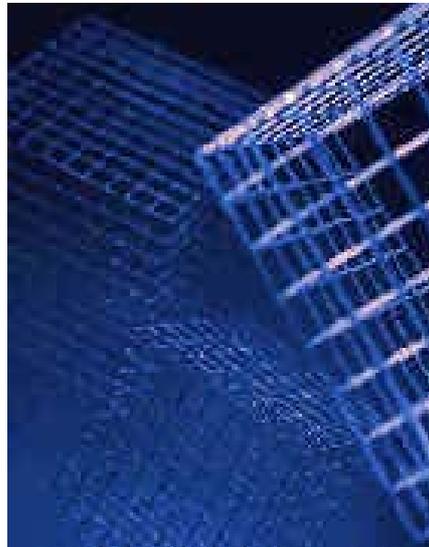


# Database Analyzer: SAP DB



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## Icons

| Icon  | Meaning        |
|---|----------------|
|  | Caution        |
|  | Example        |
|  | Note           |
|  | Recommendation |
|  | Syntax         |

## Typographic Conventions

| Type Style          | Description  |
|---------------------|--|
| <i>Example text</i> | Words or characters that appear on the screen. These include field names, screen titles, pushbuttons as well as menu names, paths and options.<br><br>Cross-references to other documentation.                                 |
| <b>Example text</b> | Emphasized words or phrases in body text, titles of graphics and tables.   |
| EXAMPLE TEXT        | Names of elements in the system. These include report names, program names, transaction codes, table names, and individual key words of a programming language, when surrounded by body text, for example, SELECT and INCLUDE. |
| Example text        | Screen output. This includes file and directory names and their paths, messages, source code, names of variables and parameters as well as names of installation, upgrade and database tools.                                  |
| EXAMPLE TEXT        | Keys on the keyboard, for example, function keys (such as F2) or the ENTER key.  |
| <b>Example text</b> | Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.  |
| <Example text>      | Variable user entry. Pointed brackets indicate that you replace these words and characters with appropriate entries.   |

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## Database Analyzer: SAP DB

### Purpose

The Database Analyzer program is a tool for analyzing the performance of SAP DB [database instances](#) [See [SAP DB Library](#)]. It replaces the tools `x_wizard` and `X_wiztrc`.

You can use the Database Analyzer independently of the SAP DB version and the [database instance type](#) [See [SAP DB Library](#)]. You can also use this program to access the database instance from a remote host.

### Scope of Functions

The Database Analyzer collects performance-relevant data by monitoring the performance of the database instance at regular (variable) intervals. It splits the results of its analyses into five classes – information, three different levels of warnings, and error messages.

This makes it easier for you to find out the following possible causes of problems with the database instance:

- Database configuration (caches, parameter)
- Synchronization (locks, critical regions, heap)
- Processing of database requests (such as processing strategies, indexes, optimizer statistics)
- Hardware configuration

The rules and commands for collecting the performance-relevant data are defined in a modifiable [configuration file](#) [Page 24].



To be able to interpret the information gathered by the Database Analyzer, you require a sound working knowledge of the SAP DB architecture, the architecture of your SAP DB application program, and your operating system.

For general information on the SAP DB database system, see [The SAP DB Database System](#) on the SAP DB Homepage <http://www.sapdb.org>.



## Calling the Database Analyzer

Call the Database Analyzer with the following command and your chosen [options](#) [Page 7]:

```
dbanalyzer [-n <database_server>] -d <database_name> -
u <user,password>
[-f <configfile>] -t <interval>[,<number>] [-o <outputdir>] [-
c <level> ]
[-i] [-nologo] [-noenv] [-stop]
```



You can also call the Database Analyzer from the Computing Center Management System (CCMS) or in the [Database Manager CLI](#) [See [SAP DB Library](#)].

- [CCMS Call](#) [See [SAP DB Library](#)]
- [Database Manager CLI Call](#) [See [SAP DB Library](#)]



## Options

You can specify the following options when you call the [Database Analyzer \[Page 6\]](#):

|                               |   |
|-------------------------------|---|
| <b>-n</b> <database_server>   | Name of the server on which the database instance runs<br><br>If you specify the server name, you must also use the option <b>-o</b> to specify the directory for the <a href="#">log files [Page 7]</a> .  |
| <b>-d</b> <database_name>     | Name of the database instance   |
| <b>-u</b> <user,password>     | User name and password  |
| <b>-f</b> <configfile>        | Name of the <a href="#">configuration file [Page 24]</a><br><br>If you do not specify a configuration file, the Database Analyzer uses the file <code>dbanalyzer&lt;version&gt;.cfg</code> in the <a href="#">SAP DB directory [See SAP DB Libraray]</a> <code>&lt;dependent_path&gt;/env</code> .  |
| <b>-t</b> <interval>,<number> | Time interval (in seconds) between two analyses and the chosen number of analyses<br><br>If you choose a <number>, then the Database Analyzer ends after this number of analyses.   |
| <b>-o</b> <outputdir>         | Directory for the log files<br><br>If you start the Database Analyzer on the server on which the database instance is installed, then you do not need to specify <b>-o</b> . In this case, the Database Analyzer uses the subdirectory <code>analyzer</code> in the <a href="#">run directory [See SAP DB Libraray]</a> of the database instance. |
| <b>-c</b> <outputlevel>       | Specifies, on a scale of 1 (low) to 4 (high), how much additional information appears on the console<br><br>If you do not specify <b>-c</b> , then no information appears on the console.   |
| <b>-I</b>                     | Deletes any existing log files for the same day   |
| <b>-nologo</b>                | Suppresses the logo   |
| <b>-noenv</b>                 | Suppresses logging and output of the environment variables from the configuration file  |
| <b>-stop</b>                  | Stops a running Database Analyzer   |



