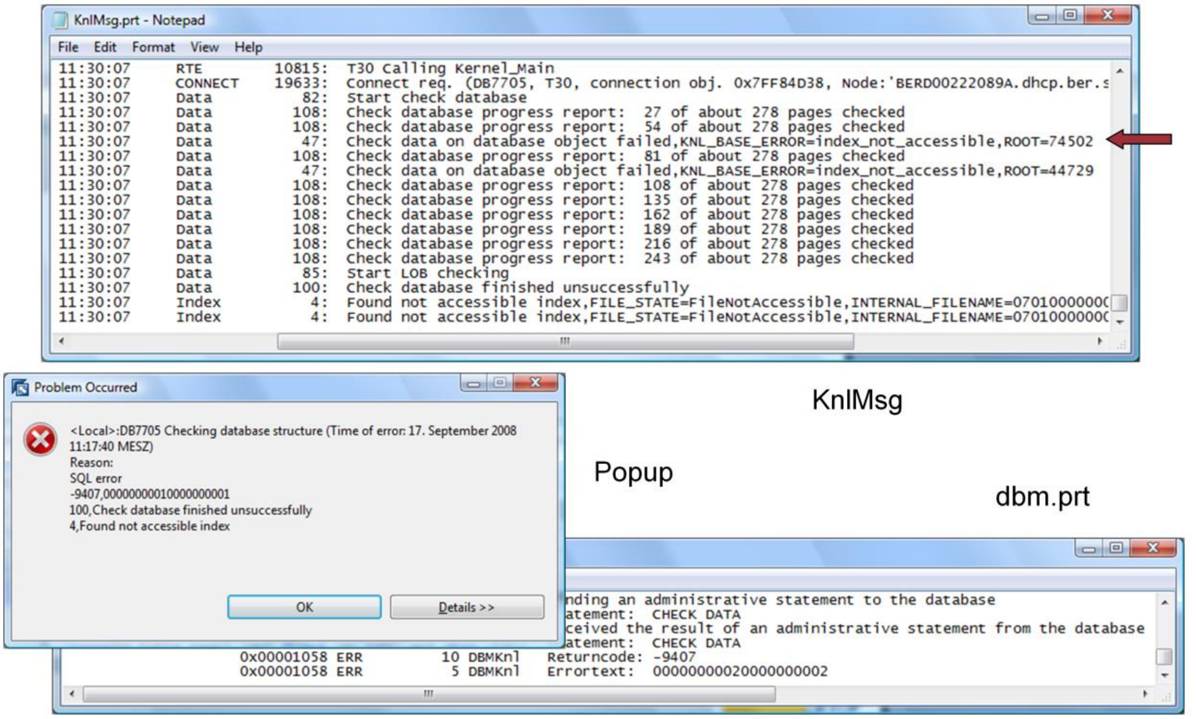
File Edit Format View Help

```
2008-09-17 10:15:00      RTE        10815:  T27 Calling Kernel_Main
2008-09-17 10:15:00      CONNECT    19633:  Connect req. (DB7705, T27, connection obj. 0x7FF81C18, Node:'BERI
2008-09-17 10:15:00      Data          82:  Start check database
2008-09-17 10:15:00      Data         108:  Check database progress report:  27 of about 274 pages checked
2008-09-17 10:15:00      Data         108:  Check database progress report:  54 of about 274 pages checked
2008-09-17 10:15:00      Data         108:  Check database progress report:  81 of about 274 pages checked
2008-09-17 10:15:00      Data         108:  Check database progress report:  108 of about 274 pages checked
2008-09-17 10:15:00      Data         108:  Check database progress report:  135 of about 274 pages checked
2008-09-17 10:15:00      Data         108:  Check database progress report:  162 of about 274 pages checked
2008-09-17 10:15:00      Data          85:  Start LOB checking
2008-09-17 10:15:00      Data         108:  Check database progress report:  189 of about 274 pages checked
2008-09-17 10:15:00      Data         108:  Check database progress report:  216 of about 274 pages checked
2008-09-17 10:15:00      Data         108:  Check database progress report:  243 of about 274 pages checked
2008-09-17 10:15:00      Data         108:  Check database progress report:  263 of about 263 pages checked
2008-09-17 10:15:00      Data          79:  Check database finished successfully
2008-09-17 10:15:00      CONNECT    19651:  Connection released (DB7705, T27, connection obj. 7FF81C18)
2008-09-17 10:15:00      RTE        10815:  T27 Kernel_Main returned
2008-09-17 10:21:45      Savepoint      1:  Savepoint (Time) started by T1
```


The successful end of CHECK DATA can be checked in ***dbm.prt*** or in file ***KnlMsg (knldiag).***

If in ***dbm.prt*** a returncode 0 is delivered the CHECK DATA was successful. In the ***KnlMsg*** at the end of the progress report a success message is written.

Consistency Checks (5) – Error Situation

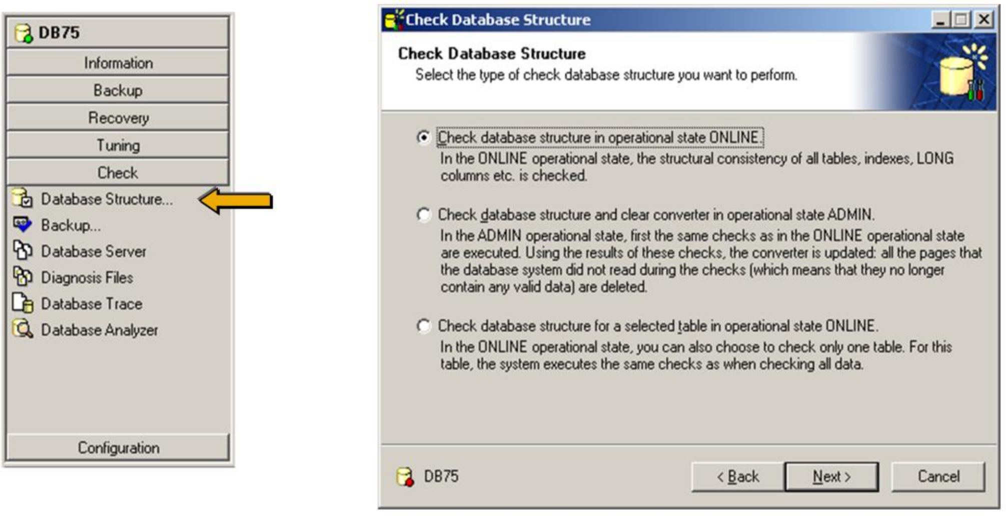


If in ***dbm.prt*** a returncode unequal to 0 is logged, there is an error situation and the defective data object has to be found out. The roots of the defective B* trees are listed in ***KnlMsg***.

At the end of CHECK DATA Database Studio opens a popup showing the first errror that occurred. Information about further errors has to be gathered from the diagnosis files.

Consistency Checks – DBMGUI (1)

- DBMGUI: Check -> Database Structure

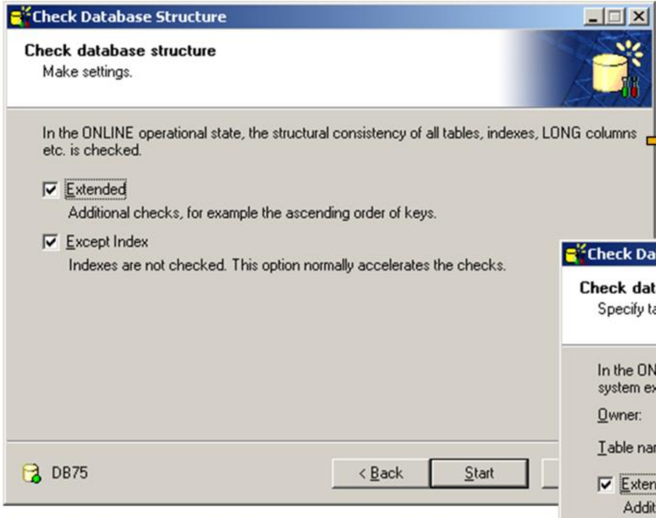


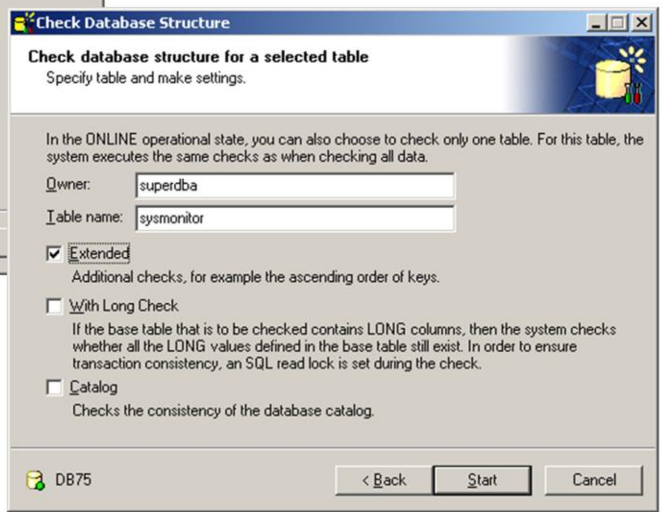
In the DBMGUI, choose ***Check -> Database Structure***. There are several options.

A consistency check can be done in various operational states. In the ONLINE operational state, the structural consistency of all tables, indexes, and LOB columns is checked. In the ADMIN operational state, the converter is also updated; pages that are no longer referenced are deleted.

The check can be restricted to a single table.

Consistency Checks - DBMGUI (2)





Different choices:

- Extended
- Except Index
- With Long Check
- Catalog

The selection options EXTENDED, EXCEPT INDEX, WITH LONG CHECK have already been explained.

CHECK CATALOG enables you to check the catalog information of a selected table.

Check Backup (1)

Backups are checked using a service database.

- No data is written to the disks.
- Service database merely occupies disk space.
- Check of parallel backups is possible.
- DBM command: recover_check

Check if the backup

- is complete
- has valid contents

Before you overwrite the backups of one generation, you should make sure that you have an intact backup.

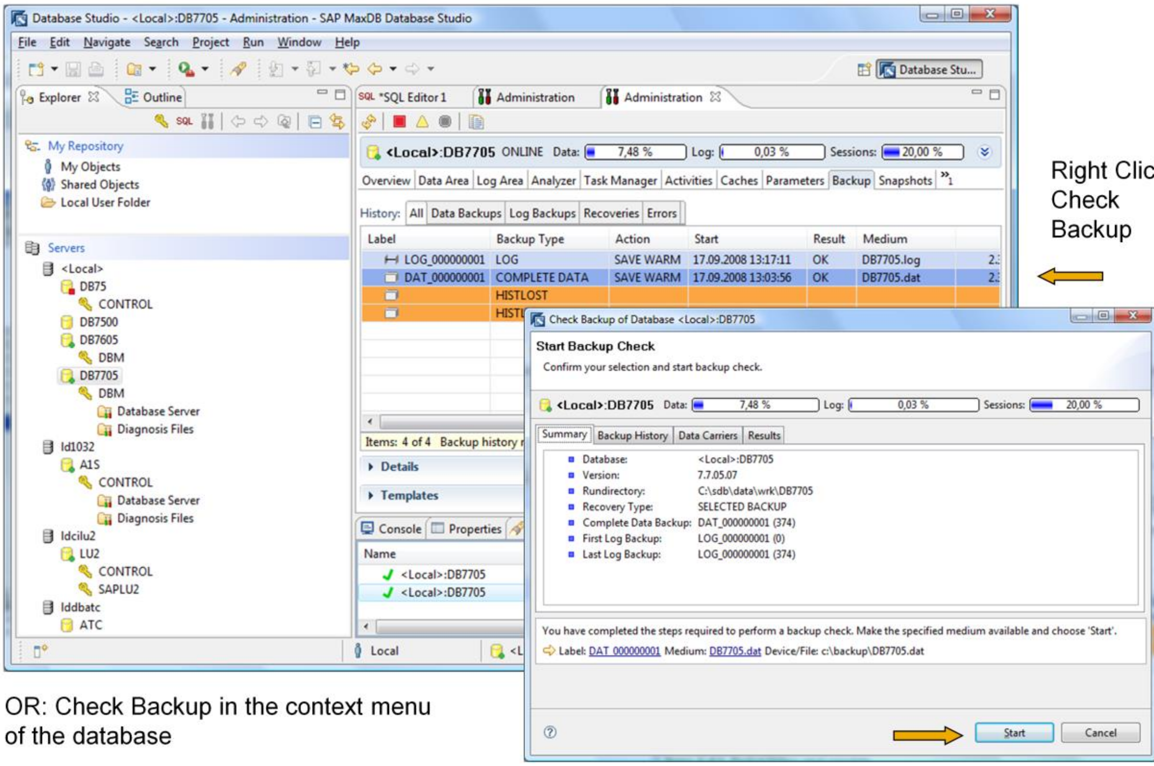
Since the check of a backup is executed on a special service database which merely uses disk space for log files, no resource bottleneck occurs.

The service database is automatically registered when a database instance is created and is stored under the name .M<version> (e.g.: .M750019).

(In older releases, the Name _SAPDB<SID> was used, though the name was shortened to 8 characters, so part of <SID> was lost.)

For a restore, the processes are logged in ***KnlMsg (knldiag)*** and the I/O can be monitored with x_cons.

Check Backup (2)



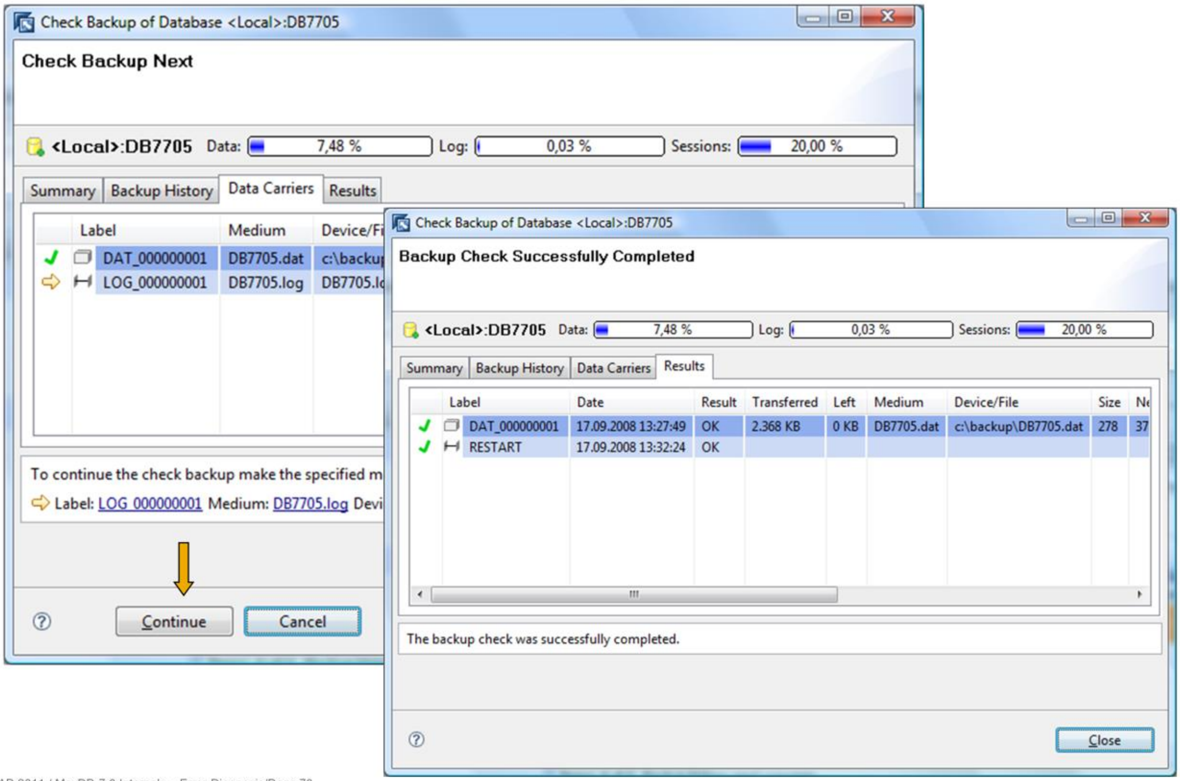
Right Click: Check Backup

OR: Check Backup in the context menu of the database

In the Database Studio, you can execute a check of a backup by choosing ***'Check Backup'*.**

Then you have to select the appropriate backup medium.

Check Backup (3)



A successful executiion of a ***Check Backup*** is marked with a green check mark. After the check of a data backup you will automatically be guided to the check of the corresponding log backups.

Examples of Problem Situations

- Connect problems
- Log full
- DB full
- Crash, Emergency Shutdown
- System hanger
- Restart problem
- Backup-/Restore problems
- System copy
- I/O problems
- System errors –9026, -9028

Connect Problems: Check with R3trans

```
d025448 on p: /sapmnt/home1/d025448
p34777:e30adm 64> setenv SQLOPT "-X"
p34777:e30adm 65> R3trans -d
This is R3trans version 6.07 (release 620 - 23.04.02 - 10:12:00).
2EETW169 no connect possible: "DBMS = ADABAS D                    --- DBNAM
E = ''"
R3trans finished (0012).
p34777:e30adm 66> more SAPDB.21710.pct
<html><head><meta http-equiv="Content-Type" content="text/html; charset=utf-8"><
/head><body ><PRE><PLAINTEXT>
PRODUCT : SAP DB C-PreComp Runtime
DRIVER  : /sapdb/programs/runtime/7301/lib/libpcr
VERSION : 7.3.1
BUILD   : 015-000-095-214

version   :P_1, P_2
SQL STATEMENT  :  FROM MODULE : dbslada            AT LINE : 5326
Statement Name : :0x000016
OUTPUT :  LZU  :  X32|LINUX 7.3.1     Build 015-000-095-106
OUTPUT :  PCR  :  C-PreComp 7.3.1     Build 015-000-095-214
START  :  DATE :  2004-04-20    TIME :  0017:45:40
END    :  DATE :  2004-04-20    TIME :  0017:45:40

SESSION    : 1;
DATABASE   : DB_000
USERKEY    : DEFAULT
SQLMODE    : SAPR3
SERVERDB   : E30
SERVERNODE: p34777
CONNECT "SAPXX              " IDENTIFIED BY :A  SQLMODE SAPR3  ISOLATION LEVEL 0
 TIMEOUT 0
SQL STATEMENT  :  FROM MODULE : dbslada            AT LINE : 7928
Statement Name : :0x000018
SQLCODE:   -4008      Unknown user name/password combination
SQLERRD(INDEX_5) : 1         SEC. FOR STATEMENT
START  :  DATE :  2004-04-20    TIME :  0017:45:40
END    :  DATE :  2004-04-20    TIME :  0017:45:41
```

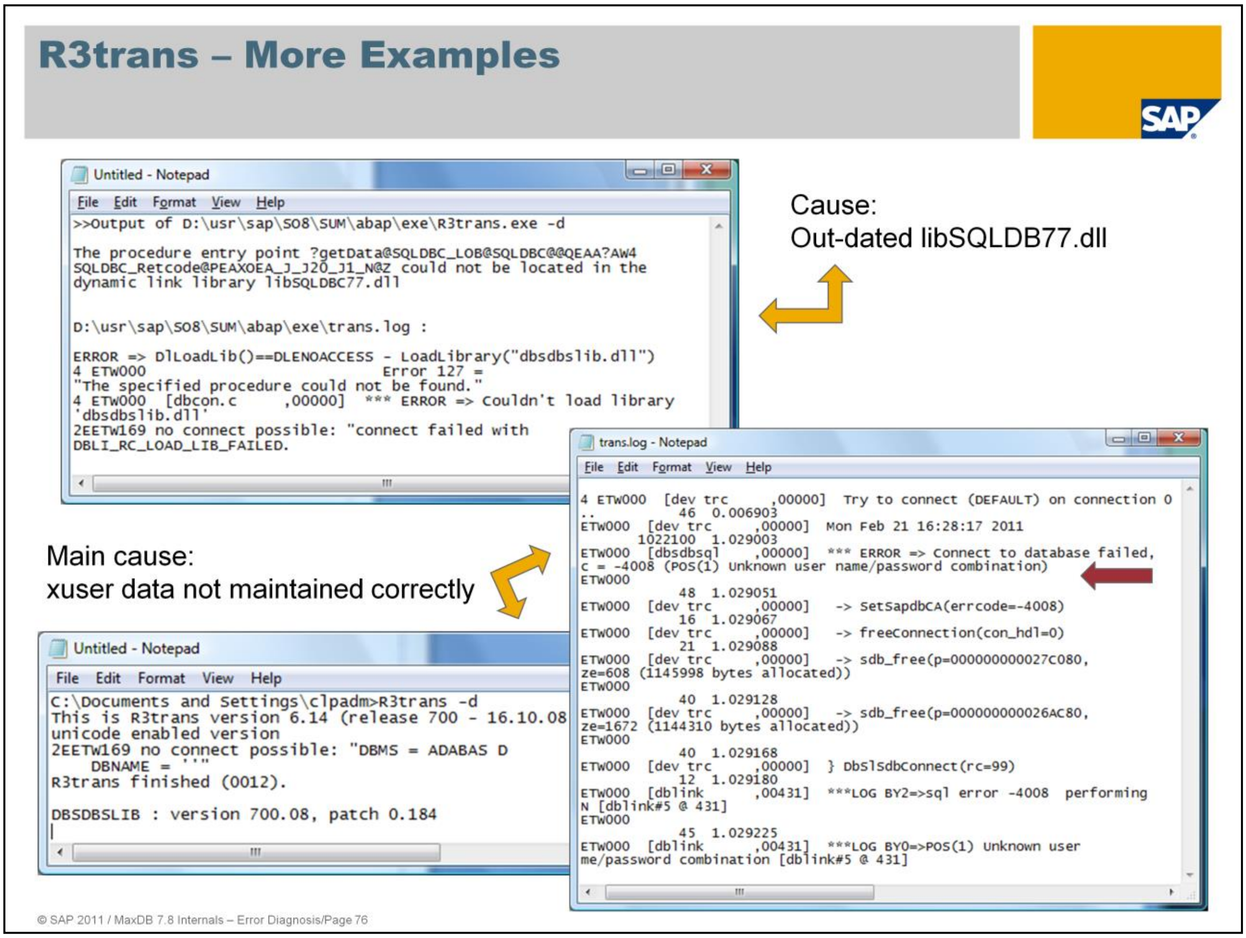

"Connect" problems can usually be reproduced quite easily with R/3trans. Call R3trans with option –d or –x.

