
Red Expert
Version 2025.07
User Guide

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Chapter 1

Introduction

Red Expert is a GUI shell developed in Java that provides an interface to Firebird and Red Database. Red Expert is an operating system independent programme that requires only JDK at least 21.

Red Expert provides easy interaction with the database, allowing you to perform various actions: write and profile queries, create and edit tables, export and compare database metadata, collect statistics, and much more.

You can contact us via the feedback form in the application (Help → Feedback) or by sending an e-mail to rdb.support@red-soft.ru. In your letter you can give us your feedback about the work of the programme, inform us about a bug or suggest a new functionality. We will be glad to help you!

Chapter 2

Install and update

2.1 Install

1. Download the Red Expert distribution from the [official Red Database DBMS site](#). The download is available only to the authorised user.
2. Start the installation RedExpert-<version>-linux-x86_64.bin file on Linux or RedExpert-<version>-windows-x86_64.exe on Windows. The installation is performed using the standard software installation wizard. Installation in Russian, English and Portuguese is provided. After installation, the application icon will appear on the desktop.
3. Run Red Expert.

The Java supplied with Red Expert is used by default. When upgrading from older versions of RedExpert (2025.05 and below), Java will be downloaded automatically.

To use third-party Java, you need to specify it in RedExpert/config/launcher.conf. You must use an absolute path to the executable file, for example:

- Example for Windows:

```
app.java.path=C:\ProgramFiles\openjdk-21\bin\java.exe
```

- Example for Linux:

```
app.java.path=/usr/lib/jvm/openjdk-21/bin/java
```

You can run the application from the console as `java -jar RedExpert.jar` command from the directory where RedExpert.jar is located, You can also launch the Launcher by running the command `./RedExpert64`. When starting the Launcher, you can specify JVM arguments, for example:

```
./RedExpert64 -Djna.debug_load=true
```

Also JVM arguments can be specified in RedExpert/config/launcher.conf:

```
# -----
# - JVM CONFIGURATION -
# -----
-Djna.debug_load=true # as example
```

2.2 Update

1. When a new version of the application is released, a dialog box will appear to notify you that a new version has been released, and the status bar will display the message Update available.
2. Click the Download button in the dialog box or the status bar and start the update.
3. When the update is complete, restart Red Expert.

You can also check for updates via menu item Help → Check for updates.

2.2.1 Skip version

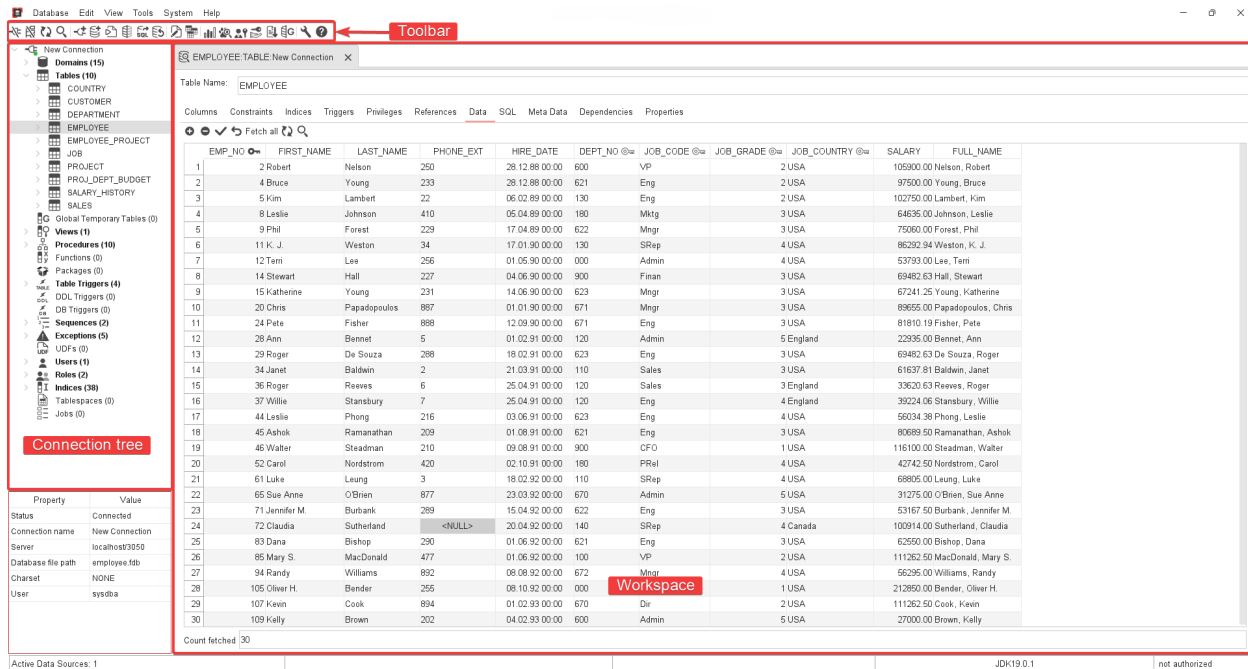
The Skip Version button keeps application at the current version and disables notifications of available update. In this case, there will be no update notifications until the next version is released. You can install the skipped version via menu item Help → Check for updates.

You can postpone the update by clicking the Remind Later button. Then the dialog box informing you about the available update will open again at the next application start.

Chapter 3

GUI Overview

The application interface is divided into three parts: toolbar, connection tree and workspace.



Img 3.1 — Application interface

1. Toolbar;
2. Connection tree;
3. Workspace.

The status bar at the bottom of the application displays information about the number of connections, available updates, JDK version and memory status.

3.1 Toolbar

The toolbar contains buttons that allow you to perform various actions, such as connecting to database and disconnecting from it, creating a new database or connection. There are also buttons for quick access to tools.

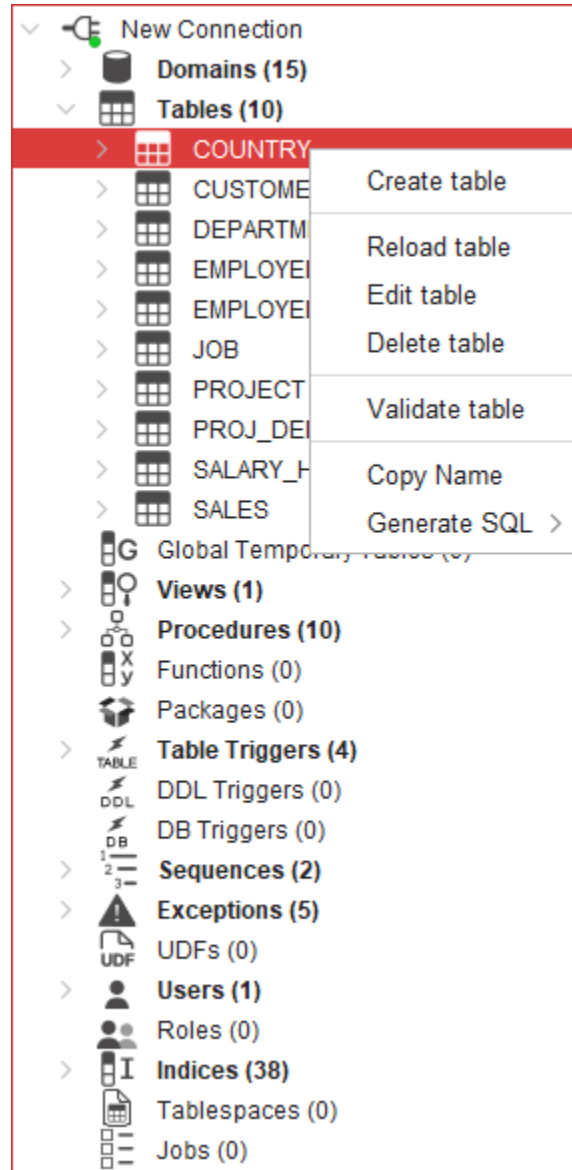


Img 3.2 — Toolbar

The set of buttons on the toolbar can be edited in the View menu or in the application settings. See appendix for a detailed description of buttons [Toolbar](#).

3.2 Connection tree

After connecting to the database, the panel displays the tree structure, the nodes of which represent database objects. The number of objects of each type is indicated in brackets.



Img 3.3 — Connection tree

A right-click on a node will bring up a pop-up menu with available actions for this object. Double-clicking on object will open a tab with detailed information about it.

3.3 Workspace

This area is used to work with database tools and edit objects.

Connection Name: New Database JDBC Driver: Jaybird 5 Driver New Driver

Server (Host): localhost Server: Red Database (Firebird) 3+

Port: 3050 User Name: SYSDBA

Database File: new_db.fdb Browse Password: *****

Character Set: UTF8 ☐ Store Password ☐ Encrypt Password

Page Size: 8192

Certificate

Certificate X.509: Browse

Container password: ☒ Store container password ☐ Verify server certificate

Create

Img 3.4 — Workspace

Detailed information about the object is viewed in the workspace, for example:

Table Name: COUNTRY

Columns Constraints Indices Triggers Privileges References Data SQL Meta Data Dependencies Properties

Fetch all

	COUNTRY	CURRENCY
1	USA	Dollar
2	England	Pound
3	Canada	CdnDlr
4	Switzerland	SFranc
5	Japan	Yen
6	Italy	Euro
7	France	Euro
8	Germany	Euro
9	Australia	ADollar
10	Hong Kong	HKDollar
11	Netherlands	Euro
12	Belgium	Euro
13	Austria	Euro
14	Fiji	FDollar
15	Russia	Ruble
16	Romania	RLeu

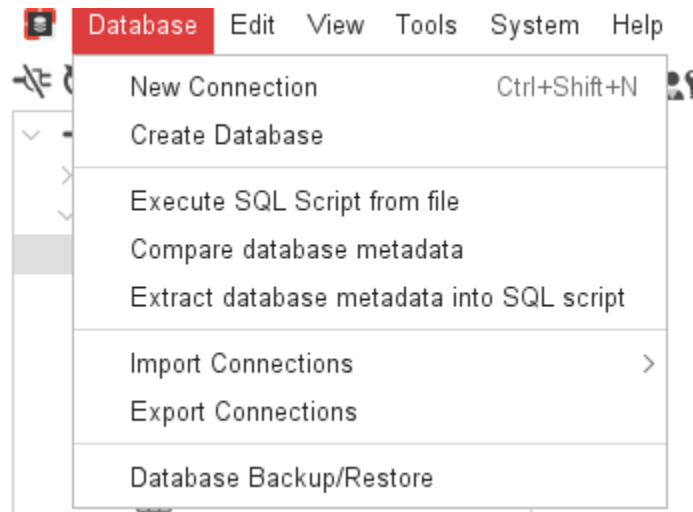
Img 3.5 — Information about table

By default, 30 records are loaded at once (this number can be changed in the settings), and the Fetch All button loads all table data.

