LCM263
Managing MaxDB with Database Studio

Version 7.7

Suitable for SAP and non-SAP environments

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Chapter

Introduction

SAP and MaxDB

MaxDB is SAP's database offering

- Part of the SAP Technology Portfolio
- Supports all SAP applications
- Part of the SAP NetWeaver Platform and Development Workbench
- Application, platform and DBMS from one vendor

MaxDB

- Competitive feature set and performance level
- Easy administration and minimal cost of ownership
- Focused on the requirements of SAP customers and SAP applications
- Ongoing SAP investment into the development of MaxDB
- Low end license and maintenance fees
- Strategic and safe alternative

History of MaxDB

1977-1997	Technical University of Berlin, Nixdorf Computer AG, Siemens-Nixdorf Informationssysteme AG, Software AG
1993	DBMS for SAP R/3
1997	Acquisition by SAP AG
2003	Rebranding to MaxDB

15 years of experience in the SAP database scenario

The roots of the database are found in the late seventies at the Technical University of Berlin.

Nixdorf Computer AG stated the potential of this development and moved it to its portfolio.

The database was bundled to several computer lines of Nixdorf and sold about 2000 installations during that era.

In 1989 the database development team was taken into an own subsidiary and Nixdorf was taken over by Siemens.

Since Siemens already had their own relational database systems in their portfolio, as a first step the software license was offered to and taken by Software AG.

MaxDB Installation Manager

The invisible DBMS

- Mobile clients / Laptop
- Workstations / PC
- Embedded DBMS

Template-based installation & configuration

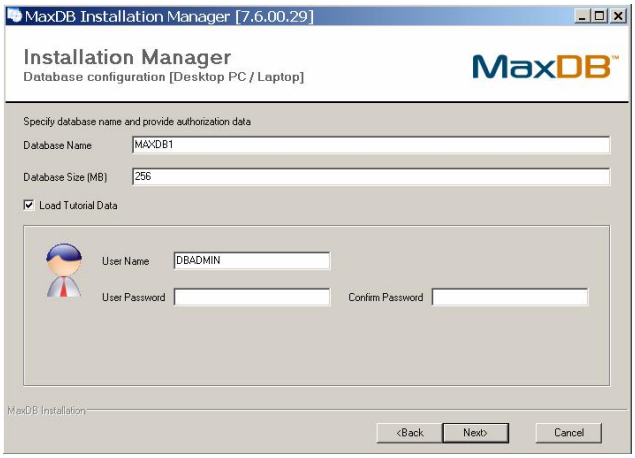
- Silent mode
- Template selection
- Optional demo data

Automatic operations

- Restart, shutdown
- Backup, recovery
- Database extension

GUI

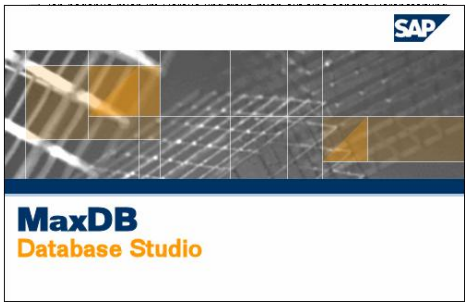
- Platform-independent



MaxDB Tools: Database Studio

Integrated, ECLIPSE-based Tool-Platform

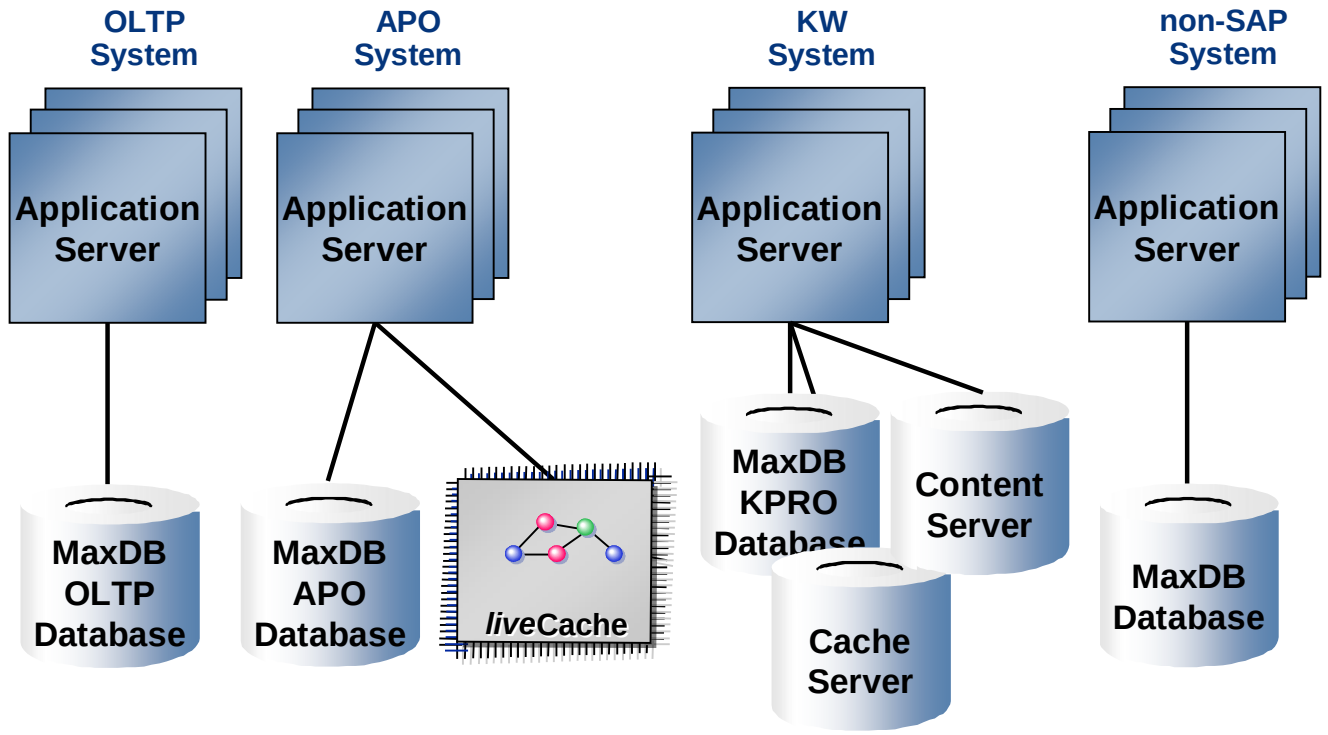
- Platform independent
- Plug-ins for
  - Landscape management
    - User
    - Repositories
  - Database management
  - SQL-Queries, Reporting
  - Loader
  - Synchronization Manager
  - DBAnalyzer



Chapter

Managing MaxDB

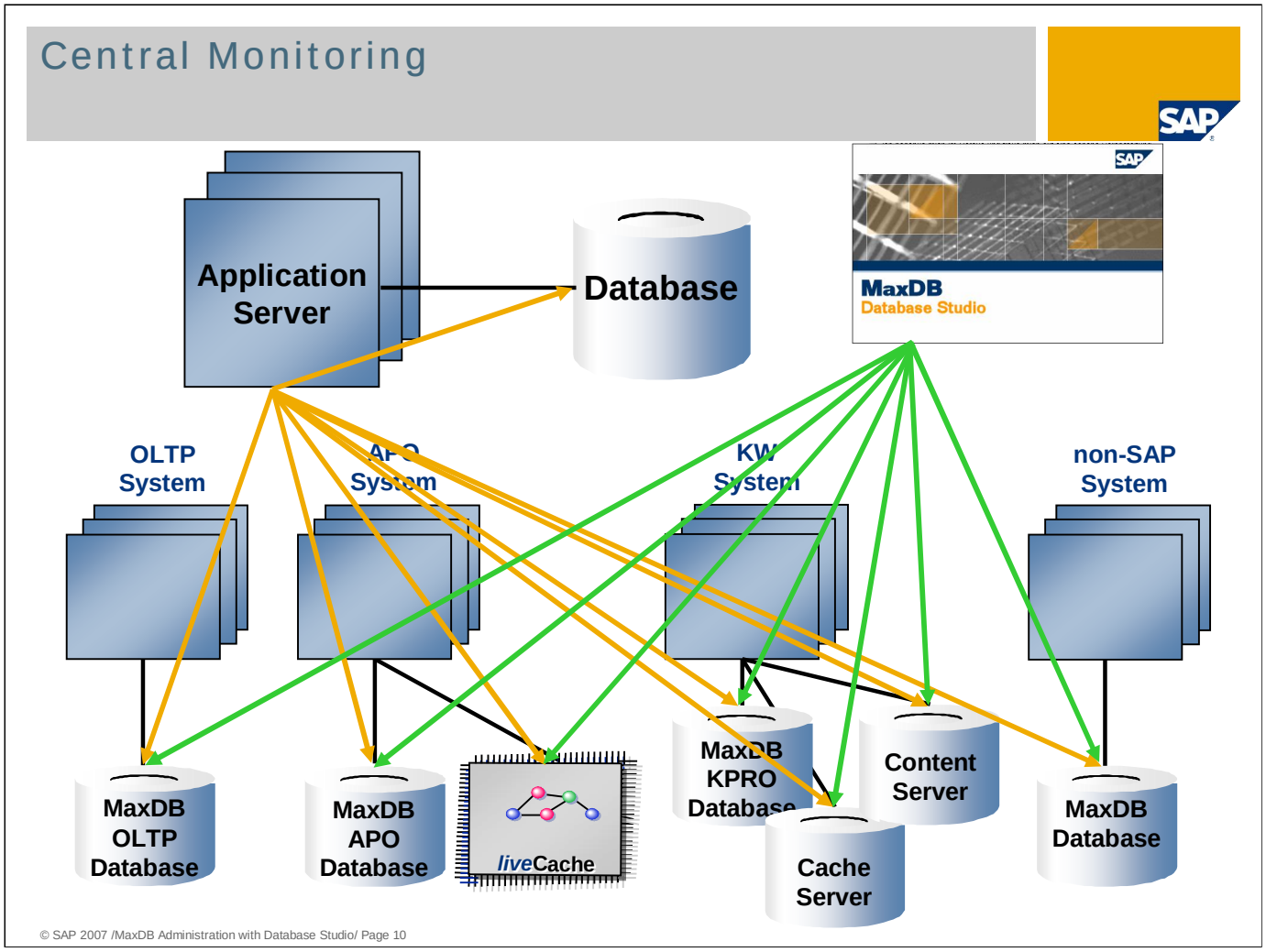
MaxDB in Your System Landscape



Your system landscape can contain several SAP systems and non-SAP systems.

All of them might run with MaxDB.

For some applications a MaxDB database is necessary – e.g. SAP SCM (MaxDB as a liveCache) or Knowledge Management (MaxDB as the Content and Cache Server).

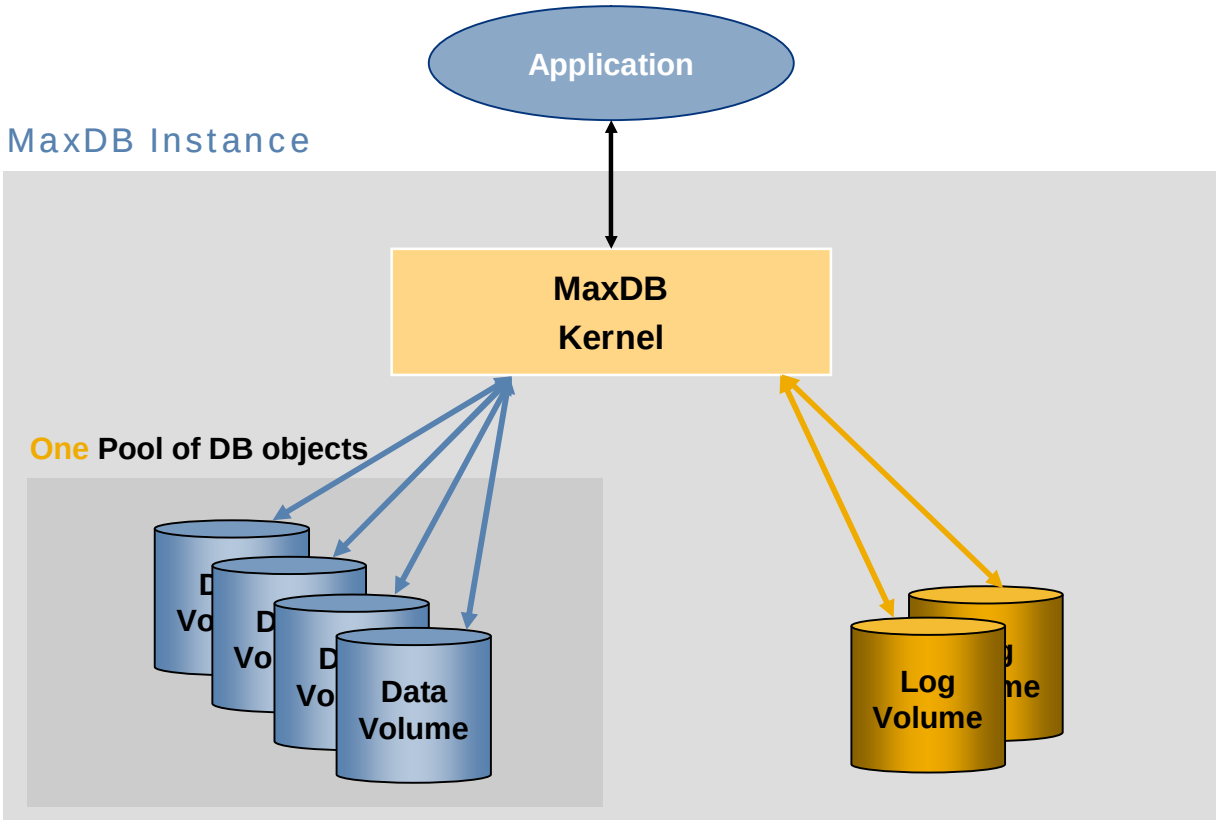


You can monitor all MaxDB instances of your system landscape using one central monitoring system. This could be e.g. a Solution Manager system.

This system may run on MaxDB but monitoring transaction DB59 is also available on systems running on a different database system.

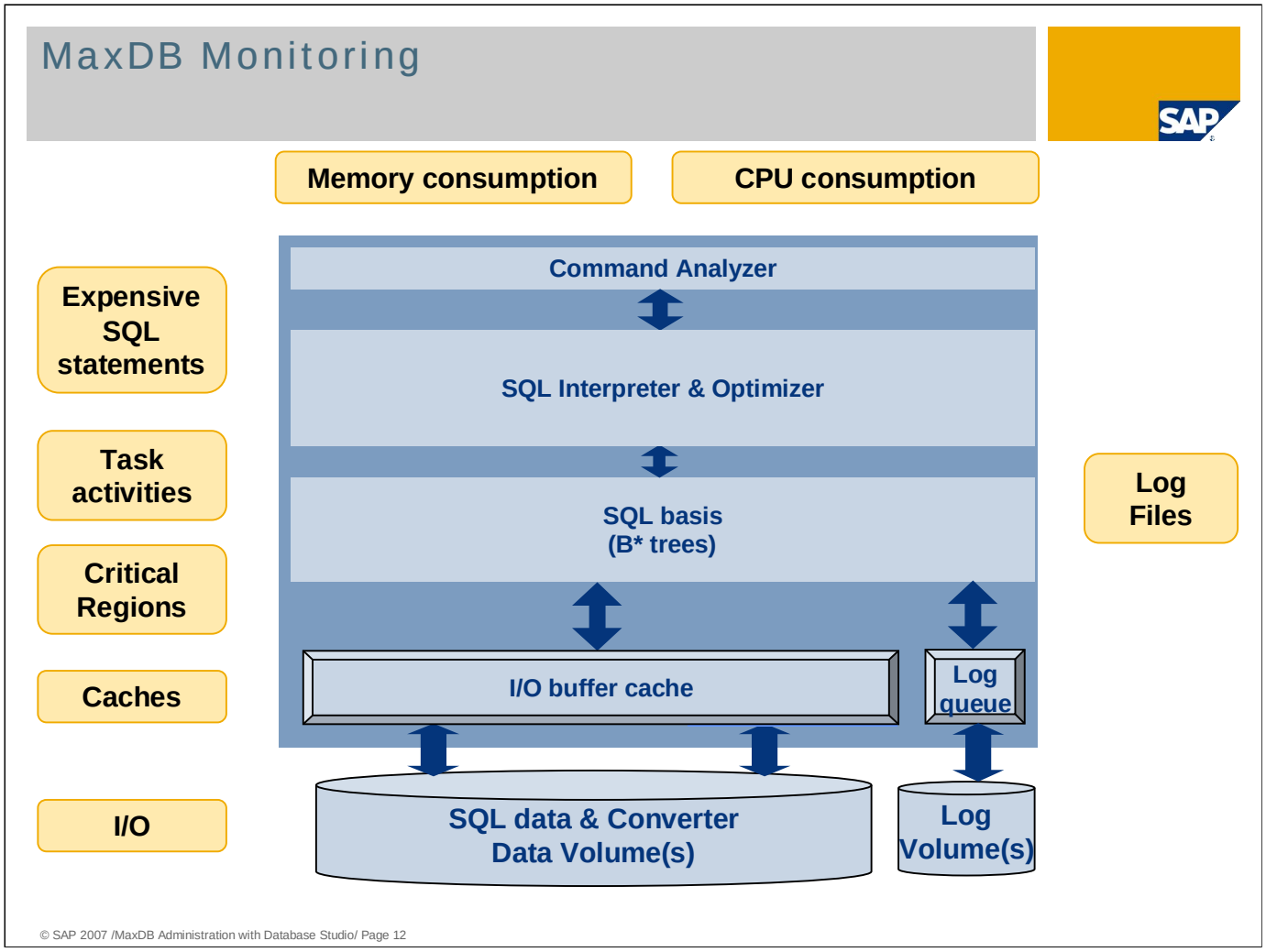
Another possibility to administer and monitor all MaxDB instances of your system landscape is to use the new tool Database Studio.

Anatomy of a MaxDB Instance



MaxDB uses several data volumes as one data area – just one large pool of database objects. You don't need to take care of single table spaces but to monitor just the filling level of the complete data area.

The same is true for the log volumes – several data volumes are used as one log area.



When you are monitoring a MaxDB instance, you need to have a look at the following areas:

- Memory and CPU consumption
- Expensive / long running SQL statements
- Task activities
- Critical regions
- Cache usage / hit rate and physical I/O
- Database log files

Database Studio provides possibilities to check these areas.

Database Analyzer also collects data about these monitoring relevant topics.
This data can then be viewed in Database Studio.

Next Steps ...