The Precompiler Runtime of the database creates a trace if the variable SQLOPT contains the value "-X". The trace is written to the file SAPDB.<PID of the client process>.pct.

In this example either the user name or the password is incorrect. The user SAPXX is probably not correct.

Check the xuser specifications with the command "*xuser list*". Maintain the xuser data as described in note 39439.

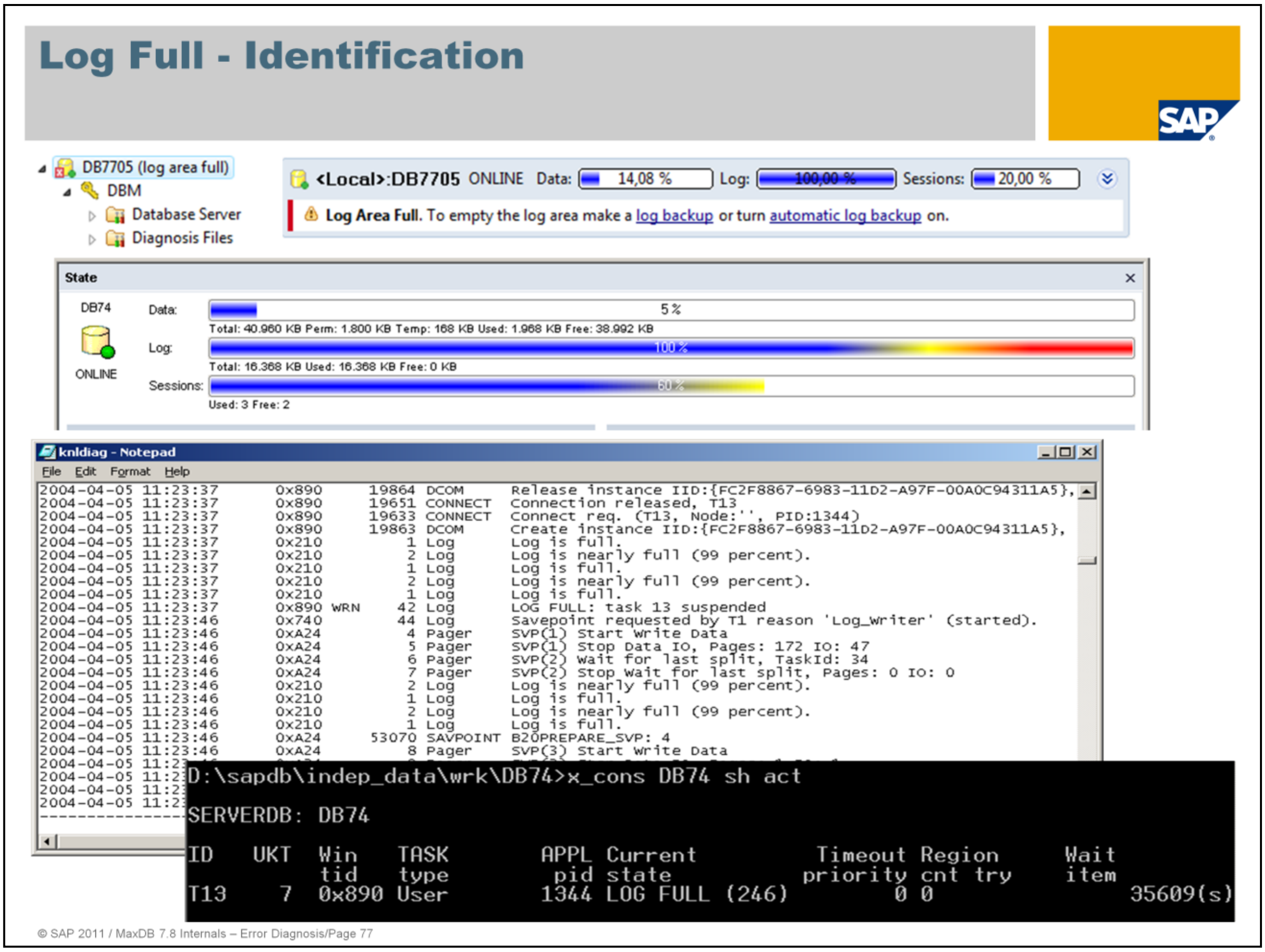
With "Connect" problems, it is often helpful to have a look in the dev logs (the ***dev_w**** files from the work directory in the SAP system).



For a few years the WebAS kernel uses the MaxDB client SQLDBC instead of the precompiler. To analyse the cause of connect problems here, too, the call of R3trans –d/-x is the adequate way to find out what‘s wrong.

If a connect request cannot be executed correctly in most cases errors in the xuser data are responsible for the problems.

R3trans –d creates a file trans.log providing more information about the cause of the problem.



A Log Full situation first manifests itself in that an hourglass is displayed for all dialog users who are performing change actions. This suggests that the database is at a standstill and the user tasks have been suspended.

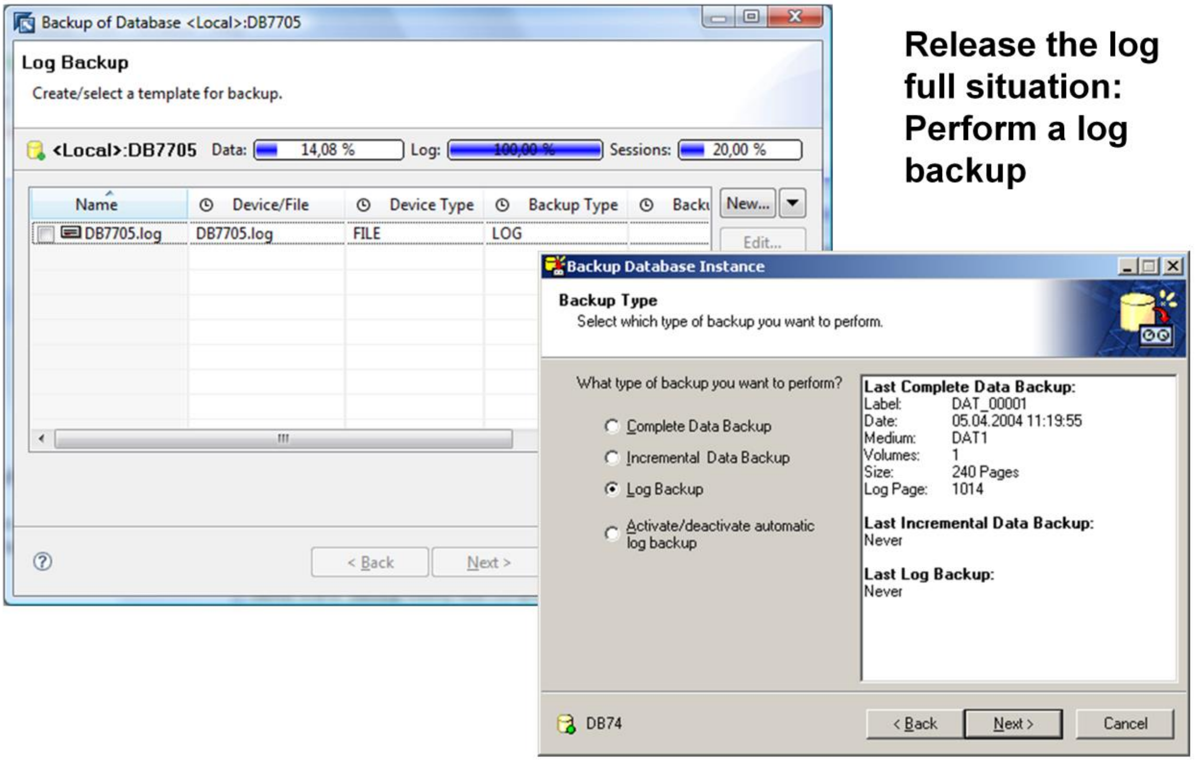
The Database Studio directly shows the state of the database next to the database name and additionally provides information about how to handle the error situation in the graphical representation of filling grades.

A quick glance in the DBMGUI shows that the log is 100% full, both in a bar and in text form.

Alternatively, ***KnlMsg/knldiag*** and x_cons offer the same information.

As a general rule, we recommend using automatic log backup, which usually keeps this situation from happening.

Log Full - Solution



Release the log full situation: Perform a log backup

A Log Full situation can **ONLY** be resolved by executing a log backup.

The Backup Wizard guides you through the required steps.

Adding a new log volume is NOT a possible way of solving the problem. As log volumes are cyclically overwritten, the pointer is usually 'somewhere in the middle' of the device and cannot jump to a new volume.

DB Full - Identification

```
D:\sapdb\indep_data\wrk\DB74>x_cons DB74 sh act

SERVERDB: DB74

ID    UKT  Win   TASK        APPL Current           Timeout Region      Wait
           tid   type         pid state             priority cnt try    item
T14     7  0x890 User        2104 db-full  (197)          0 0               43554(s)
```

knldiag - Notepad

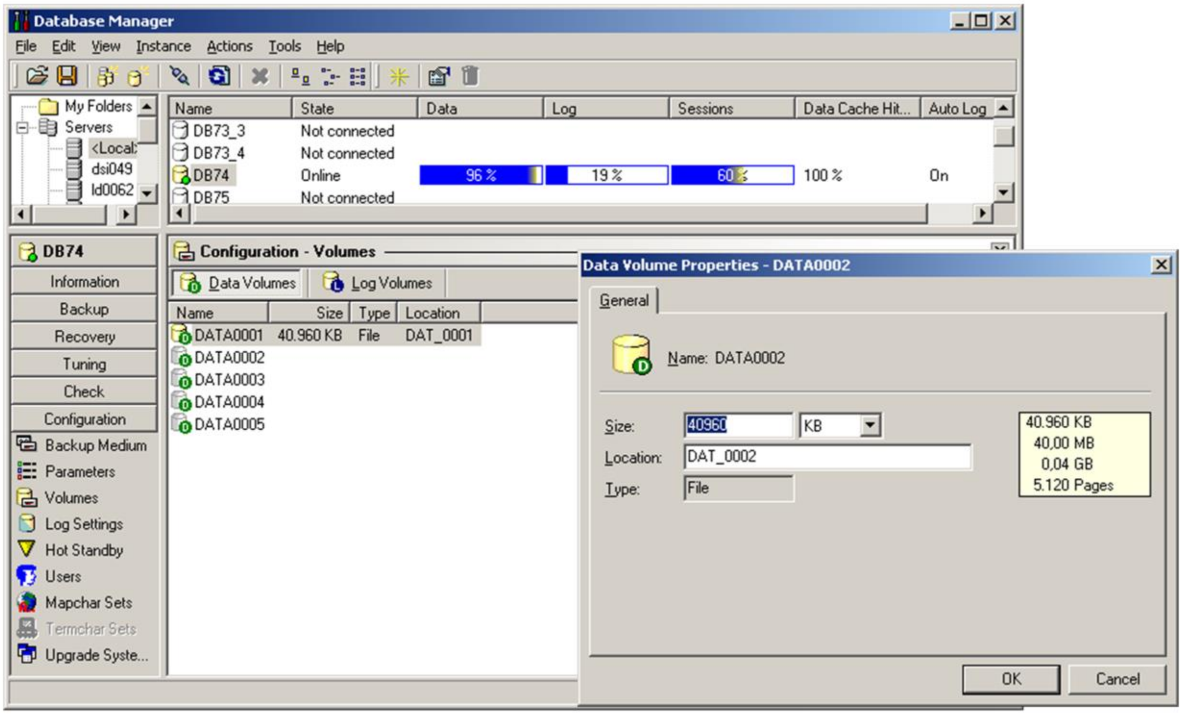
File Edit Format Help

```
2004-04-05 12:51:33      0xA24          8 Pager    SVP(3) Start Write Data
2004-04-05 12:51:33      0xA24          9 Pager    SVP(3) Stop Data IO, Pages: 1 IO: 1
2004-04-05 12:51:33      0xA24         10 Pager    SVP(3) Start Write Converter
2004-04-05 12:51:33      0x890      19633 CONNECT  Connect req. (T15, Node:'', PID:2532)
2004-04-05 12:51:33      0xA24         11 Pager    SVP(3) Stop Converter IO, Pages: 8 IO: 8
2004-04-05 12:51:33      0xA24      53071 SAVPOINT B20SVP_COMPLETED: 18
2004-04-05 12:51:33      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:33      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:33      0xA24      52024 AUTOSAVE 200 pages -> "d:\backup\db74.log.012"
2004-04-05 12:51:33      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:33      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:33      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:34      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:34      0xA24      52024 AUTOSAVE 696 pages -> "d:\backup\db74.log.012"
2004-04-05 12:51:34      0x948      19626 IO       Async I/O thread stopped, 'd:\backup\db74.log.012'
2004-04-05 12:51:34      0xA24      52031 AUTOSAVE ready
2004-04-05 12:51:34      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:34      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:34      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:34      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:34      0x890      19651 CONNECT  Connection released, T15
2004-04-05 12:51:34      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:49      0x890      19633 CONNECT  Connect req. (T15, Node:'', PID:2532)
2004-04-05 12:51:49      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:49      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:49      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:49      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:49      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:49      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:50      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:50      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:50      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
2004-04-05 12:51:50      0x890      19651 CONNECT  Connection released, T15
2004-04-05 12:51:50      0x890 WRN     39 Converte DB FULL(FBM): Task 14 suspended (45 pages changed
--------------------------------------------- current write position ----------------
```


A DB Full situation first manifests itself to the user exactly as it does with a Log Full. The user tasks are suspended and no further actions are possible.

Here too, the DBMGUI (without picture), ***KnlMsg/knldiag*** and x_cons provide information about the hang situation.

DB Full - Solution



To resolve a DB Full situation, you have to add another data volume.

To do this with DBMGUI, choose ***Configuration -> Volumes***'.

The DBMGUI generates default values for the new volume and directs the rest of the process.

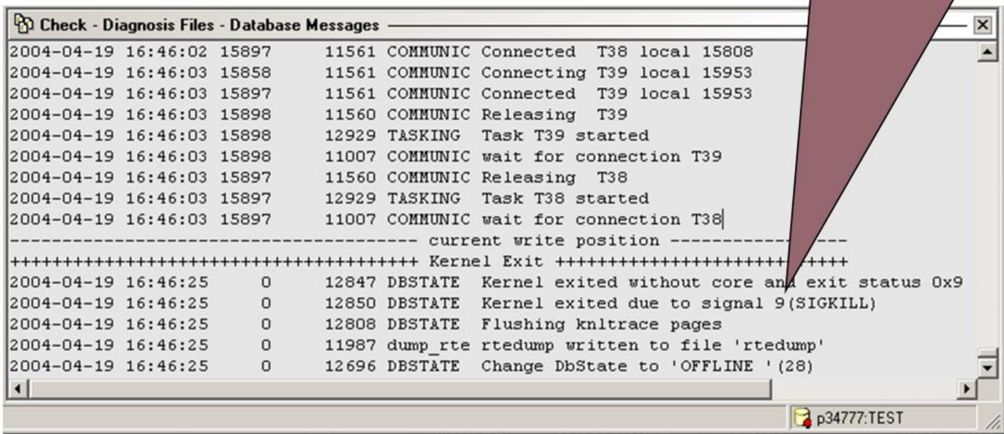
Choose ***Administration -> Data Area -> New*** in Database Studio to create a new volume.

This problem can be prevented by using the AUTOEXTEND functionality. If a defined filling grade is reached automatically a new volume is added.

Crash of the Database: kill

knldiag

Signal 9: A thread of the database has been killed with „kill –9“.

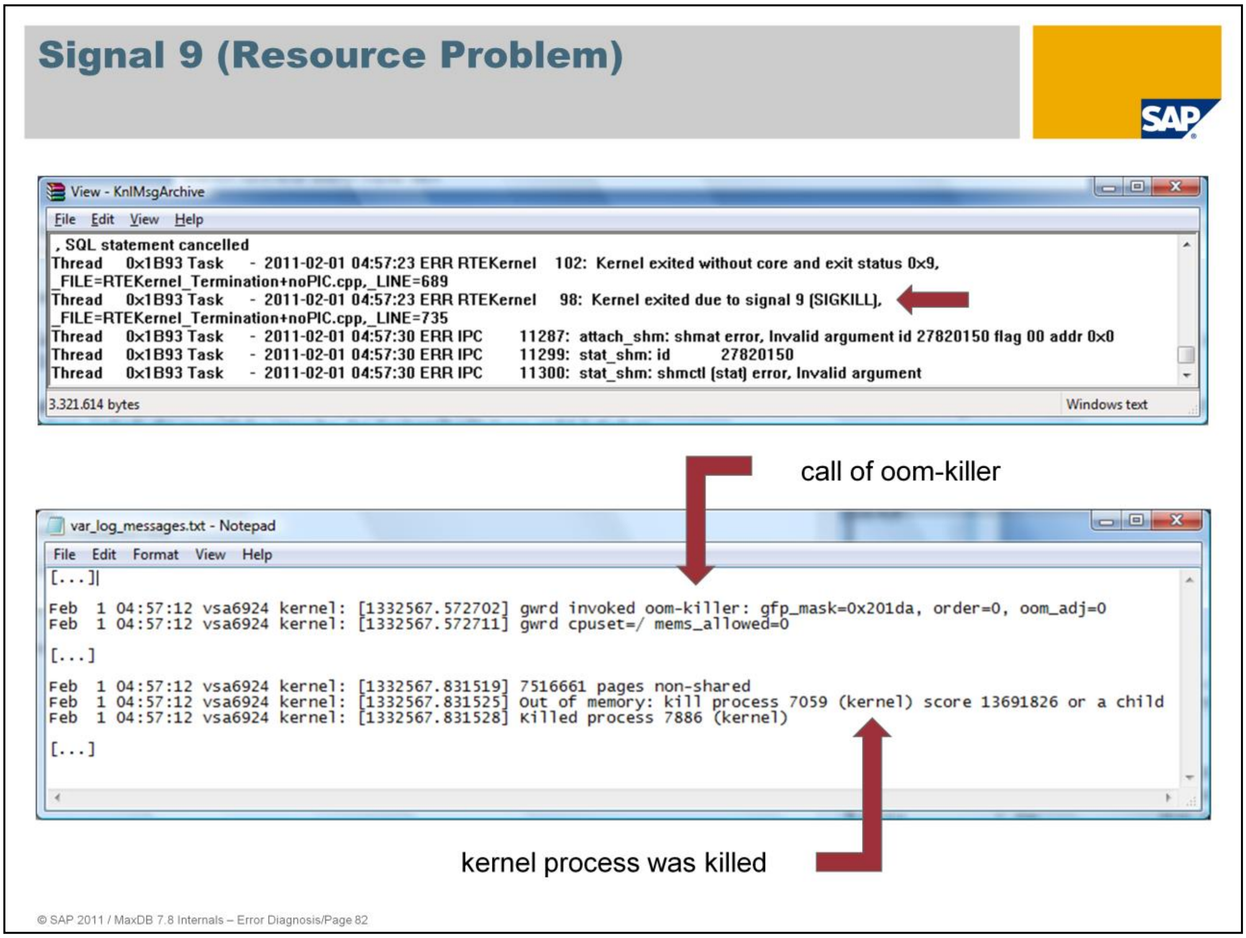


```
Check - Diagnosis Files - Database Messages
2004-04-19 16:46:02 15897      11561 COMMUNIC Connected  T38 local 15808
2004-04-19 16:46:03 15858      11561 COMMUNIC Connecting T39 local 15953
2004-04-19 16:46:03 15897      11561 COMMUNIC Connected  T39 local 15953
2004-04-19 16:46:03 15898      11560 COMMUNIC Releasing  T39
2004-04-19 16:46:03 15898      12929 TASKING  Task T39 started
2004-04-19 16:46:03 15898      11007 COMMUNIC wait for connection T39
2004-04-19 16:46:03 15897      11560 COMMUNIC Releasing  T38
2004-04-19 16:46:03 15897      12929 TASKING  Task T38 started
2004-04-19 16:46:03 15897      11007 COMMUNIC wait for connection T38
---------------------------------------- current write position ----------------------
++++++++++++++++++++++++++++++++++++++++ Kernel Exit +++++++++++++++++++++++++++++
2004-04-19 16:46:25     0      12847 DBSTATE  Kernel exited without core and exit status 0x9
2004-04-19 16:46:25     0      12850 DBSTATE  Kernel exited due to signal 9(SIGKILL)
2004-04-19 16:46:25     0      12808 DBSTATE  Flushing knltrace pages
2004-04-19 16:46:25     0      11987 dump_rte rtedump written to file 'rtedump'
2004-04-19 16:46:25     0      12696 DBSTATE  Change DbState to 'OFFLINE '(28)
p34777:TEST
```


The first place to look after a database crash is ***KnlMsg/knldiag***. In this example, the database process on Unix/Linux received signal 9. Signal 9 comes from "outside" and is not caused by the database. On Unix you can find a short description of the signals in the file /usr/include/sys/signal.h. Linux stores these definitions in /usr/include/bits/signum.h.