Chapter 4

Database

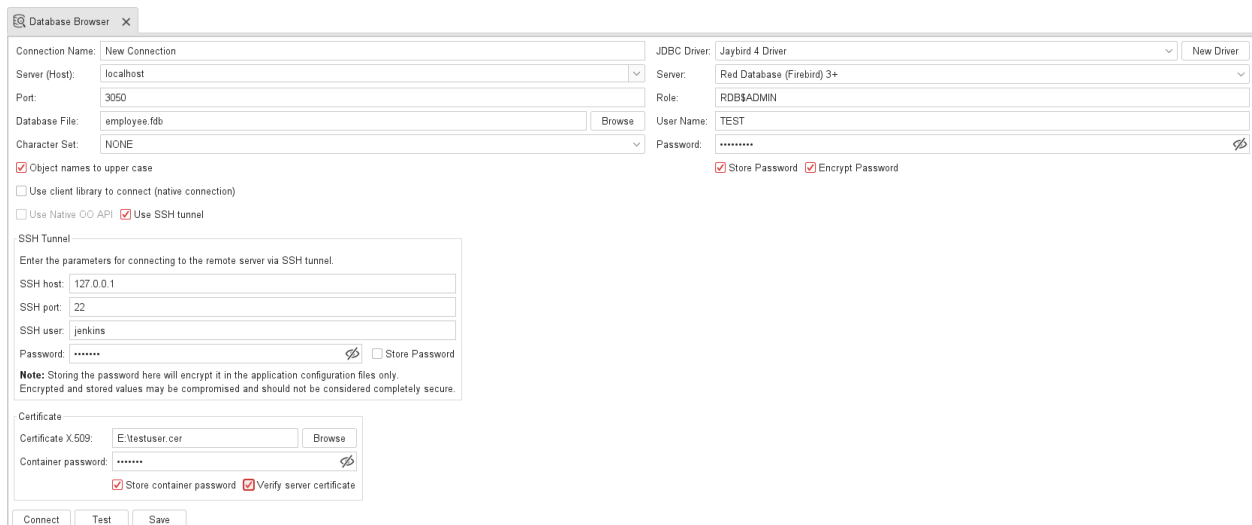
Tools for creating a database, connecting to it, and extracting and comparing metadata are under the Database tab.



Img 4.1 — Database tab

4.1 Creating a connection

Red Expert allows multiple database connections to be used simultaneously. The Database Browser displays information about the connection.



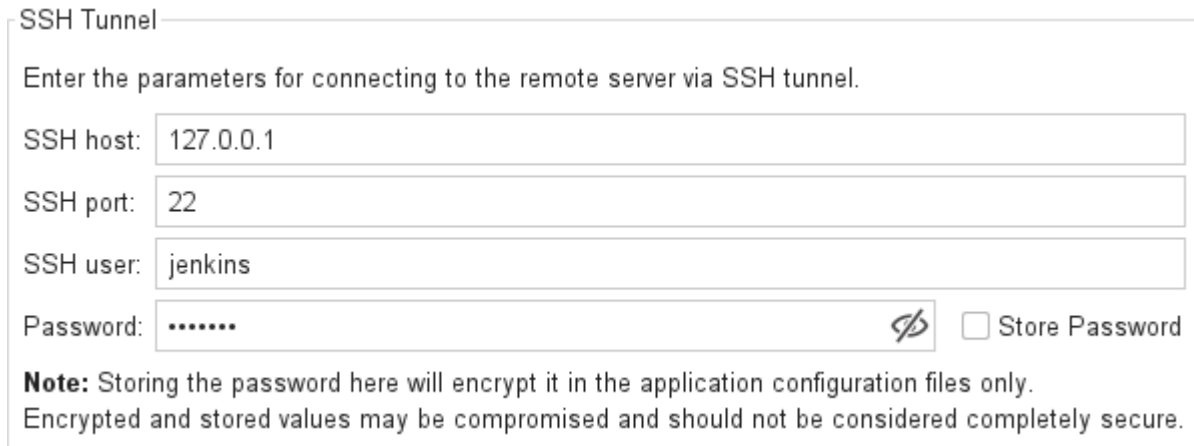
Img 4.2 — Database Browser

To create a connection, select the corresponding item in the Database menu or click the New Connection button in toolbar. Fill in the fields in the opened window and click the Connect button.

A network connection encryption error may occur when trying to connect. To support encryption you need Java version at least 21 or Java Cryptography Extension (JCE) add-on installed. Otherwise, change the value of the WireCrypt = Disabled parameter in firebird.conf.

4.1.1 SSH tunnel

You can connect to the database via an SSH tunnel. As with any SSH connection, all traffic between you and the database will be encrypted. To do this, fill in the parameters for the SSH connection.




SSH Tunnel

Enter the parameters for connecting to the remote server via SSH tunnel.

SSH host: 127.0.0.1

SSH port: 22

SSH user: jenkins

Password:  ☐ Store Password

Note: Storing the password here will encrypt it in the application configuration files only.
Encrypted and stored values may be compromised and should not be considered completely secure.

Img 4.3 — SSH tunnel

4.1.2 Certificate

For authentication by certificate, you must fill out the following form:



Certificate

Certificate X.509: E:\testuser.cer

Container password: 

☒ Store container password ☒ Verify server certificate

Img 4.4 — Certificate

4.1.3 Extended connection parameters

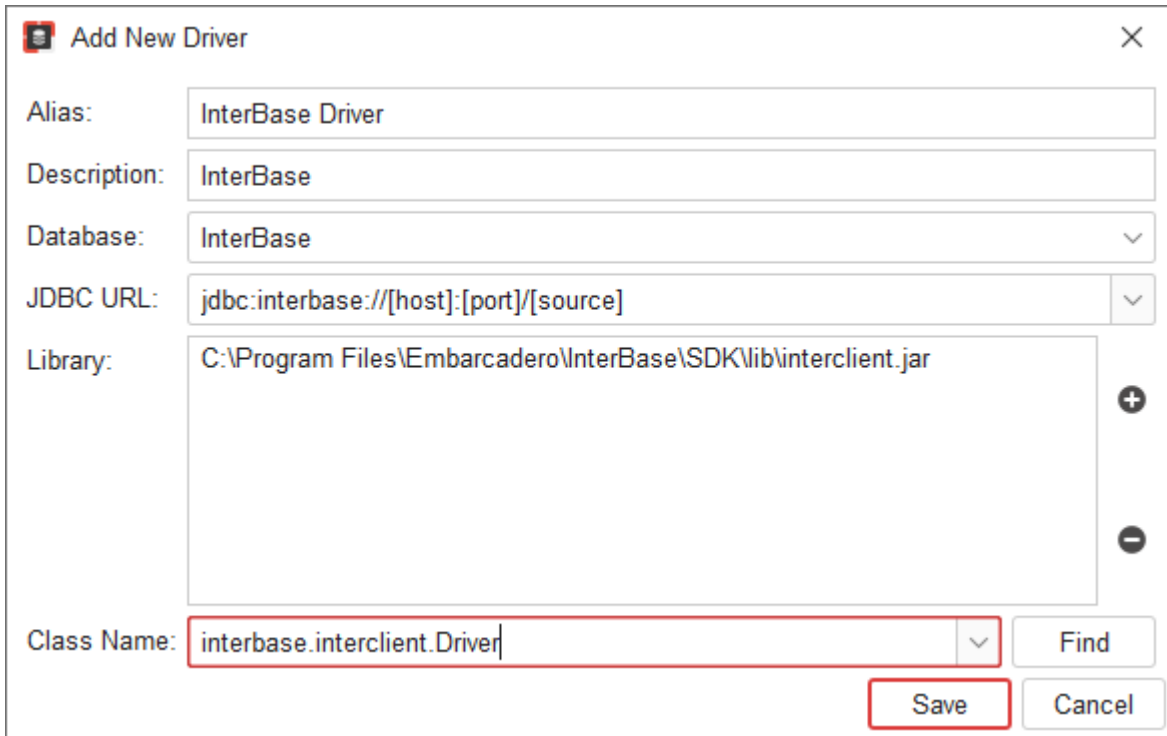
Additional connection properties can be set using the Extended tab. On this tab you can see a table with two columns. The left one corresponds to the connection parameter and the right one to its value. Refer to the JDBC driver documentation to find out what additional database connection parameters can be set.

You can also select the transaction isolation level. Different levels of transaction isolation determine the behaviour of the client application, running this transaction, in relation to other concurrent processes, running on any computer on the local network, simultaneously reading or modifying the same database as the current process. For Red Database and Firebird the default is READ_COMMITTED. For detailed description of extended connection parameters see section [Extended database connection parameters](#).

4.1.4 Connect to other servers

Red Expert allows to connect to other servers (not Firebird or RedDatabase). To establish such a connection do the following:

1. Add driver for working with specified DBMS using menu System → Drivers → Add Driver button. In the opened window fill in all fields and click Save button.



The screenshot shows a dialog box titled "Add New Driver" with a close button (X) in the top right corner. The dialog contains the following fields and controls:

- Alias:** Text field containing "InterBase Driver".
- Description:** Text field containing "InterBase".
- Database:** Dropdown menu showing "InterBase".
- JDBC URL:** Text field containing "jdbc:interbase://[host]:[port]/[source]".
- Library:** Text area containing "C:\Program Files\Embarcadero\InterBase\SDK\lib\interclient.jar". To the right of the text area are plus (+) and minus (-) buttons.
- Class Name:** Text field containing "interbase.interclient.Driver". This field and the "Save" button are highlighted with a red border.
- Buttons:** "Find", "Save", and "Cancel" buttons are located at the bottom right.

Img 4.5 — Adding InterBase driver

2. Create a connection using menu Database → Create Connection. In opened tab select correct JDBC driver and Server, fill in all fields and press Connect button:

The screenshot shows the 'Database Browser' window with the following fields and options:

- Connection Name:** InterBase
- JDBC Driver:** InterBase Driver (with a 'New Driver' button)
- Server (Host):** localhost
- Server:** Other
- Port:** 3051
- Role:** (empty)
- Database File:** employee.gdb (with a 'Browse' button)
- User Name:** sysdba
- Character Set:** UTF8
- Password:** (masked with dots and a copy icon)
- ☒ Object names to upper case
- ☒ Store Password ☐ Encrypt Password
- ☐ Use client library to connect (native connection)
- ☐ Use Native OO API ☐ Use SSH tunnel
- Buttons:** Connect, Test, Save
- Tabs:** Basic, Advanced, Database Properties

Img 4.6 — Connect to InterBase database

Currently, such connections are supported only by Query Editor and Execute SQL script from file tool.