## Log Files

The analysis data collected during the day is saved in the subdirectory `/YYYYMMDD` that you specify with the [option \[Page 7\]](#) **-o** when you [call the Database Analyzer \[Page 6\]](#).



If you start the Database Analyzer on the server on which the [database instance \[See SAP DB Libraray\]](#) is installed, then you do not need to specify **-o**. In this case, the Database Analyzer uses the subdirectory `analyzer` in the [run directory \[See SAP DB Libraray\]](#) of the database instance.

The Database Analyzer generates the following log files:

### DBAN\_<monitor\_class>.csv

These files contain all analysis data and are used to check runtime behavior.

One file exists for each monitor class (analysis area). You can use Microsoft Excel to open and read this file as soon as the Database Analyzer stops writing to it.

### DBAN.prt

This file contains the following information:

- Unique information about the configuration and performance-relevant data of the database instance
- Bottlenecks discovered by the Database Analysis after each measurement

The Database Analyzer weights the information and bottlenecks:

|          |                       |  |
|----------|-----------------------|--|
| I        | Information           | General information, such as the number of executed commands |
| W1 to W3 | Warning levels 1 to 3 | Bottleneck warnings with low, medium, and high priority      |
| E        | Emergency             | Critical problems, such as an imminent database crash        |

See also:

[List of All Log Files \[Page 8\]](#)

[List of Messages in the File DBAN.prt \[Page 9\]](#)



## List of Log Files

This table shows you the information that you can find in the Database Analyzer [log files \[Page 7\]](#).

### Log Files for All Database Instance Types

|                                   |  |
|-----------------------------------|--|
| <a href="#">DBAN.prt [Page 9]</a> | Logs messages, including analysis rules and current values that caused the message   |
| DBAN_CACHES.csv                   | Successful and unsuccessful accesses to the <a href="#">caches [See SAP DB Libraray]</a> , and hit rates   |
| DBAN_FILLING.csv                  | Filling level of the <a href="#">database instance [See SAP DB Libraray]</a> (for example, the size of the <a href="#">data volumes [See SAP DB Libraray]</a> , number of permanently and temporarily used <a href="#">pages [See SAP DB Libraray]</a> ) |
| DBAN_IO.csv                       | Reads and writes to cache pages and data pages   |
| DBAN_LOAD.csv                     | Accesses and selectivity of SELECT, FETCH, INSERT, UPDATE, and DELETE statements   |
| DBAN_LOGGING.csv                  | Number of <a href="#">log pages [See SAP DB Libraray]</a> written, filling level of the <a href="#">log queue [See SAP DB Libraray]</a>  |
| DBAN_REGIONS.csv                  | Information about accesses to critical regions   |
| DBAN_STRATEGY_INDEX.csv           | Accesses and selectivity for index searches  |
| DBAN_STRATEGY_PRIMKEY.csv         | Accesses and selectivity for PRIMARY KEY searches  |
| DBAN_STRATEGY_SCANS.csv           | Accesses and selectivity for <a href="#">INDEX SCAN [See SAP DB Libraray]</a> and <a href="#">TABLE SCAN [See SAP DB</a>   |

|                          |  |
|--------------------------|--|
|                          | <a href="#">Library</a> searches   |
| DBAN_TASK_ACTIVITIES.csv | Information on task activities (such as number of SQL statements, number of running <a href="#">user tasks</a> [See SAP DB Library], number of task changes)   |
| DBAN_TASK_IO.csv         | Number and duration of physical writes and reads from perspective of the <a href="#">log writer</a> [See SAP DB Library], the <a href="#">user task</a> [See SAP DB Library], and the <a href="#">pager</a> [See SAP DB Library]           |
| DBAN_TASK_STATES.csv     | Number and duration of processed statements<br>Number and wait duration of the <a href="#">task states</a> [See SAP DB Library] vsuspend, vwait, vsleep  |
| DBAN_TRANSACTIONS.csv    | Number of SQL statements and procedure calls, PREPARE, EXECUTE, COMMIT, and ROLLBACK statements, subtransactions, TIMEOUTS caused by locks, and conversions of row locks to table locks ( <a href="#">Lock List Escalations</a> [Page 14]) |