Interesting signals:

- SIGILL 4 /* Illegal instruction (ANSI). */
  This signal comes from outside and implies a hardware problem.
- SIGABRT 6 /* Abort (ANSI). */
  Termination without further information.
- SIGKILL 9 /* Kill, unblockable (POSIX). */
  Process/thread was terminated with kill.
- SIGBUS 10 /* bus error */
  Error predominantly in the bus system; usually an error in the database software.
- SIGSEGV 11 /* Segmentation violation (ANSI). */
  Memory overwrite; usually an error in the database software.

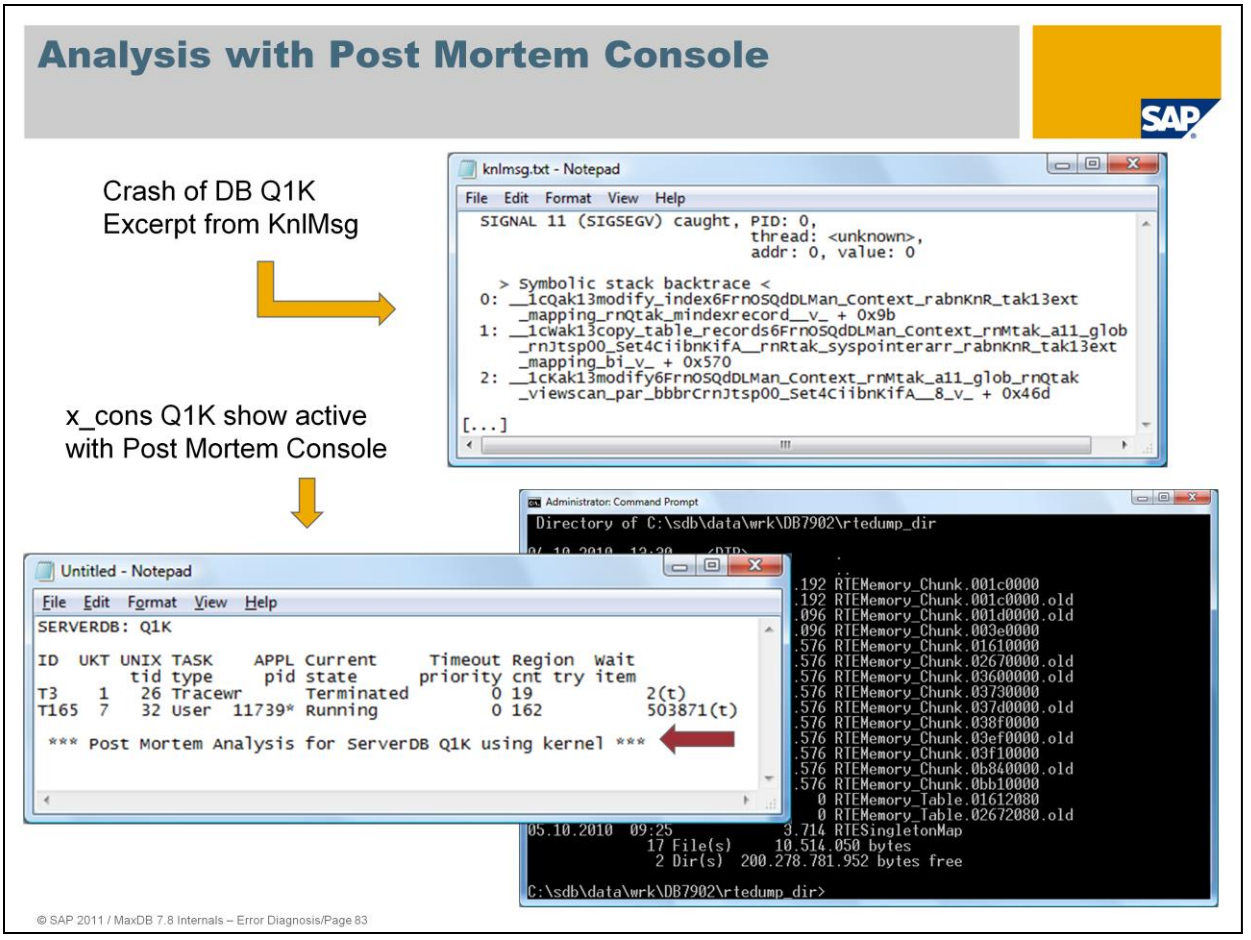


On some operating systems tools make sure to provide resources in situations with not enough memory for all running applications by killing some processes which are using a large amount of memory.

Under Linux, f.e. this is the so-called oom-killer (out of memory).

In the ***KnlMsg*** you will also find a crash with signal 9. For verification that an operating system tool caused the crash you have to look into the file /var/log/messages. You will find an entry at the same time that a process intentionally was killed because of lack of resources.

To prevent those crashes make sure to enhance the memory or reduce the number of running processes. If you switch off the mechanism you might prevent the „kill“ but the real problem of overcharging the machine still persists.



To provide more analysis information after a crash situation the so-called post mortem console has been introduced. It can only be used on UNIX systems.

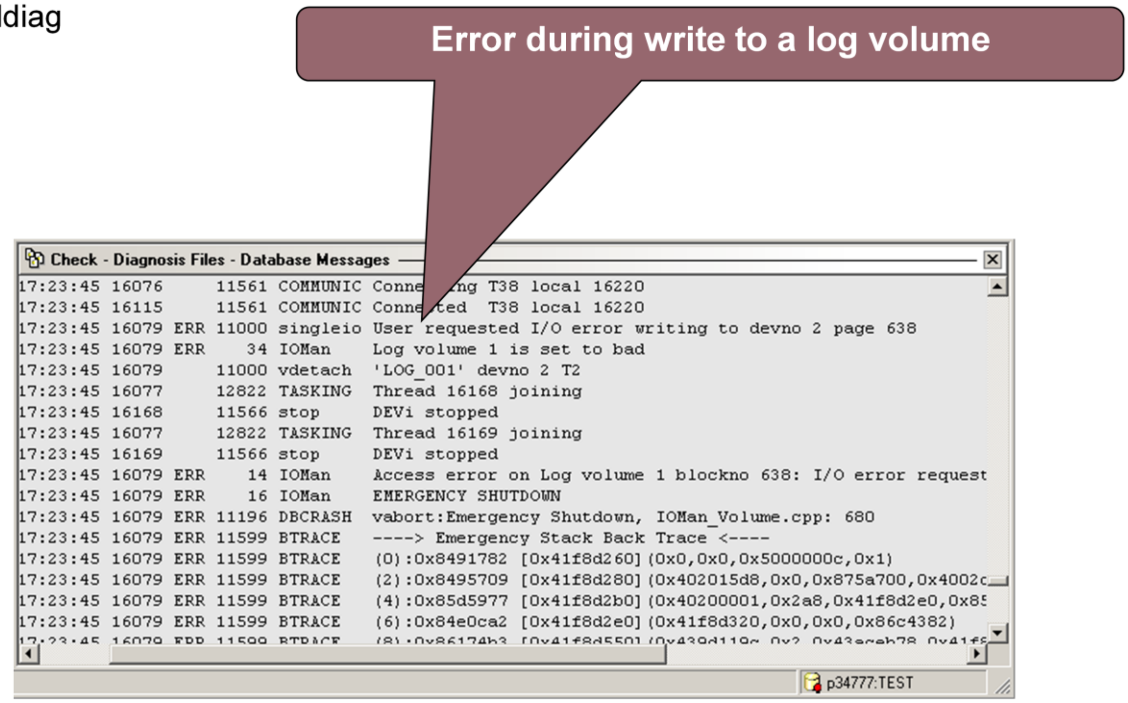
When a database is started, in the sub-directory of the rundirectory rtedump_dir the files RTEMemory_Chunk.* are created containing relevant information from the shared memory for the runtime environment This information is also accessed when you call x_cons in running operation.

To allow x_cons commands also after crash situations these files are maintained for later analysis. If the database is restarted the current RTEMemory_Chunk.* are copied to RTEMemory_Chunk.*.old. Furthermore in case of a crash they are kept in the diagnose history. With the use of option –p <archive_path> x_cons can be informed from which directory the files have to be used.

In the present example the database Q1K crashed. As first analysis step you should search for modules from the backtrace in known problem messages. If it is not a known crash which had happened before and was already analysed the information delivered by the post mortem console might be helpful. x_cons can be called and look for the formerly active tasks. Via the application PID the command responsible for the crash can be identified in the dev traces.

Emergency Shutdown: Log I/O Error

knldiag



Errors while writing to the database log are very critical, in particular if the database is not being mirrored.

Determine the cause of the I/O error. For this example, the error has been simulated.

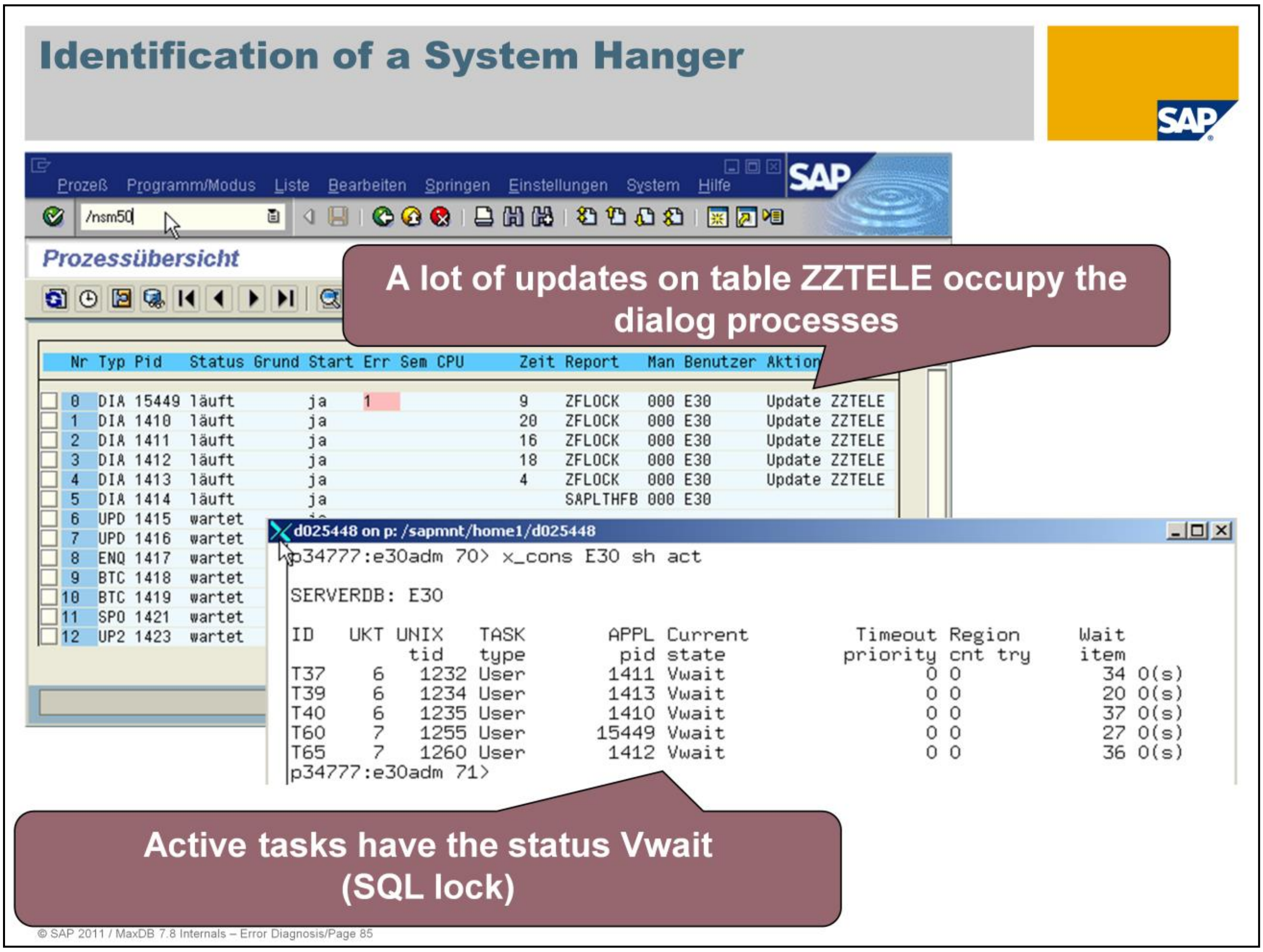
If the log is mirrored on the database side, then

- provide a new disk for the log volume,
- transfer the database to the ADMIN operational state and execute a restore for the volume using:
  dbmcli > db_execute restore log volume ‘<name of the volume>‘ ,
- start the database ONLINE.

If the log is mirrored in the system, check whether the error can be corrected in the system. If that is the case, start the database in the ONLINE operational state after the correction has been made.

If the log is irreparable, proceed as follows:

- Create a data backup. The backup is consistent on the basis of the last savepoint.
- Back up the current log area. If the log area cannot be backed up, you can use the generated data backup.
- Initialize the instance when a functional disk has been provided for the log volume. Import the data backup and the generated log backup.
  You use Database Studio (***Inittialize Database*** or ***Create Database***) or the Installation Wizard of the DBMGUI to initialize it.

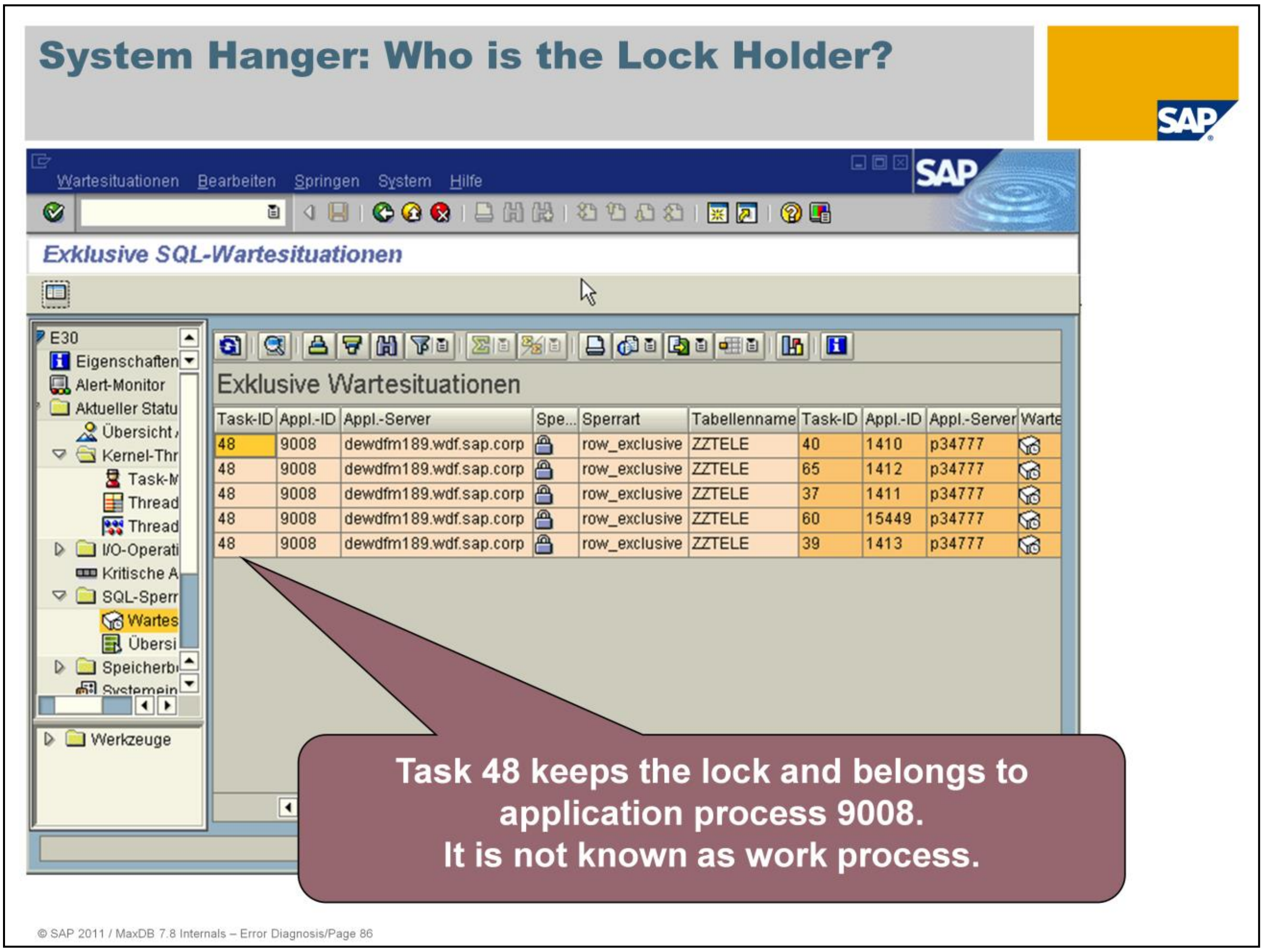


This example shows a system hanger situation.

Transaction sm50 or sm66 show numerous dialog processes that are executing updates on table ZZTELE. If transactions sm50 and sm66 are no longer usable because all dialog processes are occupied, call the program ***dpmon*** on the operating system level. In the 'Menu' there you'll see a comparable output.

The database console shows the respective tasks in the Vwait status. The tasks are waiting for the release of an SQL lock.

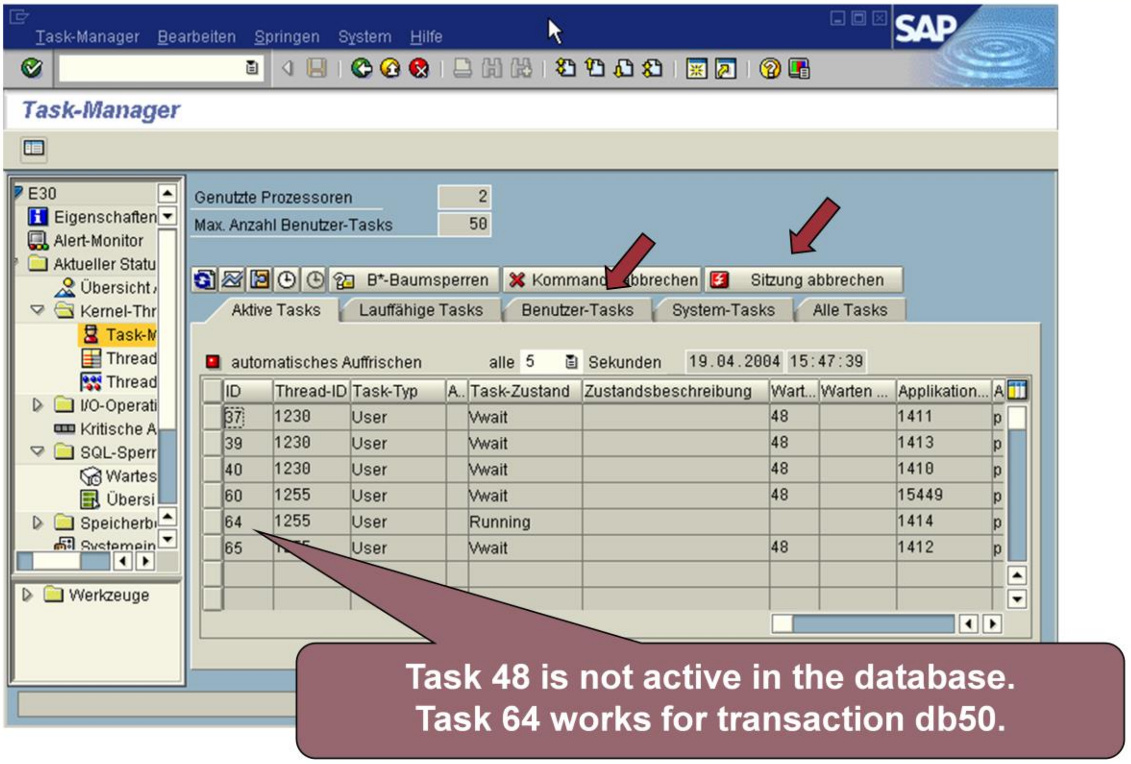
At present no other task is active in the database; that is, the lock holder is active in the application or waiting for user input.



Transaction db50 provides more information under '*SQL Locks -> Wait Situations*'. All waiting tasks are waiting for task 48. This task belongs to application process 9008 on the server dewdfm189. The server is not a SAP application server.

User operations generally have priority. Task 48 should therefore be forced to release the lock.

System Hanger: What is Task 48 doing?



Under '***Current Status -> Kernel Threads -> Task Manager*'**, transaction db50 displays the task activities. Task 48 is not active. The running task 64 formats the information for db50 itself.

To terminate 48, display all user tasks. Select task 48 and choose ‘End Session'.

It is not possible to terminate a command for task 48 if task 48 is not active. The lock can only be released by terminating the transaction. If the locking transaction is not active in the database, its transaction can be terminated by closing the session.
If a work process which is holding locks is active on the database, the termination of the command leads to the termination of the transaction. When it receives return code -102, the SAP system rolls back the transaction and writes a short dump.