4.2 Create database

To create a database, select the corresponding item in the Database menu or click the Create Database button in the toolbar. Fill in the fields in the opened window and click the Create button. For a detailed description of the fields, see the section [Database connection parameters](#).

The screenshot shows the 'Create Database' window with the following fields and options:

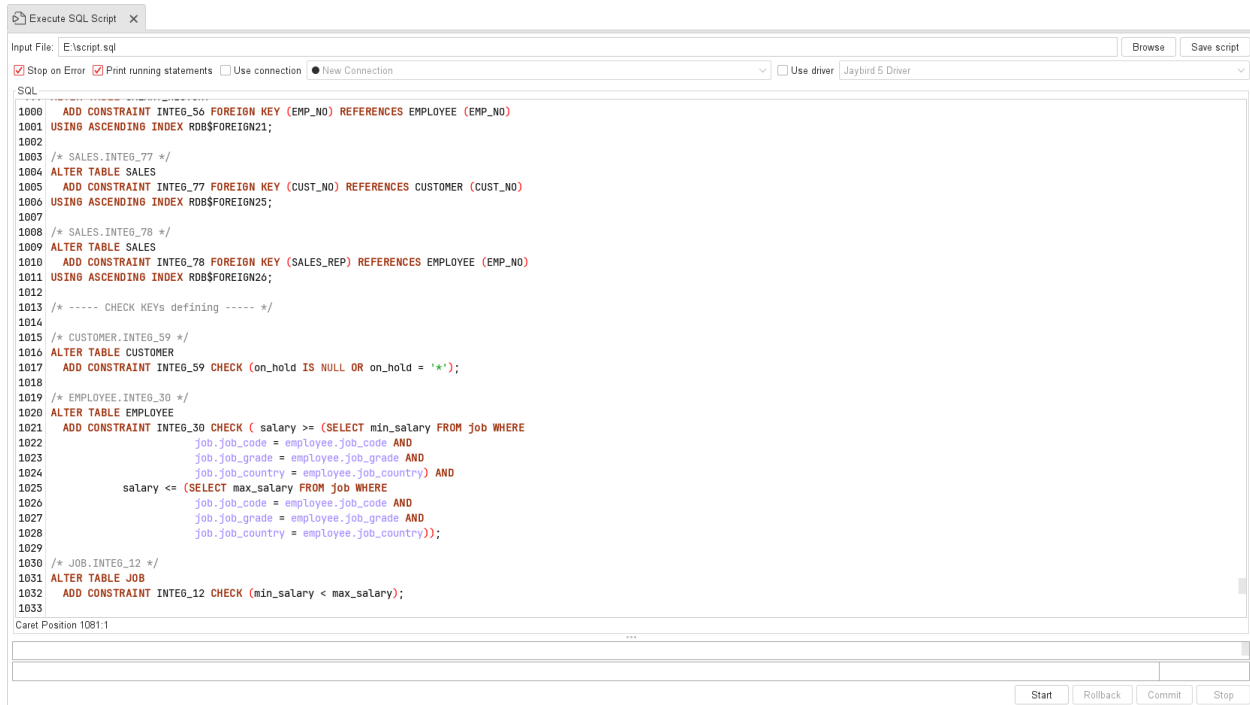
- Connection Name:** employee
- JDBC Driver:** Jaybird 5 Driver (with a 'New Driver' button)
- Server (Host):** localhost
- Server:** Red Database (Firebird) 3+
- Port:** 3050
- User Name:** testuser
- Database File:** EMPLOYEE.FDB (with a 'Browse' button)
- Character Set:** UTF8
- Password:** (masked with dots and a copy icon)
- ☐ Store Password ☐ Encrypt Password
- Page Size:** 8192
- Certificate:**
 - Certificate X.509:** (with a 'Browse' button)
 - Container password:** (masked with dots and a copy icon)
 - ☐ Store container password ☐ Verify server certificate
- Button:** Create

Img 4.7 — Database creation

When trying to create a database, a network connection encryption error may occur. To support encryption you need Java version at least 21 or JCE add-on installed. Otherwise, change the value of the WireCrypt = Disabled parameter in firebird.conf.

4.2.1 Execute SQL script from file

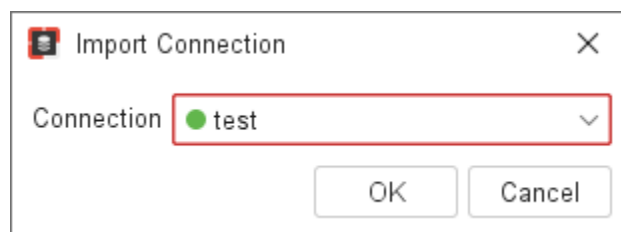
Select an open connection and specify the path to the file with SQL script and press the Execute SQL script button. Make a commit or rollback transaction by clicking on the corresponding buttons.



Img 4.8 — Execute SQL script from file

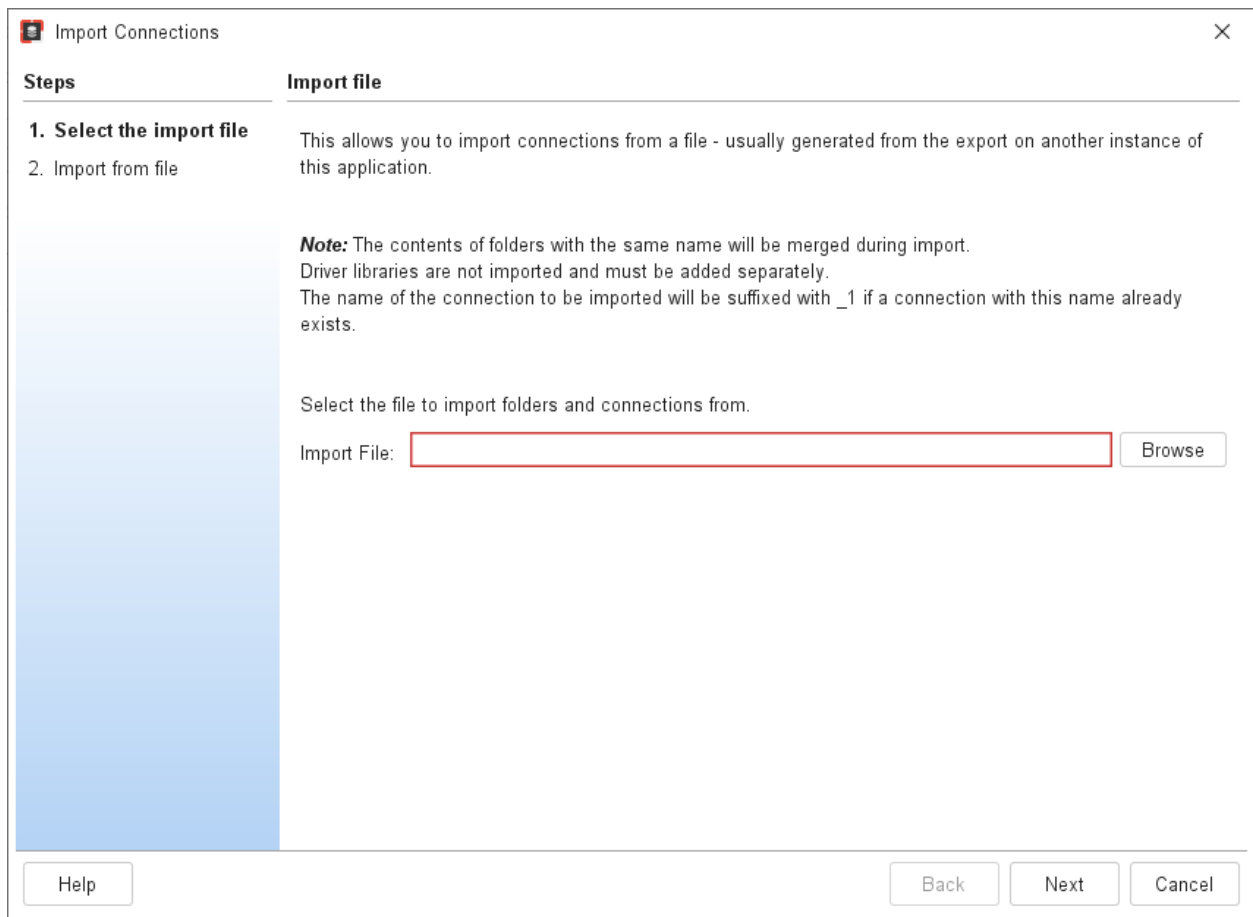
4.3 Import connection

If you already have connections configured in IBExpert, there is an option to import connections. Start Red Expert and connect to the required user database. Select the menu item Database → Import connections → Import from DB and select the required connection in the opened window.



Img 4.9 — Import connection from database

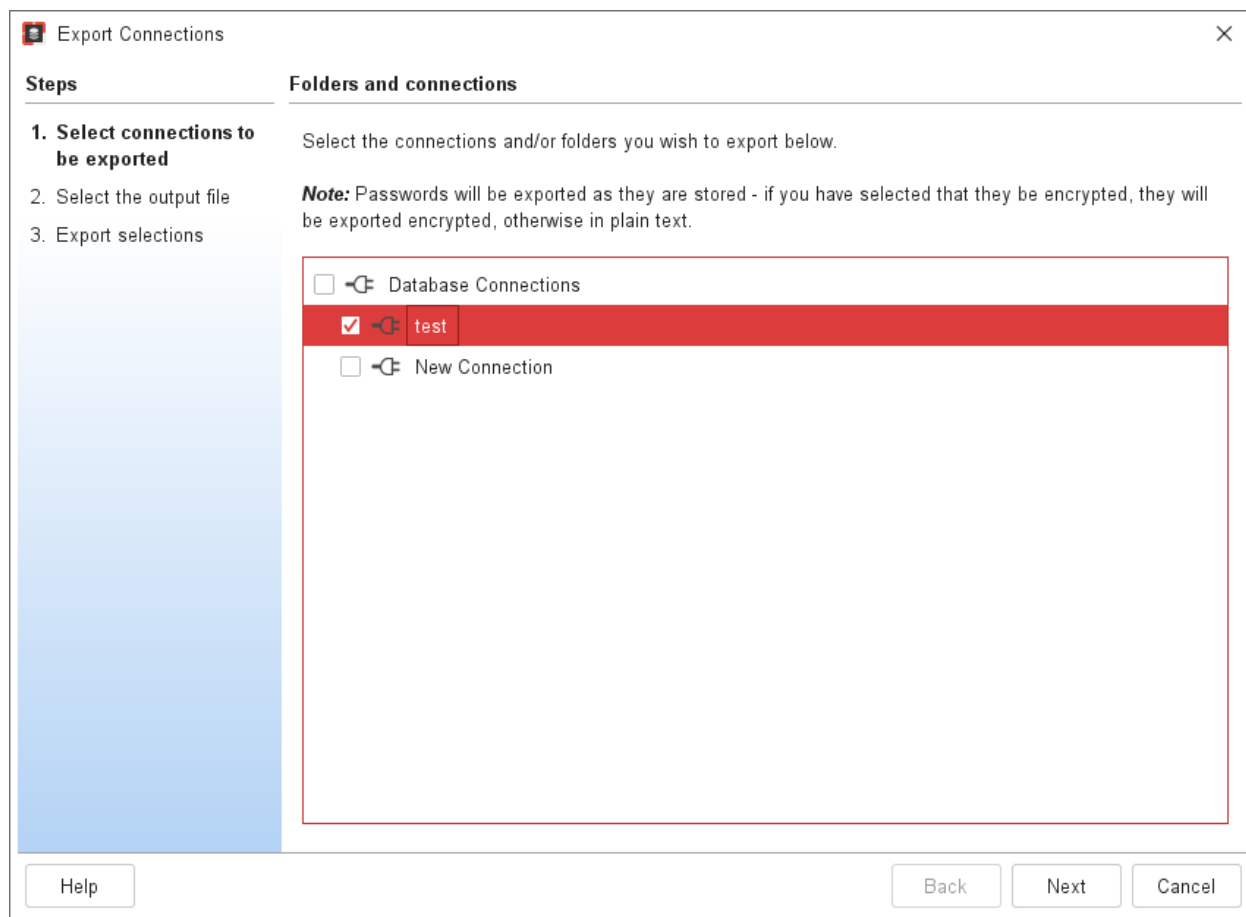
Importing a connection from a file is also available:



Img 4.10 — Import connection from file

4.4 Export connection

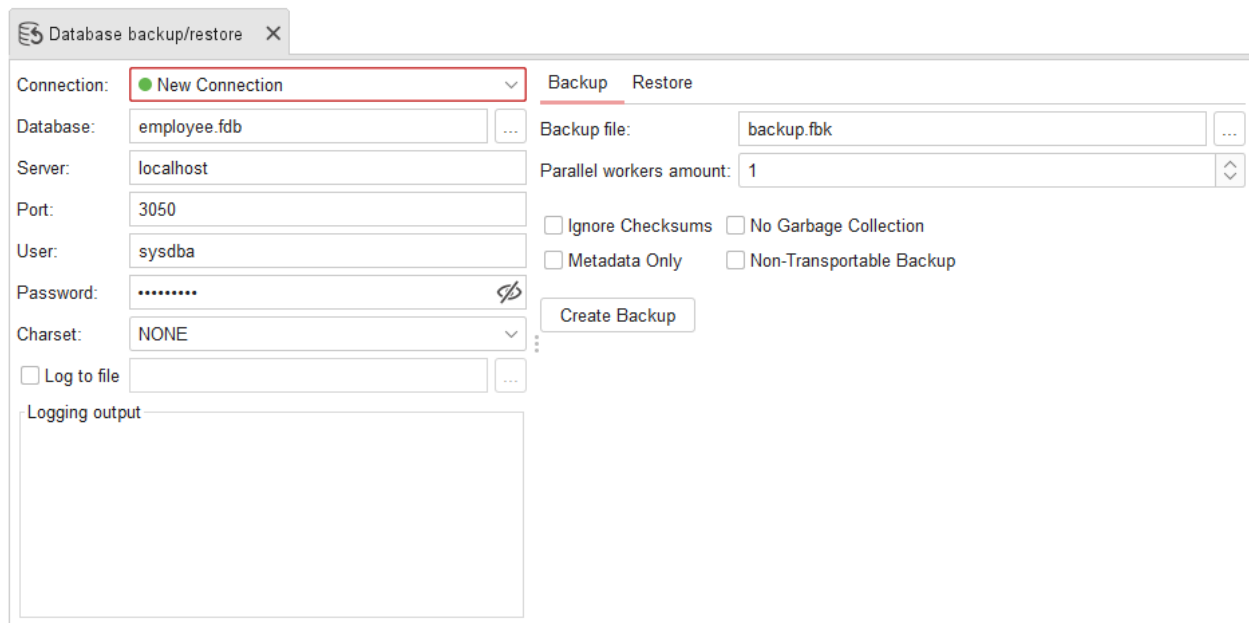
For exporting a connection to a file, select the menu item Database → Export connections and select the required connection in the opened window.



Img 4.11 — Export connection

4.5 Backup and restore

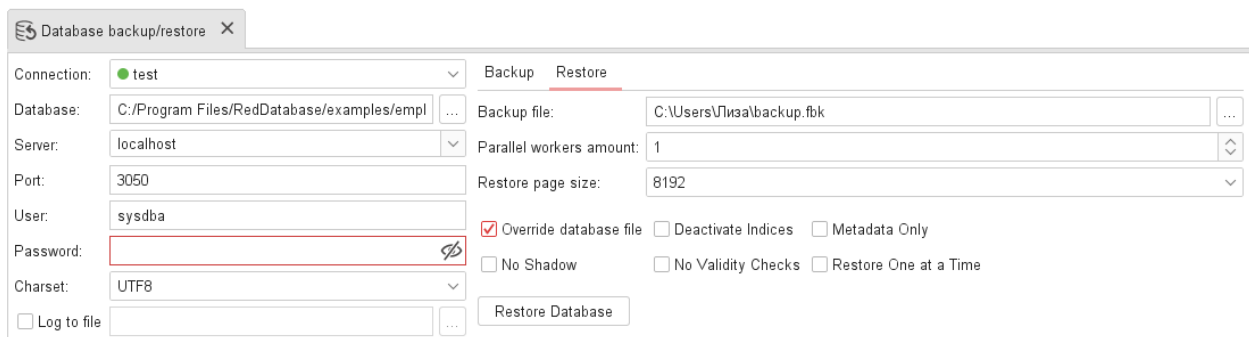
To perform a backup or restore, select the menu item Database → Backup and Restore.



Img 4.12 — Backup options Restore options

Backup options correspond to gbak keys:

- Ignore checksums - gbak -ignore;
- Metadata only - gbak -meta_data;
- No garbage collection - gbak -garbage_collect;
- Non-transoortable backup - gbak -nt.



Img 4.13 — Restore options

Restore options also correspond to gbak keys:

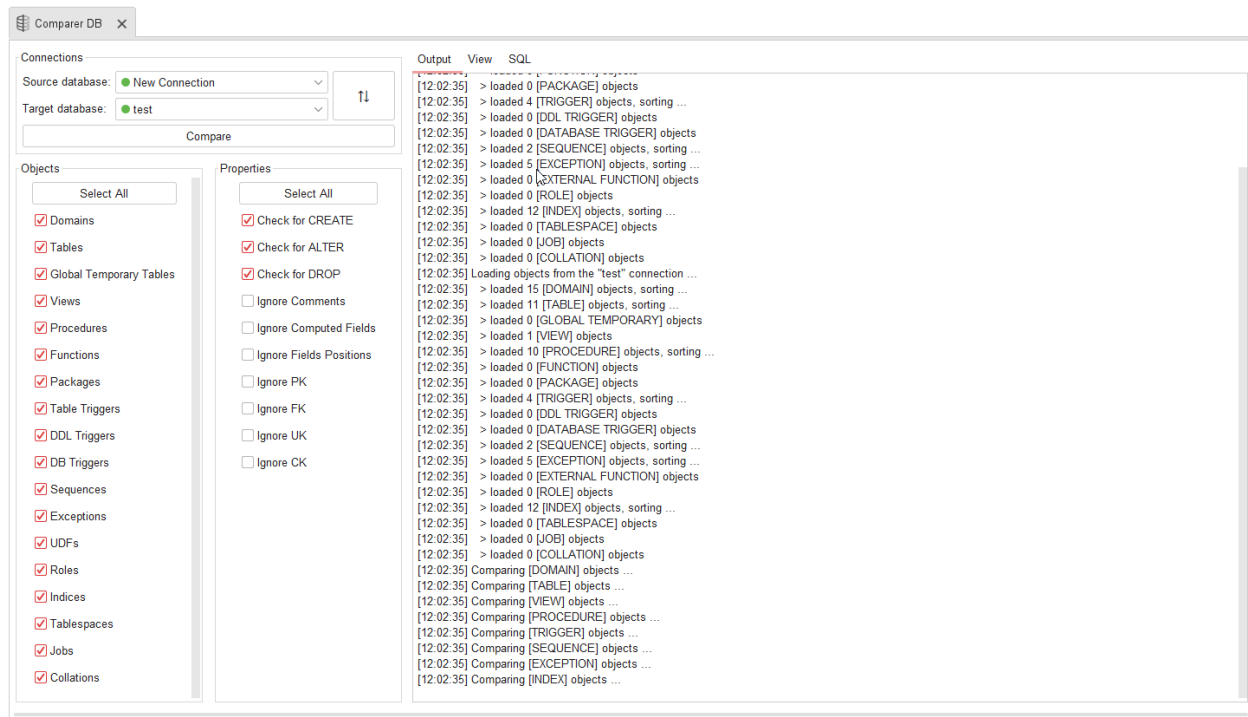
- Overwrite database file - gbak-replace_database;
- Deactivate indexes - gbak -inactive;
- Metadata only - gbak -meta_data;
- No shadow - gbak -kill;
- No validity check - gbak -no_validity;
- Restore one at time - gbak -one_at_a_time.

Chapter 5

Compare databases module

The tool compares two databases and generates a SQL script to make them identical.

As a result of executing the generated SQL script, the selected databases will have identical structure, but not identical data.



Img 5.1 — Compare databases module

Source database - the database to the state of which the target database is to be brought to. Target database - the database to which the changes will be applied.

The Attributes block is a list of database elements that need/ do not need to be considered in the comparison.