### liveCache-Specific Log Files

|                           |   |
|---------------------------|---|
| DBAN_CACHES_OCCUPANCY.csv | Cache load and occupancy (proportion of OMS, SQL, and history pages in the <a href="#">data cache</a> [See SAP DB Library])       |
| DBAN_OMS.csv              | Number of calls by <a href="#">DB procedures</a> [See SAP DB Library], dereferences, deleted objects, history accesses            |
| DBAN_OMS_CONTAINER.csv    | Information on <a href="#">class containers</a> [See SAP DB Library] (such as number of classes, occupancy, number of free pages) |
| DBAN_OMS_HEAP.csv         | Information on <a href="#">OMS heap</a> [See SAP DB Library] (such as occupancy, current size, collisions)                        |
| DBAN_OMS_VERSIONS.csv     | Information on <a href="#">OMS versions</a> [See SAP DB Library] (such as number and age of versions used)                        |



### List of Messages in the File DBAN.prt

Database Analyzer can write the following messages (among others):

|   |
|---|
| <a href="#">Avg user cmd exec time for task</a> [Page 10] |
| <a href="#">Avg user suspend time for task</a> [Page 11]  |
| <a href="#">Avg user wait time for task</a> [Page 11]     |
| <a href="#">Catalog cache hitrate</a> [Page 11]           |
| <a href="#">Collision rate</a> [Page 12]                  |
| <a href="#">Data cache hitrate</a> [Page 13]              |
| <a href="#">Data volume filling level</a> [Page 13]       |
| <a href="#">Deletes</a> [Page 14]                         |
| <a href="#">Free user tasks</a> [Page 14]                 |
| <a href="#">Index accesses</a> [Page 20]                  |
| <a href="#">Index range accesses</a> [Page 20]            |

|  |
|--|
| <a href="#">Isolated index accesses [Page 20]</a>                      |
| <a href="#">Isolated index range accesses [Page 20]</a>                |
| <a href="#">Isolated index scans [Page 20]</a>                         |
| <a href="#">Log area filling level [Page 14]</a>                       |
| <a href="#">Lock list escalations [Page 14]</a>                        |
| <a href="#">Log queue overflows [Page 15]</a>                          |
| <a href="#">Log write time [Page 15]</a>                               |
| <a href="#">Max log queue filling [Page 15]</a>                        |
| <a href="#">Number of cached history pages [Page 16]</a>               |
| <a href="#">Number of physical reads [Page 16]</a>                     |
| <a href="#">Number of physical writes [Page 17]</a>                    |
| <a href="#">Number of physical writes of temporary pages [Page 17]</a> |
| <a href="#">OMS cache hitrate [Page 17]</a>                            |
| <a href="#">OMS heap collisions [Page 18]</a>                          |
| <a href="#">OMS heap utilization [Page 18]</a>                         |
| <a href="#">OMS history cache hitrate [Page 19]</a>                    |
| <a href="#">OMS terminates [Page 19]</a>                               |
| <a href="#">OMS version is old [Page 19]</a>                           |
| <a href="#">OMS version is unloaded [Page 20]</a>                      |
| <a href="#">Out of memory exceptions [Page 21]</a>                     |
| <a href="#">Parse activities [Page 21]</a>                             |
| <a href="#">Physical reads for user task [Page 22]</a>                 |
| <a href="#">Primary key accesses [Page 20]</a>                         |
| <a href="#">Primary key range accesses [Page 20]</a>                   |
| <a href="#">Selects and Fetches [Page 22]</a>                          |
| <a href="#">Table scans [Page 23]</a>                                  |
| <a href="#">Updates [Page 14]</a>                                      |
| <a href="#">User task blocked in state [Page 23]</a>                   |
| <a href="#">User task physical writes [Page 23]</a>                    |



## Avg user cmd exec time for task

Avg user cmd exec time for task <task\_ID>: <duration> ms,  
<number of> commands, application pid <pid>

### Explanation

The time needed by the specified [user task \[See SAP DB Libraray\]](#) to execute the statements is very high. You see the average execution time of a statement, the number of statements checked, and the process ID of the relevant application process.

Whether this counts as a bottleneck, depends on the application structure.

Mass statements in background processes can often cause long runtimes. As well as this, situations such as locks in SQL objects, physical reads and writes, or dispatching that prioritizes other tasks, can cause internal kernel wait situations that increase runtimes.

If, in [liveCache \[See SAP DB Libraray\]](#) instances, a [DB procedure \[See SAP DB Libraray\]](#) needs to take a long time to execute, it is highly likely that other users are being blocked in the same liveCache thread. This can cause unexpectedly long runtimes for other transactions or DB procedures.



## Avg user suspend time for task

```
Avg user suspend time for task <task_ID>: <duration> ms,
<number of> suspends, application pid <pid>
```

### Explanation

The execution of this [user task \[See SAP DB Libraray\]](#) has been terminated by wait times. You see the average duration of all wait times that have been determined. This value is normally under 100 milliseconds.

You also see how often wait times occur.

### User Response

Check the state of the user task at regular intervals.



## Avg user wait time for task

```
Avg user wait time for task <task_ID>: <duration> ms, <number of>
waits, application pid <pid>
```

### Explanation

In a lock collision, the wait for a [lock \[See SAP DB Libraray\]](#) to be released is very long.