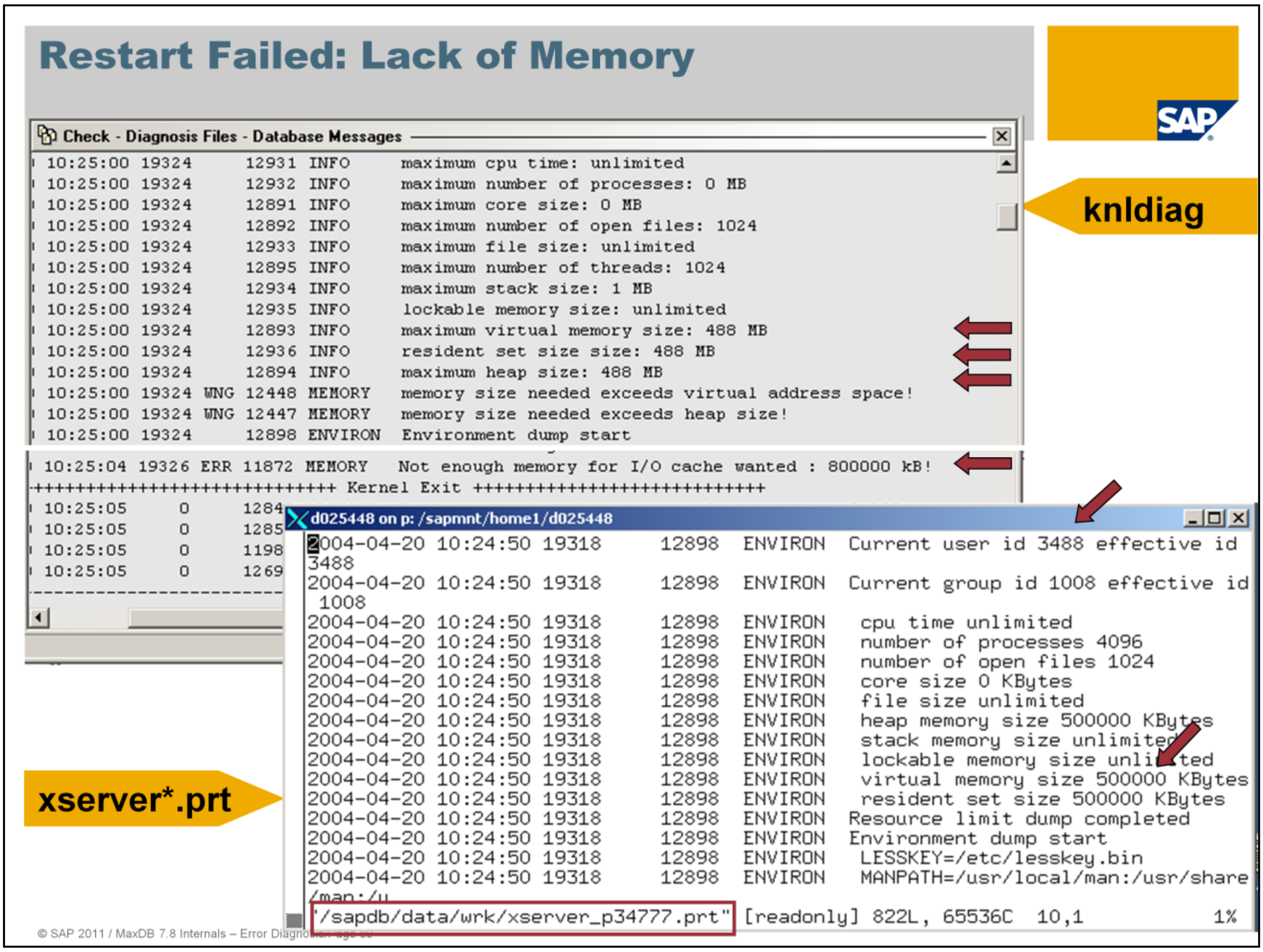
Standstill of the System: Eliminate Cause

```
d025448 on p: /sapmnt/home1/d025448
p34777:e30adm 87> x_cons E30 sh act

SERVERDB: E30

ID    UKT UNIX   TASK       APPL Current        Timeout Region     Wait
          tid    type        pid state          priority cnt try    item
T37     6   1232 User       1411 Vwait                 0 0      48    154 0(s)
T39     6   1234 User       1413 Vwait                 0 0      48    151 0(s)
T40     6   1235 User       1410 Vwait                 0 0      48    157 0(s)
T60     7   1255 User      15449 Vwait                 0 0      48    152 0(s)
T65     7   1260 User       1412 Vwait                 0 0      48    155 0(s)
p34777:e30adm 88> x_cons E30 cancel t48
p34777:e30adm 89> x_cons E30 sh act

SERVERDB: E30

ID    UKT UNIX   TASK       APPL Current        Timeout Region     Wait
          tid    type        pid state          priority cnt try    item
T37     6   1232 User       1411 Vwait                 0 0      48    166 0(s)
T39     6   1234 User       1413 Vwait                 0 0      48    163 0(s)
T40     6   1235 User       1410 Vwait                 0 0      48    169 0(s)
T60     7   1255 User      15449 Vwait                 0 0      48    164 0(s)
T65     7   1260 User       1412 Vwait                 0 0      48    167 0(s)
p34777:e30adm 90> x_cons E30 kill t48
p34777:e30adm 91> x_cons E30 sh act

SERVERDB: E30

ID    UKT UNIX   TASK       APPL Current        Timeout Region     Wait
          tid    type        pid state          priority cnt try    item
p34777:e30adm 92>
```


The action **'*Terminate Command*'** in transaction db50 corresponds to the console command '*cancel <task>*'. You terminate user sessions with '*kill <task>*'.

Terminating the locking transaction can take some time. MaxDB works with cooperative multitasking.
The tasks are not managed through a dispatcher instance.
Some actions only check whether the termination flag is set every 30 seconds.

In the console output, if the termination flag was set, this is indicated by an exclamation mark. If the task remains active (in particular in the Running and I/OWait statuses), it executes a rollback of the changes that have already been made.



In this example the database cannot transfer to the ADMIN operational state because the operating system cannot allocate enough memory.

The file ***knldiag*** shows an excerpt of the limitations for the user. These limitations are inherited from the owner of the x_server process.

When you start the x_server, make sure that the user has set sufficient limitations. On Unix/Linux, you set limitations either with limit or ulimit, depending on the shell.
Check the limitations of the x_server process in the file <indepdatapath>/wrk/xserver*.prt.

This case can be resolved by setting the limitations correctly and restarting the x_server.

Backup / Restore

Overview of backup activities: dbm.knl

Formatted display in DBMGUI: Information -> Backup History

or

in Database Studio: Administration -> Backup

Backup History

Label	Action	Beginning	Result	Medium	Size (Pages)	Volumes	Next Log Page	From Page	To Page
DAT_00005	SAVE WARM	29.07.2003 17:12:43	OK	Data_tmp	468288	1	287309		
DAT_00004	SAVE WARM	12.06.2003 18:23:12	OK	Data_tmp	467536	1	1394		
LOG_00000	SAVE WARM	12.06.2003 17:41:11	Error: (-123)						
LOG_00000	SAVE WARM	12.06.2003 17:38:34	Error: (-123)						
HISTLOST		12.06.2003 17:25:58	OK						
LOG_00000	SAVE WARM	12.06.2003 17:22:40	Error: (-123)						
HISTLOST		12.06.2003 17:22:30	OK						
DAT_00003	SAVE COLD	12.06.2003 17:06:28	OK	Data	467200	1	21596		
DAT_00002	SAVE COLD	12.06.2003 16:56:57	OK	Data	467192	1	21057		
HISTLOST		12.06.2003 16:55:54	OK						
DAT_00001	RESTORE	12.06.2003 16:42:28	OK	Data_tmp	467184	1	20981		
DAT_00001	SAVE WARM	10.06.2003 17:34:21	OK	Data	467184	1	20981		
HISTLOST		26.05.2003 15:43:57	OK						

Rows 27 / 27

Overview | Data Area | Log Area | Analyzer | Task Manager | Activities | Caches | Parameters | Backup | Snapshots | Command Line

History: All | Data Backups | Log Backups | Recoveries | Errors

Label	Backup Type	Action	Start	Result	Medium	Size	Devic...	Next ...	From...	To P...
LOG_000000003	LOG	SAVE WARM	04.03.2008 11:03:48	OK	LOG	204.864 KB	0		51245	76847
LOG_000000002	LOG	SAVE WARM	04.03.2008 11:03:40	OK	LOG	204.864 KB	0		25645	51244
LOG_000000001	LOG	SAVE WARM	04.03.2008 11:03:30	OK	LOG	204.864 KB	0		0	25644
DAT_000000003	COMPLETE DATA	SAVE WARM	04.03.2008 10:17:43	OK	PIPE	54.634.368 KB	1	93024		
	HISTLOST									
	HISTLOST									
DAT_000000002	COMPLETE DATA	SAVE WARM	18.02.2008 14:17:12	OK	PIPE	54.048.896 KB	1	1180135		
	HISTLOST									
	HISTLOST									
DAT_000000001	COMPLETE DATA	SAVE WARM	04.02.2008 13:22:18	OK	PIPE	53.791.808 KB	1	488815		

The file ***dbm.knl*** presents a first overview of which backups and which restore activities were successfully executed; or for a more orderly display in the form of a backup history in the Database Studio choose ***Administration -> Backup*** or ***Information->Backup History*** in the DBMGUI.

If any errors have occurred, the causes are noted in brief. More precise information can be found in ***KnlMsg/knldiag.***

Up to version 7.6 the file ***dbm.utl*** provides information about backups. As of version 7.7 the information from ***dbm.utl*** is integrated into other diagnosis files ***(KnlMsg/dbm.prt).***

If external backup tools (Networker, ADSM, Omniback, etc.) and the backint interface are being used, you should also check their logs, which are described in the following.

Example: Backup / Restore (1)

```
The restore from the system <SID> with backup from 15.01.01 was
killed with:
2004-01-16 20:25:53    13 ERR 54001 I/O      page 00C29008010D0200...008
2004-01-16 20:25:53    13 ERR 52015 RESTORE  write/check count mismatch
2004-01-16 20:25:53    12 ERR 52012 RESTORE  error occured, basis_err 30
2004-01-16 20:25:53    12 ERR 51080 SYSERROR -9026 Message not available
The restore with the backup from 16.01 was killed with:
2004-01-16 17:11:31    13 ERR 54001 I/O      page 00AA5684010D0200...203
2004-01-16 17:11:31    13 ERR 52015 RESTORE  write/check count mismatch
2004-01-16 17:11:31    12 ERR 52012 RESTORE  error occured, basis_err 30
2004-01-16 17:11:31    12 ERR 51080 SYSERROR -9026 Message not available
```


In the present example, the restoring of a backup terminated with a system error.

First, the system attempts to repeat the procedure with various backups. It turns out that several backups have already been affected and that a restore returns error -9026.

At this stage, the user should check the logs to see what they say about the backups, e.g. whether they were successful, etc.

Example: Backup / Restore (2)

```
UTLPRT:
=======
2004-01-19 01:00:11 400B1E0B0006 0000   SDB SAVE DATA QUICK TO '/nsr/sap
2004-01-19 03:48:08 400B1E0B0006 0001   RET RETURNCODE     0
[...]


DBMPRT:
=======
2004-01-19 01:00:11 0x00007227              0 DBM
  command backup_start nsr_full RECOVERY DATA AUTOIGNORE
2004-01-19 03:49:45 0x00007227 ERR     -24920 DBM
  ERR_BACKUPOP: backup operation was unsuccessful
                    0x00007227 ERR     -24920 DBM
  The backup tool failed with 0 as sum of exit codes.
```


Looking at ***dbm.utl*** is not sufficient! The return code 0 here shows only that the backup was successful from the database's point of view. In other words, it correctly delivered all database pages to the pipe of the external database tool.

In ***dbm.prt*** we see that the backup could not be completed successfully. The cause is not immediately visible in this file, but the tool has signaled that the backup failed from its point of view.

Backups that have the return code 0 in ***dbm.utl*** (that is, on the kernel side) but failed according to ***dbm.prt*** are identified as having failed in the backup history (DBMCLI -> backup_history_list as well as in DBMGUI). The error code, then, is the error code of the backup/restore (generally -24920).

Example: Backup / Restore (3)

```
BACKEBL:
========

2004-01-19 03:49:44
Analyzing output of NetWorker.
    Have found a completion message in the NetWorker output file
    '/var/tmp/temp1074470411-1' in line:
    save: S6F level=full, 130 GB 02:43:44      5 files
    Have found a savetime message in the NetWorker output file
    '/var/tmp/temp1074470411-1' in line:
    completed savetime=1074470655
    NetWorker has saved only 140123308032 bytes
    (the database kernel has saved 159754027008 bytes).
The backup size of database and NetWorker are different.

2004-01-19 03:49:44
Filling reply buffer.
    Have encountered error -24920:
        The backup tool failed with 0 as sum of exit codes.

    Constructed the following reply:
        ERR
        -24920,ERR_BACKUPOP: backup operation was unsuccessful
        The backup tool failed with 0 as sum of exit codes.
Reply buffer filled.
```


The log of the backup tool provides information as to why the backup was not considered successful.

There is a big discrepancy between the number of bytes backed up by the database kernel and the number of bytes given by the Networker which cannot be explained by rounding errors.

Here we cannot identify the cause, which could only be determined in cooperation with the Networker manufacturer Legato. While a file system backup was in progress, the Networker failed to end the data backup correctly when it accessed the data backup pipe.

MaxDB now ensures that file system and database backups remain separate.

Example: Faulty Tape Devices

1st attempt: RESTORE DATA was successful

RESTORE LOG fails

```
The recovery of the system <SID> breaks with
2004-01-16 20:11:11    13 ERR 52015 RESTORE  bad log page 98897294
2004-01-16 20:11:25    13 ERR 52608 RESTART  LOCAL: failed
2004-01-16 20:11:29    12 ERR 52012 RESTORE  error occured, basis_err 90
2004-01-16 20:11:29    12 ERR 51080 SYSERROR -9030 Message not available
```

2nd attempt: RESTORE DATA fails, but is later successful with the identical backup

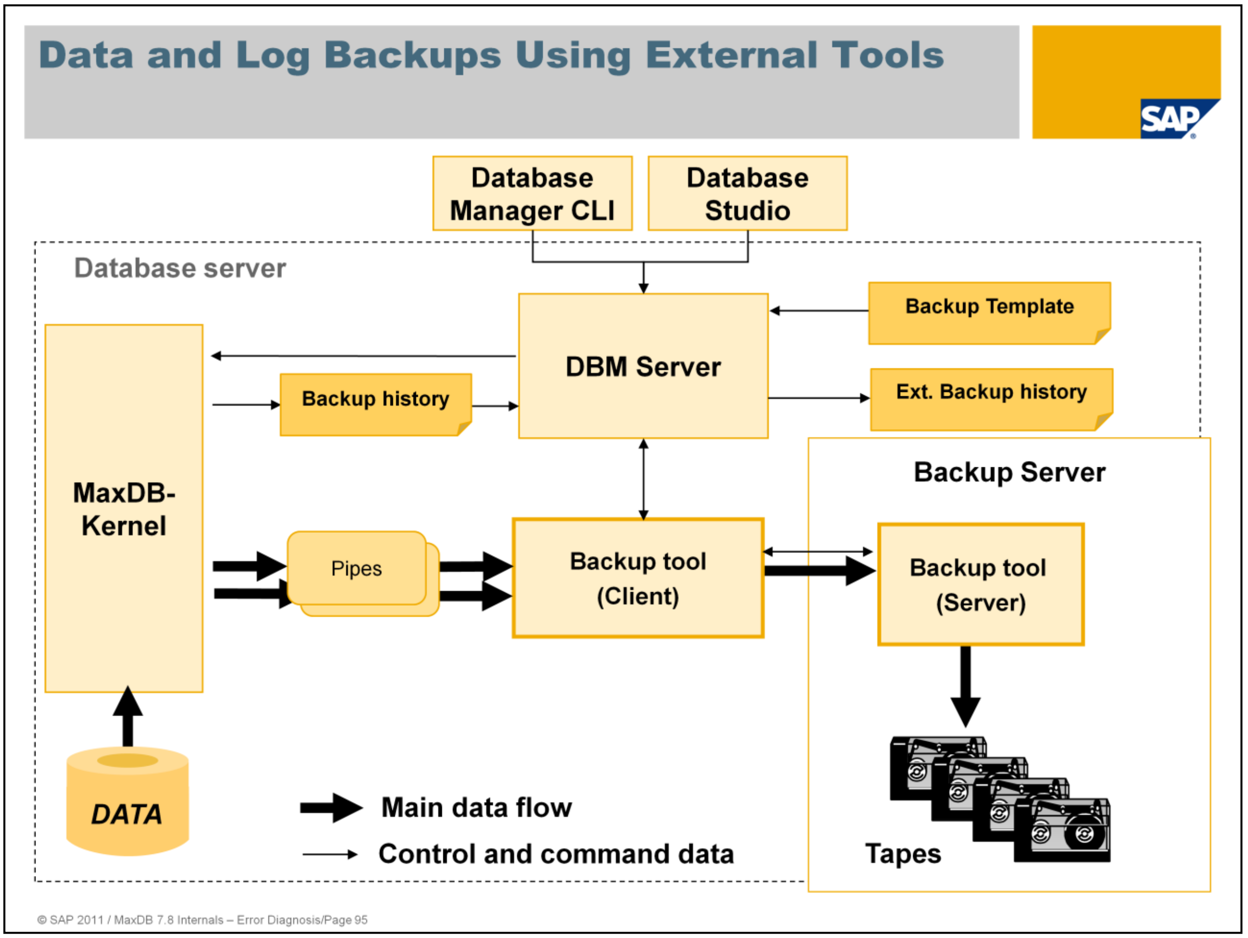
```
Excerpt from the Backup History:
4007CDD70001|DAT_00210|RESTORE  |2004-01-13 23:00:20|
2004-01-13 23:00:20|2004-01-16 12:46:10|2004-01-16 12:51:56|
98576129|          |YES|nsr_comp
10624|         0|     -9026|

4007D1BF0002|DAT_00210|RESTORE  |2004-01-13 23:00:20|
2004-01-13 23:00:20|2004-01-16 13:01:55|2004-01-16 19:39:16|
98576129|          |YES|nsr_comp
20023232|         1|         0|
```


In this example, the restore of a log backup terminates with system error -9030 (bad log page).

During the attempt to repeat the restore process completely, there was already a problem with the data backup. Subsequently, however, the data backup (with the same label) was successfully recovered.

This non-deterministic behavior suggests a problem with the tape peripherals. In such cases, checking the tape drives and the controller and changing the defective device will solve the problem.

With luck, the problem will have been merely a read error; in the worst case scenario, the tapes will already have been incorrectly filled.

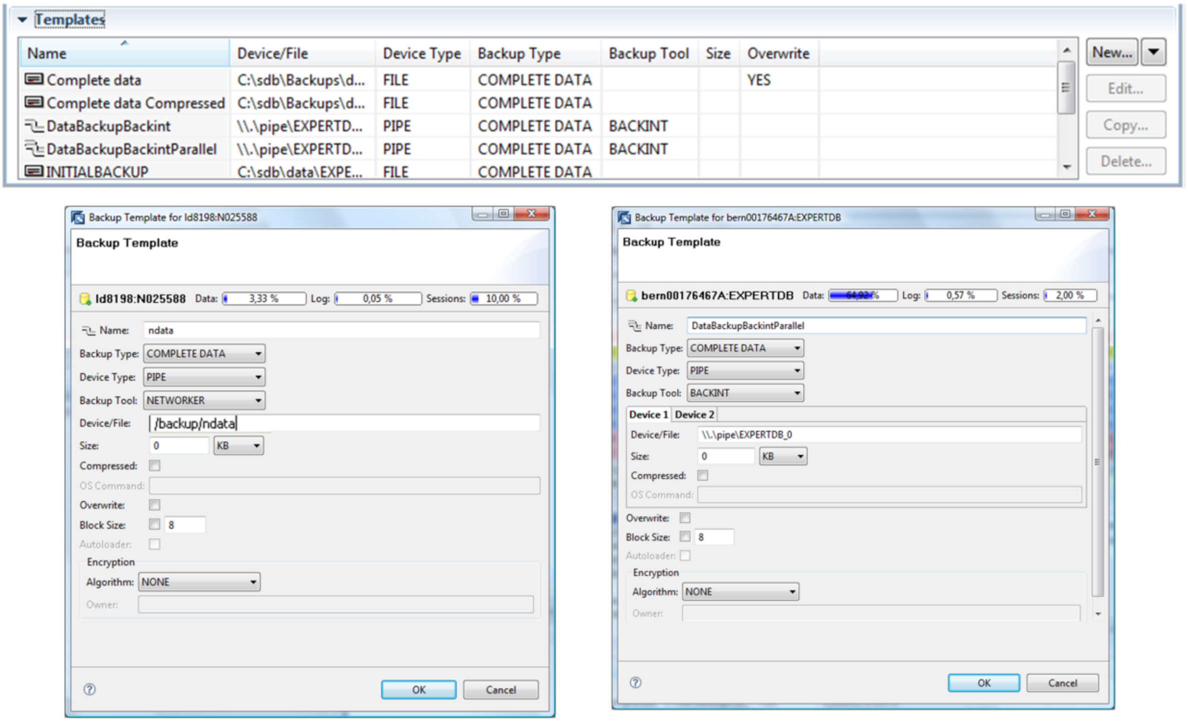


Backups for SAP MaxDB are always triggered by the DBM Server – either through the DBMCLI or through Database Studio. The DBM Server is also the component which starts the external backup tool. The backup procedure works as follows:

1. The DBM Server sends the backup command to the database kernel.
2. The database kernel creates and opens one or more pipes (as specified in the backup template used by the DBM Server).
3. The DBM Server starts the backup client of the backup tool as soon as the database kernel opens the first pipe. Which backup tool is to be used is also specified in the backup template.
4. The backup tool opens the pipes, transfers the data to the backup server, and stores it on tape.
5. The database kernel records the result of the backup in the backup history.
6. The DBM server requests the unique backup IDs (External Backup ID) from the backup tool and enters these in the External Backup History (dbm.ebf). -This makes it possible to link the backup IDs generated by the database kernel with the backup ID of the external backup tool.
7. The backup is logged in the External Backup Protocol (dbm.ebp).