The Parameters block is a list of conditions that affect comparing databases and forming an SQL script that brings target database structure to state of source database:

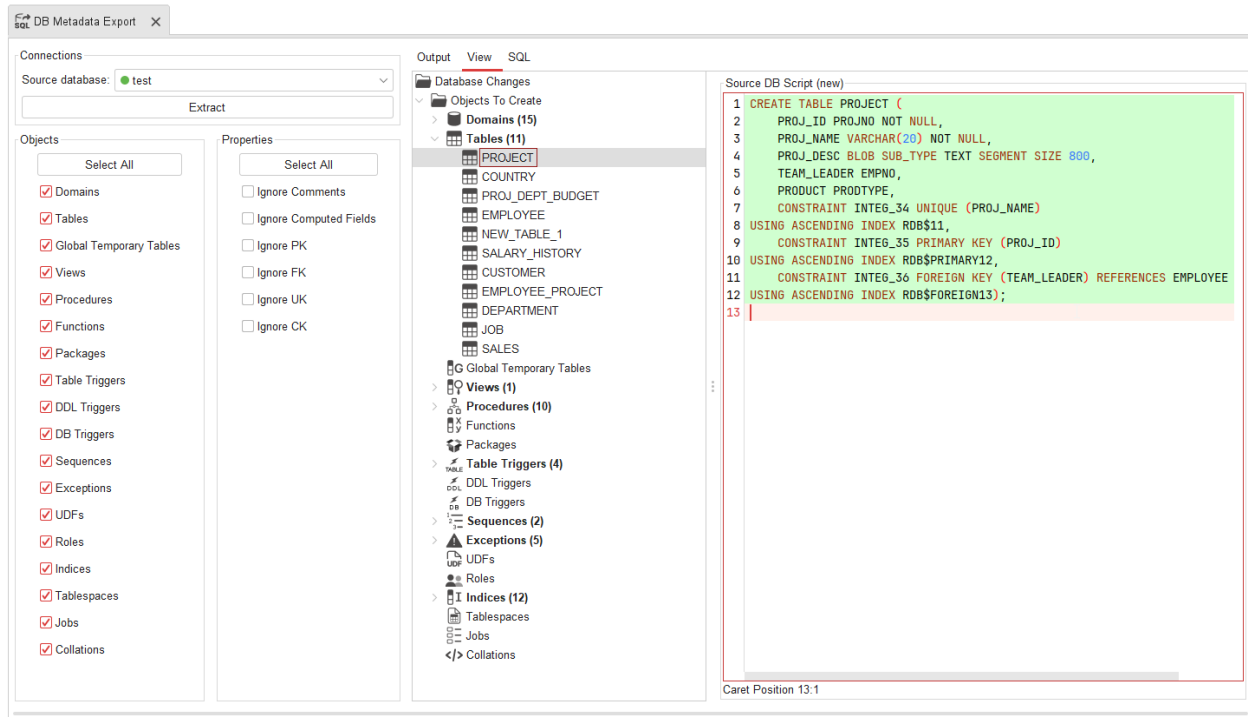
- Check for CREATE/ALTER/DROP - add to SQL script queries for creating/modifying/deleting objects in target database;
- Ignore comments - consider comments when comparing databases;
- Ignore calculated fields - consider calculated fields when comparing databases;
- Ignore fields positions - consider column positions when comparing databases;
- Ignore PK/FK/UK/CK - consider constraints when comparing databases.

Found differences will be recorded in the Output tab. In SQL tab will be script that brings the structure of the target database to structure of source database.

Chapter 6

Export metadata

This tool extracts metadata of selected database into SQL script, execution of which allows you to create a duplicate of that database.



Img 6.1 — Export metadata

Source database is the database whose metadata needs to be extracted.

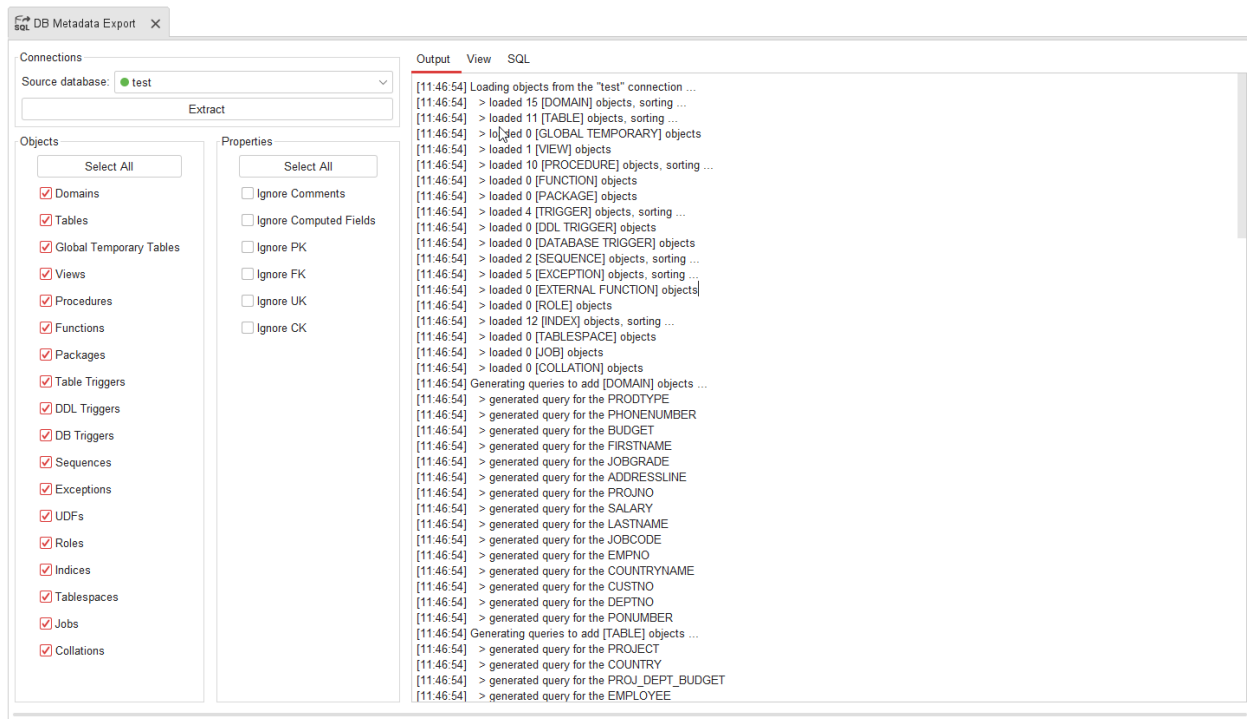
The Attributes block is a list of database elements that need/ do not need to be considered when exporting.

The Parameters block is a list of conditions that affect the extraction of metadata and the generation of the SQL script that creates the selected database:

- Ignore comments - consider comments when exporting;
- Ignore calculated fields - consider calculated fields when exporting;
- Ignore PK/FK/UK/CK - consider restrictions when exporting.

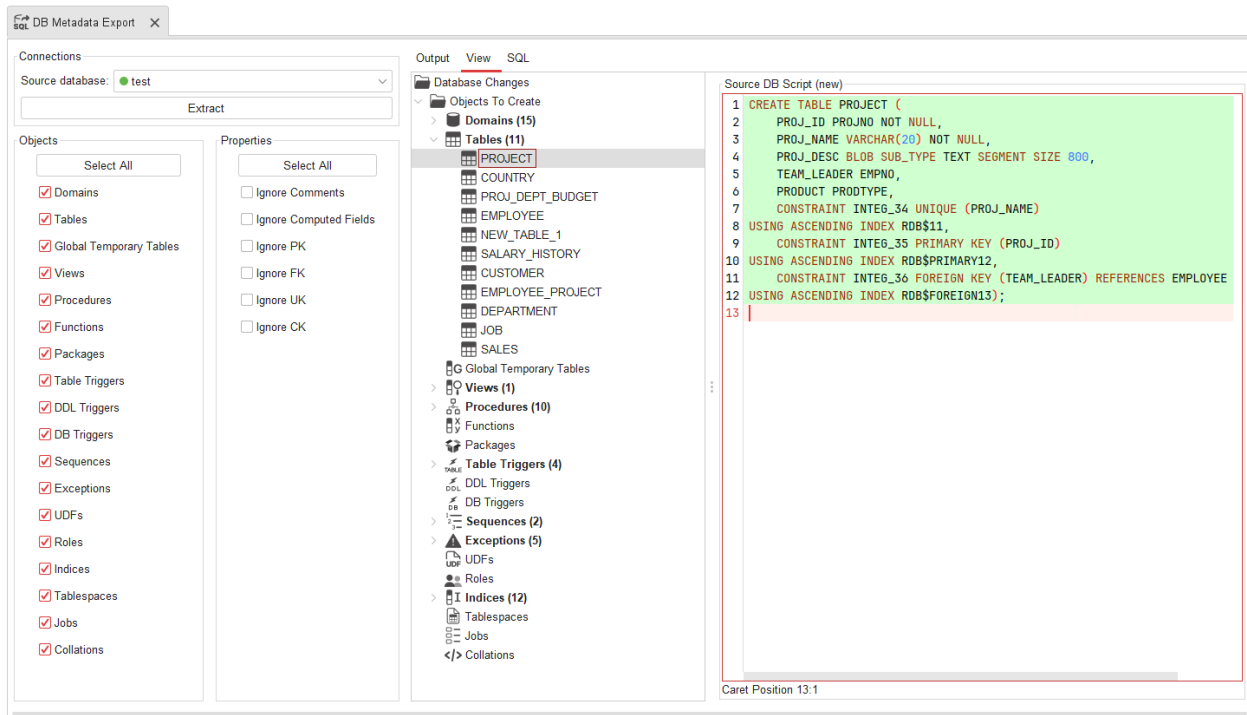
You can view results of metadata export in Output, View, and SQL tabs.

Output tab lists the items whose metadata has been extracted:



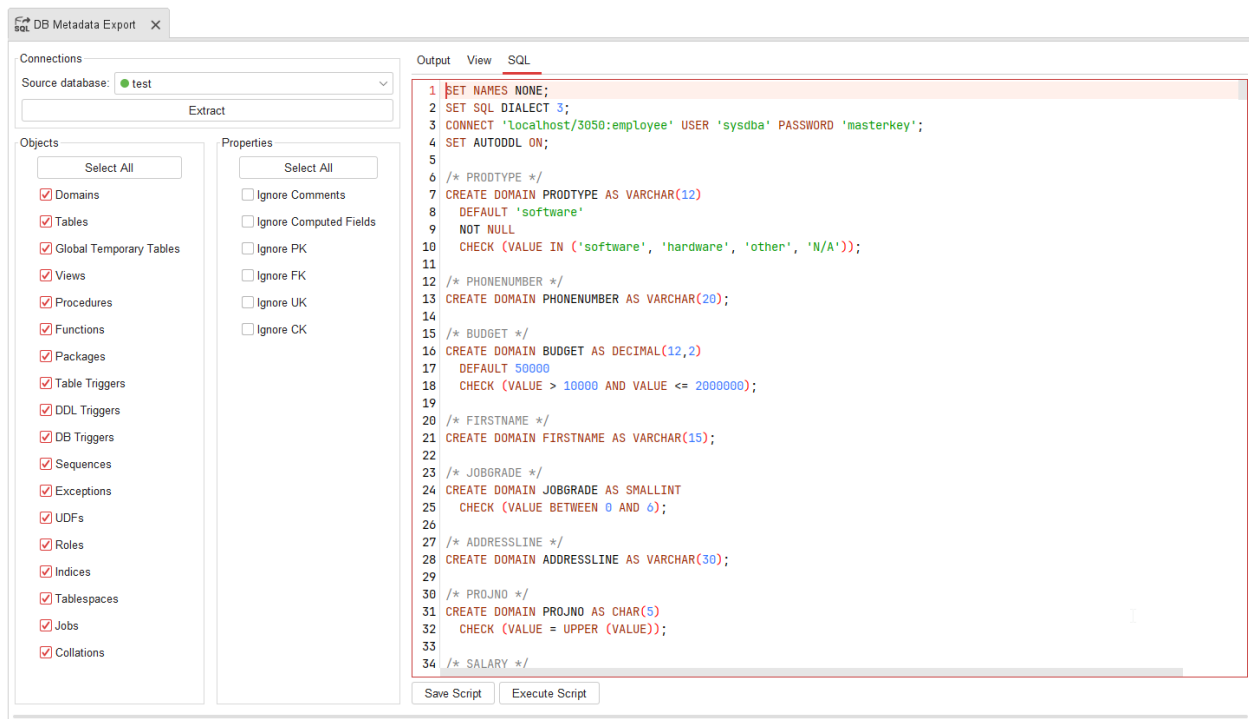
Img 6.2 — Output tab

View tab displays the extracted items that will be created when the generated script is executed:



Img 6.3 — View tab

SQL tab contains the generated SQL script:

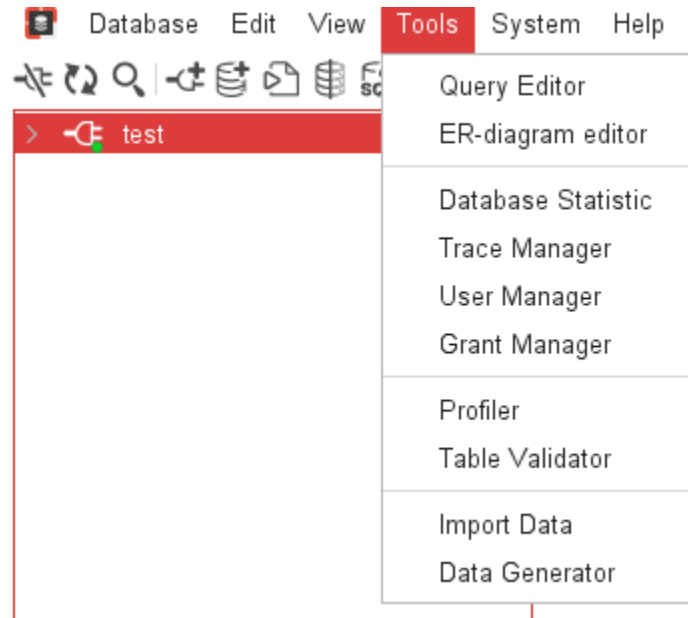


Img 6.4 — SQL tab

Chapter 7

Tools

This tab contains various tools for working with database.



Img 7.1 — Tools tab

Available tools:

- [Query editor](#)
- [ER-diagram editor](#)
- [Database statistic](#)
- [Trace manager](#)
- [User manager](#)
- [Grant manager](#)
- [Profiler](#)
- [Table validation](#)
- [Import data](#)
- [Data generator](#)

Chapter 8

Query editor

Query Editor is a customisable tool for viewing and executing SQL statements. Any number of editors can be open at the same time.

Query Editor supports the following functions:

- Customisable SQL syntax highlighting;
- Tooltips for keywords and database object names;
- Execution of multiple queries;
- Executing and displaying multiple queries with multiple results (Result Set);
- Output contains information about how table counter values have changed during query execution;
- Support for parameterised queries;
- Full printing support;
- Transaction management;
- IDE style text editor functions - search, replace, paste, etc.;
- Export results;
- Support for multiple open connections;
- Searchable executable history of SQL queries;
- Fast transition from editor to database object view by pressing CTRL + Left mouse button on the object name;
- Transaction isolation level selection.

The screenshot shows a 'Query Editor - script1.sql' window. The query entered is 'select * from EMPLOYEE'. Below the query, a status bar indicates '42 rows returned', '0:00:00.168' execution time, 'INS' status, '1.23' rows per second, and 'Auto-commit is enabled'. The results are displayed in a table with columns: EMP_NO, FIRST_NAME, LAST_NAME, PHONE_EXT, HIRE_DATE, DEPT_NO, JOB_CODE, JOB_GRADE, JOB_COUNTRY, and SALARY. The table contains 42 rows of employee data.

	EMP_NO	FIRST_NAME	LAST_NAME	PHONE_EXT	HIRE_DATE	DEPT_NO	JOB_CODE	JOB_GRADE	JOB_COUNTRY	SALARY
1	2	Robert	Nelson	250	28.12.88 00:00	600	VP		2 USA	105900.00
2	4	Bruce	Young	233	28.12.88 00:00	621	Eng		2 USA	97500.00
3	5	Kim	Lambert	22	06.02.89 00:00	130	Eng		2 USA	102750.00
4	8	Leslie	Johnson	410	05.04.89 00:00	180	Mktg		3 USA	64635.00
5	9	Phil	Forest	229	17.04.89 00:00	622	Mngr		3 USA	75060.00
6	11	K. J.	Weston	34	17.01.90 00:00	130	SRep		4 USA	86292.94
7	12	Terri	Lee	256	01.05.90 00:00	000	Admin		4 USA	53793.00
8	14	Stewart	Hall	227	04.06.90 00:00	900	Finan		3 USA	69482.63
9	15	Katherine	Young	231	14.06.90 00:00	623	Mngr		3 USA	67241.25
10	20	Chris	Papadopoulos	887	01.01.90 00:00	671	Mngr		3 USA	89655.00
11	24	Pete	Fisher	888	12.09.90 00:00	671	Eng		3 USA	81810.19
12	28	Ann	Bennet	5	01.02.91 00:00	120	Admin		5 England	22935.00
13	29	Roger	De Souza	288	18.02.91 00:00	623	Eng		3 USA	69482.63
14	34	Janet	Baldwin	2	21.03.91 00:00	110	Sales		3 USA	61637.81
15	36	Roger	Reeves	6	25.04.91 00:00	120	Sales		3 England	33620.63
16	37	Willie	Stansbury	7	25.04.91 00:00	120	Eng		4 England	39224.06
17	44	Leslie	Phong	216	03.06.91 00:00	623	Eng		4 USA	56034.38
18	45	Ashok	Ramanathan	209	01.08.91 00:00	621	Eng		3 USA	80689.50
19	46	Walter	Steadman	210	09.08.91 00:00	900	CFO		1 USA	116100.00
20	52	Carol	Nordstrom	420	02.10.91 00:00	180	PRel		4 USA	42742.50
21	61	Luke	Leung	3	18.02.92 00:00	110	SRep		4 USA	68805.00
22	65	Sue Anne	O'Brien	877	23.03.92 00:00	670	Admin		5 USA	31275.00
23	71	Jennifer M.	Burbank	289	15.04.92 00:00	622	Eng		3 USA	53167.50

Img 8.1 — Query editor

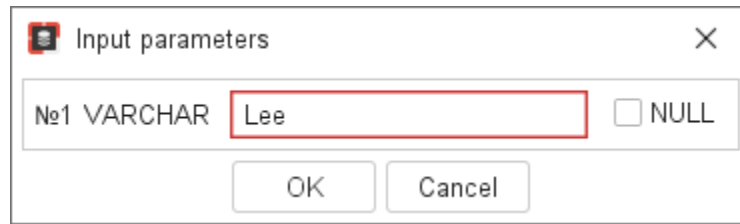
8.1 Parameterised queries

In some cases, you need to create a query that can be used multiple times, but with different input values each time. For example, you can write several queries to find data about an employee with a certain last name. Or you can write a single query, changing only the employee's last name.

To create a query that may have different input data at different times, query parameters are used. Parameters can be named or unnamed. An unnamed parameter is a question mark (?) that can be specified anywhere in the query, instead of a literal value. For example:

```
SELECT * FROM employee WHERE (last_name = ?)
```

After running such query, a dialogue window will open for entering the parameter value (employee's last name):



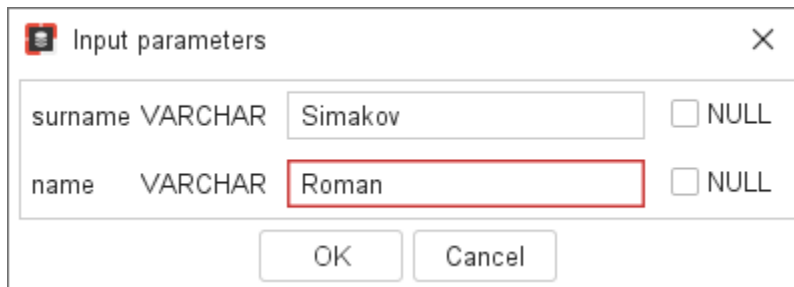
The screenshot shows a dialog box titled "Input parameters" with a close button (X) in the top right corner. Inside the dialog, there is a single input field labeled "№1 VARCHAR" containing the text "Lee". To the right of the input field is a checkbox labeled "NULL", which is currently unchecked. At the bottom of the dialog are two buttons: "OK" and "Cancel".

Img 8.2 — Unnamed parameter

Named parameters are a combination of a colon and the parameter name (:<paramname>), which can also be substituted for a literal value. Named parameters are especially useful if there are multiple parameters in a query. For example:

```
SELECT * FROM employee WHERE (last_name = :surname AND first_name =:name)
```

After running such query, a dialogue box will open for entering the values of the parameters (last name and first name of the employee):



The screenshot shows a dialog box titled "Input parameters" with a close button (X) in the top right corner. Inside the dialog, there are two input fields. The first is labeled "surname VARCHAR" and contains the text "Simakov". The second is labeled "name VARCHAR" and contains the text "Roman". To the right of each input field is a checkbox labeled "NULL", which is currently unchecked. At the bottom of the dialog are two buttons: "OK" and "Cancel".