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

Chapter

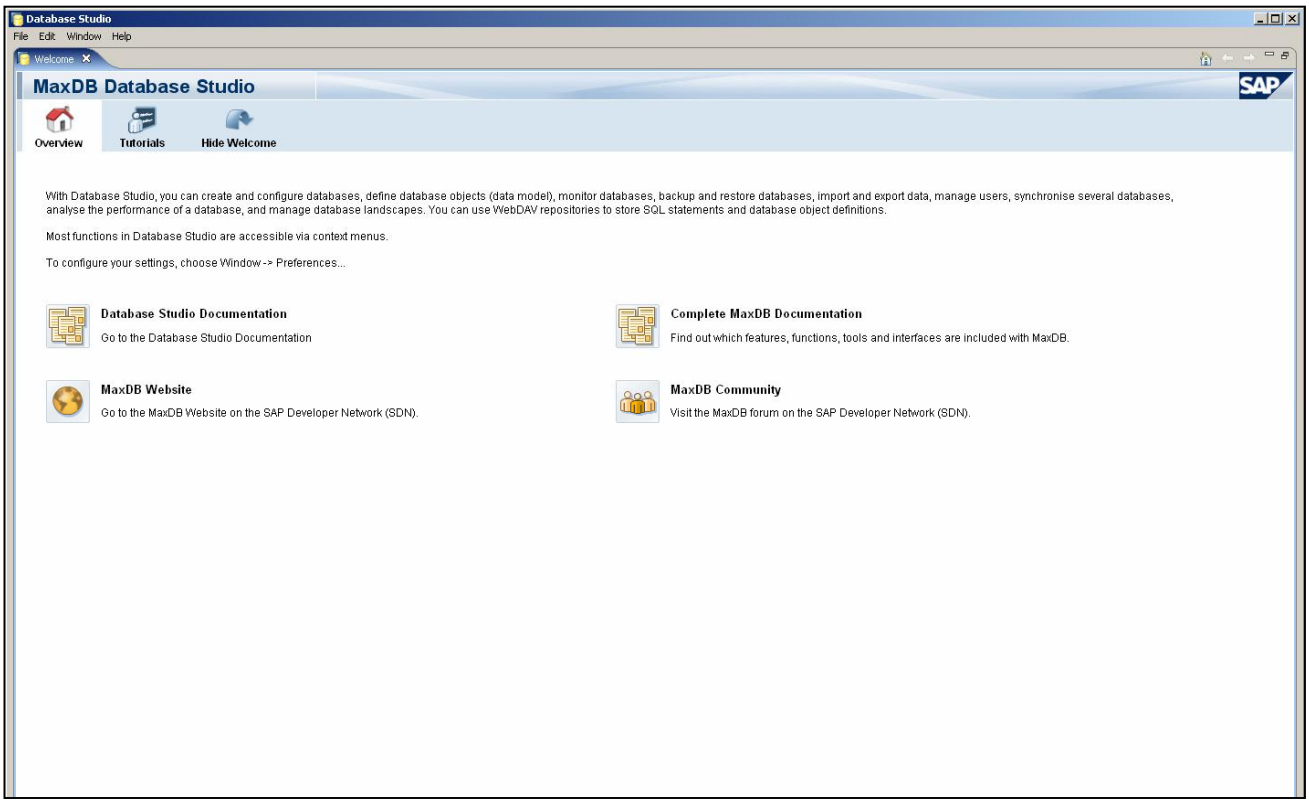
Managing MaxDB with Database Studio

Info

Attention please:

If you want to use Database Studio for adminstrating a MaxDB version older than 7.7, please be aware to install Database Studio on a separate computer and run administration remotely until further notice.

Database Studio – Welcome Page



Database Studio is SAP's new tool for managing MaxDB databases.

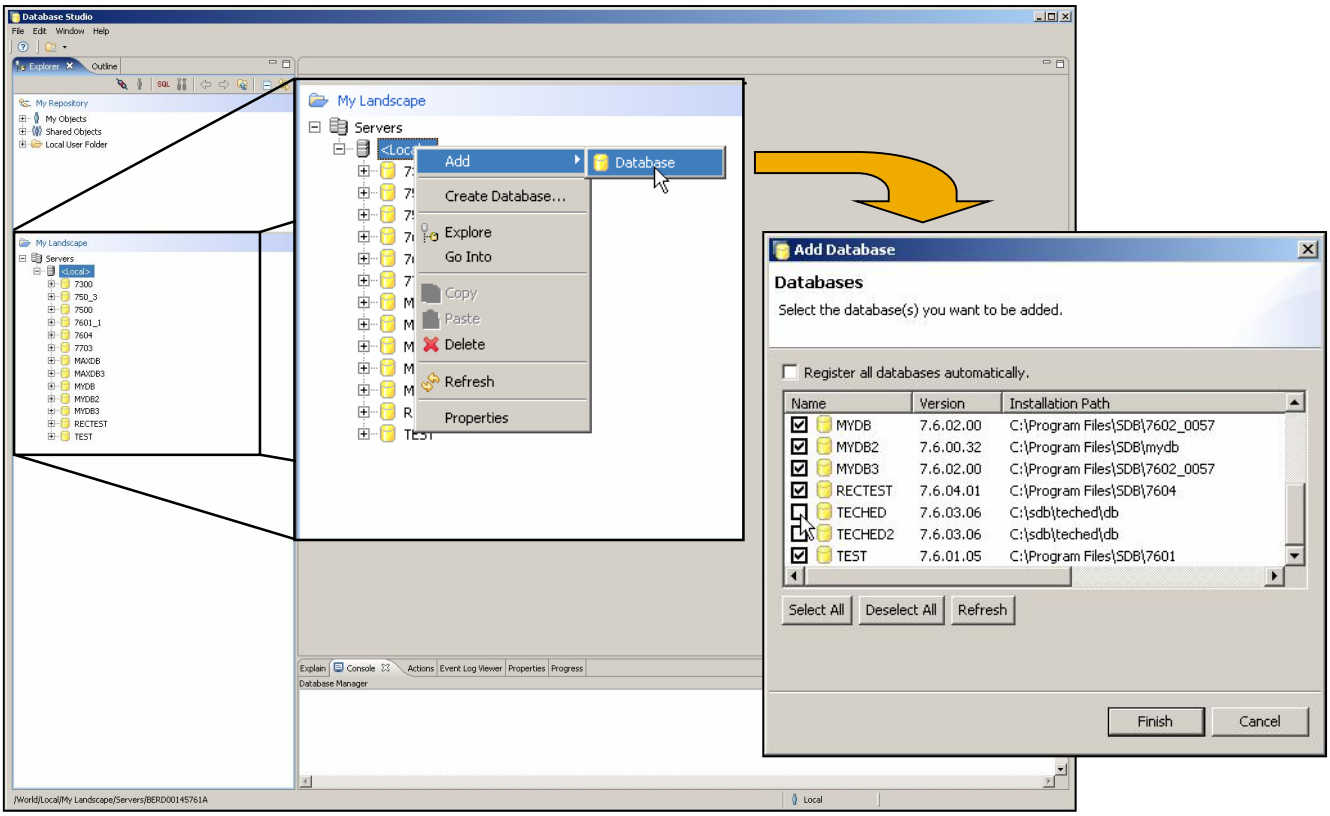
As of MaxDB version 7.7, Database Studio replaces the Database Manager GUI, SQL Studio and Synchronization Manager tools. It also provides new functions, such as a graphical user interface for the Loader tool.

With Database Studio, you can create and configure databases, define database objects (data model), monitor databases, backup and restore databases, import and export data, and much more.

Database Studio is platform independent – it can run on UNIX/Linux as well as on Windows.

The Database Studio Welcome Page provides access to the MaxDB website and the MaxDB documentation.

Add a Database



The context menu (right mouse click on an item) is essential to use the Database Studio.

The options in the context menu depend on the item on which it was opened.

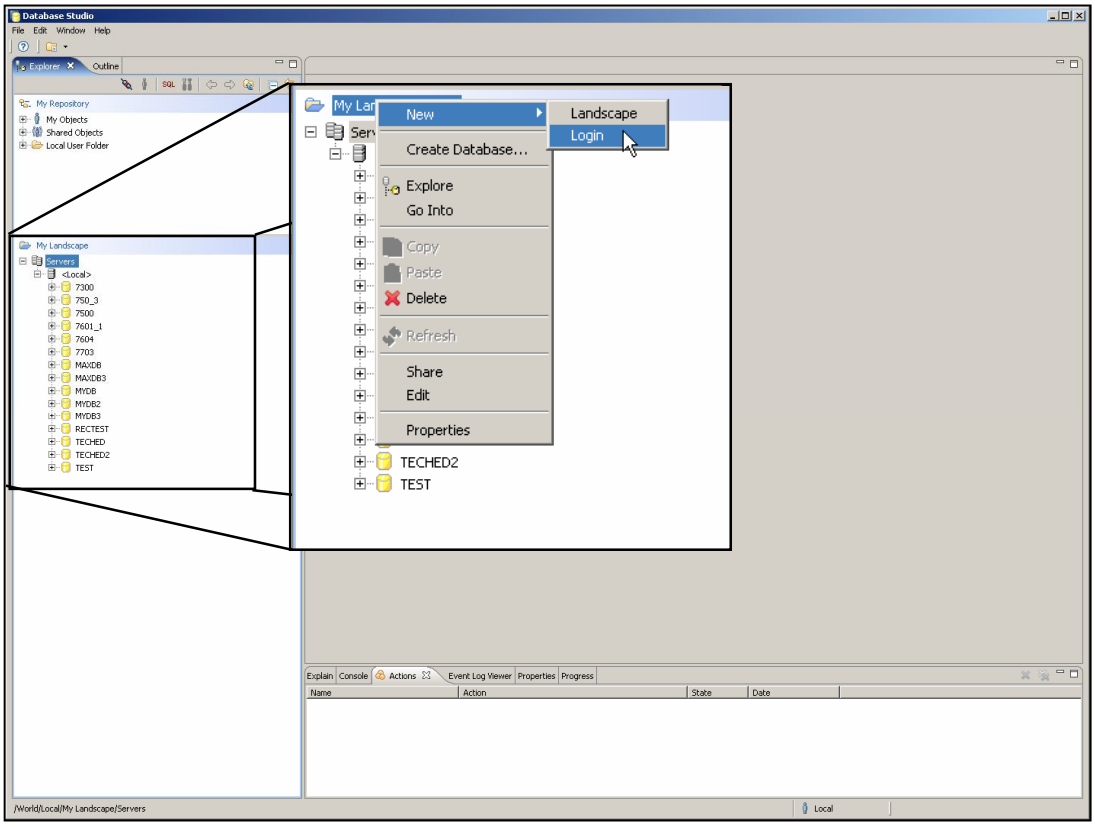
A right mouse click on *Servers* allows to register a new database server to Database Studio, the context menu on a server name allows to register databases which are installed on this server.

In the list of databases you can select which should be added to the Database Studio.

MaxDB databases as of version 7.5 can be administered with Database Studio. As of MaxDB version 7.7 Database Studio is required for managing databases.

Database Studio, DBMGUI und SQLStudio can be installed on the same server.

User Management

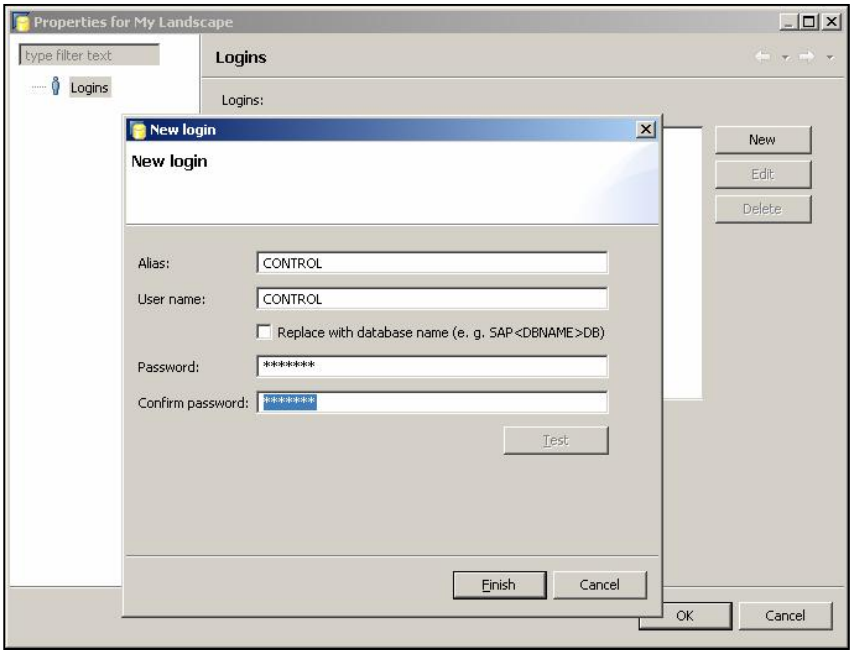


Specify at least one user and password for database connections.

You can either add the login information to each single database or (if several databases use the same user information) you can specify global logins per landscape.

In this example the context menu on *My Landscape* was opened to create a new entry in the global user management.

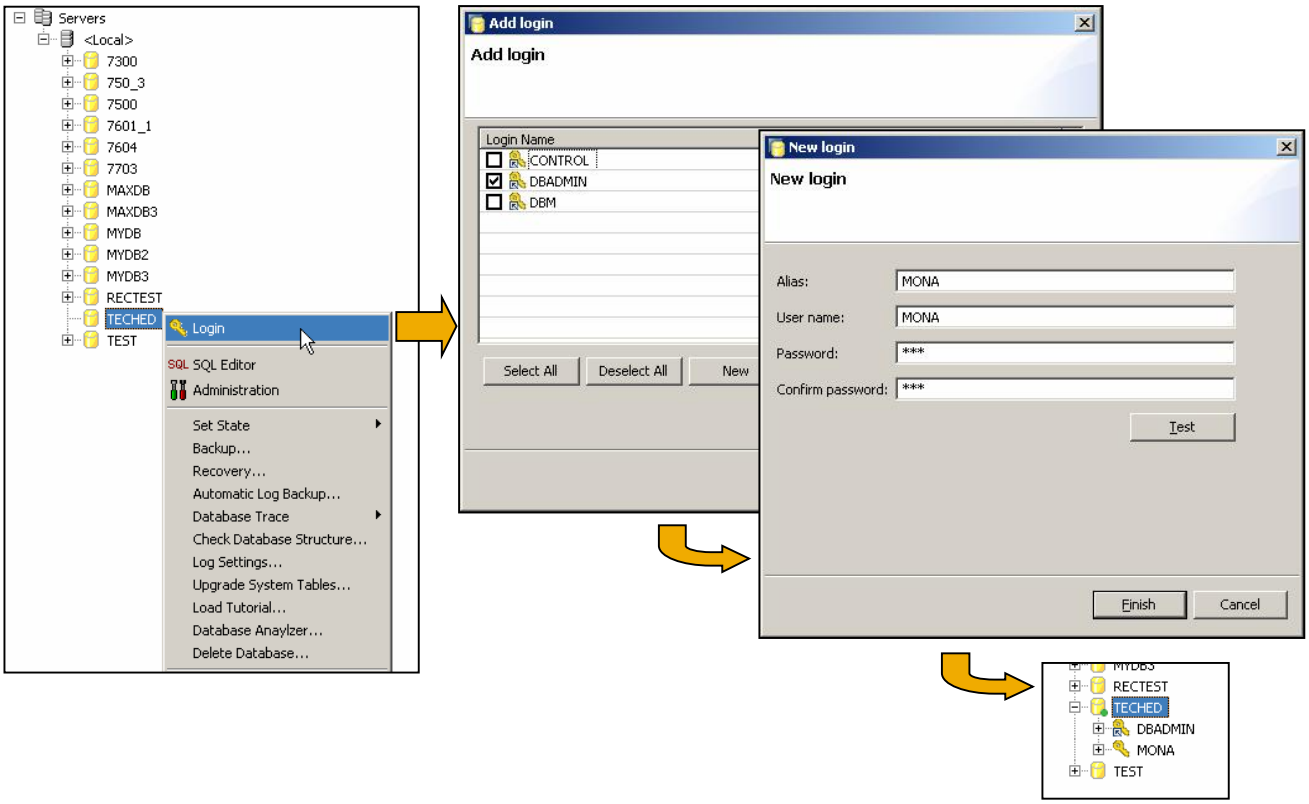
Create Login



The global user management allows to create login entries which can then be used to login to different databases.

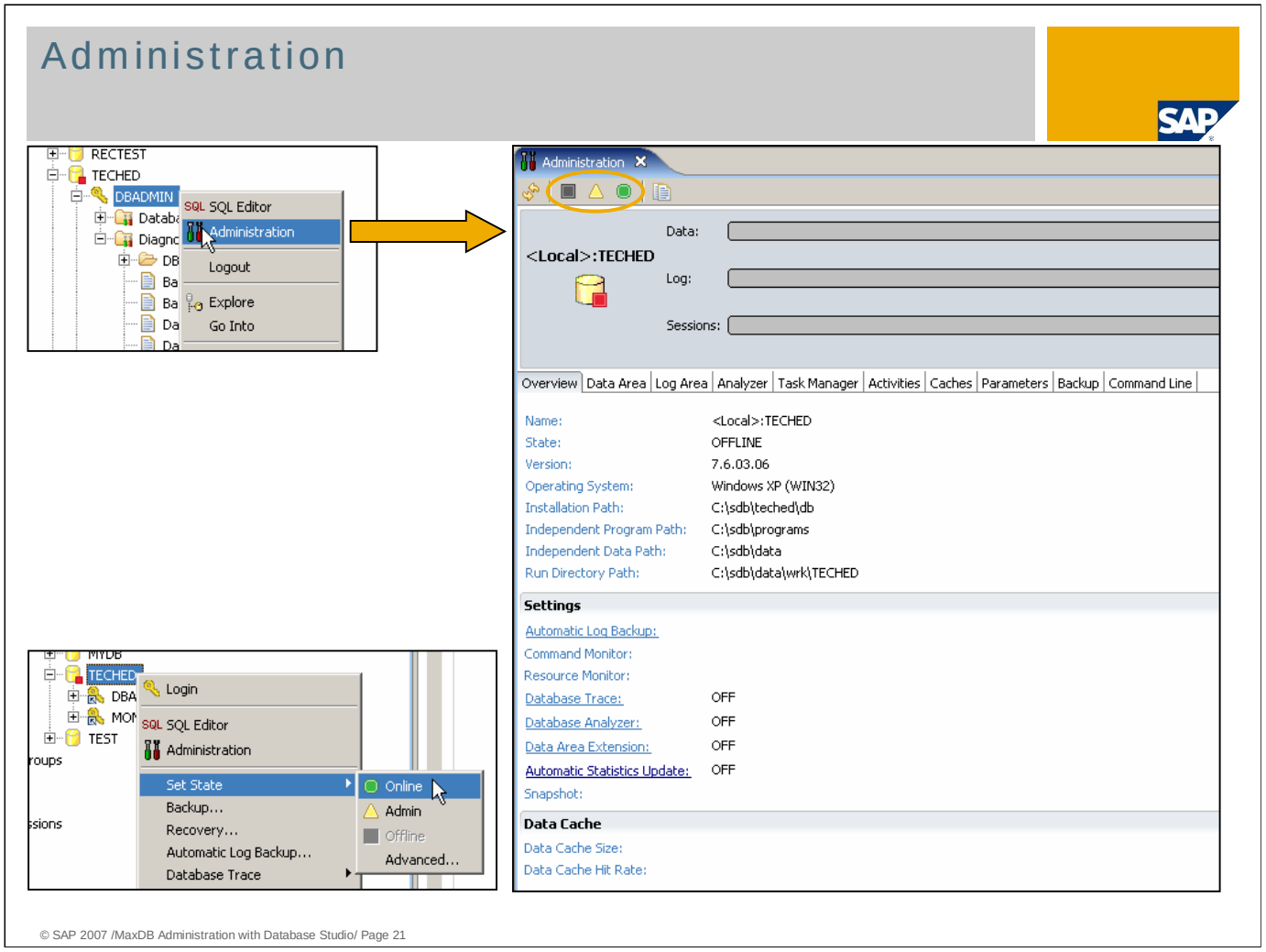
Enter a valid user name and a valid password to be able to logon to a specific database.