External backup tools can not be used directly for automatic log backups. Automatic log backups are triggered directly by the database kernel, which isn't aware of the configuration of external backup tools. Automatic log backups can only be performed to versioned files. However, the usage of a so called log staging area is supported which can be configured in a way that the versioned files created by the database kernel are backed up to an external backup tool. Details about this follow later in the session.

External Backup Tools



Before you can perform backups, you must define the relevant backup templates. You can create and change backup templates or template groups of parallel backup media in Database Studio in the backup section of the Administration window by choosing Templates.

To be able to create a parallel backup template, you must set the value of the "MaxBackupMedia" parameter to match the number of individual templates in a parallel backup template. For example, if a template group is to comprise 10 individual templates, the value of the "MaxBackupMedia" parameter must be "10“ (or higher).

You can specify the following information for the template:

- *Name* of the backup template. This name is freely definable and is not dependent on the storage location used (Device/File).
- *Backup Type*: Specify the type of backup for which this template is to be used.
- *Device Type*: Tape, file, or pipe – if an external backup tool is to be used, the Device Type must be set to pipe.
- *Backup Tool*: Type of external backup tool (if applicable)
- *Device/File*: Path to a device, name of a defined pipe, or name of a file including its path. If you do not specify a path, a file is created in the run directory of the database instance.
- *Size*: Maximum size of the backups that can be created on this template (if you do not make an entry in this field, files of unlimited size can be created).
- *OS Command*: In this field, you can specify operating system commands for backups to tape.
- *Overwrite*: This option enables you to perform successive backups to the same file, overwriting the previous backup each time. Use this function carefully since it makes it impossible to restore one of the previous backups.
- *Block Size*: The entry in this field defines the size of the data blocks to be written to the template. If page clustering is used for the instance, the value in this field must be larger than a multiple of the cluster size used (minimum block size, for example, of "64").
- *Autoloader*: Select the Autoloader checkbox if you want to use a tape device with automatic tape swapping.

The above examples show one template which can be used for a backup to Networker and a template group comprising of 2 single templates which can be used for a parallel backup with Backint.

Supported External Backup Tools

- Networker (NSR)
- Tivoli Storage Manager (TSM)
- Tools supporting the interfaces *Backint for MaxDB* or *Backint for Oracle* (BACK)

MaxDB supports different external backup tools and backup techniques:

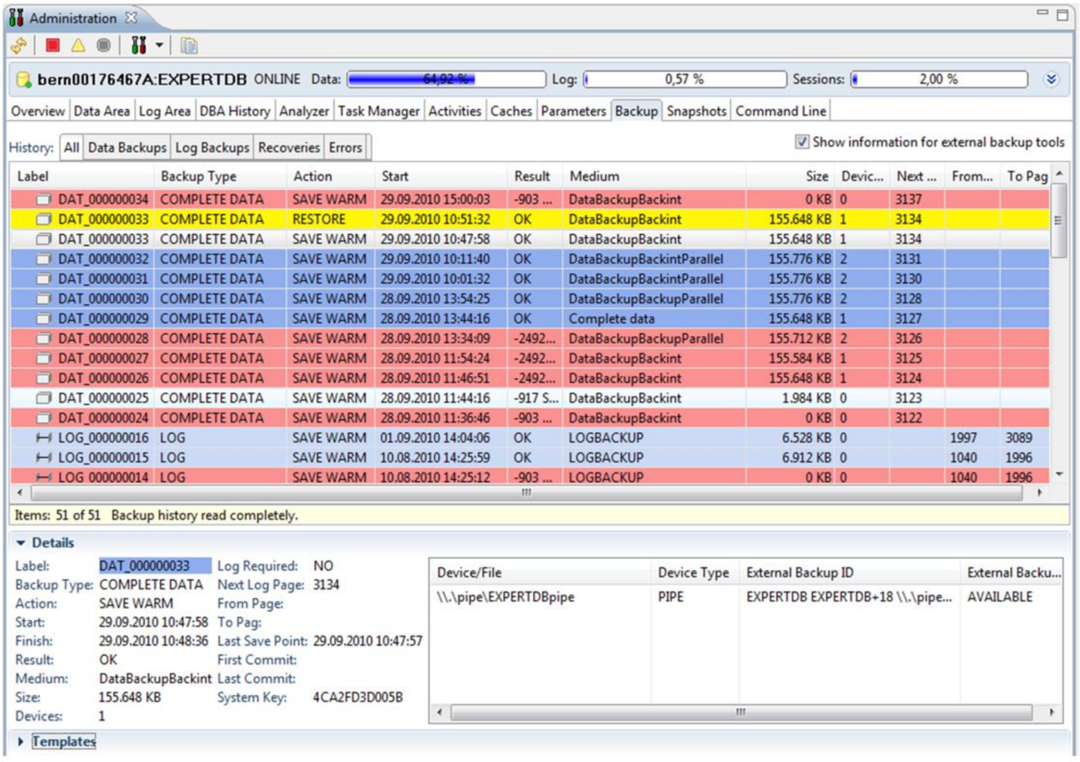
- Networker (NSR)
- Tivoli Storage Manager (TSM)
- Tools supporting the interfaces *Backint for MaxDB* or *Backint for Oracle* (BACK) f.e.
  - HP Data Protector >6.0 supports *Backint for MaxDB*
  - Comvault QiNetix > 6.1 supports *Backint for MaxDB*
  - All other external backup tools known to the market which are not mentioned here have to be configured via *Backint for Oracle.* According to experience they need additional adapters from the vendors of external backup tools.

To support one of these tools it is necessary to define pipe as *Device Type* of the backup template.

Some more example definitions for templates under Unix and Windows:

- Windows: First tape device: `\\.\tape0`
  Pipe: `\\.\pipe\PipeName`
  UNIX: Tape device, f.e.: `/dev/tape0`
  Pipes: `/backup/pipe0`
  Template definitions are stored in the file ***dbm.mmm*** in the rundirectory of the database instance.

Backup History / Backup Details



The Backup History contains information about all successful and unsuccessful backups. Detailed information fo each entry is available in the Details section. Here also the external backup ID is displayed, if an external backup tool was used.

DBMCLI Commands for Backup and Recovery

- `backup_start <template_name> DATA|PAGES|LOG`

  Example:

  `backup_start "DataBackupBackint" DATA`

- `backup_ext_ids_get`

  Example:

  `backup_ext_ids_get DataBackupBackint`

- `backup_ext_ids_list`

  Example output:

```
END
AVAILABLE|EXPERTDB EXPERTDB+12 \\.\pipe\EXPERTDB_0|DATA  MIGRATION|2010-09-29 10:11:40|
AVAILABLE|EXPERTDB EXPERTDB+13 \\.\pipe\EXPERTDB_1|DATA  MIGRATION|2010-09-29 10:11:40|
AVAILABLE|EXPERTDB EXPERTDB+18 \\.\pipe\EXPERTDBpipe|DATA  MIGRATION|2010-09-29 10:47:58|
```

- `recover_start <template_name> <backup_type> [ExternalBackupID <ebid_list>] [<nnn>]`

  Example:

  `recover_start "DataBackupBackint" DATA EBID "EXPERTDB EXPERTDB+18 \\.\pipe\EXPERTDBpipe"`

When using DBMCLI, a backup of the database is done with the help of the backup_start command.

As the DBMServer recognizes the backup tool to be used from the backup template, there is no difference in the backup command between a backup with and a backup without a backup tool.

As more than one DBMServer command is needed for displaying the External Backup Identifiers, an interactive dbmcli session must be used.

The columns of the displayed list are separated by the pipe character (|).

The list has the following format:
<Availability>|<External Backup ID>|<backup type>|<date_time>|

If in an answer to backup_ext_ids_list or backup_ext_ids_listnext a line with a keyword CONTINUE follows the line with the keyword OK, the next part of the list can be requested with the backup_ext_ids_listnext command.

A restore is done with the commands recover_start and recover_replace (for restoring more than one log backup).

The keyword EBID (or ExternalBackupID) is followed by a comma-separated list of External Backup IDs. With parallel backups, all External Backup Identifiers of the individual backup parts must be transmitted as a comma-separated list enclosed in double quotes ("<ExtBackupID_1>, <ExtBackupID_2>, ..., <ExtBackupID_n>").

Further Examples:

recover_start ADSM LOG EBID P47579_DB7_2001.03.30_15.51.20_SAVELOG_ADSM

recover_start NSR DATA EBID "NST 985877420 P47579"

recover_start BACK PAGES EBID "DB72 985963853 \\.\pipe\b1,DB72 985963913 \\.\pipe\b2"

Relevant Log Files

These log files might be relevant in case a backup or recovery using an external backup tool fails:

- Database Manager log file (dbm.prt)
- External Backup Protocol (dbm.ebp)
- External Backup Log (dbm.ebl)
- External Backup History dbm.ebf
- Database Messages (KnlMsg)

The database manager log file ***dbm.prt*** contains the backup and recovery calls and – if an error occured - the error message. Therefore this log file can (in addition to the backup history and the external backup history) be used to check the success of a backup/recovery.

Detailed information regarding the backup/recovery can be found in the external backup protocol (or if this file has already been overwritten in the external backup log ***dbm.ebl***). In addition to information about the configuration parameter of the external backup tool, ***dbm.ebp*** contains information about the commands sent to the database kernel as well as the backup tool call. The error position makes it possible to identify which component was responsible for the problem.

Depending of the cause of the error, it might be necessary to analyze log files of the backup tool.

In case the cause for the backup or recovery failure is not the communication with the external backup tool or problems of the external backup tool, but in the actual processing of the data by the database kernel, the database messages file ***KnlMsg*** should be checked for more detailed information regarding the problem.

Example: Analysis with dbm.prt

dbm.prt:

```
INF         283 DBMSrv   Command 'backup_start "DataBackupBackint" DATA' is being executed.
INF           1 DBMKnl   Sending an administrative statement to the database
INF           8 DBMKnl   Statement:  SAVE DATA QUICK TO '\\.\pipe\EXPERTDBpipe' PIPE BLOCKSIZE 8 NO
CHECKPOINT MEDIANAME 'DataBackupBackint'
ERR           3 DBMKnl   Received the result of an administrative statement from the database
ERR           9 DBMKnl   Statement:  SAVE DATA QUICK TO '\\.\pipe\EXPERTDBpipe' PIPE BLOCKSIZE 8 NO
CHECKPOINT MEDIANAME 'DataBackupBackint'
ERR          10 DBMKnl   Returncode: -903
ERR           5 DBMKnl   Errortext:  Host file I/O error
ERR      -24580 DBMSrv   ERR_COMMAND_FAILED: Command 'backup_start' has ended and failed with return
code -24920.
ERR      -24920 DBMSrv   ERR_BACKUPOP: backup operation was unsuccessful
ERR      -24778 DBMSrv   The backup tool failed with 2 as sum of exit codes. The database request was
canceled and ended with error -903.
```


In file ***dbm.prt*** you can see that the backup was started to a backup template called DataBackupBackint. The exact statement sent to the database kernel is logged as well as an error messages.

Error message „The backup tool failed with 2 as sum of exit codes. The database request was canceled and ended with error -903." indicates, that the backup tool caused the problem and that the database request was only cancelled as a result of that failure. So the error analysis has to concentrate on the backup tool and its configuration.

dbm.prt is stored in the run directory of the database (default: <indepdatapath>/wrk/<SID>).

Access via DB50: *Properties -> Files -> DBMPRT*

Access via Database Studio: *Diagnosis Files -> Database Manager Log File*

Example: Analysis with dbm.ebp I

dbm.ebp:

```
2010-09-29 15:00:03
Checking existence and configuration of Backint for MaxDB.
    Using configuration variable 'BSI_ENV' = 'C:\TOOLS\parfiles\bsi.env' as path of the configuration
file of Backint for MaxDB.
    Setting environment variable 'BSI_ENV' for the path of the configuration file of Backint for MaxDB
to configuration value 'C:\TOOLS\parfiles\bsi.env'.
    Reading the Backint for MaxDB configuration file 'C:\TOOLS\parfiles\bsi.env'.
        Found keyword 'BACKINT' with value 'C:\sdb\expertdb\db\bin\backint.exe'.
        Found keyword 'INPUT' with value 'C:\TOOLS\parfiles\backint4MAXDB.in'.
        Found keyword 'OUTPUT' with value 'C:\TOOLS\parfiles\backint4MAXDB.out'.
        Found keyword 'ERROROUTPUT' with value 'C:\TOOLS\parfiles\backint4MAXDB.err'.
        Found keyword 'PARAMETERFILE' with value 'C:\TOOLS\parfiles\backintmaxdbconfig.par'.
        Found keyword 'TIMEOUT_SUCCESS' with value '600'.
        Found keyword 'TIMEOUT_FAILURE' with value '300'.
    Finished reading of the Backint for MaxDB configuration file.
...
2010-09-29 15:00:03
Starting database action for the backup.
    Requesting 'SAVE DATA QUICK TO '\\.\pipe\EXPERTDBpipe' PIPE BLOCKSIZE 8 NO CHECKPOINT MEDIANAME
'DataBackupBackint'' from db-kernel.
The database is working on the request.
...
2010-09-29 15:00:04
Starting Backint for MaxDB.
    Starting Backint for MaxDB process 'C:\sdb\expertdb\db\bin\backint.exe -u EXPERTDB -f backup -t
file -p C:\TOOLS\parfiles\backintmaxdbconfig.par -i C:\TOOLS\parfiles\backint4MAXDB.in -c
>>C:\TOOLS\parfiles\backint4MAXDB.out 2>>C:\TOOLS\parfiles\backint4MAXDB.err'.
    Process was started successfully.
Backint for MaxDB has been started successfully.
```


This is the beginning of file ***dbm.ebp***. You can see that variable BSI_ENV is set to C:\TOOLS\parfiles\bsi.env. Next, the configuration parameters read from this file are listed. In case a parameter is spelled incorrectly, this would be visible here, as unknown keywords are explicitely listed.

In this example, the configuration file is fine.

The backup request was sent to the database successfully and afterwards Backint for MaxDB was started successfully as well.

So far, everything looks fine – however, the log file is continued on the next slide…

Example: Analysis with dbm.ebp II

```
2010-09-29 15:00:04
Waiting for end of the backup operation.
    2010-09-29 15:00:04 The backup tool is running.
    2010-09-29 15:00:04 The database is working on the request.
    2010-09-29 15:00:05 The backup tool process has finished work with return code 2.
    2010-09-29 15:00:09 The database is working on the request.
    2010-09-29 15:00:19 The database is working on the request.
    2010-09-29 15:00:34 The database is working on the request.
    2010-09-29 15:00:54 The database is working on the request.
    2010-09-29 15:01:06 Canceling Utility-task after a timeout of 60 seconds elapsed ... OK.
    2010-09-29 15:01:07 The database has finished work on the request.

...
2010-09-29 15:01:07
Cleaning up.
    Copying output of Backint for MaxDB to this file.
    ---------- Begin of output of Backint for MaxDB (C:\TOOLS\parfiles\backint4MAXDB.out)----------
        Reading parameter file C:\TOOLS\parfiles\backintmaxdbconfig.par.

    ---------- End of output of Backint for MaxDB (C:\TOOLS\parfiles\backint4MAXDB.out)----------
    Removed Backint for MaxDB's temporary output file 'C:\TOOLS\parfiles\backint4MAXDB.out'.
    Copying error output of Backint for MaxDB to this file.
    ---------- Begin of error output of Backint for MaxDB (C:\TOOLS\parfiles\backint4MAXDB.err)-------
---
        The file 'C:\TOOLS\parfiles\backintmaxdbconfig.par' does not exist.
        Could not open the parameter file.

    ---------- End of error output of Backint for MaxDB (C:\TOOLS\parfiles\backint4MAXDB.err)---------
-
    Removed Backint for MaxDB's temporary error output file 'C:\TOOLS\parfiles\backint4MAXDB.err'.
    Removed the Backint for MaxDB input file 'C:\TOOLS\parfiles\backint4MAXDB.in'.
Have finished clean up successfully.
```


Once the database kernel and the backup tool are started, the DBMServer determines their state regularly. As you can see, the backup tool failed shortly after it was started, error message „The backup tool process has finished work with return code 2.“ is logged.

As a consequence of that, the database request was cancelled by the DBMServer.

In the output information of Backint for MaxDB you can find the reason for the failure: the parameter file 'C:\TOOLS\parfiles\backintmaxdbconfig.par' specified in the bsi.env file could not be found by Backint for MaxDB. Therefore the tool could not start to work on the backup request.

External Backup History

External Backup History (dbm.ebf)

- Contains the backup history including the external backup IDs.
- Is written consecutively, not cyclically overwritten.

Example output:

```
4CA1B98A0013|DAT_000000026||DATA  MIGRATION|2010-09-28 11:46:51|BACK|-24920|The backup tool failed with 2 as sum
  of exit codes.|DataBackupBackint|vftPipe|NO|0|8|S|\\.\pipe\EXPERTDBpipe|0|
4CA1BB500016|DAT_000000027||DATA  MIGRATION|2010-09-28 11:54:24|BACK|-24920|The backup tool failed with 2 as sum
  of exit codes.|DataBackupBackint|vftPipe|NO|0|8|S|\\.\pipe\EXPERTDBpipe|0|
4CA1D2B00019|DAT_000000028||DATA  MIGRATION|2010-09-28 13:34:09|BACK|-24920|The backup tool failed with 2 as sum
  of exit codes.|DataBackupBackupParallel|vftPipe|NO|0|8|M|\\.\pipe\EXPERTDB_0|0|
4CA1D2B00019|DAT_000000028||DATA  MIGRATION|2010-09-28 13:34:09|BACK|-24920|The backup tool failed with 2 as sum
  of exit codes.|DataBackupBackupParallel|vftPipe|NO|0|8|M|\\.\pipe\EXPERTDB_1|1|
...
4CA2F4BC000D|DAT_000000032|EXPERTDB EXPERTDB+12 \\.\pipe\EXPERTDB_0|DATA  MIGRATION|2010-09-29
  10:11:40|BACK|0||DataBackupBackintParallel|vftPipe|NO|0|8|M|\\.\pipe\EXPERTDB_0|0|
4CA2F4BC000D|DAT_000000032|EXPERTDB EXPERTDB+13 \\.\pipe\EXPERTDB_1|DATA  MIGRATION|2010-09-29
  10:11:40|BACK|0||DataBackupBackintParallel|vftPipe|NO|0|8|M|\\.\pipe\EXPERTDB_1|1|
4CA2FD3D005B|DAT_000000033|EXPERTDB EXPERTDB+18 \\.\pipe\EXPERTDBpipe|DATA  MIGRATION|2010-09-29
  10:47:58|BACK|0||DataBackupBackint|vftPipe|NO|0|8|S|\\.\pipe\EXPERTDBpipe|0|
```

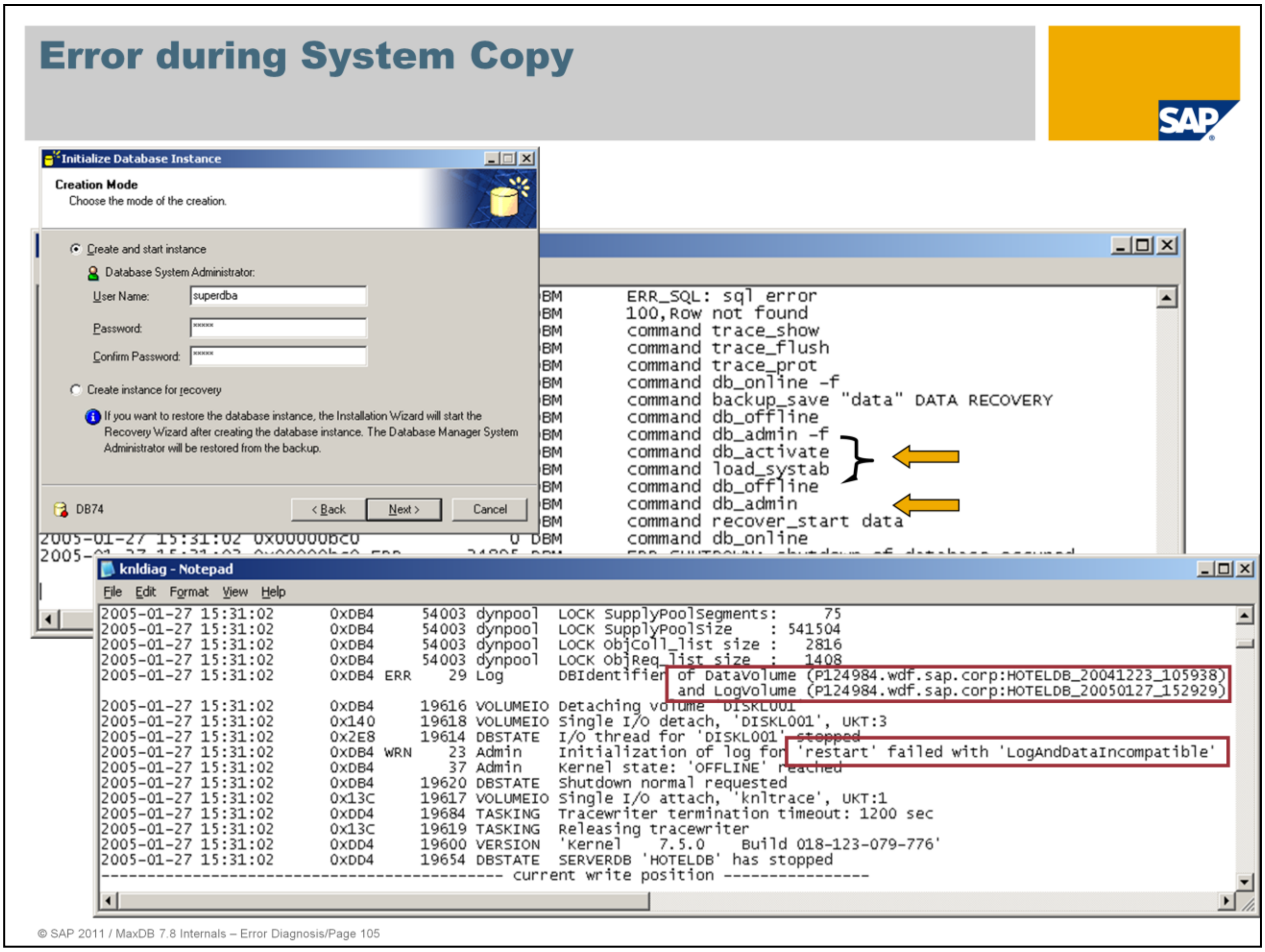

The file ***dbm.ebf*** contains the backup history, the backup ID, external backup IDs and error messages. This file is written consecutively and is NOT cyclically overwritten, so that the entire backup history is available for support.