Img 8.3 — Named parameters

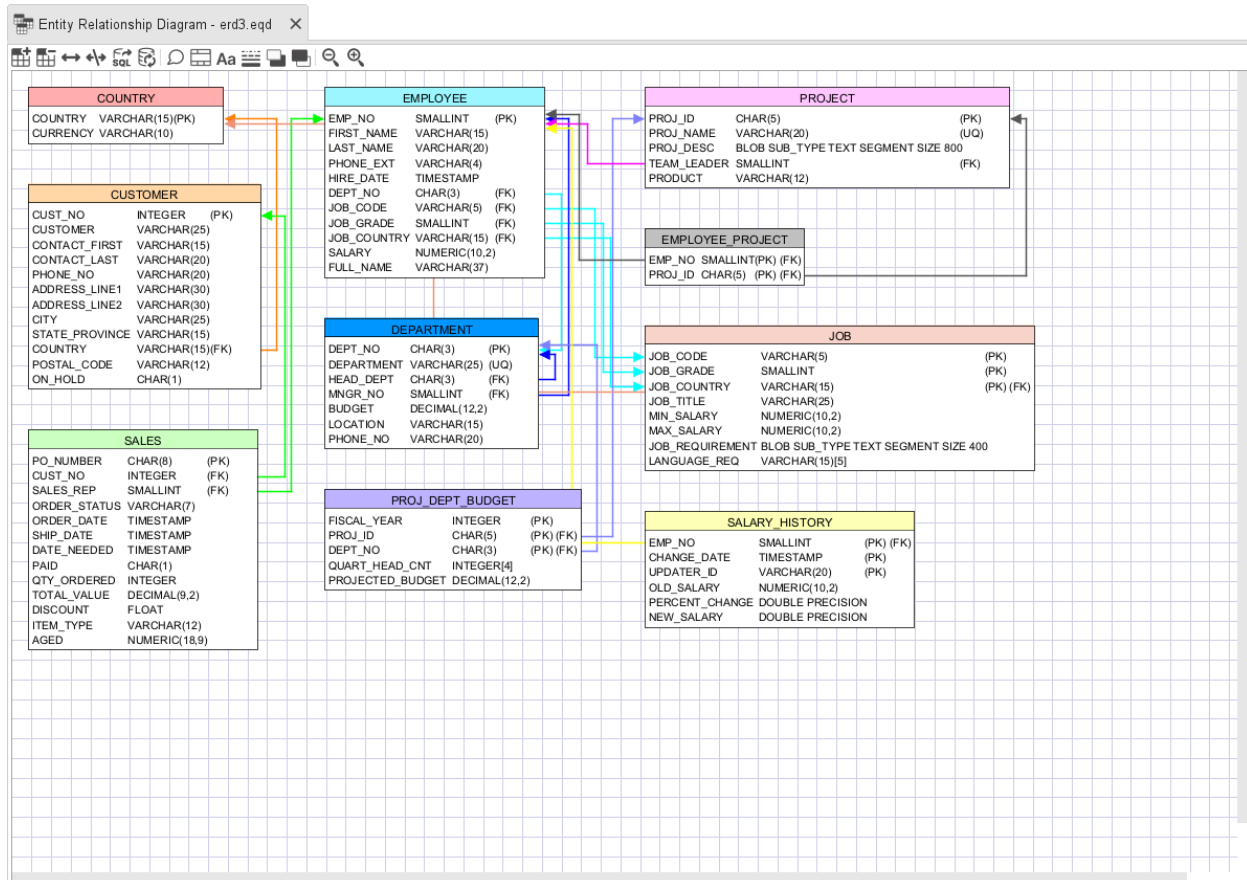
8.2 Query history

After successful execution, the query is stored in the editor's log cache. The number of queries stored in the history is specified in the editor settings. Saved queries are not lost after restarting the application or the query editor.

Chapter 9

ER-diagram editor

Tool is used to create and edit ER-diagrams of databases.



Img 9.1 — ER-diagrams editor

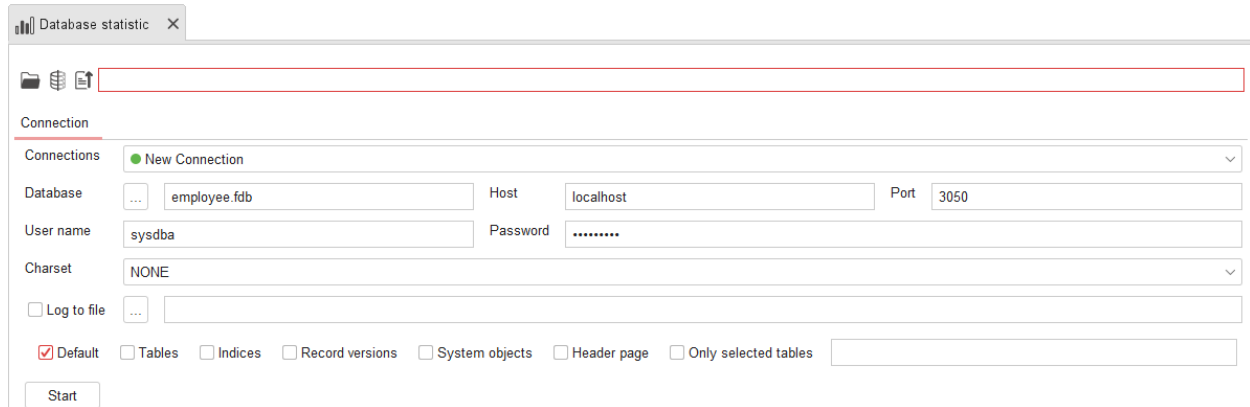
Main functions:

- Creating and editing an ER-diagram;
- Generating an SQL script to create the tables represented in the diagram;
- Building an ER diagram from an existing database;
- Exporting the diagram to various formats.

Chapter 10

Database statistic

Tool displays database statistics and also allows you to compare the results of analysing two databases.

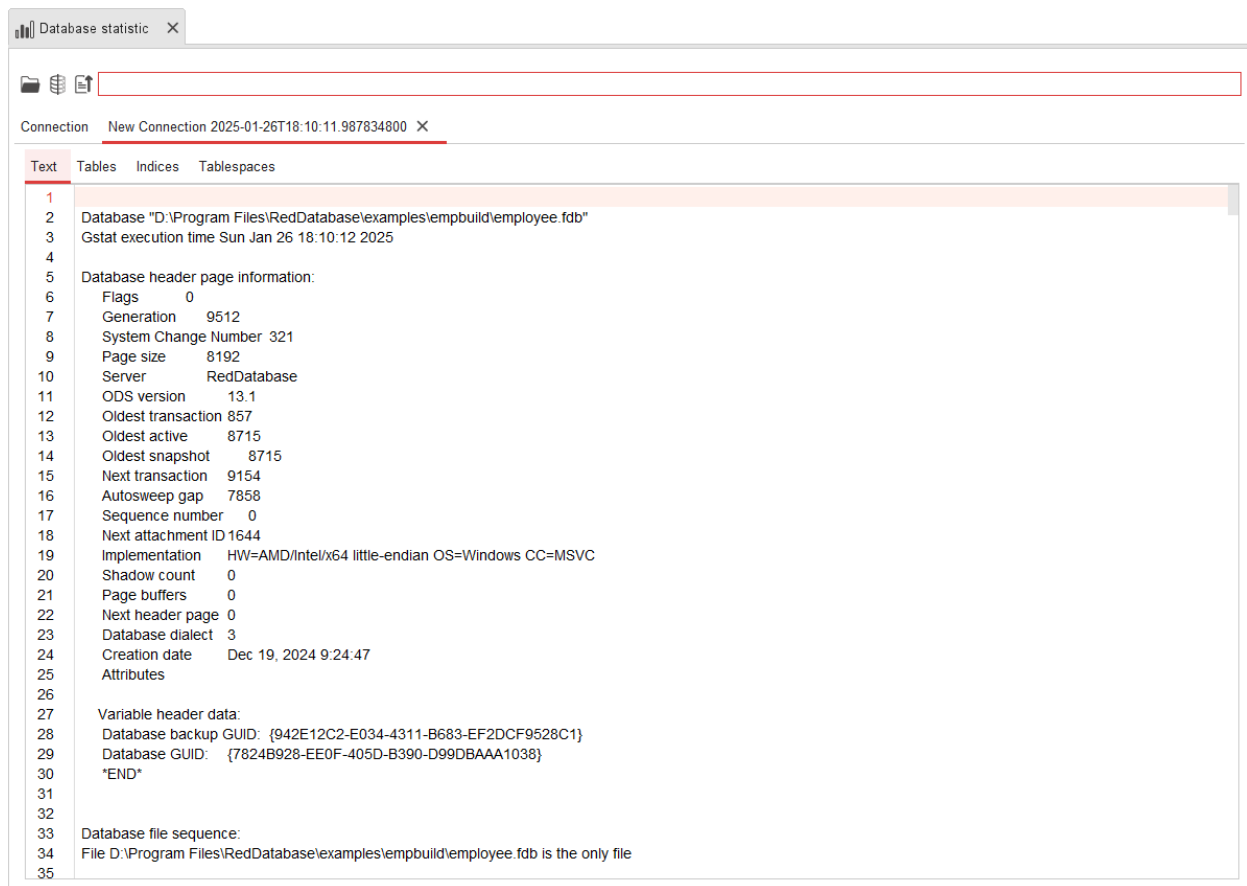


Img 10.1 — Database statistic

Statistical collection formats:

- Default - analysis of the whole database, output is similar to execution of `gstat` without options;
- Tables - data page statistics, output is similar to `gstat -data`;
- Indices - analyses indexes, output similar to `gstat -index`;
- Record Versions - adds statistics on average record lengths, number of versions and information about BLOB;
- System Objects - analyses system tables and indexes;
- Header page - static database data, output is similar to `gstat -header`;
- Only selected tables - analysis of selected tables, the parameter is available if a connection to the selected database is established.

Statistic is displayed in a separate tab:



Img 10.2 — Statistics

See [Database statistics](#) for a detailed description of the values to be collected.

10.1 Comparing statistics of two databases

For comparing the statistics of two databases, collect statistics for the second database and click the Compare button.

The Text tab will display text output of statistics:

Line	Statistic	Value
7	Generation	9672
8	System Change Number	321
9	Page size	8192
10	Server	RedDatabase
11	ODS version	13.1
12	Oldest transaction	857
13	Oldest active	8962
14	Oldest snapshot	8715
15	Next transaction	9319
16	Autosweep gap	7858
17	Sequence number	0
18	Next attachment ID	1657
19	Implementation	HW=AMD/Intel/x64 little-endian OS=Windows CC=MSVC
20	Shadow count	0
21	Page buffers	0
22	Next header page	0

Line	Statistic	Value
7	Generation	9673
8	System Change Number	321
9	Page size	8192
10	Server	RedDatabase
11	ODS version	13.1
12	Oldest transaction	857
13	Oldest active	8962
14	Oldest snapshot	8715
15	Next transaction	9322
16	Autosweep gap	7858
17	Sequence number	0
18	Next attachment ID	1660
19	Implementation	HW=AMD/Intel/x64 little-endian OS=Windows CC=MSVC
20	Shadow count	0
21	Page buffers	0
22	Next header page	0

Img 10.3 — Textual output of statistics

In Tables, Indices and Tablespaces tabs, column values show difference between result of first and second database.