Add a Login to a Database Instance



After you created a global login, you can add this login to a database in your landscape.

Additionally you can create new user entries, which can then only be used for the selected database instance.



The *Administration* window can be opened from the user‘s context menu.

The user needs to be a DBM operator – SQL users are not permitted to administer the database instance.

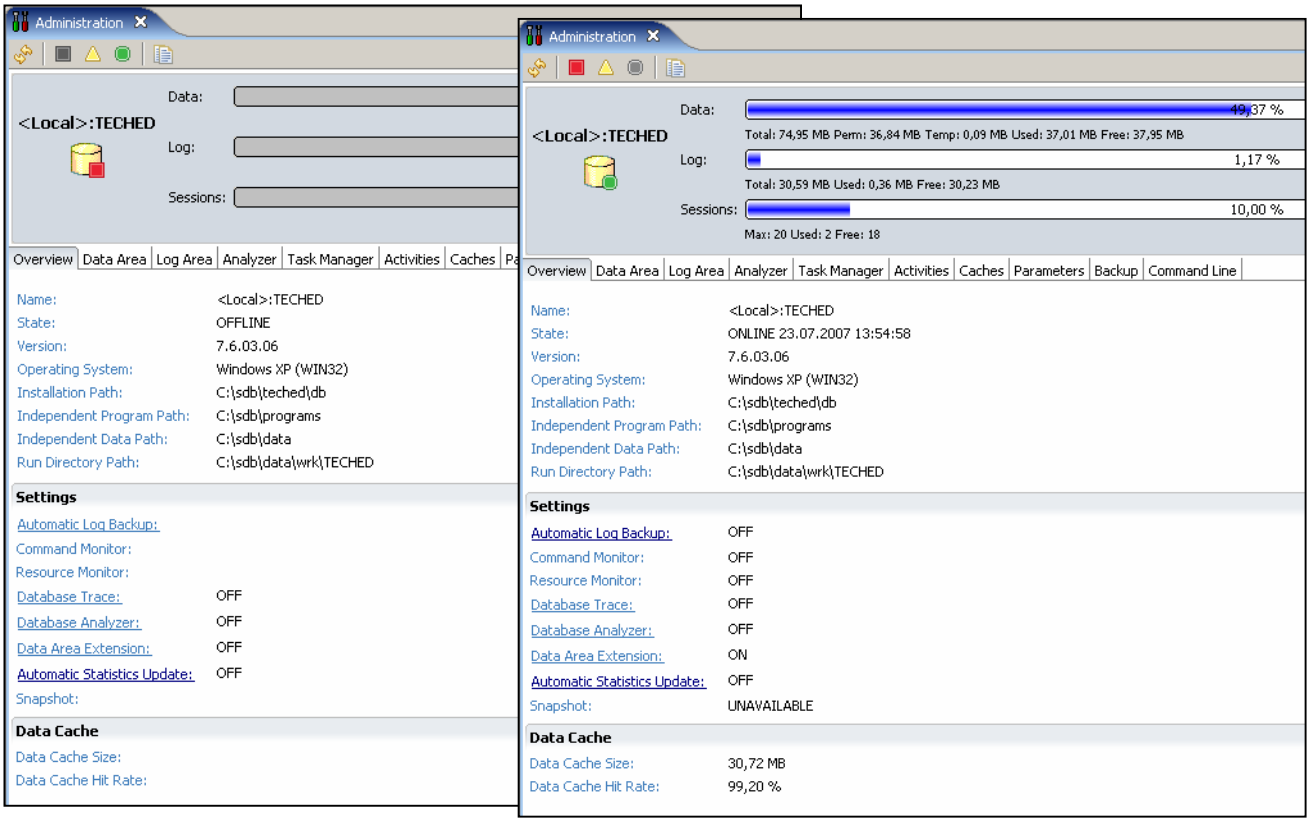
In this window you can start and stop the database, monitor it, change the configuration and create backups.

There are three possible operational states of MaxDB:

- OFFLINE:
  MaxDB kernel processes and caches do not exist.
  No user can use the database.
- ADMIN:
  The MaxDB kernel is active (processes are started, caches are initialized). Users cannot connect to the database. Only the DBM operator can connect and perform administrative tasks.
- ONLINE:
  The MaxDB kernel is active and ready to work. Users can connect to the database.

To start/stop the database you can either use the traffic light icons on top of the window or you choose *Set -> State* in the context menu on the database name.

Administration – Overview



The information shown in the *Administration* window depends on the database state – while the database is OFFLINE less information is available than in state ONLINE.

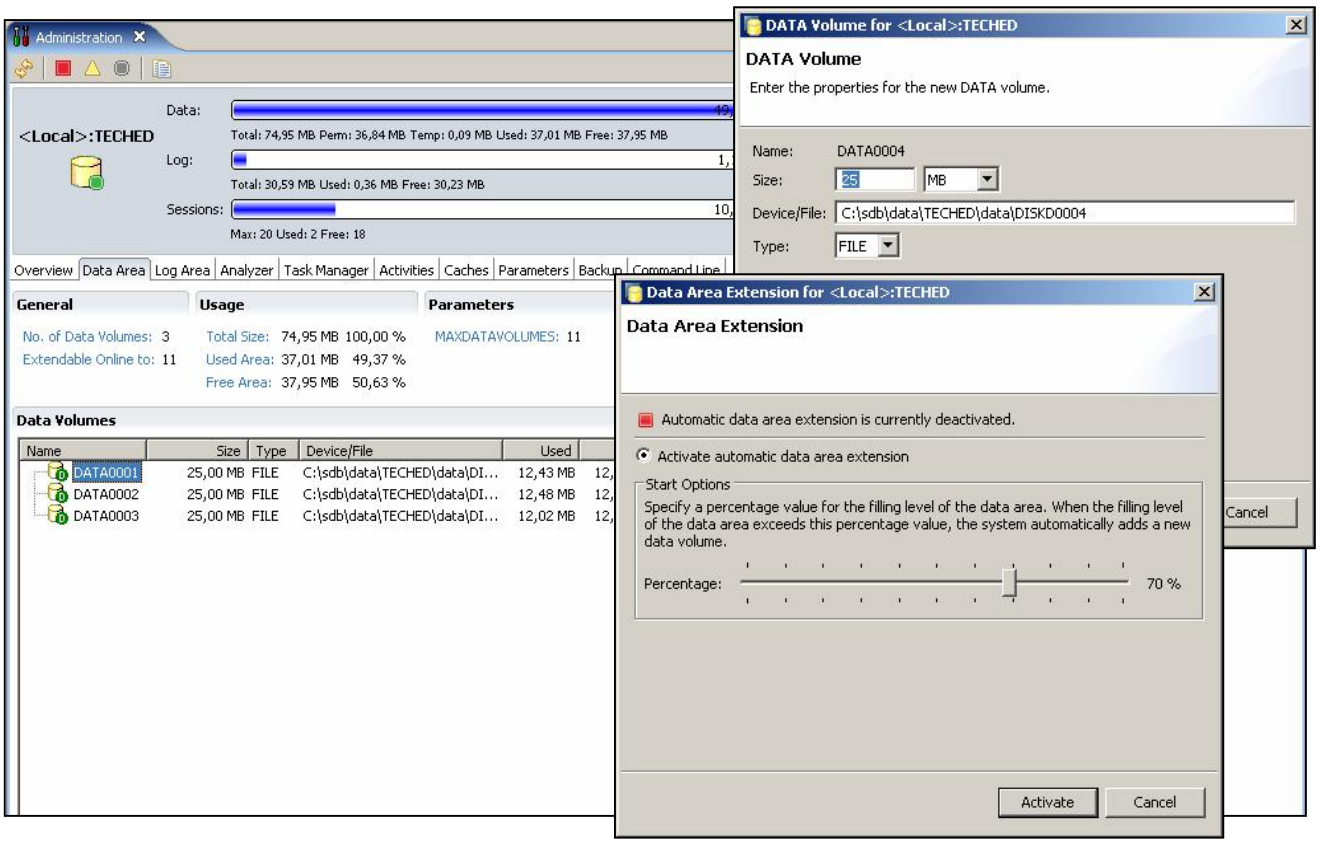
The filling level information can be seen in any *Administration* section.

The *Overview* section provides general information about the database installation as well as the status of several features like *Automatic Log Backup* or *Automatic Data Area Extension*.

MaxDB directories:

- The *Independent Program Path* contains programs and libraries shared by the MaxDB instances and MaxDB applications. These programs are downwards compatible.
  The *Independent Data Path* contains the configuration data and *run directories* of MaxDB instances.
  The location of these directories is specified during the first installation of MaxDB software. They exist only once on the server.
- The *Installation Path* contains the server software that depends on the database version (e.g. kernel). Several dependent directories can exist alongside each other.
- The *run directory* contains the status files of a MaxDB instance.

Administration – Data Area



In the *Data Area* section you can find information about the defined data volumes – e.g. the size, the location and the filling level of the single data volumes.

The data area can consist of several data volumes. The *Total Size* shows the sum of the sizes of all data volumes.

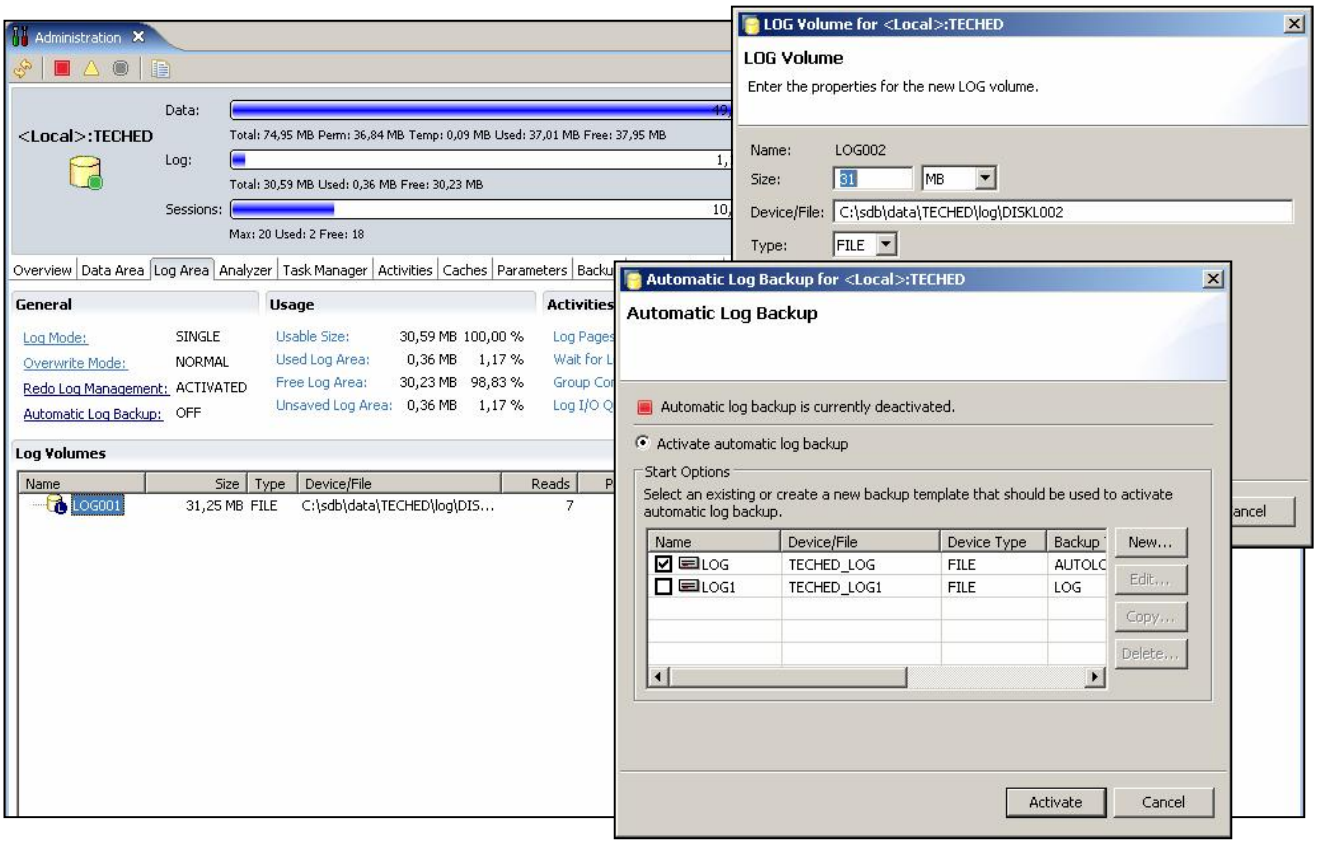
The data is automatically distributed to all volumes equally. Table space definitions are not necessary.

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

In the *Data Area* section you can add a new data volume or delete an existing data volume.

The *Automatic Data Area Extension* can be activated in the *Overview* section. With this feature a new data volume is added automatically when a specific filling level of the data area is reached.

Administration – Log Area



In the *Log Area* section you find detailed information about the log area. The log area can consist of several log volumes - however they are used as one single log area.

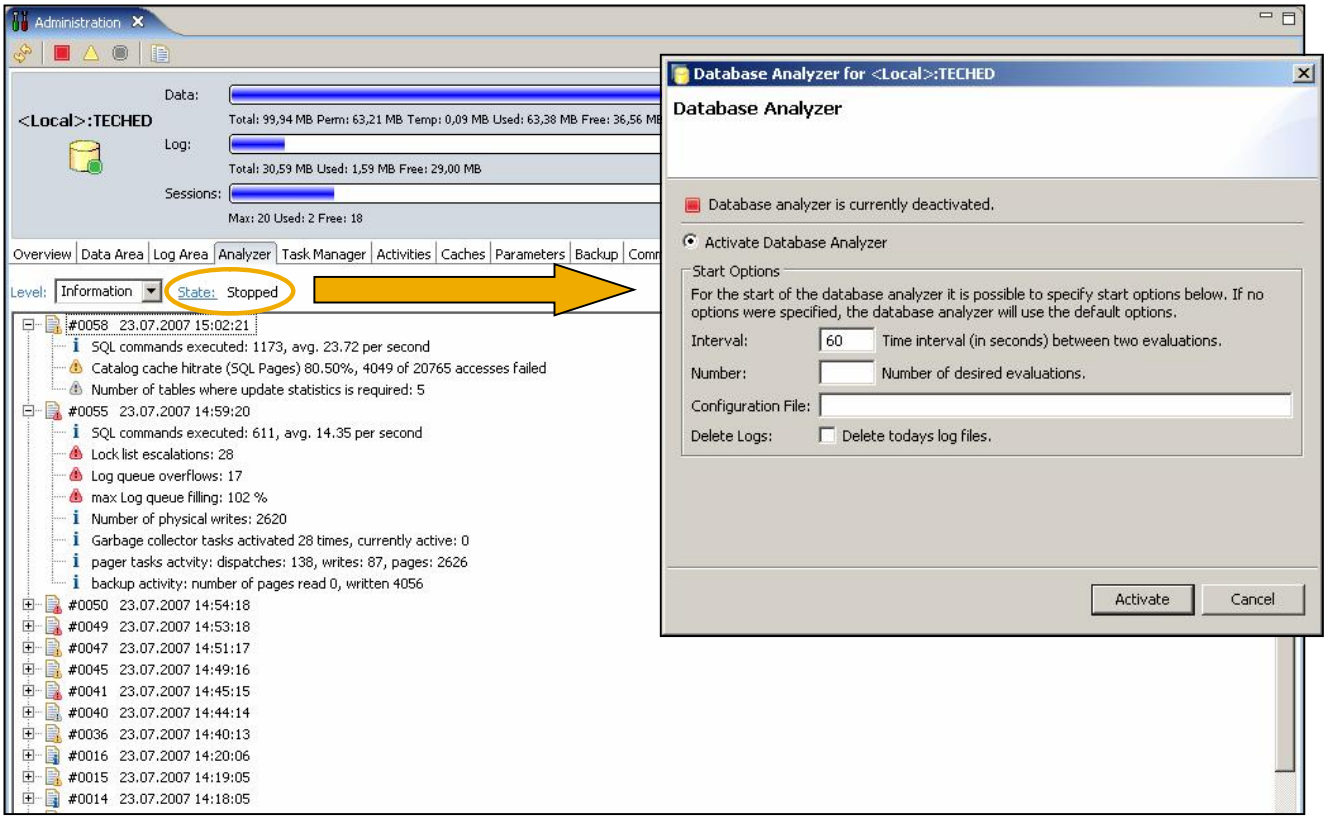
You can also change the log settings and add new log volumes.

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

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

For test or demo systems it is possible to activate an *Overwrite Mode* for the log volumes - then you don't have to take log backups before the information on the log volume can be overwritten.
It is also possible to switch off the writing of log information.
Both of these possibilities are not recommended for productive systems as you won't be able to restore the database to the latest state.