If a backup tool was able to backup successfully, but could not determine the external backup ID, the backup is entered as failed in the backup history.

dbm.ebf is stored in the run directory of the database (default: <indepdatapath>/wrk/<SID>.

Access via DB50: *Properties -> Files -> BACKEBF*

Access via Database Studio: *Diagnosis Files -> External Backup History*



One typical user error with system copies is to first completely install a database (including restart and loading the system tables) and only then import a backup. This often leads to confusion when it then turns out that it is no longer an "empty DB".

The user chose **'*Create and start instance*'** instead of **'*Create instance for recovery*'** in the DBMGUI.

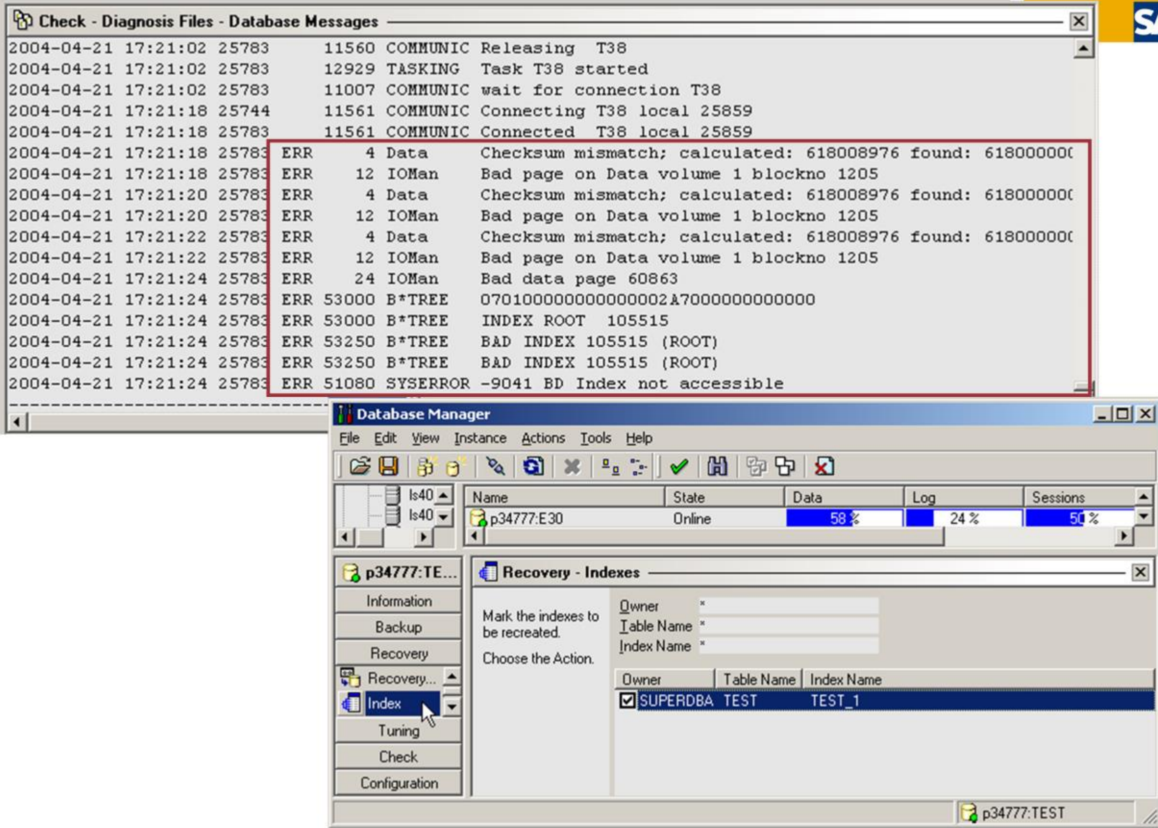
The individual steps can be viewed in ***dbm.prt***. We can see that db_activate was carried out, which represents the first restart of a DB, and that only afterwards a backup was imported.

The system's reaction to this error is somewhat different than in earlier versions (<= 7.3). The system no longer issues return code –8003 „Log and Data must be compatible“ because the database is immediately transferred to the OFFLINE operational state and the DBMGUI no longer receives a message about the exact cause of the error. This ensures that the memory areas can be completely cleared.

KnlMsg reports that the cause of the shutdown here again was LogAndDataIncompatible, albeit without the familiar return code.

It is also noted that the DBIdentifiers of the data and log volumes do not match.

I/O Error: Verification of Checksum in Index Page



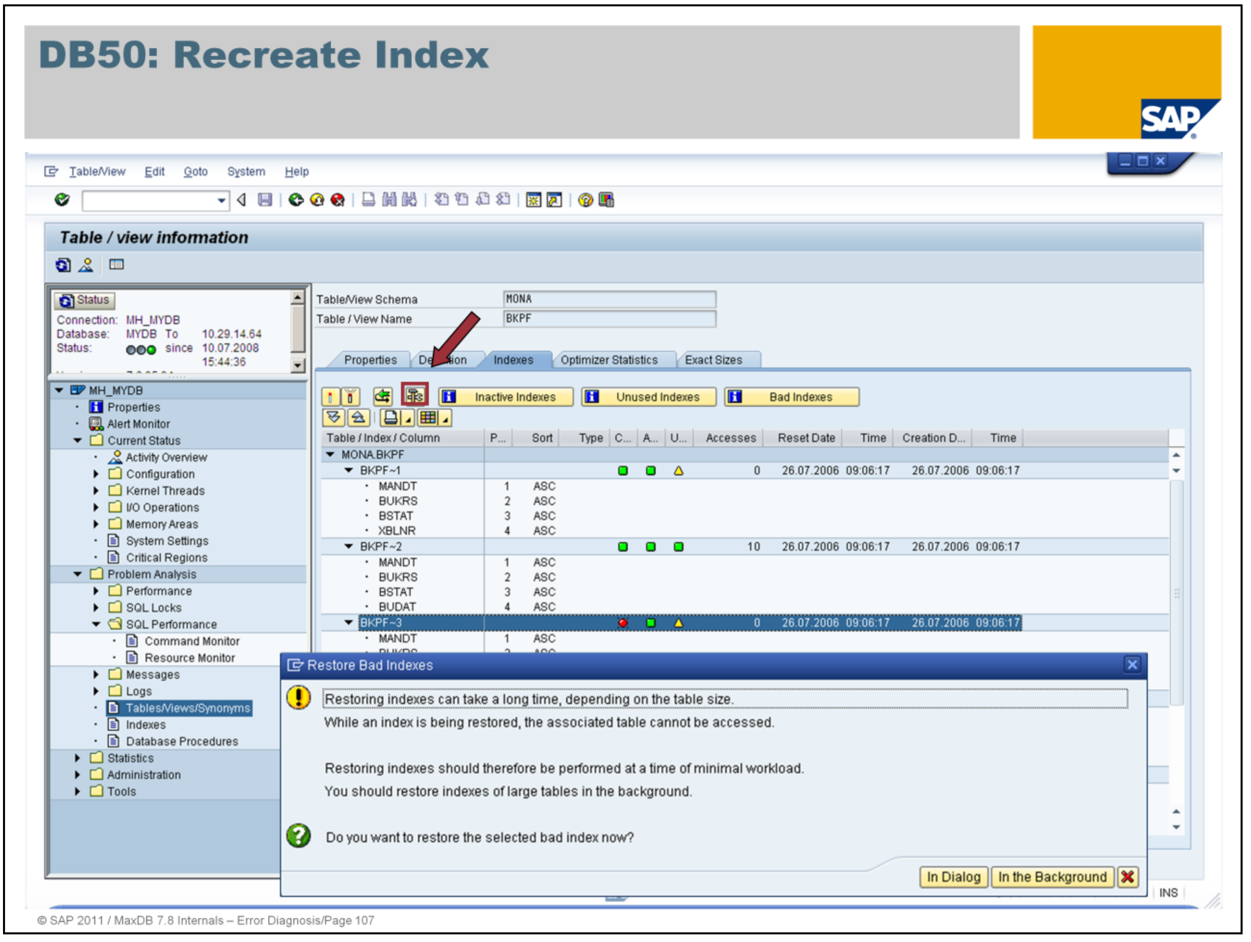
After a data page was read from a data volume, checksum 618008976 was calculated. Before writing the block, checksum 618000000 was calculated and written to the block. Apparently the block is not situated correctly on the disk.

This read I/O is repeated twice. If the error occurs every time, the database assumes that the block is defective. This is a block for an index (secondary key tree). The index is marked as BAD.

Check the I/O system. If the damage to the I/O system can be repaired, you can delete the index and then regenerate it.

Under ***'Recovery -> Index'*** , the DBMGUI displays the indexes marked as BAD. You can select the index and recreate it.

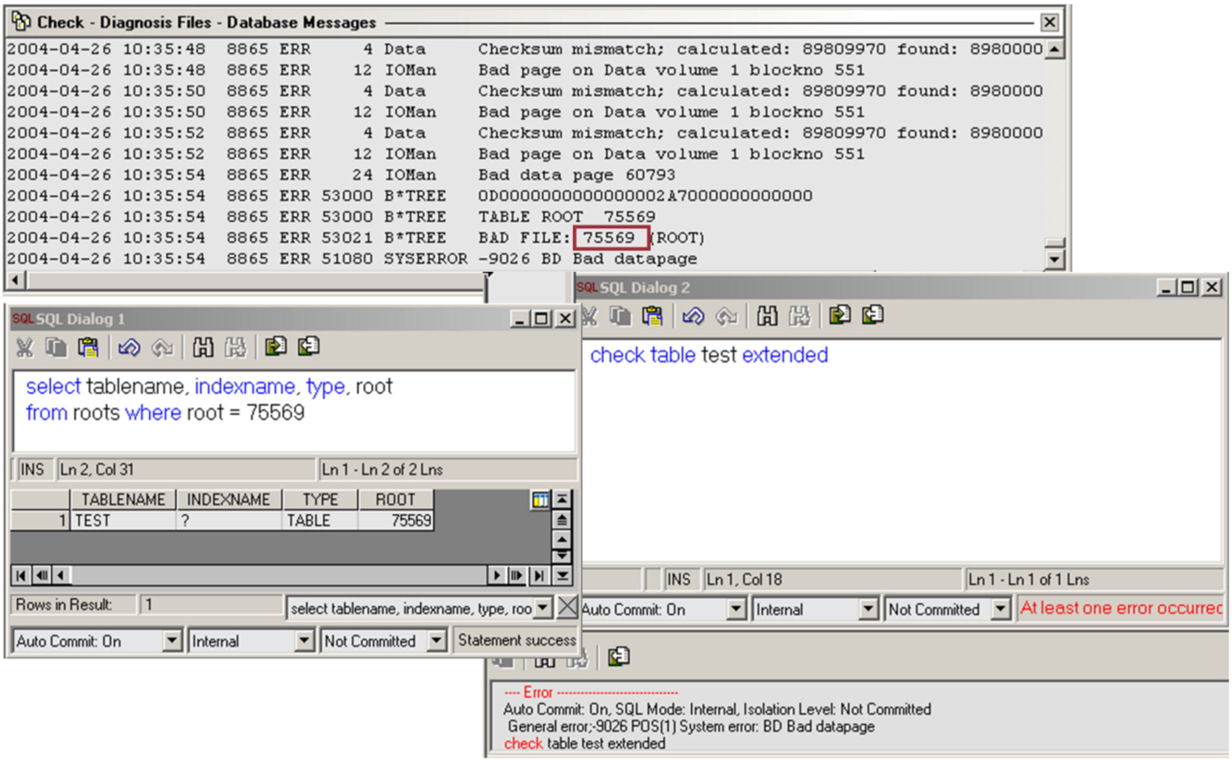
Regardless of whether or not you are able to identify errors in the I/O system, it is a good idea to run a **CHECK DATA** in such a case.



Corrupted indexes (different example) can directly be recreated by using transaction db50. Mark the corrupted index and choose ***Restore Index***.

Attention: Up to version 7.7.4 during index creation the corresponding table is locked for write transactions.

I/O Error: Verification of Checksum in Data Page



In this case, too, a block was read whose checksum did not match with the calculated value. According to the ROOTS view, this tree belongs to the TEST table.

In such a case, check the table with the **CHECK TABLE EXTENDED** statement (default as of 7.6.01). With the option EXTENDED, the sequence of the primary keys is checked on all B* tree levels.

If CHECK TABLE does not return any errors, the table is intact. Note that in disk mirroring, depending on the disk used for the I/O, a correct block and then an incorrect block may be returned.

If CHECK TABLE continues to return the error, you have the following options:

- Restore the database
- Delete the tables and load the data from a sister system. This can lead to data loss. When tables are deleted, blocks that are no longer accessible remain occupied. In the ADMIN operational state, these blocks are transferred to free space administration with a **CHECK DATA WITH UPDATE**.
- Download the table without reading the records of the defective blocks, delete the table and load the downloaded records. The table data can be read in primary key sequence. The primary key values of the records in the defective block are not specified in the selection. This method is only possible if no index page of the B* tree has been affected. Data loss occurs.

System Error

Diagnosis of severe errors
(-10000 < Error number <= -9000)
Sometimes the database crashes.

- 1. After a crash, the start procedure copies the diagnosis files to a directory. In the standard, the parameter DiagnoseHistoryPath is set to <RUNDIRECTORY>/DIAGHISTORY. Only two versions of these files are kept (parameter DiagnoseHistoryCount)
- 2. After the crash:
  - Try to restart the database (with vtrace switched on)
- 3. Check, if the error can be reproduced (with vtrace switched on)
- 4. Inform the support group, if the cause could not be identified – open a customer message.

Diagnosis files only have to be explicitly saved if they are not automatically copied to the DIAGHISTORY.

Settings for the collection of historical crash information can be done via the parameters DiagnoseHistoryPath (DIAG_HISTORY_PATH) and DiagnoseHistoryCount (DIAG_HISTORY_NUM).

Analysis Examples

Message -602 in Syslog

Zeit	Typ	Nr	Man	Benutzer	Tcod	MNr	Text Datum: 17.02.05
10:48:07	DIA	1	000	E30	SE38	BYL	Datenbankfehler -602 erfordert Intervention durch Datenbankadministrator
10:48:07	DIA	1	000	E30	SE38	BY4	Datenbankfehler -602 beim SEL-Zugriff auf Tabelle ZZTELE_902 aufgetreten
10:48:20	DIA	1	000	E30	SE38	AB0	Laufzeitfehler "DBIF_RSQL_SQL_ERROR" aufgetreten.
10:48:20	DIA	1	000	E30	SE38	AB1	> Kurzdump "050217 104820 p34777 E30 " erstellt.

How can database problems be analysed using db50?

- Example 1: -9026 Bad Data Page
- Example 2: -9028 Bad File

How does MaxDB support do an analysis if the database can no longer be transferred to the Online operational state (DB state Admin)?

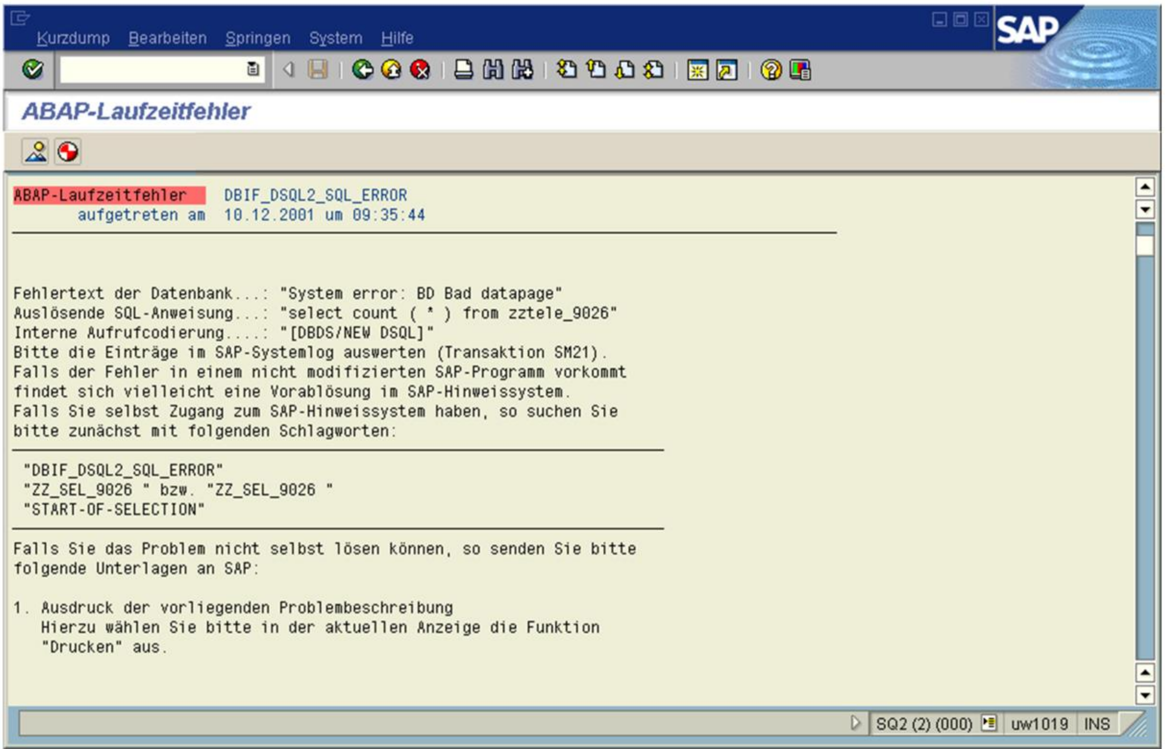
- Analyze pages
- Restart record

MaxDB system errors are "mapped" to the general error -602 in the WebAS System. So this error number does not tell you much.

If the database is still in the ONLINE operational state or has restarted it following a crash, the analysis can be continued with transaction db50.

If restarting the database is no longer possible, other measures are required.