This can be caused by a long transaction. Long wait times ([task state \[See SAP DB Libraray\]](#) `vwait`) can also occur when many applications want to lock the same object.

The database system attempts to execute locking [tasks \[See SAP DB Libraray\]](#) with high priority within the database kernel if the locks are requested by other sessions.

For information on the current locks, see the [system tables \[See SAP DB Libraray\]](#) `TRANSACTIONS` and `LOCKS` in the database instance.

### User Response

Check the following aspects of the application:

- Is it suitable for [isolation level 0 \[See SAP DB Libraray\]](#) (uncommitted)?
- Can the time between the lock request and the COMMIT statement be reduced?
- Can you avoid simultaneous locks on the same row by splitting tables?



## Catalog cache hitrate

```
Catalog cache hitrate <percentage>%, <number> of <number> accesses
failed
```

## Explanation

The hit rate when accessing the [catalog cache \[See SAP DB Libraray\]](#) in which the parsed SQL statements are administered is too low. In a running database application, the catalog cache hit rate should be about 90%. If new program parts or programs are started, the hit rate can sink to a very low level. However, the average over 15 minutes should not be below 85%.

## User Response

The size of the catalog cache should be about 100 pages for each database session. You can check this with the [database parameters \[See SAP DB Libraray\]](#) MAXUSERTASKS and CAT\_CACHE\_SUPPLY.

The catalog cache is enlarged dynamically by the active database sessions, and released again with a RELEASE statement. You can determine the current cache sizes with the SQL statement **SELECT \* FROM CONNECTEDUSERS**.

If sessions need significantly more than 100 pages, we recommend that you increase the catalog cache accordingly in the medium term, if the memory of the server is large enough.



## Collision rate

```
<region_name>: collision rate (<percentage>%), <number of>
collisions, <number of> accesses on region <region_ID>
```

## Explanation

The rate of [lock collisions \[See SAP DB Libraray\]](#) is very high.

[Tasks \[See SAP DB Libraray\]](#) that run in different [threads \[See SAP DB Libraray\]](#) are attempting to access a global region in parallel. The synchronization that enables this often leads to collisions.



One exception to this in [liveCache \[See SAP DB Libraray\]](#) instances are high collision rates in the regions (<region-name>) OMSVDIR and CNSTVIEW. This is normal for certain actions, such as a simultaneous CIF queue transfer.

## User Response

You need to act if the collision rate rises above 10%. Generally, the risk of collisions rises with the number of processors used (database parameter [MAXCPU \[See SAP DB Libraray\]](#)). Check, therefore, whether the database system can fulfill the needs of the applications with fewer CPUs in multiprocessor systems.

If high collision rates occur in multiprocessor central systems (database system and application run on the same server), check whether the CPU on the server is overloaded, and whether the database threads are blocked by other applications. In this case, the database threads that contain [user tasks \[See SAP DB Libraray\]](#); should have REAL TIME PRIORITY in the operating system. However, at the same time, the value of MAXCPU must be at least one lower than the number of real CPUs, to avoid operating system blocks.

## Additional Actions

- If the high collision rates occur in the regions DATAn, SPLITn or TREE n, then increase the values of the database parameters [DATA\\_CACHE\\_RGNS \[See SAP DB Libraray\]](#), [TREE\\_RGNS \[See SAP DB Libraray\]](#), and [CACHE\\_SIZE \[See SAP DB Libraray\]](#).
- If the high collision rates occur in the regions TRACE or BUFWRTR, then activate the [database trace \[See SAP DB Libraray\]](#) temporarily for troubleshooting only.



## Data cache hitrate

Data cache hitrate <percentage>%, <number> of <number> accesses failed

### Explanation

The hit rate when accessing the [data cache \[See SAP DB Libraray\]](#) is too low. In a running [liveCache \[See SAP DB Libraray\]](#) application, the hit rate should not be under 100%.

Lower hit rates may occur for short periods of time, for example, when objects are accessed for the first time, or if a table that is being scanned (TABLE SCAN) is larger than 10% of the data cache (only if the database parameter [LRU\\_FOR\\_SCAN \[See SAP DB Libraray\]](#) has the value `yes`). Data cache hit rates that are lower than 99% over 15 minutes must be avoided.

### User Response

Check the following points:

- Load in the data cache
- Configuration of the database instance and the hardware
- In liveCache instances, the size of the plan versions, as well as [OMS versions \[See SAP DB Libraray\]](#) that have existed for a long time.



Individual SQL statements can often take up a large proportion of the total logical and physical reads. Increasing the cache just moves the load from the hard disk to the CPU, even though, for example, an additional index could turn a read-intensive table scan into quick direct access.

For information on creating optimized SQL statements, see [Optimizer: SAP DB 7.4 \[See SAP DB Libraray\]](#).



## Data volume filling level

Data volume filling level <percentage>%, <number of> pages configured, perm used <perm\_used>, temp used <temp\_used>

### Explanation

The filling level of the [data volumes \[See SAP DB Libraray\]](#) is high. If the filling level is 100%, the database stops.

### User Response

If the amount of data that needs administering in the database instance has increased, you may need to add a new data volume.