Administration – Database Analyzer



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

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

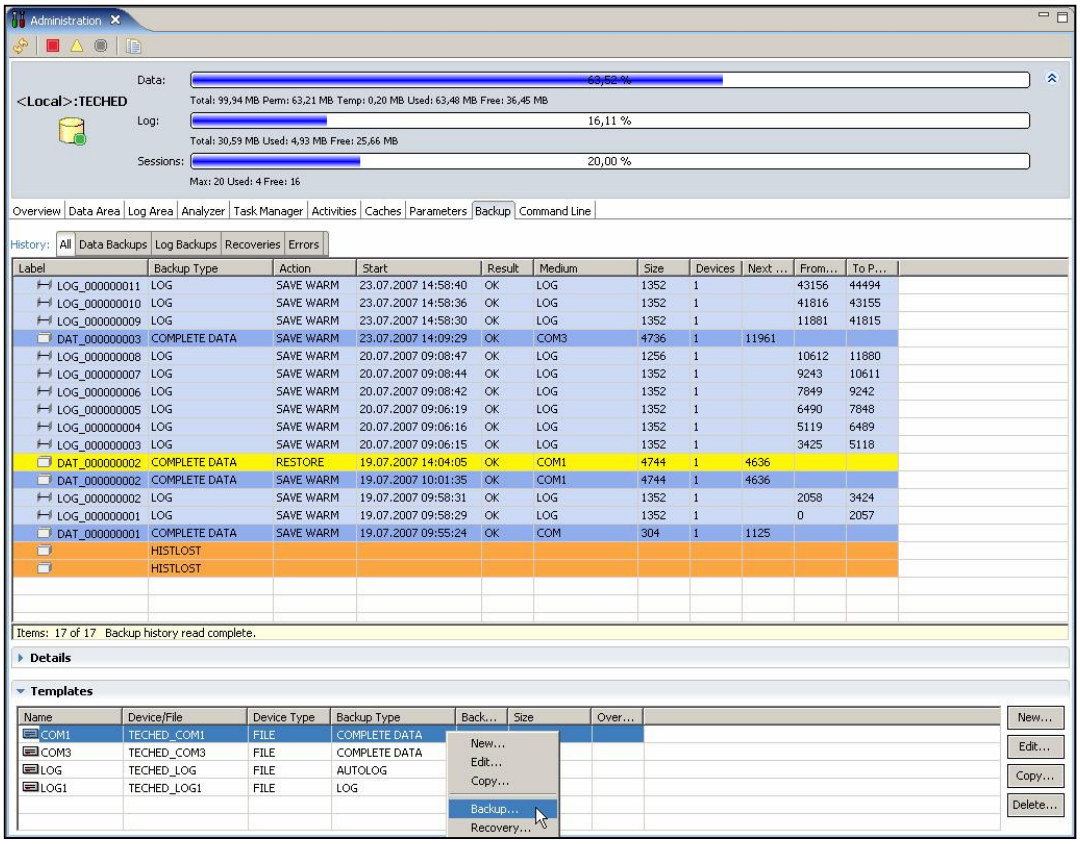
The Database Analyzer rates the information and bottlenecks:

- I: General information, such as the number of executed commands
- W1 to W3: Bottleneck warnings with low, medium, and high priority

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

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

Administration – Backup History



In the *Backup* section you'll see the *Backup History* and all *Backup Templates* (formerly called *Backup Medium*).

Detailed information about each created backup including the label and the return code are available.

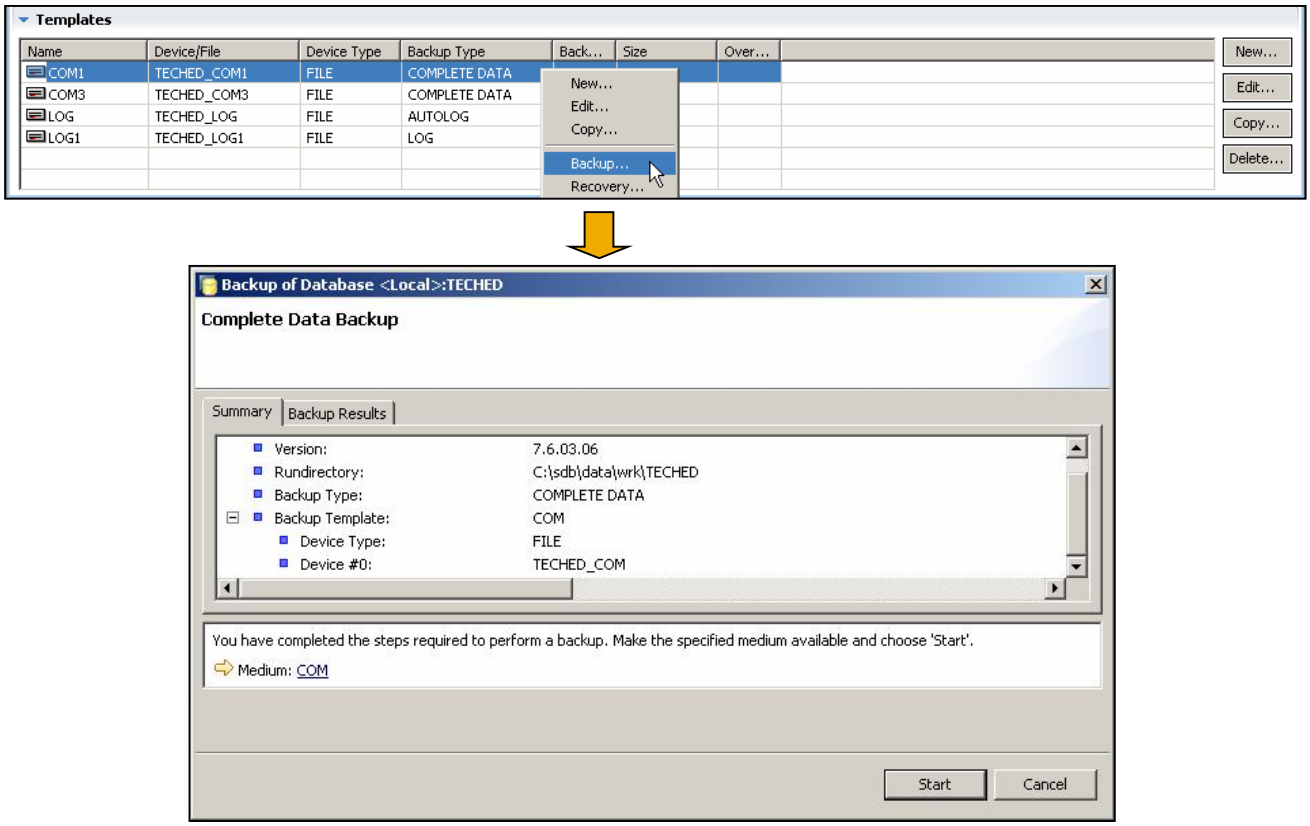
Furthermore you can create new *Backup Templates* and perform a *Backup* or a *Recovery*.

You can use backup tools from other providers for backup and restore. Some of these backup tools are supported directly by the database system. With operating system scripts, you can also use all other backup tools that can process backups from pipes.

The following external backup tools are supported directly by MaxDB:

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

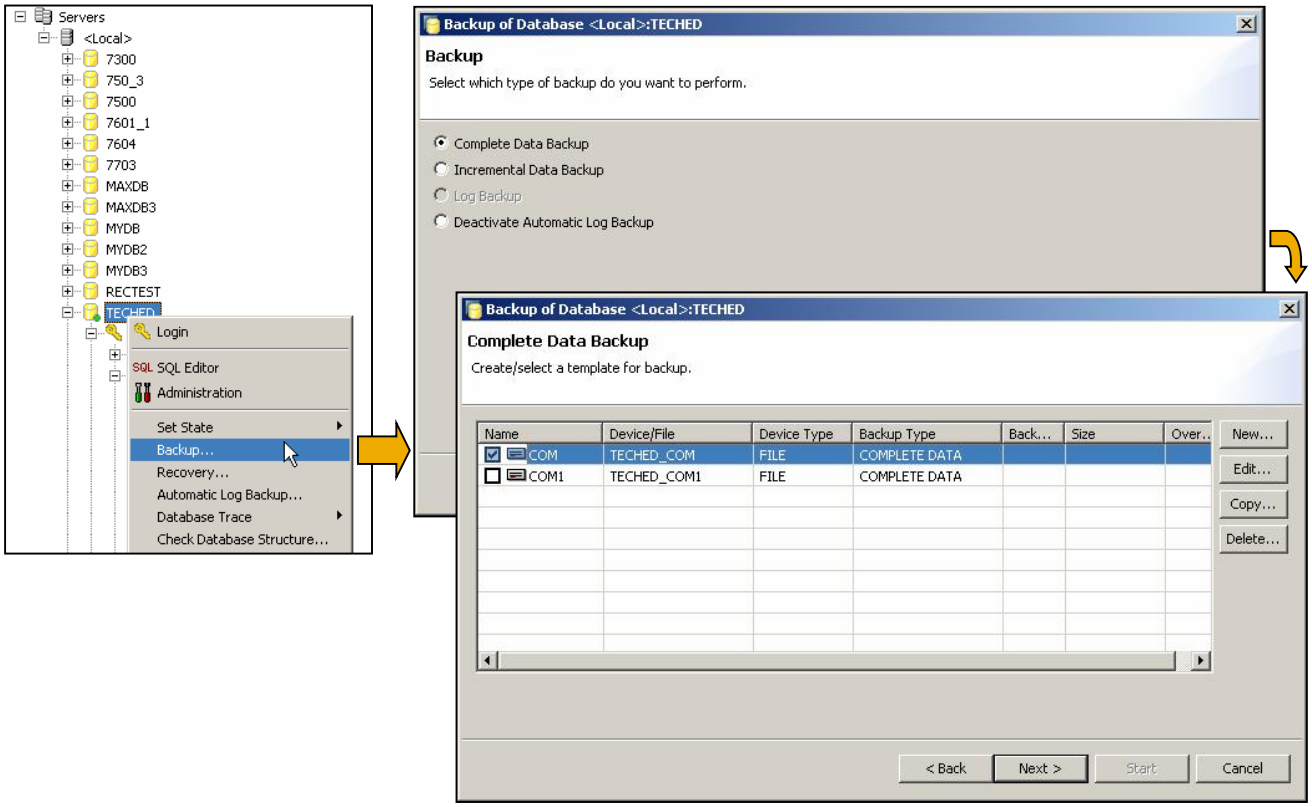
Administration – Backup History: Create a Backup



Each backup template is bound to a specific backup type (complete data backup, incremental backup or log backup).

When you start the backup from the context menu on a backup template the *Backup Wizard* is automatically opened for the specific backup type and the backup will be started using the selected template.

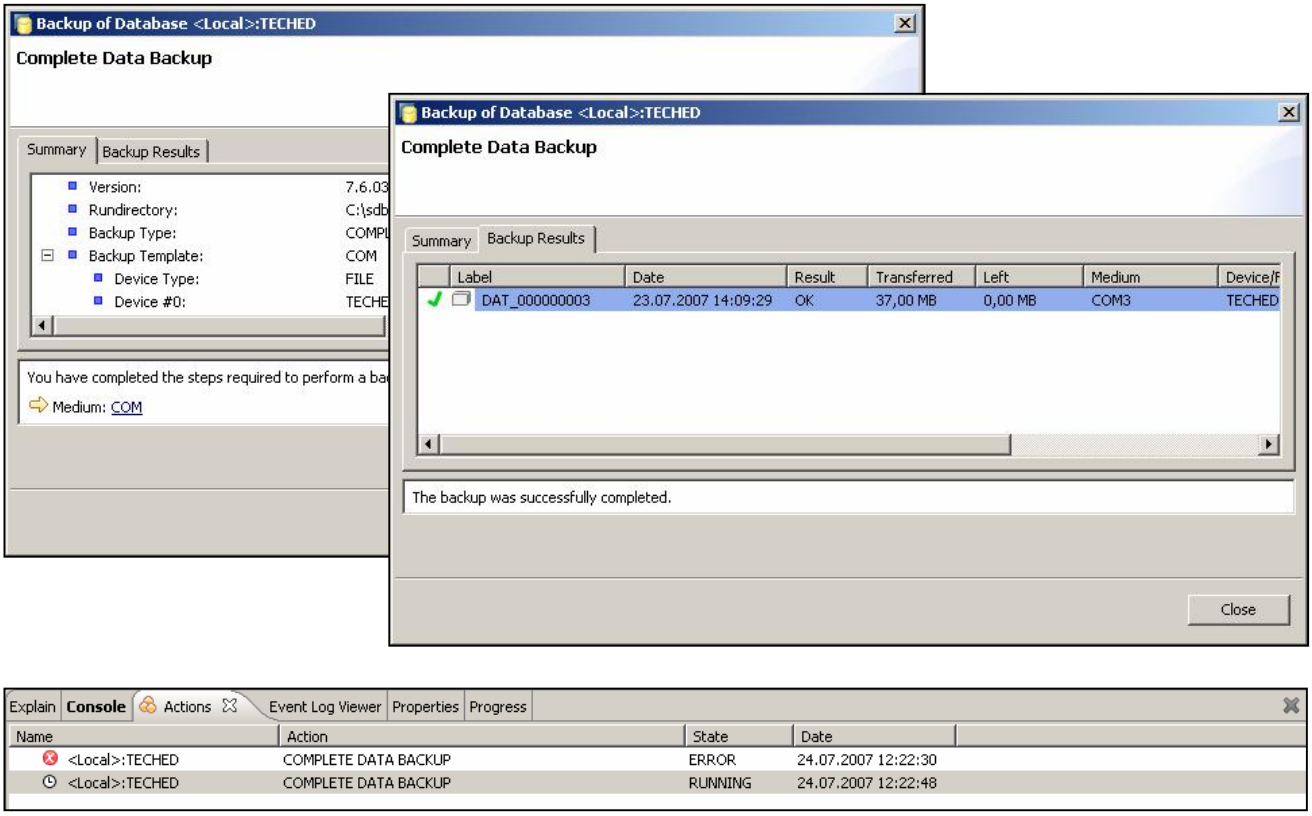
Administration – Create a Backup I



Another possibility to perform a backup is to choose *Backup* from the database‘s context menu.

In this case you can choose what kind of a backup you would like to perform and in the next step you select or create the backup template for this action.

Administration – Create a Backup II



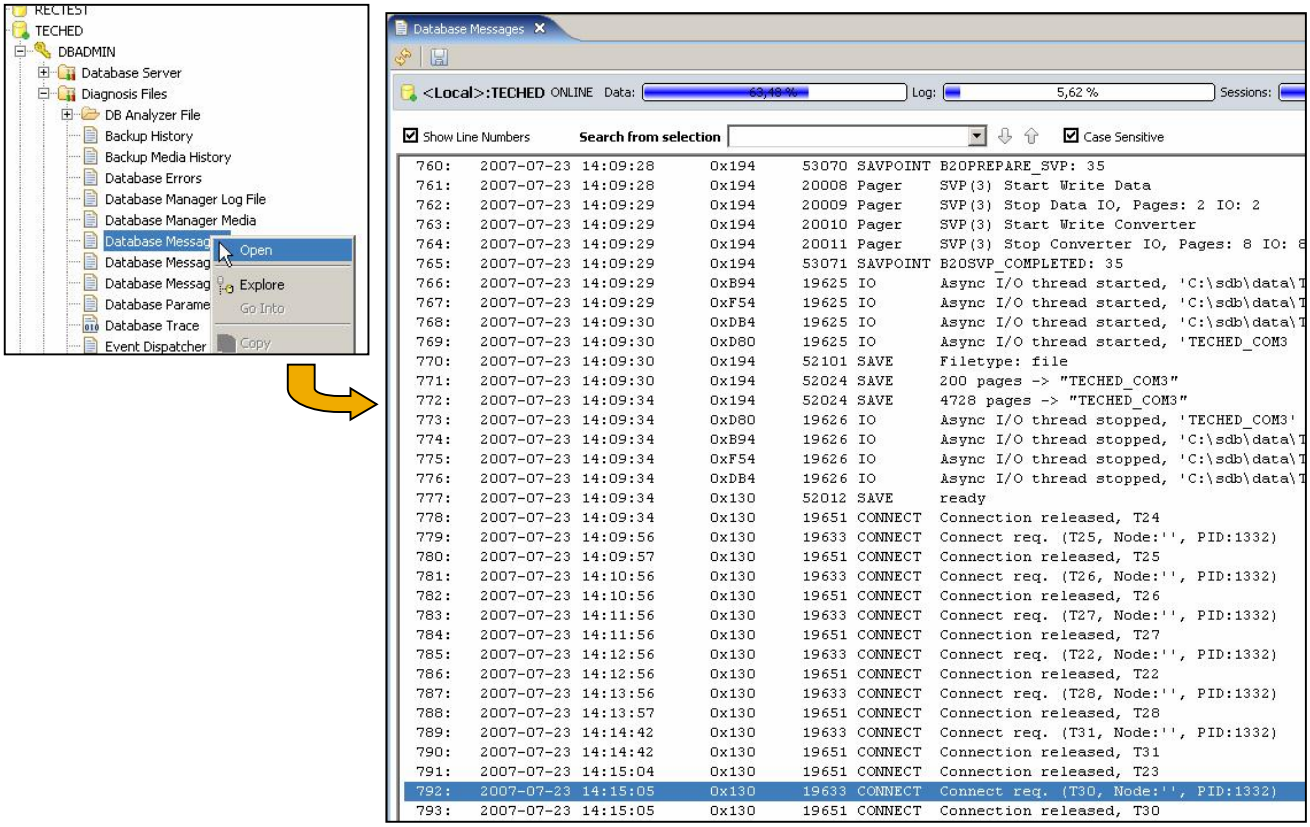
The backup will be created after you confirmed the selected action.

When the backup finished, information about the backup is displayed (backup label, size, location, …).

While the backup is running you can choose to close the *Backup Wizard* using the *Background* button. This enables you to work with the Database Studio while the backup is active.

The progress of the backup can then be seen in the *Actions* tab in the lower part of the Database Studio window.

Administration – Database Message File



A DBM operator can access the database diagnosis files in the Database Studio. All available files are listed in the tree in folder *Diagnosis Files*.