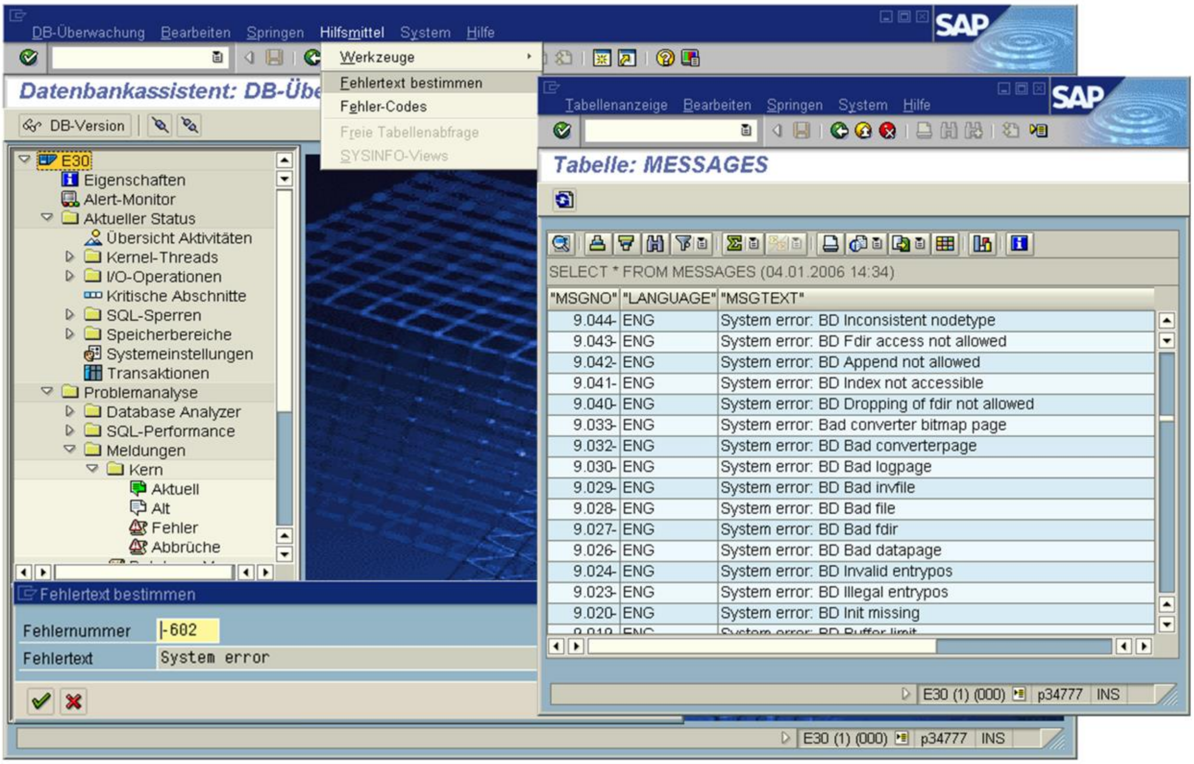
DB50: Problem Analysis -9026 Bad Data Page



A short dump with error -602 'BD Bad Data Page‘ occurred during execution of the ABAP report ZZ_SEL_9026.

The short dump thus provides more detailed information about the error than the system log and returns the corresponding text from the database.

DB50: Error Texts and Codes

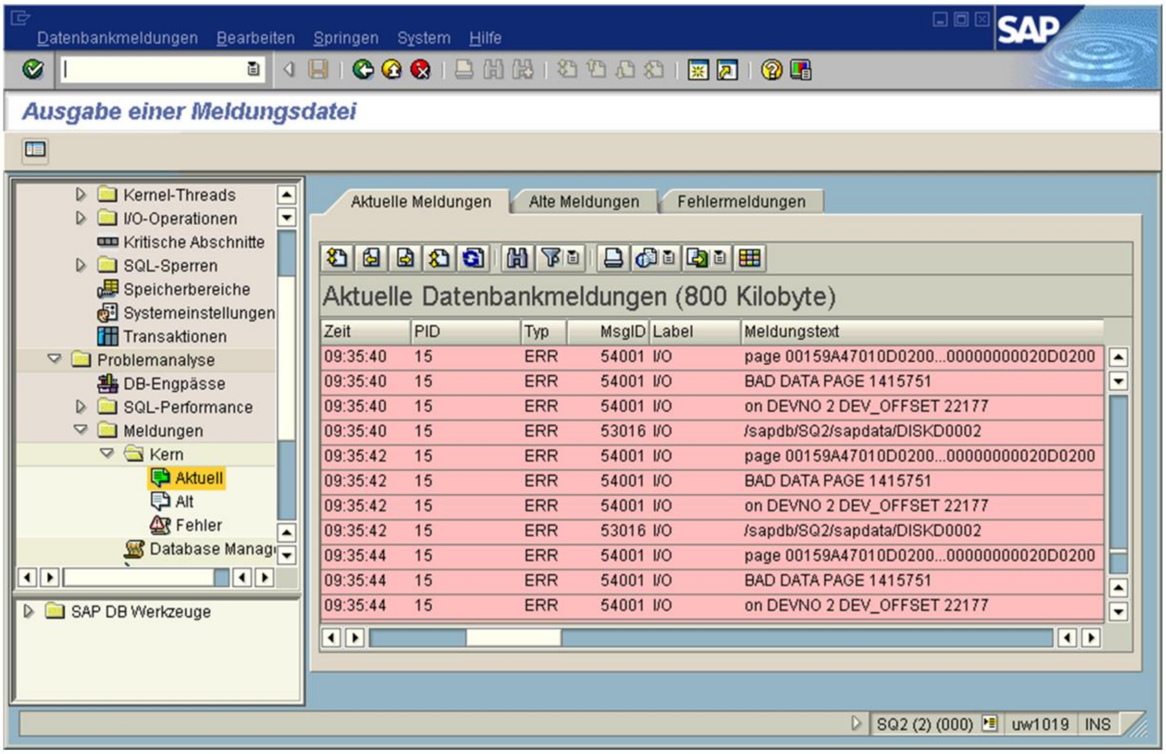


In the initial menu for transaction db50, you can find the text that corresponds to a particular number via ***Utilities -> Determine error text***. The text for error -602, however, is not terribly helpful as it is too general.

Utilities-> Error Codes provides information about (system) error numbers as well as their texts by displaying the Messages table.

IIn the present example, ***KnlMsg/knldiag*** must be utilized for further analysis.

DB50: Problem Analysis - Messages



To display the messages of the database system ***(KnlMsg/knldiag)***, choose ***Problem Analysis-> Messages.***

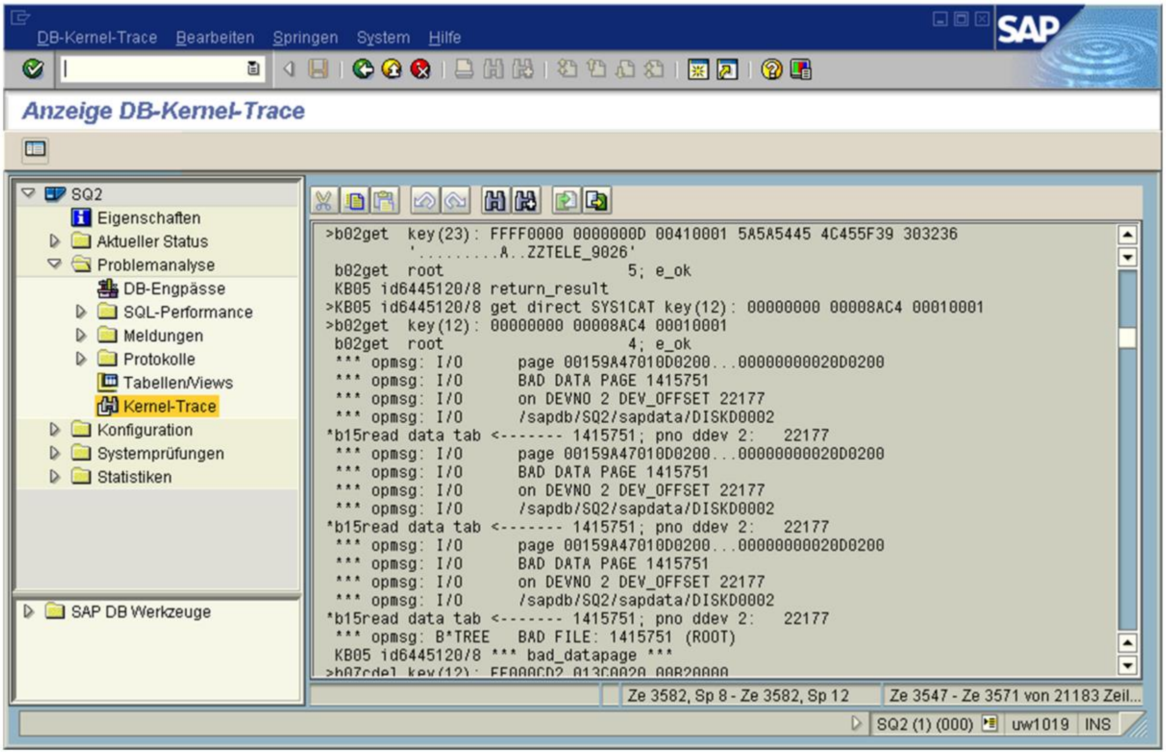
The error 'Bad Data Page‘ with error number -9026 is logged.

The root page of the affected object 1415751 is also recorded.

The position of the object is also logged. The defective object is located in Data Volume Number 2 at position 22177.

For a more precise analysis as to what is wrong with this object, the kernel trace (Vtrace) can be useful.

DB50: Problem Analysis – Kernel Trace



Using db50, a Vtrace has been created.

The root page of the affected object 141575, the volume (DevNo 2) and the position in the volume (22177) are logged.

In addition, an important section of the affected page is logged in the Vtrace which allows you to identify the cause of error -9026.

Each page has one so-called header and one trailer entry, consisting of 8 bytes each. Both entries are checked when the page is accessed.

Header entry: Page: 00 15 9A 47 01 0D 02 00

Trailer entry: Page: 00 00 00 00 02 0D 02 00

If inconsistencies appear when the header and trailer are compared, the 'Bad data page' error is sent to the application.

In this example we see that the first 5 bytes in the trailer differ from the header.

If the affected object is a database table, the database must be restored.

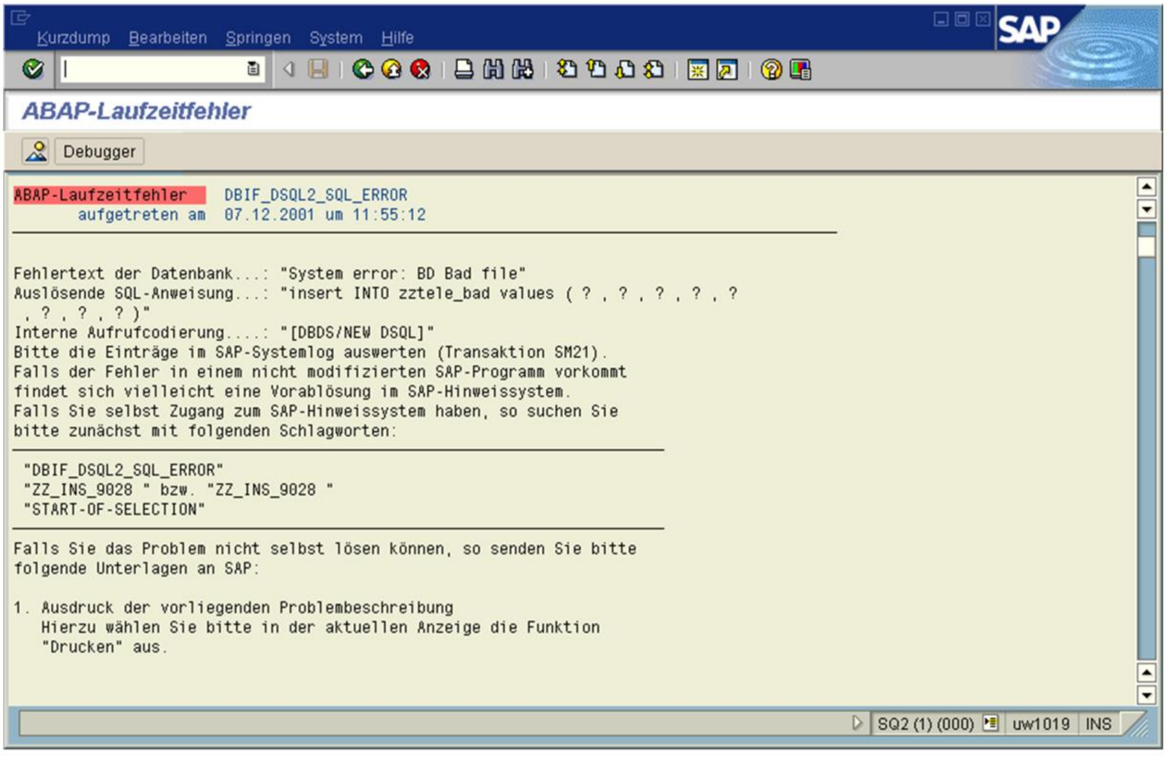
Example -9026: Solution

- Check, if the affected object is a table.
- Examine volume 2, if there are hardware problems.
- Remove hardware problem.
- Restore of the database
- CHECK DATA with transaction db13

If the affected object is an index, error -9026 could be remedied by simply deleting and recreating the index; the cause of the problem, however, would not be solved.

The hardware must be examined in any event as such cases (-9026) can be due to hardware errors.

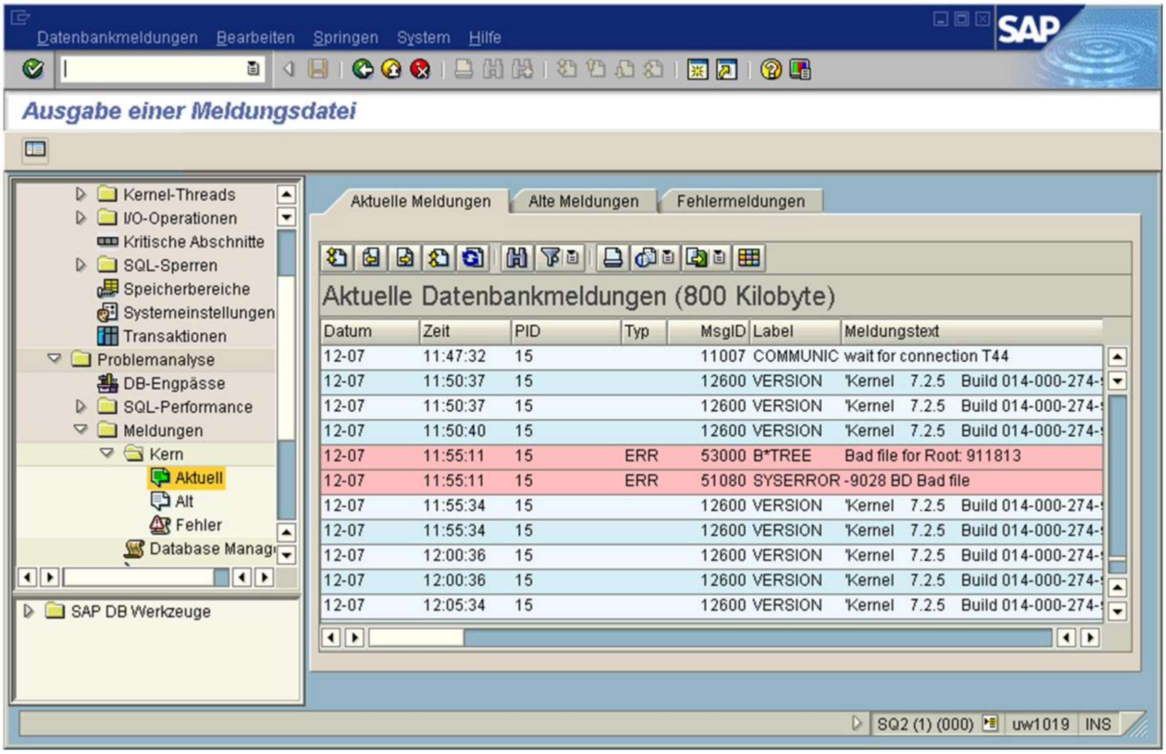
DB50: Problem Analysis -9028 BD BAD FILE



Report zz_ins_9028 terminated with a short dump.

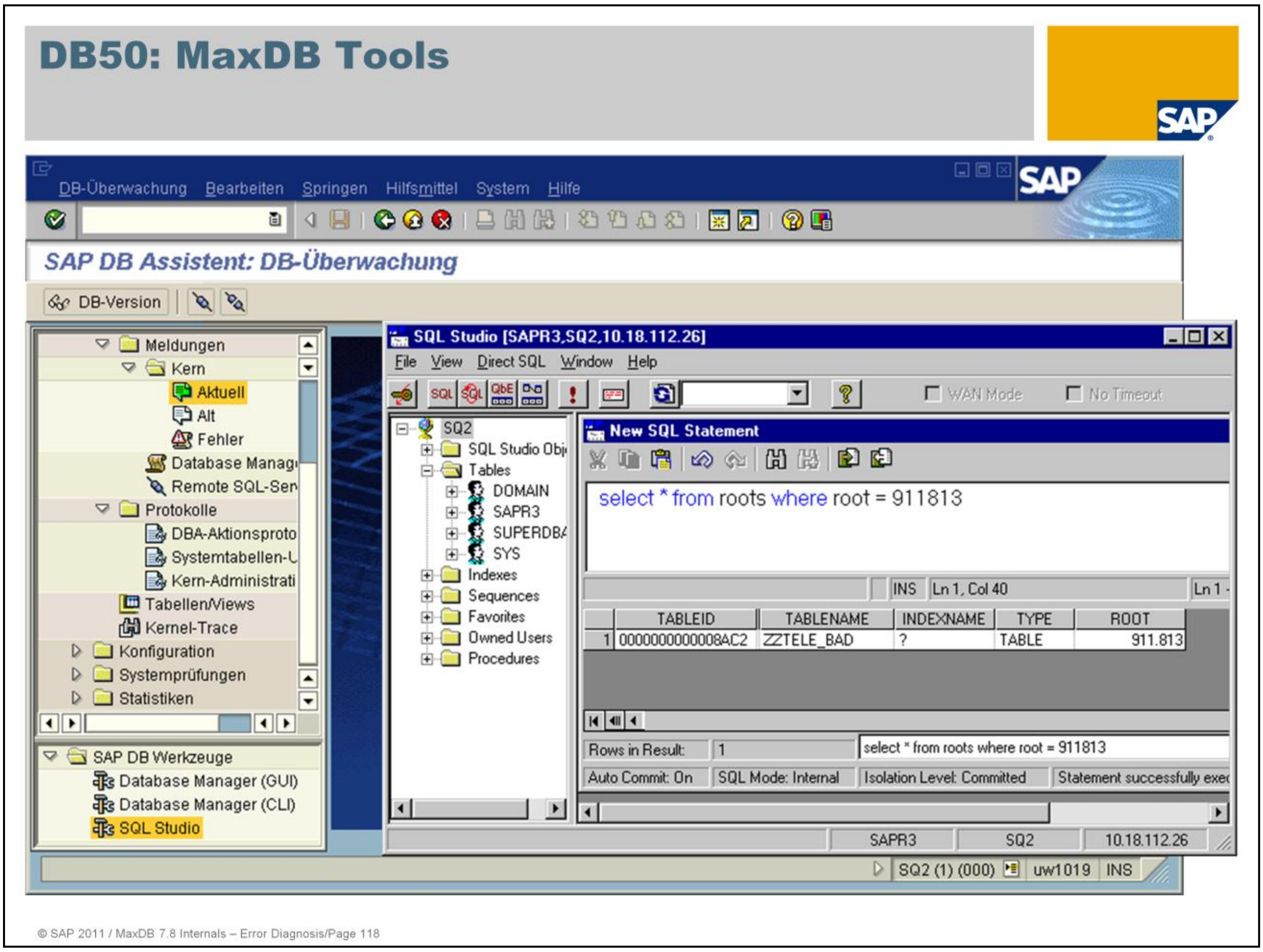
The cause of the error, -602 'BD Bad File‘, can be seen in the short dump.

DB50: Problem Analysis – Messages



The current example has the error "-9028 Bad File“: access to the table has been blocked because a serious error (e.g. -9026) occurred.

The root page number is recorded in ***KnlMsg/knldiag**.* You can find out the table with the root page number.



Until version 7.7 you will find out which database object is affected by accessing the view ROOTS.

We have already seen how commands can be sent interactively to the database using the SQL Studio. The SQL Studio can be started directly from transaction db50.

The ROOTS table contains the root page number, the object type and the name of the database object for all database objects.

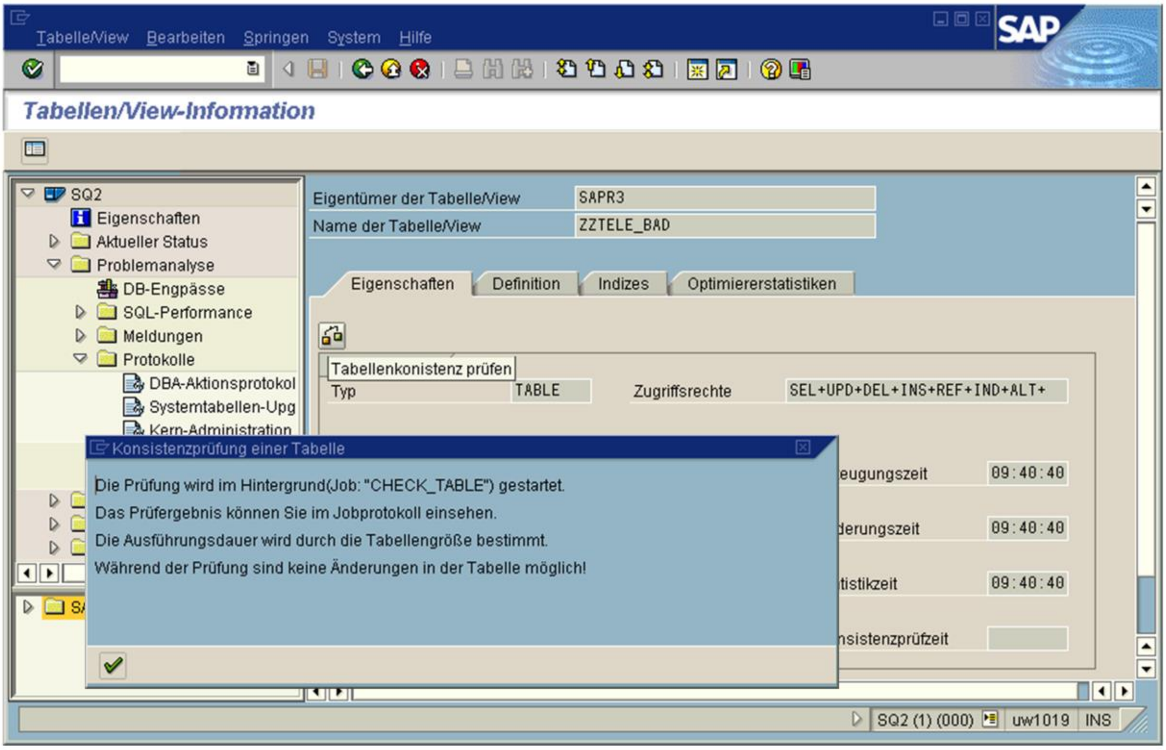
As of version 7.8 the following command can be used to determine the database object:

```
SELECT t.tablename, f.* FROM files f, tables t
WHERE (f.primaryfileid = t.tableid) OR f.fileid = t.tableid)
  AND f.root = 911813
```

Example – Field Types in the view roots

SYS	System table (not accessible)
NAMED INDEX	named index
TABLE	Table
SHORT STRING FILE	contains the short LOB COLUMNs (exists for each table with LOB COLUMNs)
LONG COLUMN	contains the long LOBs (OWNER, TABLENAME and INDEXNAME not specified)
TEMP	temporary table

DB50: CHECK TABLE



In the present example, we know that table zztele_bad has caused a problem; a consistency check is triggered.