A large proportion of temporary data pages (`temp used`) indicates large amounts of (buffer) results. Find the statement that causes these large amounts of (buffer) results to be created, and check the access strategies for this statement.



For information on creating optimized SQL statements, see [Optimizer: SAP DB 7.4 \[See SAP DB Libraray\]](#).



## Deletes/Updates

Delete selectivity <percentage>%: <number of> deletes, <number of> rows read, <number of> rows qualified

Update selectivity <percentage>%: <number of> updates, <number of> rows read, <number of> rows qualified

### Explanation

The ratio of read rows to modified rows is poor for DELETE or UPDATE statements.

Before UPDATE and DELETE statements can modify or delete rows, the row must be localized in the table. The same access strategies are used as in a SELECT statement.

### User Response

Find the statement that causes this poor ratio of read rows to found rows, and check the access strategies for this statement.



For information on creating optimized SQL statements, see [Optimizer: SAP DB 7.4 \[See SAP DB Library\]](#).



## Free user tasks

Free user tasks: <count>, connected users: <count>

### Explanation

The number of free [user tasks \[See SAP DB Library\]](#) is low. If there are no free user tasks, then no more applications can connect to the database.

### User Response

Check the existing database connections. Check whether any applications have connected to the database more than once. If the amount of applications that want to work with the database instance rises, you may need to increase the values of the database parameter [MAXUSERTASKS \[See SAP DB Library\]](#).



## Log area filling level

Log area filling level <percentage>%, <number of> pages configured, <number> used

### Explanation

The filling level of the [log area \[See SAP DB Library\]](#) is high. If the filling level is 100%, the database stops.

### User Response

Back up the log area. If necessary, activate [automatic log backups \[See SAP DB Library\]](#). If automatic log backups are already activated, check whether the last backup was successful.



## Lock list escalations

Lock list escalations: <count>

## Explanation

The number of [row locks \[See SAP DB Libraray\]](#) in a table is too high. The database system attempts to convert the row locks into a table lock (see also [Lock Behavior \[See SAP DB Libraray\]](#)).

## User Response

You can specify the maximum possible number of row locks in the lock list in the database parameter [MAXLOCKS \[See SAP DB Libraray\]](#). The database system attempts to convert the row lock into a table lock if a [task \[See SAP DB Libraray\]](#) holds more than  $0,1 * MAXLOCKS$  row locks in a table. If too many escalations occur, increase the parameter value.

Whether escalations are a problem depends strongly on the application in question. If escalations occur, check the application to see whether modifying transactions that lock a lot of rows cannot be corrected by an interim [COMMIT \[See SAP DB Libraray\]](#).



## Log queue overflows

```
Log queue overflows: <count>
```

```
Log queue overflows: <count>, configured log queue pages: <count>
```

## Explanation

The [log queue \[See SAP DB Libraray\]](#) is full before the [log pages \[See SAP DB Libraray\]](#) are written to the [log volume \[See SAP DB Libraray\]](#).

## User Response

Check the value of the database parameter [LOG\\_IO\\_QUEUE \[See SAP DB Libraray\]](#) and raise it, if necessary.

Check the performance of the hard disk on which the log volumes are located.



## Log write time

```
Avg log write time (log writer task) <duration> ms, <number of>  
writes, <number of> pages
```

```
Avg log write time (dev thread) <duration> ms, <number of> writes,  
<number of> pages
```

## Explanation

The physical writes of [log entries \[See SAP DB Libraray\]](#) take too long. There is the risk of a bottleneck.

## User Response

Check the reads and writes in the disk area or device on which the log area is located. If possible, only the log entries must be made here, and no other reads or writes. In certain circumstances, you may need to move the log area to a quicker device.



## Max log queue filling

```
Max log queue filling: <percentage>%
```

## Explanation

The filling level of the [log queue \[See SAP DB Libraray\]](#) is high. If the filling level reaches 100%, you risk a [log queue overflow \[Page 15\]](#).

## User Response

Check the value of the database parameter [LOG\\_IO\\_QUEUE \[See SAP DB Libraray\]](#) and raise it, if necessary.

Check the performance of the hard disk on which the [log volumes \[See SAP DB Libraray\]](#) are located.



## Number of cached history pages

Number of cached history pages (<number>) exceeds number of cached OMS pages (<number>)

## Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

In the [data cache \[See SAP DB Libraray\]](#), the number of history pages is higher than the number of OMS data pages.

## User Response

Search for old [OMS versions \[See SAP DB Libraray\]](#) and transactions that prevent the history pages from being deleted in the data cache.

Check whether the reports /SAPAPO/OM\_REORG\_DAILY and /SAPAPO/OM\_DELETE\_OLD\_SIMSESS are being executed at regular intervals (see also [Monitoring OMS Versions \[See SAP DB Libraray\]](#)).



## Number of physical reads

Number of physical reads: <count>

## Explanation

A large number of physical reads are being made on the [volumes \[See SAP DB Libraray\]](#) of the database instance, since the data requested by the applications was not found in the [data cache \[See SAP DB Libraray\]](#).

## User Response

If a table is accessed for the first time, or if it has not been used for a long time, and was therefore displaced from the data cache, then this situation is not a problem.