The most important log files are:

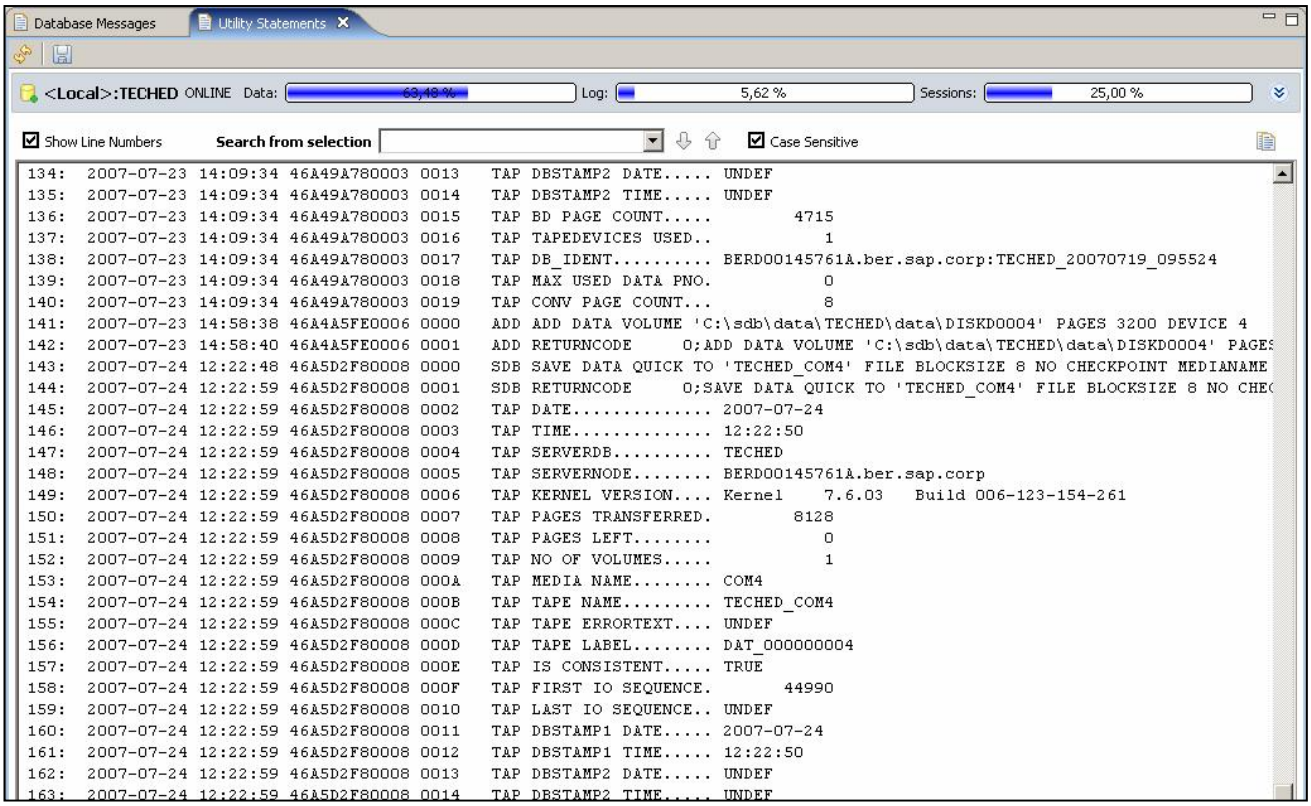
- *Database Messages* - contains status and error messages of the database kernel
- *Database Errors* - contains all error messages since database installation
- *Utility Statements* - contains administrative commands sent to the database kernel (e.g. SHUTDOWN, BACKUP, CHECK DATA) including their return code(s)
- *Backup History* - contains all backup and recovery actions
- *Database Manager Log File* - contains all (administrative) commands sent to the dbmserver

To display a log file, choose *Open* in the context menu on the file name. A double-click on the file name does also work.

This example shows the *Database Messages* file. It consists of two parts: the first part contains information about the database start and is not overwritten. In the second part information is logged during the runtime of the database. This part is overwritten cyclically. The current write position is marked with 'current write position'.

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

Administration – Utility Statement File



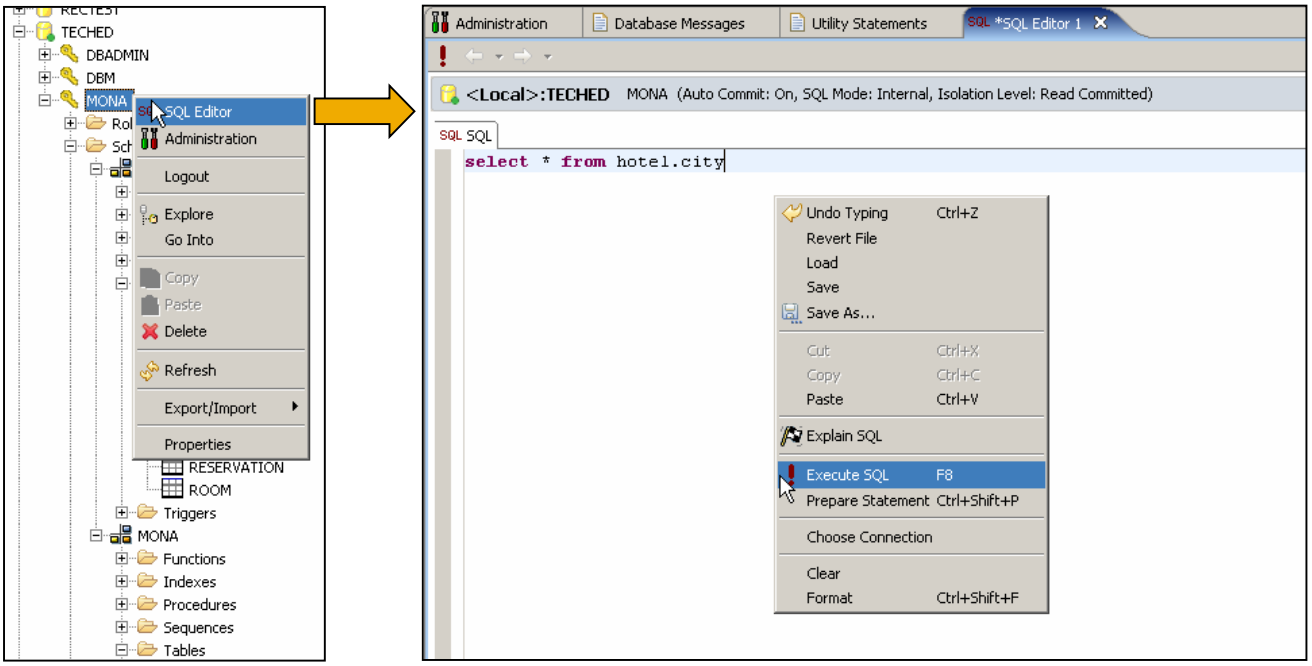
The *Utility Statement* file contains information about all administrative tasks sent to the database kernel.

It contains information about

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

including the return codes of these commands.

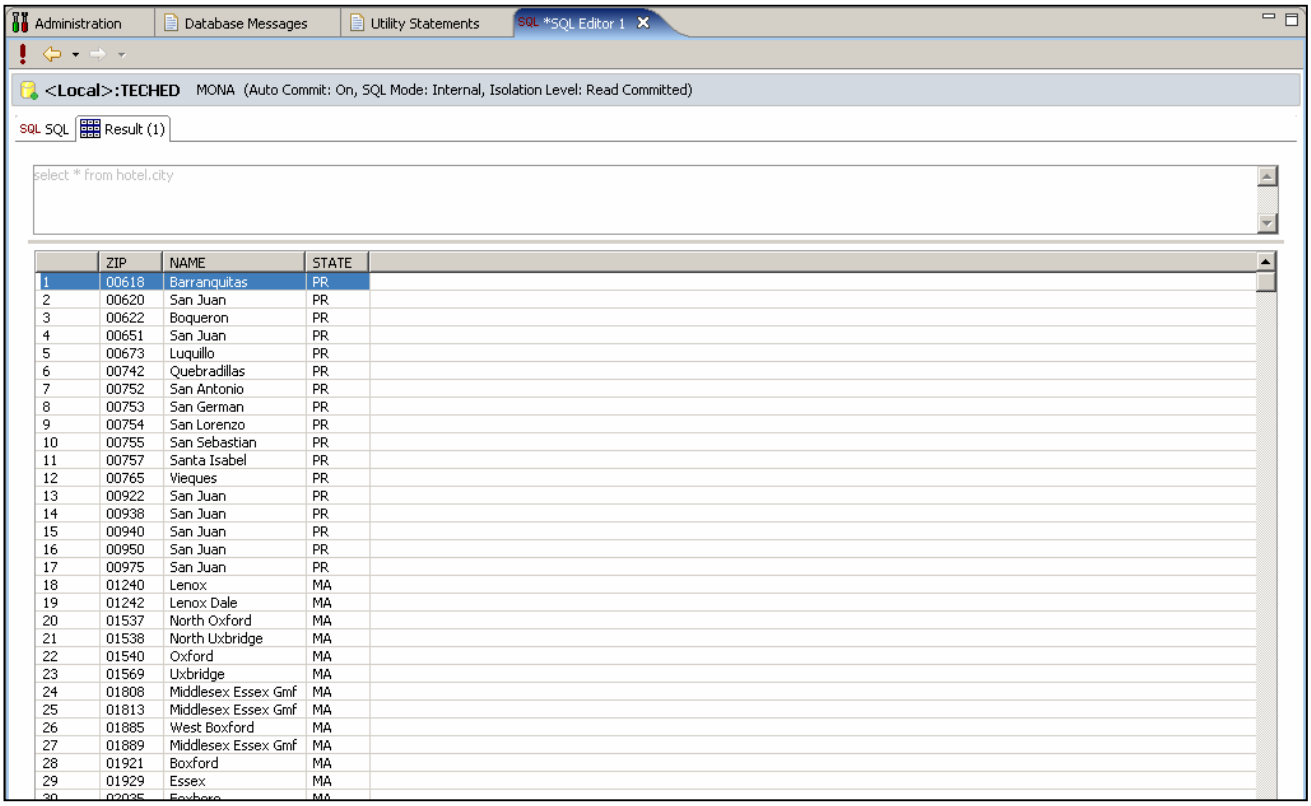
SQL – SQL Editor



Choose *SQL Editor* in the context menu on the SQL user to open the *SQL Editor* window. There you can execute any SQL command – e.g. a SELECT statement.

When you choose *Execute SQL* the statement is executed.

SQL – Result Window

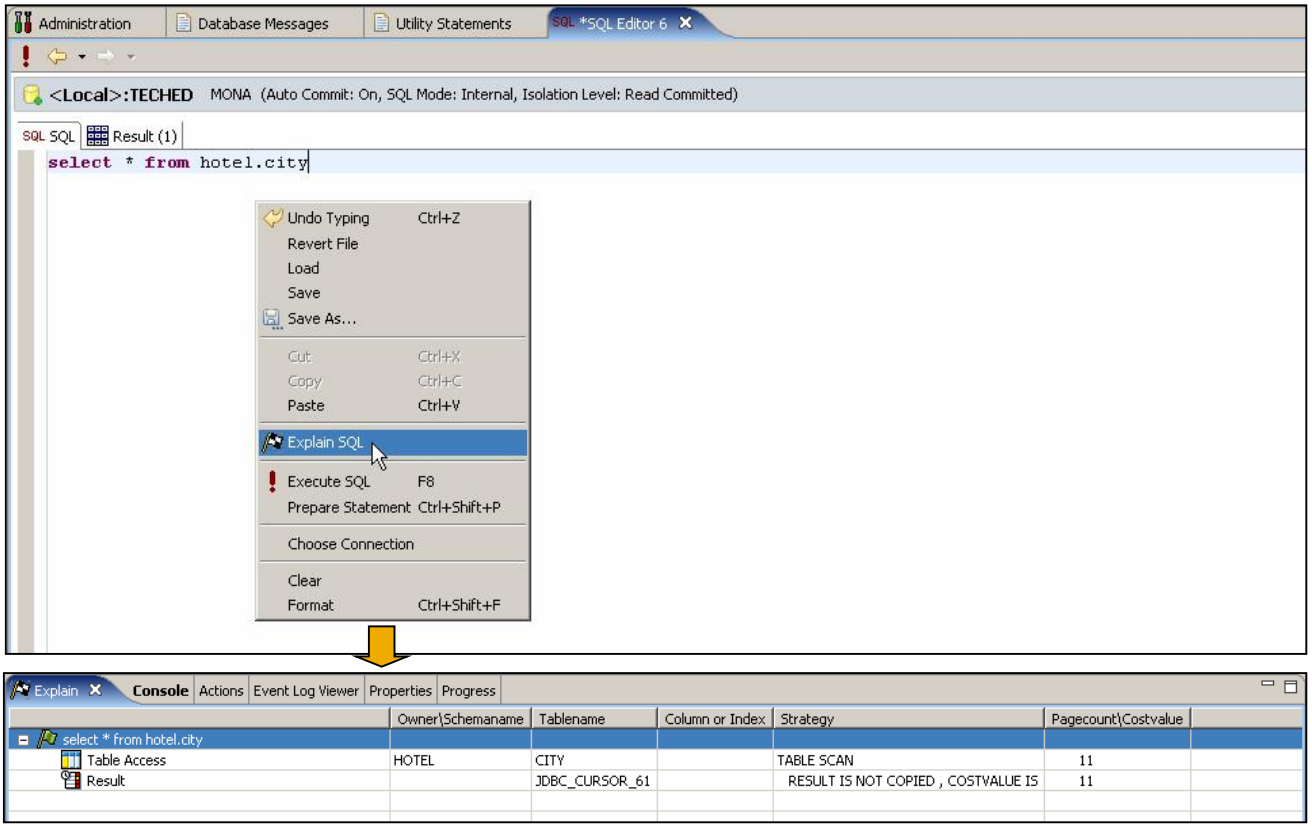


	ZIP	NAME	STATE
1	00618	Barranquitas	PR
2	00620	San Juan	PR
3	00622	Boqueron	PR
4	00651	San Juan	PR
5	00673	Luquillo	PR
6	00742	Quebradillas	PR
7	00752	San Antonio	PR
8	00753	San German	PR
9	00754	San Lorenzo	PR
10	00755	San Sebastian	PR
11	00757	Santa Isabel	PR
12	00765	Vieques	PR
13	00922	San Juan	PR
14	00938	San Juan	PR
15	00940	San Juan	PR
16	00950	San Juan	PR
17	00975	San Juan	PR
18	01240	Lenox	MA
19	01242	Lenox Dale	MA
20	01537	North Oxford	MA
21	01538	North Uxbridge	MA
22	01540	Oxford	MA
23	01569	Uxbridge	MA
24	01808	Middlesex Essex Gmf	MA
25	01813	Middlesex Essex Gmf	MA
26	01885	West Boxford	MA
27	01889	Middlesex Essex Gmf	MA
28	01921	Boxford	MA
29	01929	Essex	MA

The result is shown in a second tab.

If the result set is large, not all rows are fetched at once but only the first 1000 rows. When you scroll down, the next rows are fetched.

SQL – Explain Statement



It is also possible to view the *Execution Plan* of the SQL statement. To do so choose *Explain SQL* in the context menu of the *SQL Editor*.

In this example the data is read using a full TABLE SCAN.

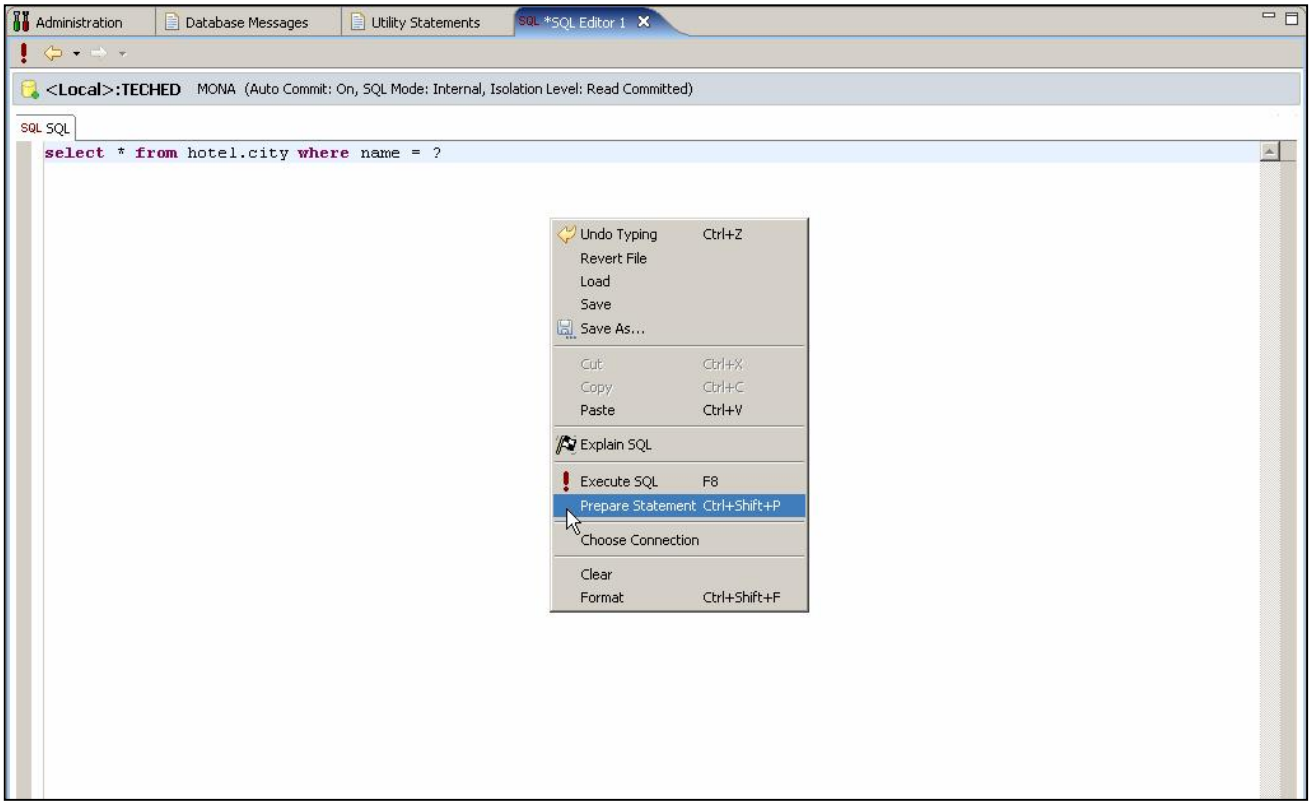
To determine the best optimizer strategy for an SQL statement analyze all tables involved.