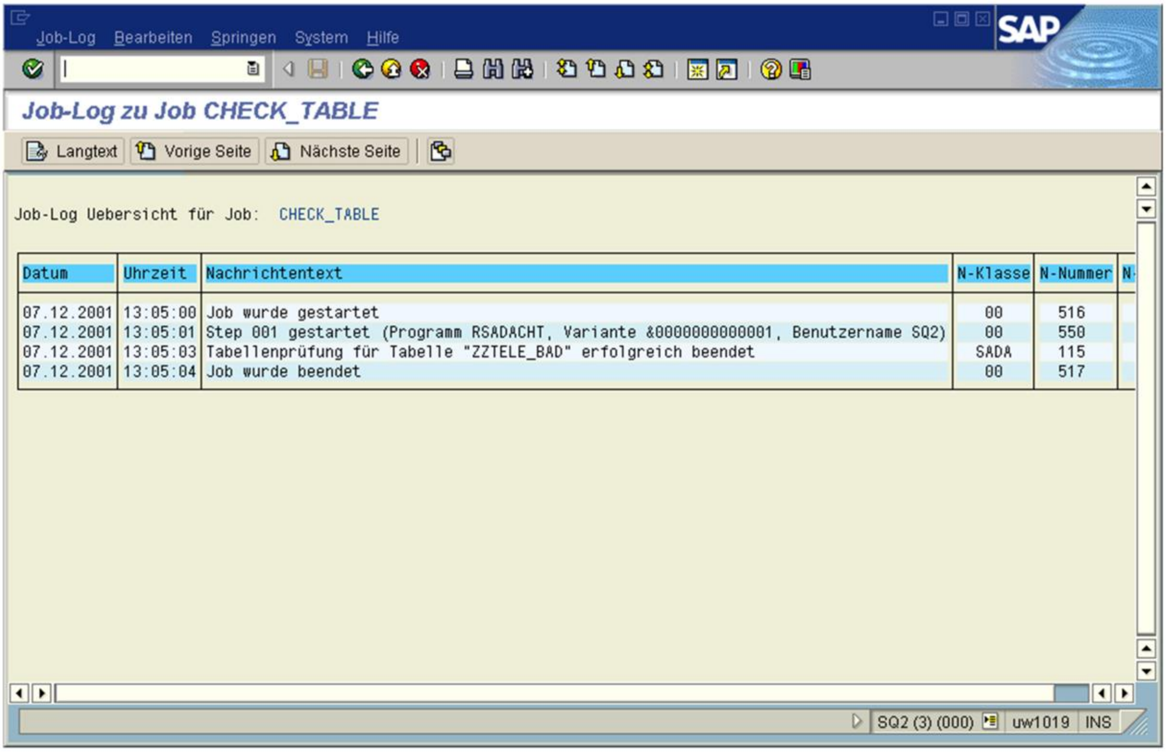
A Check Table is executed on the table.

Check Table checks the tree structure of the B* tree, header-trailer and so on.

If no inconsistencies are found, the BAD flag is retracted and access to the table is enabled.

This can happen if, for example, a Raid system reports an error but then corrects it immediately. Then the table is consistent, but has nevertheless been set to BAD.

SM37: Job Log Check_table



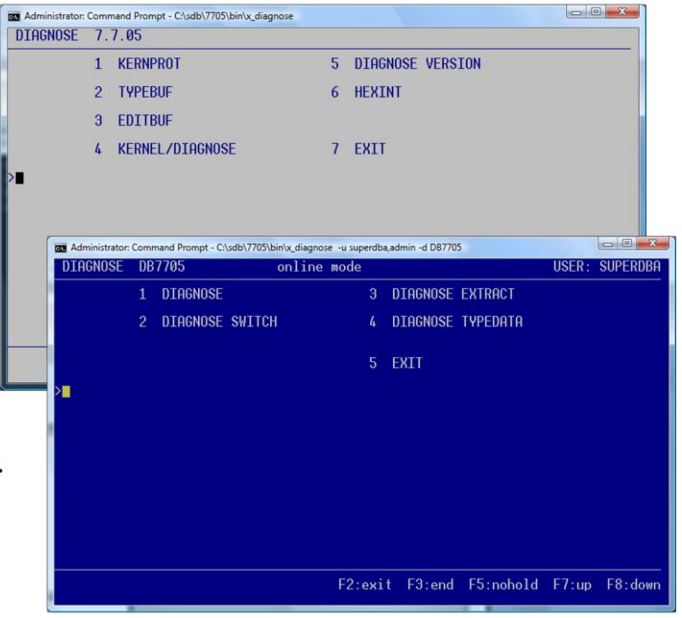
The '*Check Table*' executed without problems and reported no errors.

The program that had terminated with -9028 or -602 System Error can now be restarted.

x_diagnose

- Direct access to database pages (data, converter, log)
- Extraction of B* trees
- Analysis of knldump
- Command:
  <instroot>/bin/x_diagnose

  < instroot>/bin/x_diagnose
  -u <dbm-user>,<dbm-pw> -d <SID>



The tool ***x_diagnose*** allows you to access log pages and data pages in the database directly. With ***x_diagnose***, you can can export configuration or restart information from the pages.

If necessary, you can extract an entire table tree.

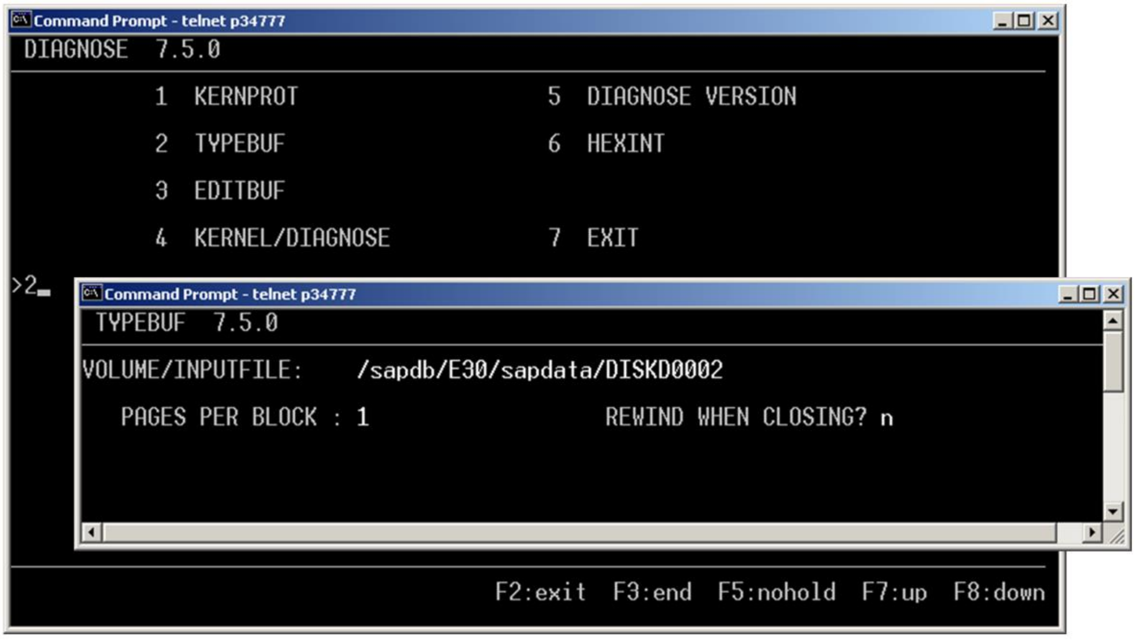
x_diagnose is also used to evaluate ***knldumps***. Cache contents, converter information, lock list entries, etc., can be analyzed at a later time.

Because improper use of the tool can be dangerous, ***x_diagnose*** should only be used by development.

In exceptional cases, pages can be repaired directly using an editing function.

Depending on the call of ***x_diagnose*** (with or without user/password combination for the database administrator) different menus were offered.

Diagnosis: Data Page (1)



The following pages show how to extract a data page with ***Diagnose***.

First you choose TYPEBUF.

Then you enter the volume name.

The following slides show the x_diagnose tool of version 7.5; the menus are still identical in 7.7.

Data Page (2)

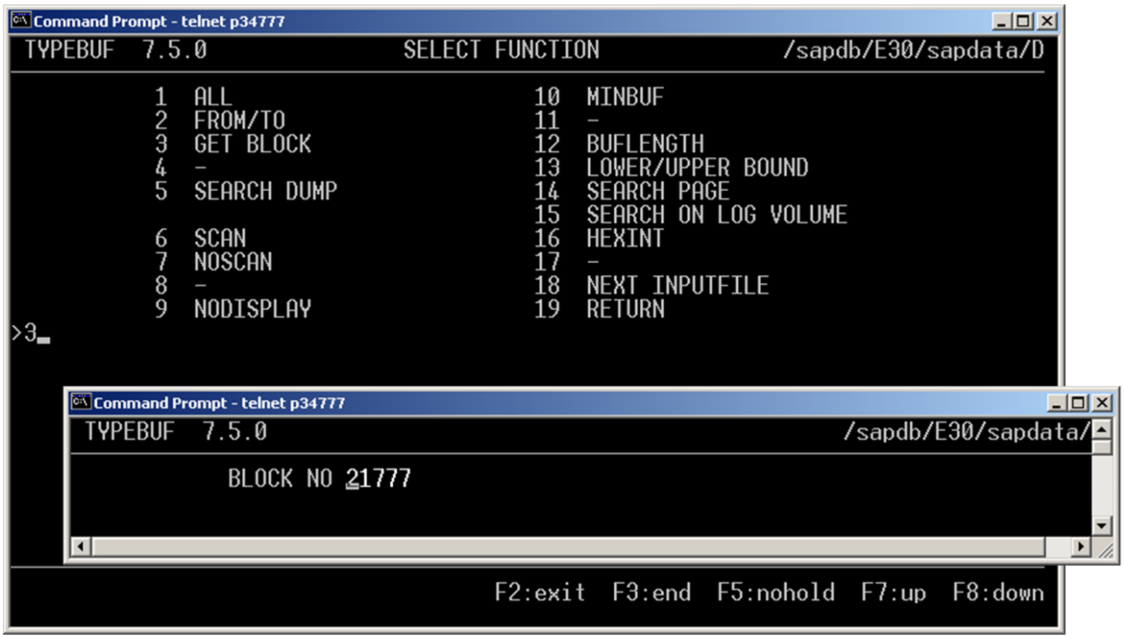
```
Command Prompt - telnet p34777

 TYPEBUF  7.5.0              SELECT FUNCTION              /sapdb/E30/sapdata/D

            1  ALL                          10  MINBUF
            2  FROM/TO                      11  -
            3  GET BLOCK                    12  BUFLENGTH
            4  -                            13  LOWER/UPPER BOUND
            5  SEARCH DUMP                  14  SEARCH PAGE
                                            15  SEARCH ON LOG VOLUME
            6  SCAN                         16  HEXINT
            7  NOSCAN                       17  -
            8  -                            18  NEXT INPUTFILE
            9  NODISPLAY                    19  RETURN
>6

                                     F2:exit  F3:end  F5:nohold  F7:up  F8:down
```

Data Page (3)

```
Command Prompt - telnet p34777
TYPEBUF   7.5.0                                              /sapdb/E30/sapdata/D

          node:
             F = node header
             K = key       S = key (short info: first/last key of node)
                           M = key (minbuf/maxbuf)
             R = record/object

          log:                                       dump:
             H = logentry (header only)                 D = dump label
             L = logentry                               F = full info
             G = logentry (minbuf/maxbuf)

          BD pages (converter):
             B = BD full info

          other pages (restartrec, log info, hostfile info, etc.):
             F = full info

        SELECT CHAR: f_

                                 F2:exit  F3:end  F5:nohold  F7:up  F8:down
```


Using the SCAN menu, you can then specify what information you desire.

Data Page (4)

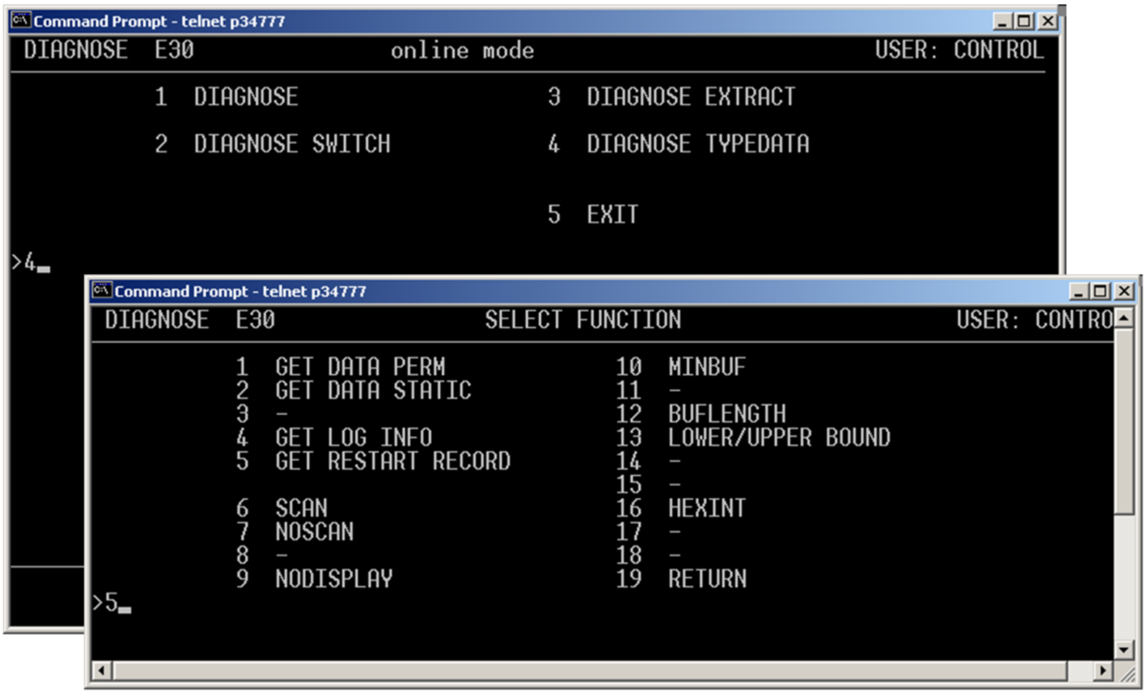


By specifying a block address - taken, for example, from ***KnlMsg (knldiag)*** - you come to the desired page.

Data Page (5)

```
Command Prompt - telnet p34777
 TYPEBUF  7.5.0                                           /sapdb/E30/sapdata/D

LEAF 66043  perm           entries : 83        [block 21777]
     bottom   : 7331       root    : 60723     convvers: 421
                           right   : 66044     writecnt: 1

00001      nodepage.pno: 66043            nodepage.pt : data
00006      nodepage.pt2: tab              nodepage.chk: ChecksumData
00008      nodepage.mde: empty
08181      nd_checksum : 131338522        nodepge2.pno: 66043
08189      nodepge2.pt : data             nodepge2.pt2: tab
08191      nodepge2.chk: ChecksumData
08192      nodepge2.mde: empty
00009      nd_bottom   : 7331             nd_rec_cnt  : 83
00017      nd_level    : 0
00019      nd_filestate: empty
00020      nd_sorted   : false            nd_root     : 60723/33ED0000
00025      nd_right    : 66044/FC010100   nd_left     : nil_pno
00033      nd_last     : nil_pno          nd_leaf_no  : nil_pno
00041      nd_conv_vers: 421              nd_str_vers : nil_pno
00049      nd_file_vers: dummy            nd_inv_usage: 0
00057      nd_leaf_cnt : 1                nd_treeleavs: nil

HOLDING                    F1:hex/int F2:exit  F3:end  F5:nohold  F7:up  F8:down
```

Diagnosis: Restart Record (1)



You want to check the restart record.

You can access the restart record in various ways. One way is to choose KERNEL/DIAGNOSE, which brings you to the menus displayed here.

Restart Record (2)

```
Command Prompt - telnet p34777
 DIAGNOSE  E30                                                  USER: CONTROL

RESTARTREC    21599   Savept: at 2004-09-21 09:38:45 0
00001 i4 1 restartr.pno: 21599            restartr.pt : data
00006  1 1 restartr.pt2: checkpt          restartr.chk: ChecksumLogInfo
00008  1   restartr.mde: - - - -
08181 i4i4 checksum    : 372708           restart2.pno: 21599
08189  1 1 restart2.pt : data             restart2.pt2: checkpt
08191  1   restart2.chk: ChecksumLogInfo
08192  1   restart2.mde: - - - -
00017 b1i1 rstIsConsist: false            rstConfigPha: 0
00019 b1   rstSetEndRdO: false
00025 i4i4 rstConvVers : 4952             rstPrevConvV: 4951
00033 i4i4 rstCurrBupVs: 4936             rstPrevBupVs: 4936
00049 i4i4 crSnapShotBA: 514              crConvRootBA: 39812609
00057 i4i4 crFdirRoot  : 1                crLngDirRoot: 2
00065 i4i4 crMaxDynPno : 586214           crMaxStatPno: 1860
00073 b1   crRecovIncom: false
00089      crReleaseVrs: Kernel    7.3.0   Build 020-000-084-663
00201 i4i1 svpId       : 568              svpReason   : 0
00207 i2i4 svpOpenTrans: 0                svpIOseqNo  : 2081936
00213 i4i2 svpStrtDevOf: 38682            svpStrtEntOf: 3152

HOLDING                                     F1:NOHOLD F3:end  F5:nohold
```


The last Savepoint was written on 21.09.2004.

The database is in an inconsistent state (rstIsConsist: false).

Restart Record (3)

```
Command Prompt - telnet p34777
 DIAGNOSE  E30                                                USER: CONTROL

00219 i1   svpStrtEntTp: 30
00225 i4i4 svpOpnTrnsRo: 579679            svpHistoryRo: nil_pno
00233      svpDate     : 2004-09-21        svpTime     : 09:38:45
00241      svpEntryDate: 2004-09-20        svpEntryTime: 07:05:31
00369  4   srgSession  : 226991
00377      srgSurrogate: 0-66C0
00385      srgSyskey   : 0-22B6C9
00393  6   srgTrans    : 1879216
00613 i4i4 rstTotLogSiz: 0                 rstDatBupCnt: 16
00621 i4   rstLastDataB: 2044497
00625      rstReleaseVe: Kernel    7.5.0    Build 018-121-079-776
00665      rstDbIdent  : p34777:E30_20030612_182312

HOLDING                                     F1:NOHOLD F3:end  F5:nohold
```

Diagnosis: Loginfo Page

```
Command Prompt - telnet p34777
 DIAGNOSE   E30                                                    USER: CONTROL

LOGINFO       2    at 2004-09-22 11:00:14 MAX USED OFFSET 131070

FlushMode: MinimizeSpace DeviceState: Okay

00001 i4 1 id           : 2                    pagetype     : LogInfoPage
00009      date         : 2004-09-22           time         : 11:00:14
00017 i1i1 flushmode    : 0                    devicestate  : 0
00019 i2i4 queuecount   : 1                    cycleRelaOFF: 131070
00025 i4i4 lastknownSEQ: 2086118               lastknownOFF: 39307
00033 i4i4 oldNotSavOFF: 12820                 oldNotSavSEQ: 1967890
00041 b1b1 devspaceEnab: true                  autoOverwrit: false
00045 i4   logBackupCnt: 13                    redoUntilDat: 0000-00-00
00053   i4 redoUntilTim: 00:00:00              clearLowOFF : nil
00061 i4i4 clearUppOFF : nil                   seqAftRedoUn: nil
00069 i4   oldstKnwnIOS: 1967890
00241      dbVersion    : Kernel    7.5.0     Build 018-121-079-776
00281      dbident      : p34777:E30_20030612_182312
00669      master node  : P34777

HOLDING                                       F1:NOHOLD F3:end   F5:nohold
```


You access Loginfo Page via the same menu (GET LOG INFO).

The DBIdent, among other things, can be determined here.

Any questions?