However, if this does not explain the read activity, check the hit rate for the data cache, and increase the size of the data cache, if necessary.

Also make sure that the SQL statements specified by the application do not read significantly more data than needed for processing, because of poor [search strategies \[See SAP DB Libraray\]](#), for example.

If the database parameter [LRU\\_FOR\\_SCAN \[See SAP DB Libraray\]](#) has the value `yes`, then [table scans \[See SAP DB Libraray\]](#) use only 10% of the data cache for caching the table. This means that the table cannot be held completely in the data cache, and the next scan has to read it physically again.



## Number of physical writes

Number of physical writes: <count>

### Explanation

Not all of the data used by the applications can be held in the [data cache \[See SAP DB Libraray\]](#). This causes pages from the data cache to be displaced to the data area, which means that there are a large number of writes to the [data volumes \[See SAP DB Libraray\]](#).

This phenomenon is almost unavoidable if load times (data import) are long, since the imported data is usually much larger than the size of the data cache.

Also, a [savepoint \[See SAP DB Libraray\]](#) also writes modified pages from the data cache to the data area at regular intervals. Read and write activity increases significantly at this time, without causing a genuine bottleneck. In normal operations, you should not be able to measure any significant write activities other than the savepoints.

### User Response

If you notice a high level of write activity in normal operations, first make sure that no savepoint was active during the measurement interval (which is possibly too short).

If no savepoint was active, increase the size of the data cache.



## Number of physical writes of temporary pages

Number of physical writes of temporary pages: <count>

### Explanation

When temporary [data pages \[See SAP DB Libraray\]](#) are generated to build (buffer) sets of results (in JOINS or ORDER BY statements, for example), the [data cache \[See SAP DB Libraray\]](#) is not large enough for the temporary pages, and they have to be displaced to the [data area \[See SAP DB Libraray\]](#). However, these pages must be exported out of the data area again for the further processing of the SQL statement.

### User Response

Find the statement that causes these large amounts of (buffer) results to be created, and check the access strategies for this statement.



For information on creating optimized SQL statements, see [Optimizer: SAP DB 7.4 \[See SAP DB Libraray\]](#).



## OMS cache hitrate

OMS cache hitrate <percentage>%, <number> of <number of> accesses failed

### Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

The hit rate when accessing the [OMS data \[See SAP DB Libraray\]](#) in the [data cache \[See SAP DB Libraray\]](#) is too low. In a running liveCache application, the hit rate should not fall below 100%, otherwise the data must be read physically.

The hit rate may fall for short periods of time, for example, when objects are accessed for the first time.

## User Response

Check the following points:

- Load in the [data cache \[See SAP DB Libraray\]](#)
- Size of the plan version
- Long-running [OMS versions \[See SAP DB Libraray\]](#)
- Configuration of the liveCache instance and the hardware



## OMS heap collisions

OMS heap collision rate <percentage>%, <number of> collisions during <number of> heap allocations/deallocations

## Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

[Tasks \[See SAP DB Libraray\]](#) that run in different [threads \[See SAP DB Libraray\]](#) attempt to request or release memory from the [OMS heap \[See SAP DB Libraray\]](#) in parallel. This causes collisions.

## User Response

Check whether the parameter [OMS\\_HEAP\\_COUNT \[See SAP DB Libraray\]](#), which determines the number of OMS heap segments, has an optimum value.

Generally, the risk of collisions rises with the number of processors used (database parameter [MAXCPU \[See SAP DB Libraray\]](#)). Check whether the liveCache can fulfill the requirements of the applications with fewer processors. If not, check whether the CPU on the server is overloaded, and whether the liveCache threads are blocked by other applications running on the server. In this case, the liveCache threads that contain [user tasks \[See SAP DB Libraray\]](#); should have REAL TIME PRIORITY in the operating system. However, at the same time, the value of MAXCPU must be at least one lower than the number of real CPUs, to avoid operating system blocks.



## OMS heap utilization

OMS heap utilization <percentage>%, used/max:  
<used\_size>/<heap\_limit\_size> MB

## Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

The memory requirements in the [OMS heap \[See SAP DB Libraray\]](#) are very high for the running [DB procedures \[See SAP DB Libraray\]](#).

If the memory utilization in the OMS heap reaches 100%, there is the risk of errors in the DB procedures (Out Of Memory Exceptions), or that [OMS version data \[See SAP DB Libraray\]](#) is displaced from the OMS heap to the global [data cache \[See SAP DB Libraray\]](#) (OMS version is unloaded).

## User Response

If necessary, increase the size of the OMS heap.

Check whether the configuration of your database instance and hardware meets the requirements of the liveCache application.



## OMS history cache hitrate

OMS history cache hitrate <percentage>%, <number> of <number of> accesses failed

### Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

The hit rate when accessing the [history data \[See SAP DB Libraray\]](#) in the [data cache \[See SAP DB Libraray\]](#) is too low. In a running liveCache application, the hit rate should not fall below 100%, otherwise the data must be read physically.

The hit rate may fall for short periods of time, for example, when objects are accessed for the first time.