Check

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

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

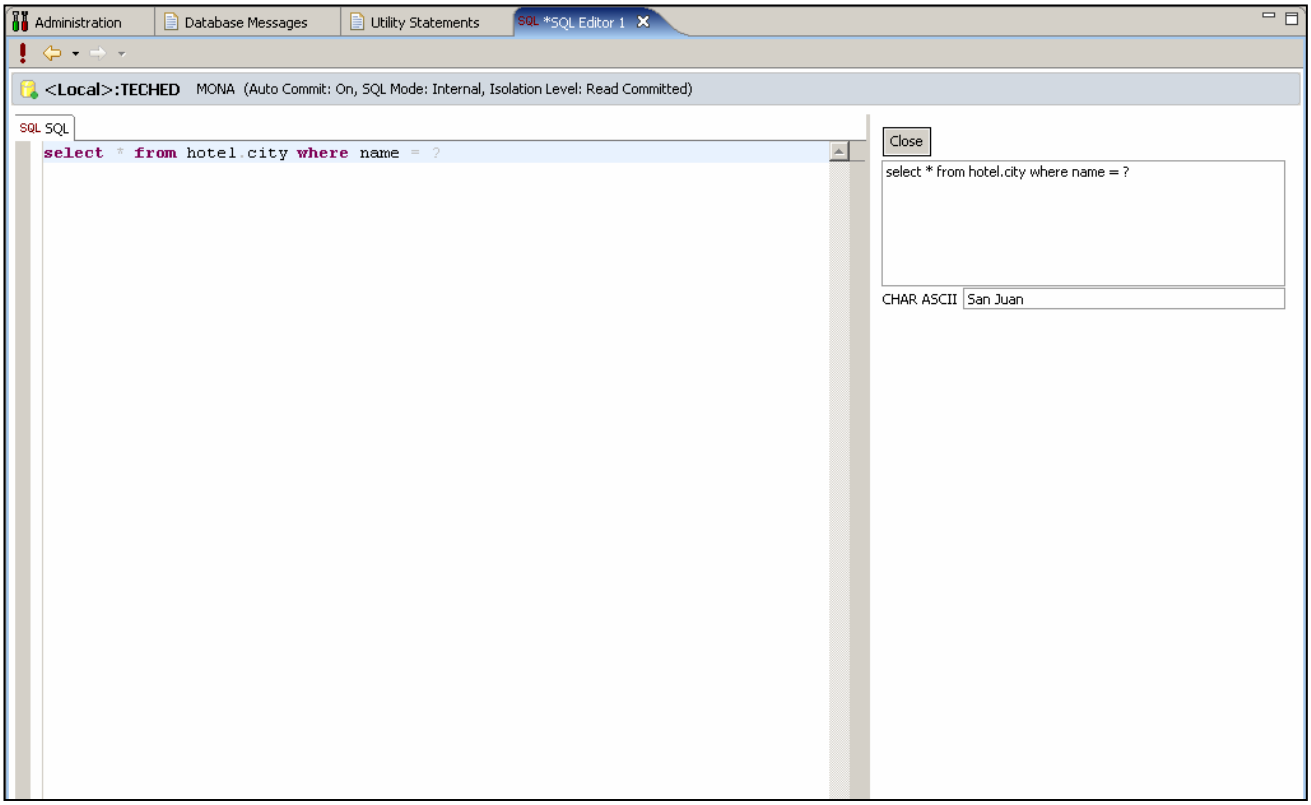
SQL – Prepare Statement I



You can choose to prepare and execute a statement in two steps. Then you can use parameters in the SQL statement.

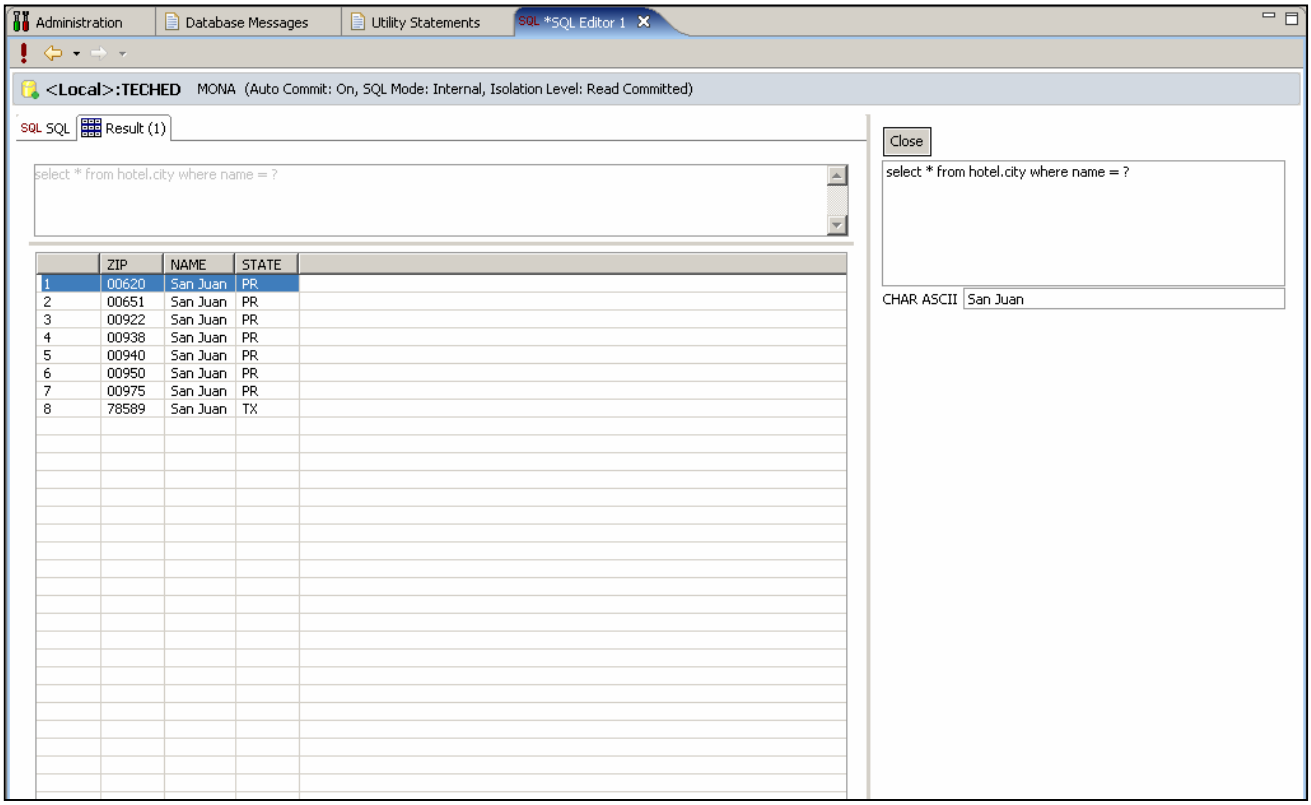
Instead of the parameter value enter a ? in the SQL statement and then choose *Prepare Statement*.

SQL – Prepare Statement II



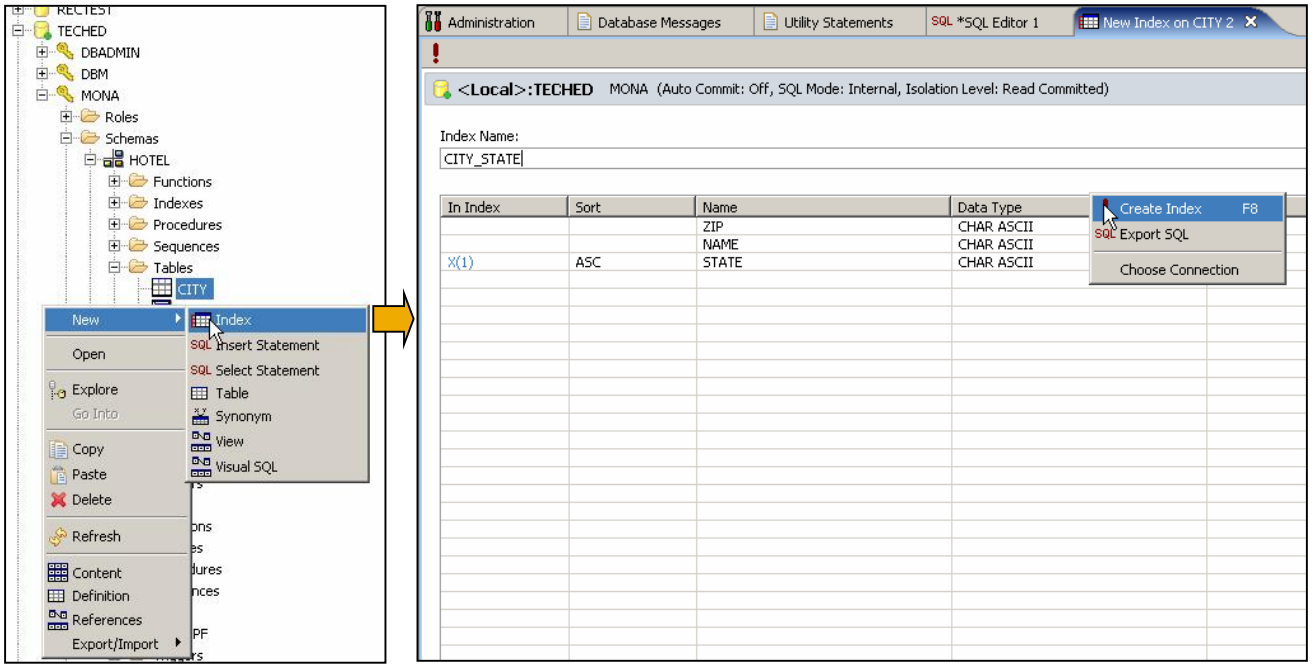
Now you can enter the parameter values and execute the statement.

SQL – Prepare Statement III



You can change the parameters and re-execute the statement with the new parameter values. The statement is then not prepared again but executed directly.

SQL – Create an Index



For a SQL user you can see all schemas, tables, indexes and other database objects owned by this user.
Views as well as tables can be found in folder *Tables*.

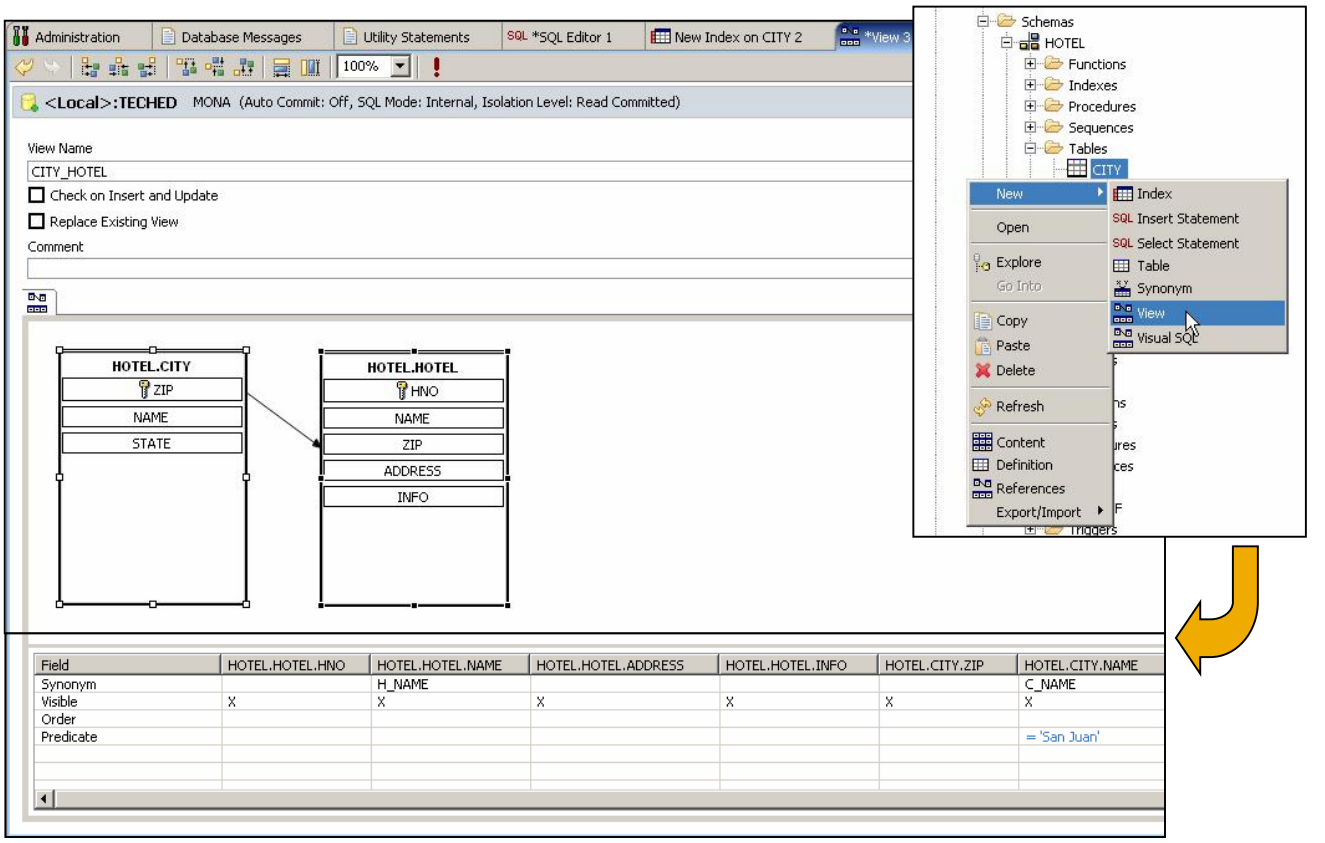
Using the context menu on a database object you can open the object definition, display the content of the object, delete or create new objects, …

To create a new index for a table choose *New -> Index* from the context menu of this table.

You'll get a list of all columns and you can select the columns which should be part of the index.

Don't forget to specify a name for this index, before you choose *Create Index*.

SQL – Create a View I



From the context menu on a table name you can also choose to create a new view on this table.

In the *View Editor* you can add other tables for a join view using drag and drop of a table from the tree into the *View Editor*.

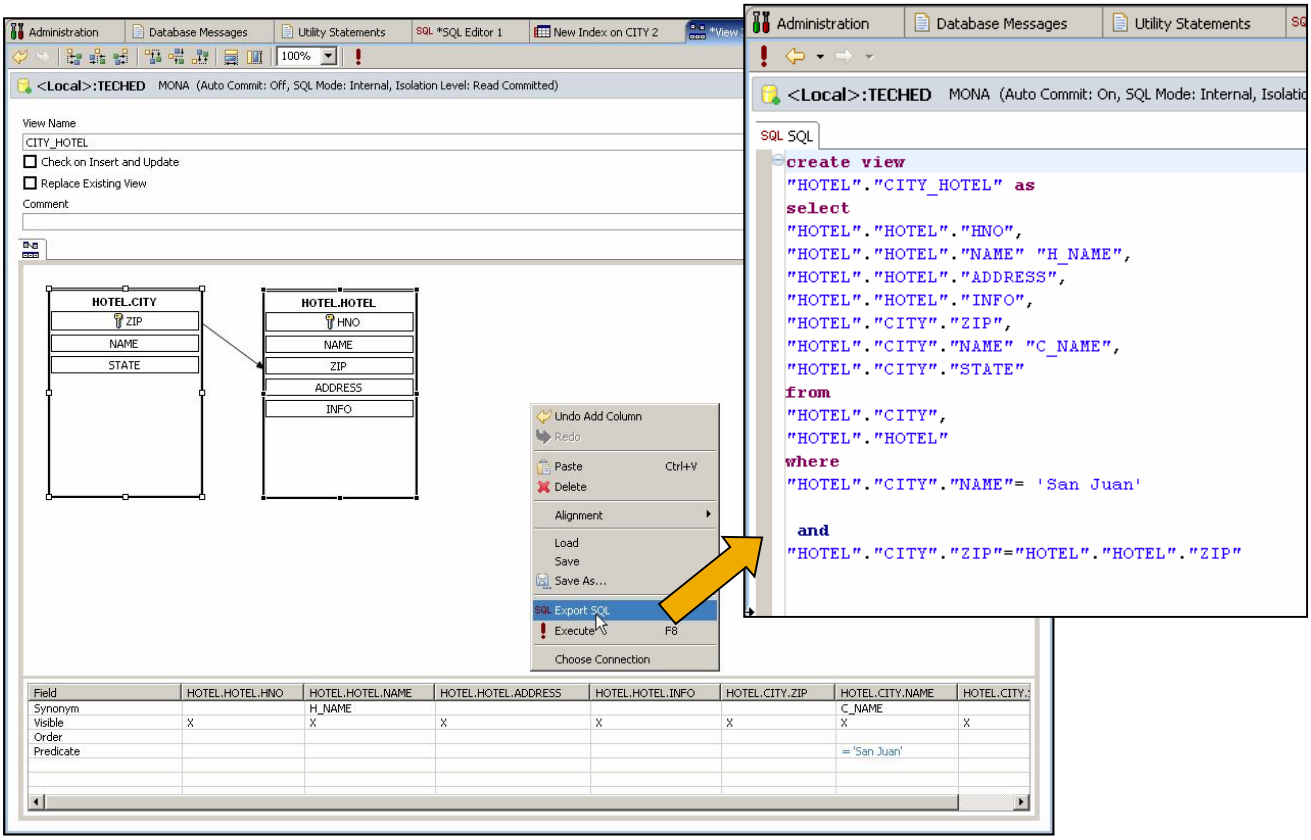
You have to specify a name for the view.

Then you can drag and drop the columns which should be part of the view definition from the tables into the *Field* list in the lower part of the window.

When you create a join view, remember to specify alias names for the chosen columns if their name is not unique.

Furthermore you can specify qualifications (*Predicate*) for the columns.

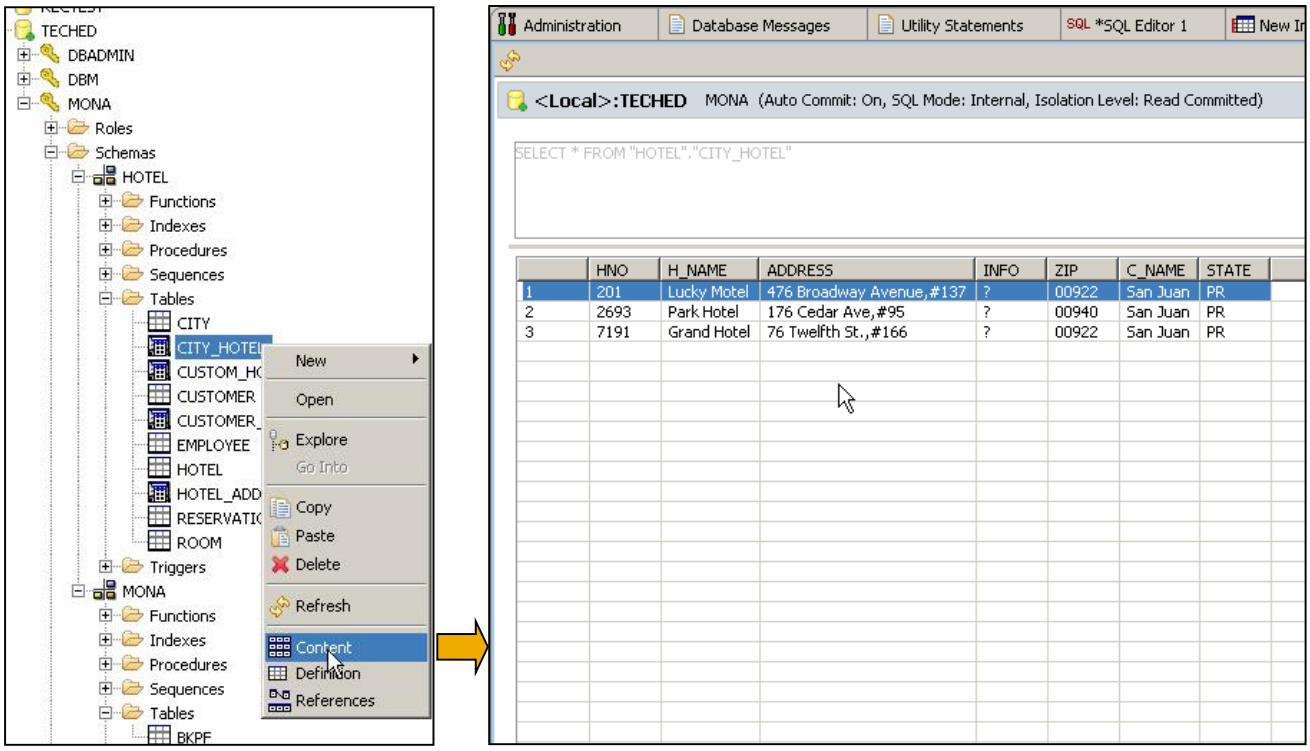
SQL – Create a View II



Before you create the view, you can check the corresponding SQL statement using the option *Export SQL*.

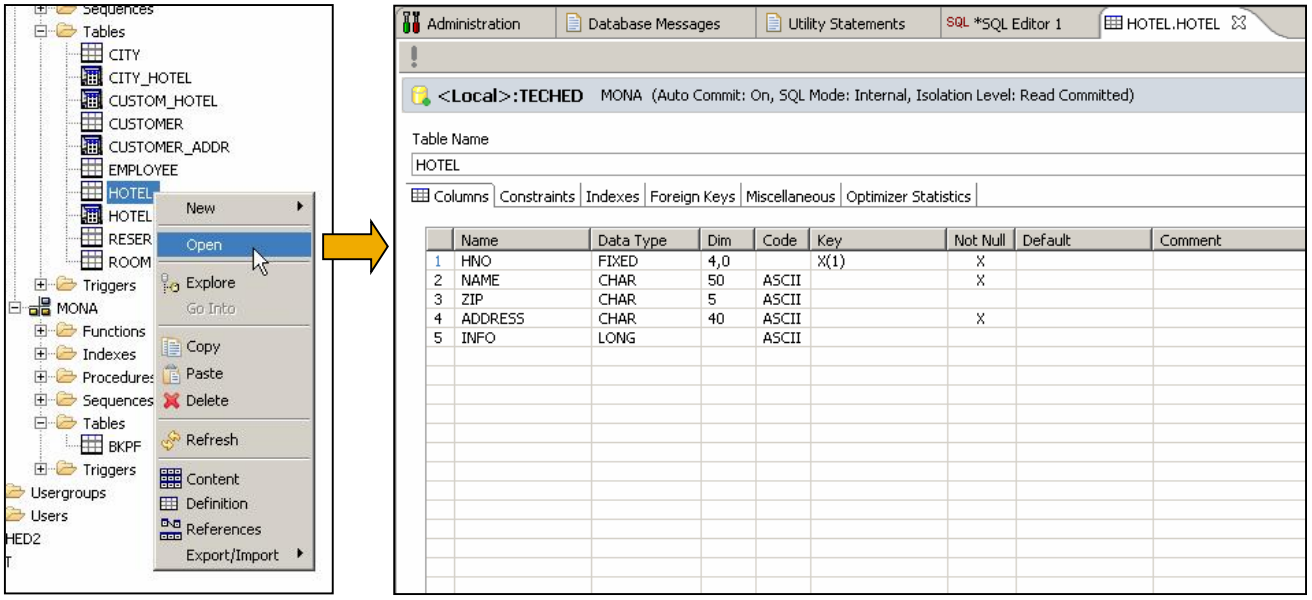
To actually create the view choose *Execute*.

SQL – View/Table Content



In the context menu of a table or a view you can choose to display the *Content* of this table/view.

SQL – Table Definition I

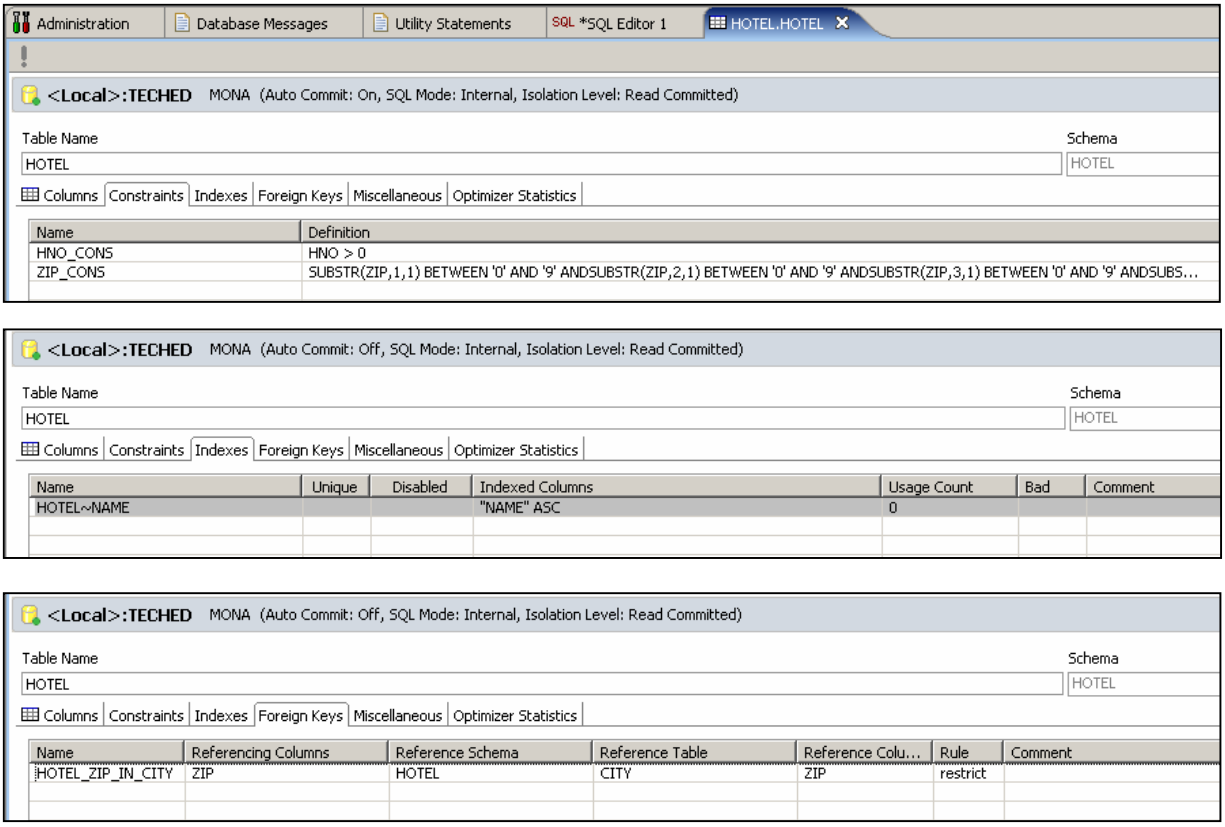


If you choose to *Open* a table you'll get detailed information about the table definition.

In section *Columns* you see all columns of this table including the data type, default value and NOT NULL condition. The primary key columns are also shown.

It is possible to alter the table definition in this window. Just choose *Edit* in the context menu to do so.

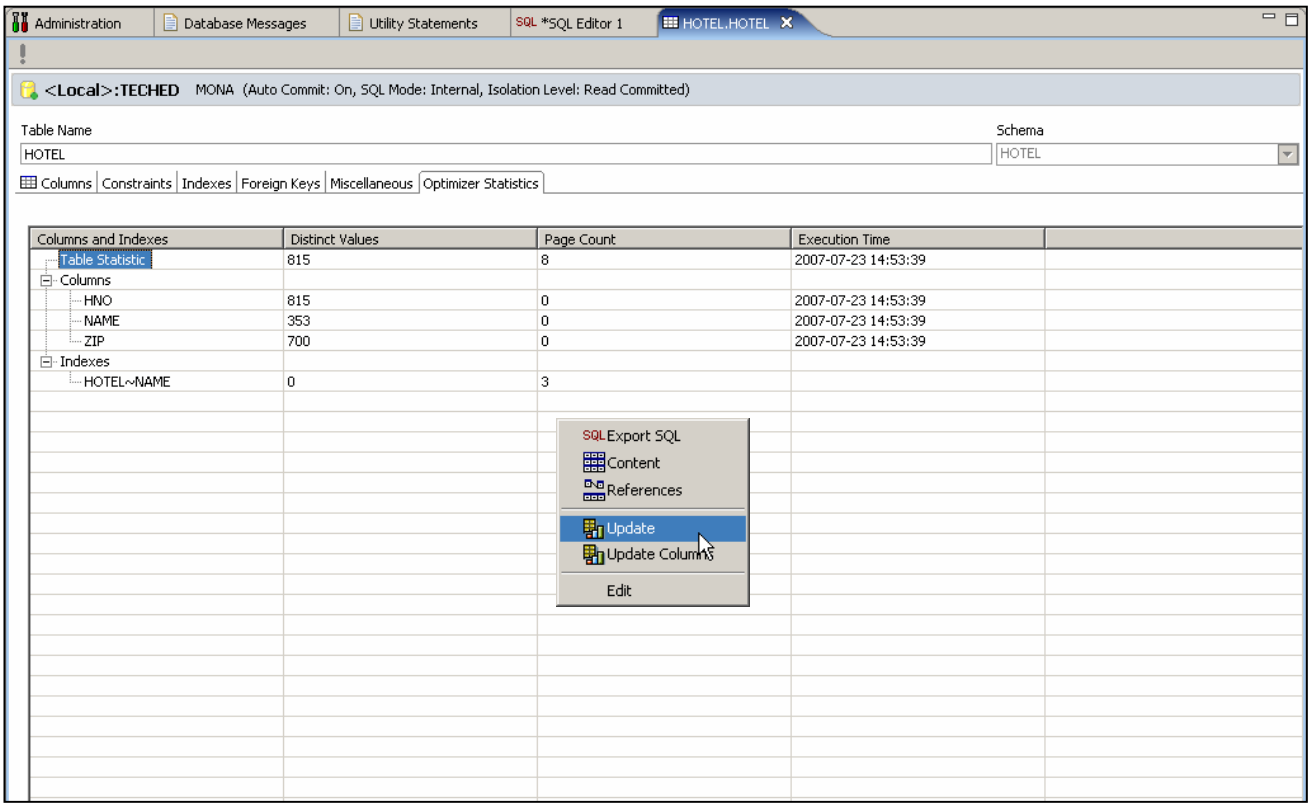
SQL – Table Definition II



In the next sections you can see, which *Constraints*, *Indexes* and *Foreign Keys* exist for this table.

All of these settings can also be changed and new constraints / indexes / foreign keys can be created.

SQL – Table Definition III



In the *Optimizer Statistics* section the optimizer statistics are displayed.

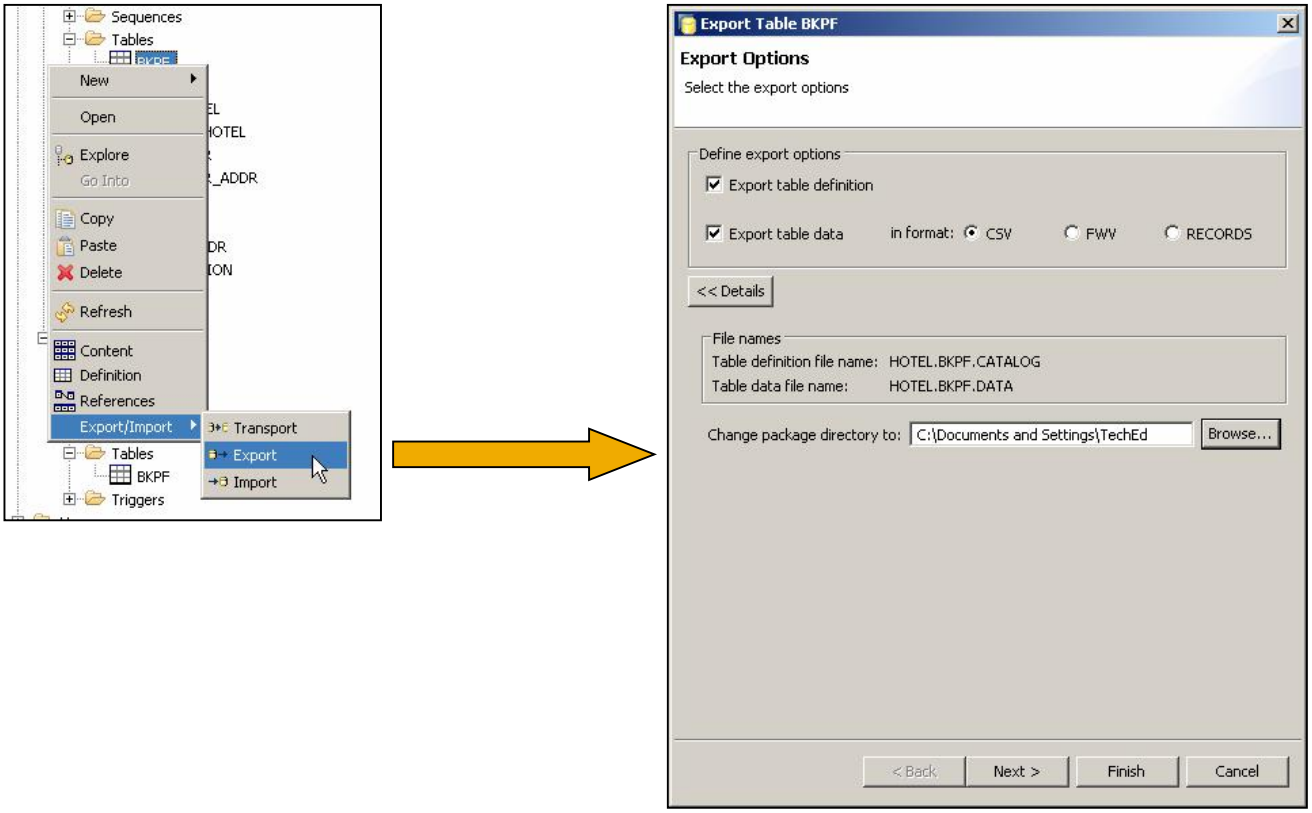
It is possible to update these statistics by choosing *Update*.

If you choose *Update Columns*, you can decide for which columns the statistics should be updated.

Accurate statistic values are important for the optimizer to be able to choose the best execution plan for join selects.

For large tables (> 1000000 rows) the sample value should be set to 5% - for smaller tables a sample value of 20000 rows is sufficient (note #808060).

Loader – Export Table I

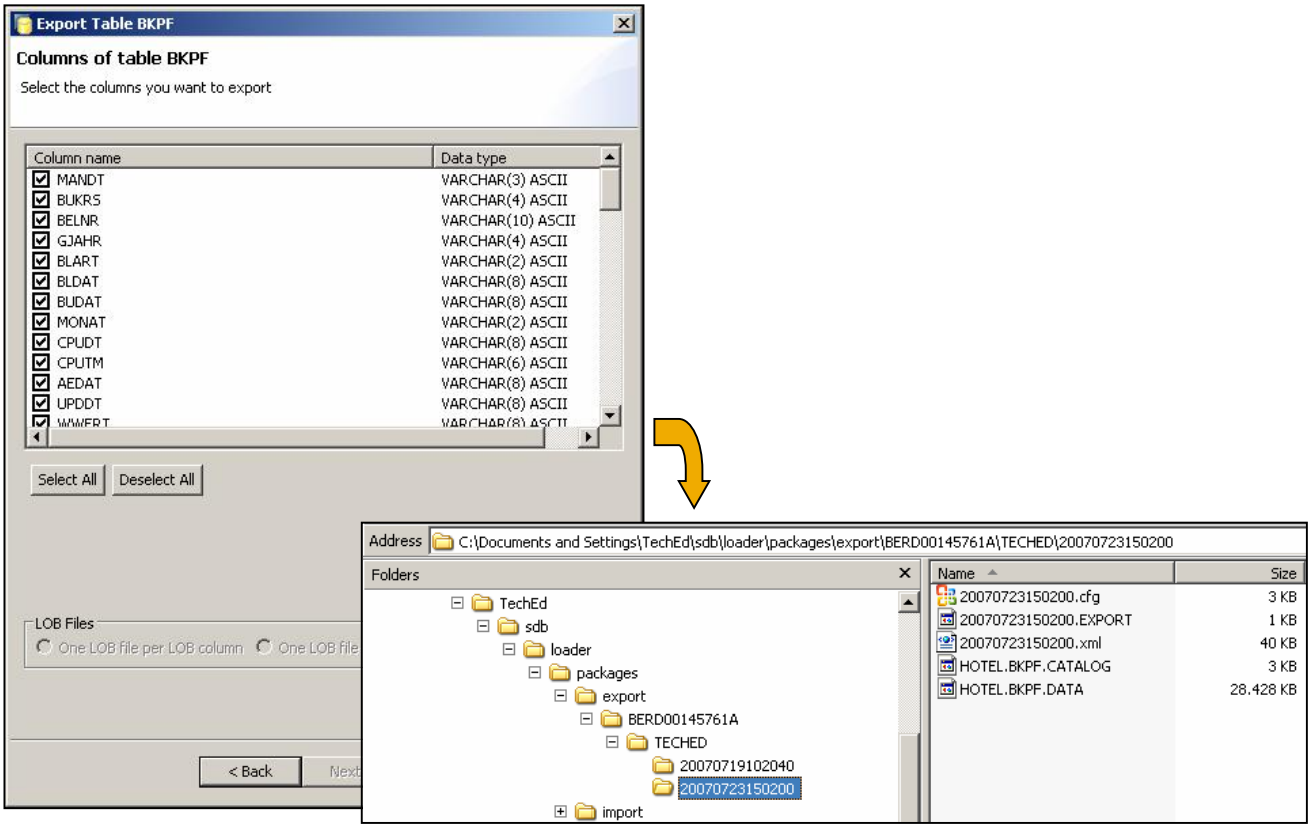


The loader is now also integrated into the Database Studio – there was no loader GUI available in the old tools.

You can easily export a table by choosing *Export* in the context menu on a table name.

In the export dialog you can specify the export options like the export directory and the format in which the data should be exported.