### User Response

Check the following points:

- Load in the [data cache \[See SAP DB Libraray\]](#)
- Size of the plan version
- Long-running [OMS versions \[See SAP DB Libraray\]](#)
- Configuration of the liveCache instance and the hardware



## OMS terminates

<number of> terminates of DB procedure '<DB\_procedure\_name>' due to errors

### Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

An error occurred during the execution of the specified [DB procedure \[See SAP DB Libraray\]](#).

### User Response

Use the [log files \[See SAP DB Libraray\]](#) (such as knldiag and lcapo\_com\_trace\_<xy>.txt) to find out the cause of the error.



## OMS version is old

OMS version <OMS\_version\_ID> is <hours> hours old, uses <number> KB

### Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

[OMS versions \[See SAP DB Libraray\]](#) are open for long periods of time and occupy memory in the [OMS heap \[See SAP DB Libraray\]](#). In this way, the number of [history pages \[See SAP DB Libraray\]](#) grows in the [data cache \[See SAP DB Libraray\]](#) and on the hard disk.

### User Response

Find out the OMS version and the filling level of the data cache.

If the filling level of the data cache and the percentage of the history pages are high, try and find out the cause.

Check whether the reports /SAPAPO/OM\_REORG\_DAILY and /SAPAPO/OM\_DELETE\_OLD\_SIMSESS are being executed at regular intervals (see also [Monitoring OMS Versions \[See SAP DB Libraray\]](#)).

## OMS version is unloaded

OMS version <OMS\_version\_ID> is unloaded, uses <number> KB

### Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

[OMS version \[See SAP DB Libraray\]](#) data was loaded from the [OMS heap \[See SAP DB Libraray\]](#) into the [data cache \[See SAP DB Libraray\]](#), since the value of one of the two liveCache parameters [OMS\\_HEAP\\_THRESHOLD \[See SAP DB Libraray\]](#) or [OMS\\_VERS\\_THRESHOLD \[See SAP DB Libraray\]](#) was exceeded.

Performance suffers when accessing the relevant OMS versions, since it takes longer to access the data cache than the OMS heap.

### User Response

Check the parameters OMS\_HEAP\_THRESHOLD and OMS\_VERS\_THRESHOLD.

If necessary, increase the size of the OMS heap.

## Optimizer strategies

<number of> <optimizer\_strategy\_executes>, selectivity <percentage>%:  
<number of> rows read, <number of> rows qualified

### Explanation

The ratio of read table rows to found table rows is poor when a particular access strategy (<optimizer\_strategy\_executes>) is used.

The access strategy can be one of the following strategies:

- Primary key accesses  
([EQUAL CONDITION FOR KEY COLUMN \[See SAP DB Libraray\]](#),  
[EQUAL CONDITION FOR KEY COLUMN \(SUBQ\) \[See SAP DB Libraray\]](#),  
[IN CONDITION FOR KEY COLUMN \[See SAP DB Libraray\]](#))
- Primary key range accesses  
([RANGE CONDITION FOR KEY COLUMN \[See SAP DB Libraray\]](#),  
[RANGE CONDITION FOR KEY COLUMN \(SUBQ\) \[See SAP DB Libraray\]](#),  
[IN CONDITION FOR KEY COLUMN \[See SAP DB Libraray\]](#))
- Index accesses  
([EQUAL CONDITION FOR INDEX \[See SAP DB Libraray\]](#),  
[EQUAL CONDITION FOR INDEX \(SUBQ\) \[See SAP DB Libraray\]](#),  
[IN CONDITION FOR INDEX \[See SAP DB Libraray\]](#))
- Index range accesses  
([RANGE CONDITION FOR INDEX \[See SAP DB Libraray\]](#),  
[RANGE CONDITION FOR INDEX \(SUBQ\) \[See SAP DB Libraray\]](#),  
[IN CONDITION FOR INDEX \[See SAP DB Libraray\]](#))

- Isolated index accesses  
see: [EXPLAIN Statement: Columns O,D,T,M \[See SAP DB Libraray\]](#), column O (Only Index)  
and Index accesses
- Isolated index range accesses  
see: [EXPLAIN Statement: Columns O,D,T,M \[See SAP DB Libraray\]](#), column O (Only Index)  
and Index range accesses
- Isolated index scans  
([INDEX SCAN \[See SAP DB Libraray\]](#))

## User Response

Find the statement that causes this poor ratio of read rows to found rows, and check the access strategies for this statement.



For information on creating optimized SQL statements, see [Optimizer: SAP DB 7.4 \[See SAP DB Libraray\]](#).

See also [Table scans \[Page 23\]](#)



## Out of memory exceptions

Out of memory exceptions: <count>

### Explanation

This message can occur for [liveCache \[See SAP DB Libraray\]](#) instances only.

[DB procedures \[See SAP DB Libraray\]](#) fail due to too little memory in the [OMS heap \[See SAP DB Libraray\]](#).

### User Response

- Search for more information in the [log file \[See SAP DB Libraray\]](#) knldiag.
- Check the [OMS versions \[See SAP DB Libraray\]](#), and check how much space they occupy in the OMS heap, for example, by using the log files `DBAN_OMS_VERSIONS.csv` and `DBAN_OMS_HEAP.csv`.
- Check the OMS heap and, if necessary, increase the size of the heap.