Loader – Export Table II

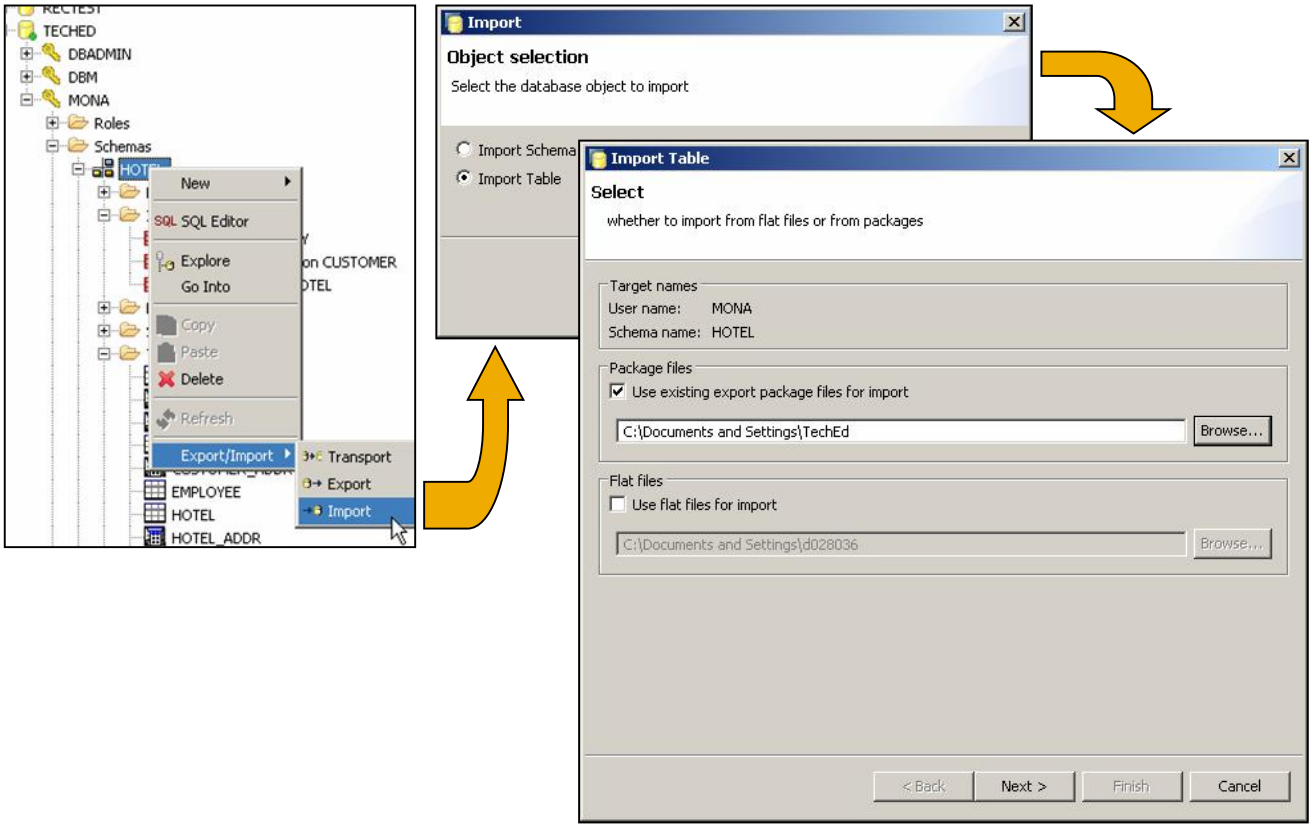


In the next step you can decide which columns of the specified table should be exported.

As a result of the export the export files are created in the specified directory.

These files can now be used for an import into another database.

Loader – Import Table I

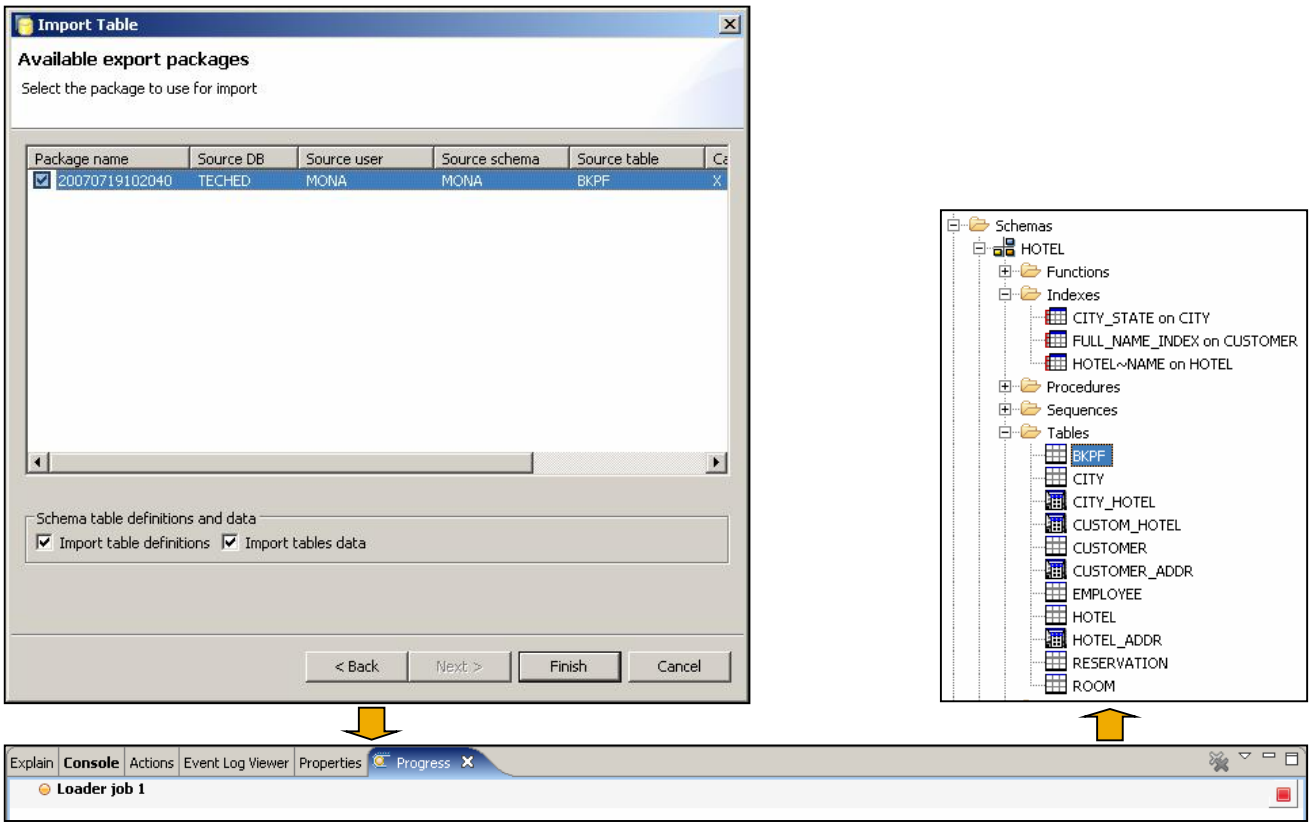


You can import the exported data into a different database or into the same database into a different schema.

To start an import choose *Import* in the context menu on a schema name.

Database Studio helps you finding the export file with the data to be imported.

Loader – Import Table II



While the import is active, the job is shown in the *Progress* view in the lower part of the Database Studio Window. When the import is finished, the imported table is available in the tree.

It is also possible to transport tables between databases or schemas using drag and drop.
You just drag the table to the target database or schema and drop it there.

Summary

Database Studio allows you to monitor and administer all MaxDB database instances in your system landscape.

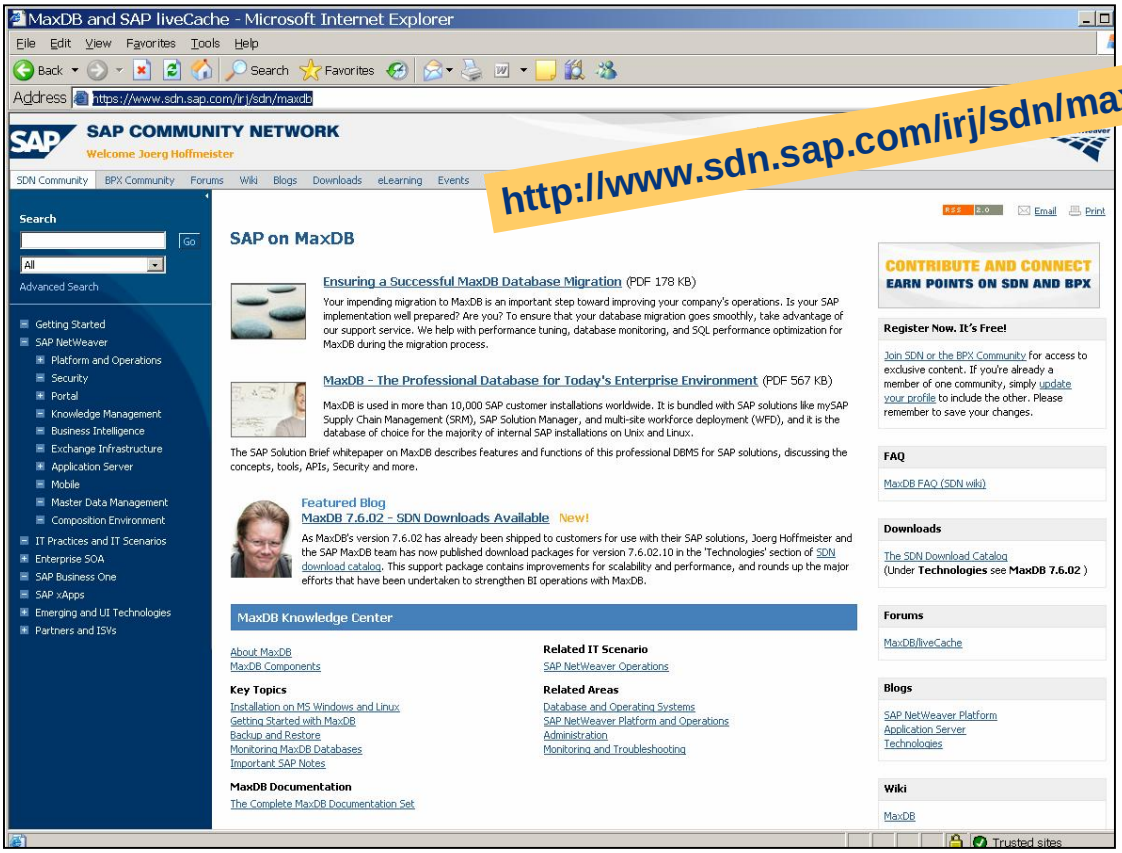
- You can access all MaxDB instances of your system landscape – it doesn't matter on which platform and with which application it is running.
- All administrative tasks can be performed with the Database Studio.
- You can monitor your MaxDB instances. Performance problems can be analyzed and solved using this tool.

Enterprise Class Database Technology from SAP for SAP

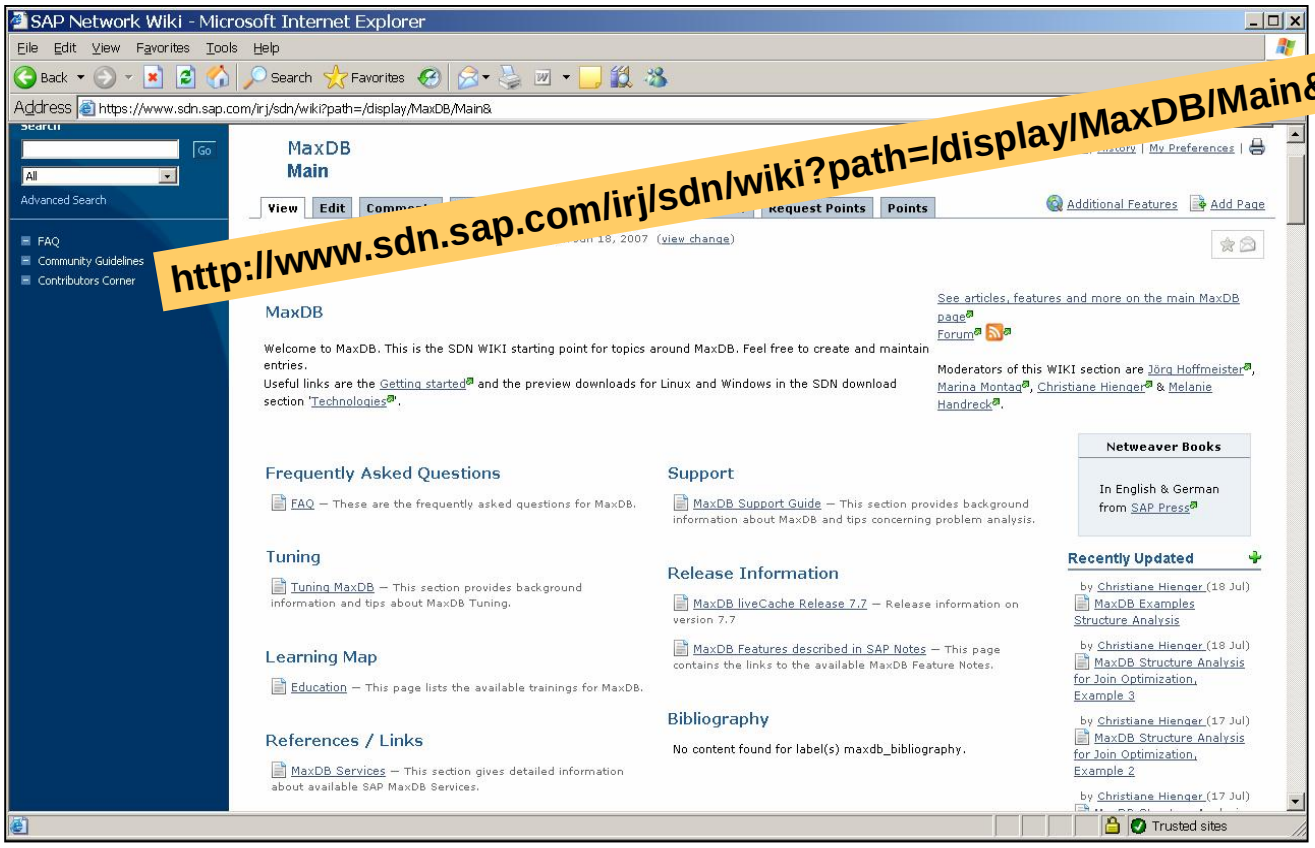
Chapter

Further Information

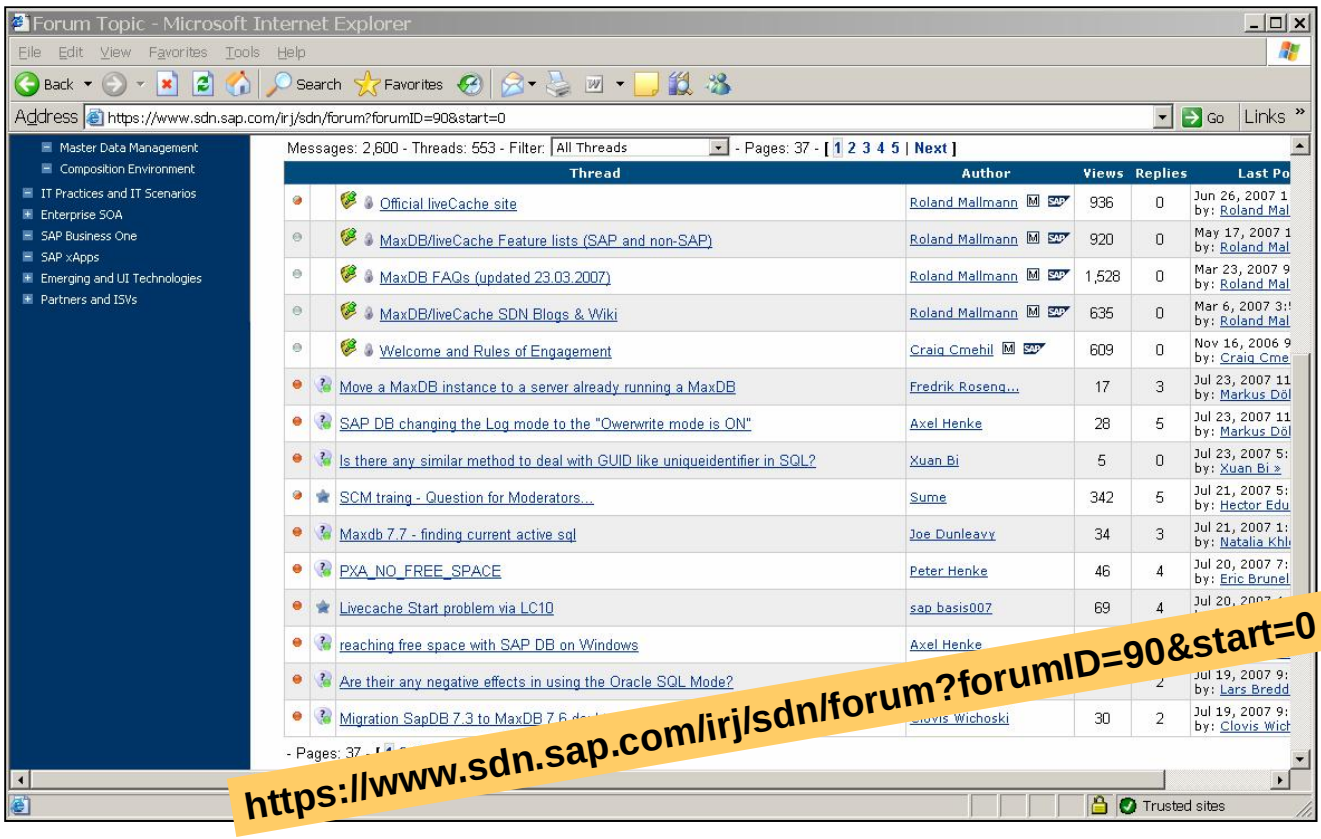
SAP Network: Information on MaxDB



SAP Network: MaxDB Wiki



SAP Network: MaxDB Forum



MaxDB Release Notation

<Major Release>.<Minor Release>.<Support Package>.<Build>

=

<n>.<n>.<nn>.<nn nnn.nnn.nnn.nnn...>

Development focus on support packages

Check for availability and permission to use

Use Software Distribution Center (SWDC)
and Product Availability Matrix (PAM)

If major and minor release remain unchanged,
every move forward is allowed,

otherwise check PAM for your solution.

Further Information

Public Web

SAP Developer Network:

Home: http://www.sdn.sap.com/irj/sdn/maxdb
Wiki: http://www.sdn.sap.com/irj/sdn/wiki?path=/display/MaxDB/Main&
Forum: http://www.sdn.sap.com/irj/sdn/forum?forumID=90&start=0

Related SAP Education Training Opportunities

http://www.sap.com/education/

ADM515, Database Administration MaxDB

TEWA60, SAP APO LiveCache Monitoring

UMEW50, MaxDB Empowering Workshop Administration

UMEW60, MaxDB Empowering Workshop Performance Monitoring and Optimization

WB550, MaxDB Internals Workshop

Thank you!