## Parse activities

Parse activities <percentage>%, <number of> prepares, <number of> commands

### Explanation

The proportion of parse activities in the total number of statements executed is very high.

Before an SQL statement is executed for the first time, it has to be analyzed (parsed). When doing this, the database system determines the possible access strategies, and saves the statement to the database instance in a compact form. When the statement is executed again, only this internal information is accessed, and the statement executed directly.

For static SQL statements, the [C/C++ precompiler \[See SAP DB Libraray\]](#) makes sure that the parse activity is performed only once. In applications that are based on ODBC or the

C/C++ precompiler, and that use the PREPARE statement, the developer is responsible for the number or parse or EXECUTE requests.

If the JDBC interface is used, and the parse info cache is active, the JDBC interface is responsible for the optimization of the parse requests. However, you must keep the number of PREPARE statements as small as possible here as well.

A high level of parse activity when the database is running can indicate a missing statement cache implementation in your application, or a missing parse info cache in the JDBC interface.



A level of parse activity is normal when programs or program parts are started for the first time.

## Physical reads for user task

<number of> physical reads for user task <task\_ID>, <number of> commands, application pid <pid>

### Explanation

The [user task \[See SAP DB Libraray\]](#) <task\_id> makes a large number of physical reads on the [volumes \[See SAP DB Libraray\]](#) of the database instance, since the data requested by the applications was not found in the [data cache \[See SAP DB Libraray\]](#).

### User Response

If a table is accessed for the first time, or if it has not been used for a long time, and was therefore displaced from the data cache, then this situation is not a problem.

However, if this does not explain the read activity, check the hit rate for the data cache, and increase the size of the data cache, if necessary.

Also make sure that the SQL statements specified by the application do not read significantly more data than needed for processing, because of poor [search strategies \[See SAP DB Libraray\]](#), for example.

If the database parameter [LRU FOR SCAN \[See SAP DB Libraray\]](#) has the value `yes`, then [table scans \[See SAP DB Libraray\]](#) use only 10% of the data cache for caching the table. This means that the table cannot be held completely in the data cache, and the next scan has to read it physically.

## Selects and Fetches

<number of> selects and fetches, selectivity <percentage>%: <number of> rows read, <number of> rows qualified

### Explanation

The strategies for accessing table data are poor for SELECT or FETCH statements. The system has to read a large number of table rows to find a small number of rows that fulfill a WHERE condition.

### User Response

Find the statement that causes this poor ratio of read rows to found rows, and check the access strategies for this statement.



For information on creating optimized SQL statements, see [Optimizer: SAP DB 7.4 \[See SAP DB Library\]](#).



## Table scans

<number of> table scans, selectivity <percentage>%: <number of> rows read, <number of> rows qualified

### Explanation

The ratio of read rows to found rows is poor for table scans ([TABLE SCAN \[See SAP DB Library\]](#)). This often indicates a poor [search strategy \[See SAP DB Library\]](#), caused either by the application (missing or insufficient indexes), or by a problem in the SELECT optimization of the database kernel.

Scanning large tables can have seriously negative effects on the performance of the entire system.

### User Response

Find the statement that causes this poor ratio of read rows to found rows, and check the access strategies for this statement.



For information on creating optimized SQL statements, see [Optimizer: SAP DB 7.4 \[See SAP DB Library\]](#).



## User task blocked in state

User task <task\_ID> blocked in state '<state\_description>'

User task <task\_ID> blocked in state '<state description>',  
DB procedure: <DB\_procedure\_name>

### Explanation

The specified [user task \[See SAP DB Library\]](#) is active, however, its [task state \[See SAP DB Library\]](#) is not changing. This also blocks all other tasks in the same [user kernel thread \[See SAP DB Library\]](#). In extreme cases, the blocking task may be in an endless loop.



## User task physical writes

User task physical writes: <count>

### Explanation

Modified pages are swapped from the [data cache \[See SAP DB Library\]](#) to the [data area \[See SAP DB Library\]](#), since not all of the data used by the applications can be held in the data cache.

If the data cache were large enough, the physical write would be delayed to the next [savepoint \[See SAP DB Library\]](#), and be performed asynchronously. Cache displacements, however, cause synchronous writes and reads, and must be avoided.

This phenomenon is almost unavoidable if load times (data import) are long, since the imported data is usually much larger than the size of the data cache.

## User Response

Increase the size of the data cache.



### Configuration File

The configuration file `dbanalyzer<version>.cfg` defines the rules and commands for how the [Database Analyzer \[Page 1\]](#) determines performance-relevant data.

The Analyzer either takes the performance-relevant data directly from the system tables for the database, or calculates it from these values.

The configuration file also describes the five classes (information, three levels of warnings, error messages) that the Database Analyzer uses to analyze the parameters and log them in the file [DBAN.prt \[Page 9\]](#). You can specify fixed instructions for how the user should respond to these classes.



Changes to the rules and commands apply to the configuration file only; the Database Analyzer program remains unchanged.