Database statistic X

Connection New Connection 2025-01-27T14:30:27.634 X gstat_00.00.25.10.2021.txt X Compare X

Text Tables Indices Tablespaces

	name	tablespace	primary pointer p.	index root page	pointer pages	data pages	data page slots	primary pages	secondary pages	swept pages	empty pages	full p
	COUNTRY	PRIMARY	235	236	1	1	1	0	0	0	0	0
	CUSTOMER	PRIMARY	238	239	1	1	1	0	0	0	0	0
	DEPARTMENT	PRIMARY	258	259	1	1	1	0	0	0	0	0
	EMPLOYEE	PRIMARY	264	265	1	1	1	0	0	0	0	0
	EMPLOYEE_PROJECT	PRIMARY	279	280	1	1	1	0	0	0	0	0
	JOB	PRIMARY	250	251	1	2	2	1	1	1	0	0
	PROJECT	PRIMARY	272	273	1	2	2	1	1	1	0	0
	PROJ_DEPT_BUDGET	PRIMARY	285	286	1	2	2	1	1	1	0	0
	SALARY_HISTORY	PRIMARY	292	293	1	1	1	0	0	0	0	0
	SALES	PRIMARY	305	307	1	1	1	1	0	0	0	0
	ACCIDENT		3862	3863	3	8720	8720	8690	30	8681	1	8664
	ACCIDENTDET		4530	4531	3	7112	7120	7035	77	6577	456	6580
	ACCIDENTDETMK		4917	4918	1	456	456	456	0	450	6	447
	ACCIDENTDETMKRES		4919	4920	1	1040	1040	1040	0	1033	7	1030
	ACCIDENTDETNUM		4694	4695	1	2584	2584	2528	56	2156	372	2147
	ACCIDENTDETNUMRES		4780	4781	1	0	0	0	0	0	0	0
	ADHOCPARAMS		4387	4388	1	0	0	0	0	0	0	0
	ANALISATOR		3902	3903	1	1	1	1	0	1	0	0
	ANALISATORHANDLERSET		5156	5157	1	0	0	0	0	0	0	0
	ANALISATORMETHODSR		4971	4972	1	0	0	0	0	0	0	0
	ANALISATORPARAMS		3908	3909	1	16	16	16	0	10	6	9
	ANALISATORPLATES		4861	4862	1	0	0	0	0	0	0	0
	ANALISATORPLATESLINKS		4883	4884	1	0	0	0	0	0	0	0
	ANALISATORPROTOCOLS		3914	3915	1	1	1	1	0	1	0	0
	ANALISATORREAGENTS		4656	4657	1	0	0	0	0	0	0	0
	ANALISATORREAGLINK		4674	4675	1	0	0	0	0	0	0	0
	ANALISATORREAGPARA		5152	5153	1	0	0	0	0	0	0	0
	ANALISATOR_REF		5584	5585	1	1	1	1	0	1	0	0
	ANAMEZ		3264	3265	1	1	1	1	0	1	0	0
	ANONYMOW		9396	9397	1	0	0	0	0	0	0	0

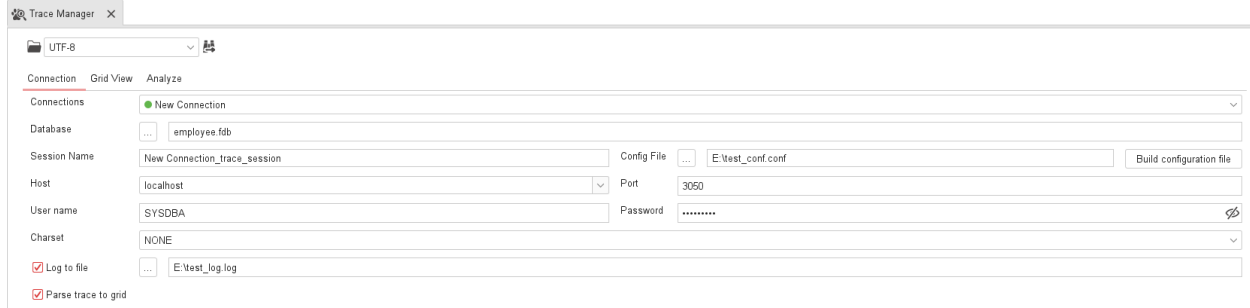
Img 10.4 — Result of statistics comparison

Green colour indicates what is in both databases. Red colour indicates tables and indexes that are present in the first database but absent in the second database.

Chapter 11

Trace manager

Trace Manager allows you monitor and analyse everything that happens in the database in real time. It tracks and logs such events as: connection to database and disconnection from it, database creation and deletion, execution of DML and DDL, stored procedures, etc.



Img 11.1 — Trace manager

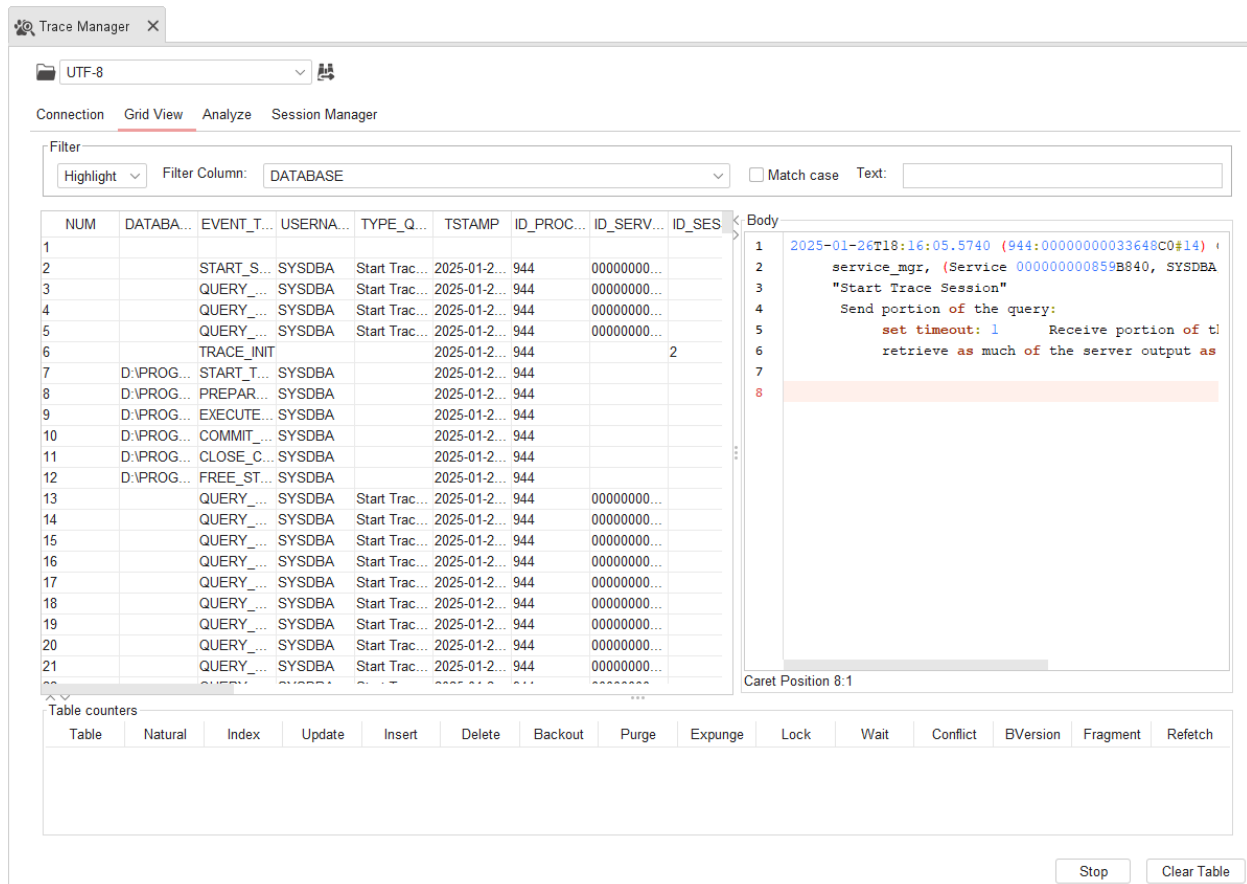
To enable audit service, all fields must be filled in. You can select a saved database connection and the parameter fields will be filled in automatically based on that connection.

Specify a configuration file with audit settings. Depending on the server version, the audit settings differ slightly, so select the server corresponding to the database from the drop-down list. If the required configuration file is not available, configure the audit settings and save them to a configuration file. For a description of the parameters, see. [Trace manager configuration file settings](#).

11.1 Grid view

Event table in Trace Manager is filled in either when tracing is enabled or when a saved log file is opened. When opening a log file, there is an option to select the encoding.

By default, the event table displays all possible columns containing information about the registered event. Some columns can be hidden. To do this, click the Visible columns button and modify them as required.



Img 11.2 — Grid view

When you right-click on any table, a context menu appears to export the table.

See [Trace manager events table](#) for a description of the event table columns.

11.2 Trace analysis

Trace analysis displays information about events that occurred during a defined time interval. Events are added either when tracing is enabled or when a log file is opened.

Trace analysis parameters:

- TIME - Information about query execution time;
- READ - Information about number of pages read from the disc;
- FETCH - Information about number of pages read from page cache;
- WRITE - Information about number of pages recorded on the disc;
- MARK - Information about number of pages changed in the page cache;
- RSORT - Information about RAM size used for sorting;
- DSORT - Information about the size of temporary files used in the query;
- Round values - If the value is greater than 10000, it will be converted to a larger unit until it becomes less than 10000;
- Show Plan - Execution plan for query.

Additional parameters:

- Period - Time period to be analysed; after changing the period, press the Rebuild button;
- Compare queries by N symbols - Consider queries as identical if they have the same first N characters;
- Filter events - Allows you to select the types of events to be analysed.

Trace Manager

UTF-8

Connection Grid View **Analyze** Session Manager

☒ TIME ☐ READ ☐ FETCH ☐ WRITE ☐ MARK ☐ RSORT ☐ DSORT ☐ Round values ☒ Show plan ☐ Show more parameters

SQL

```

1 CREATE TABLE NEW_TABLE_1 (
2   TES BIGINT)
3

```

Caret Position 3:1

Plan (If there is more than one plan, the font will be red)

QUERY	COUNT	PLAN_COUNT	TOTAL_TIME	AVG_TIME	MAX_TIME	MIN_TIME	STD_DEV_TIME
CREATE TABLE NEW_TABLE_1 (TES BIGINT)	1	0	26	0	26	26	0

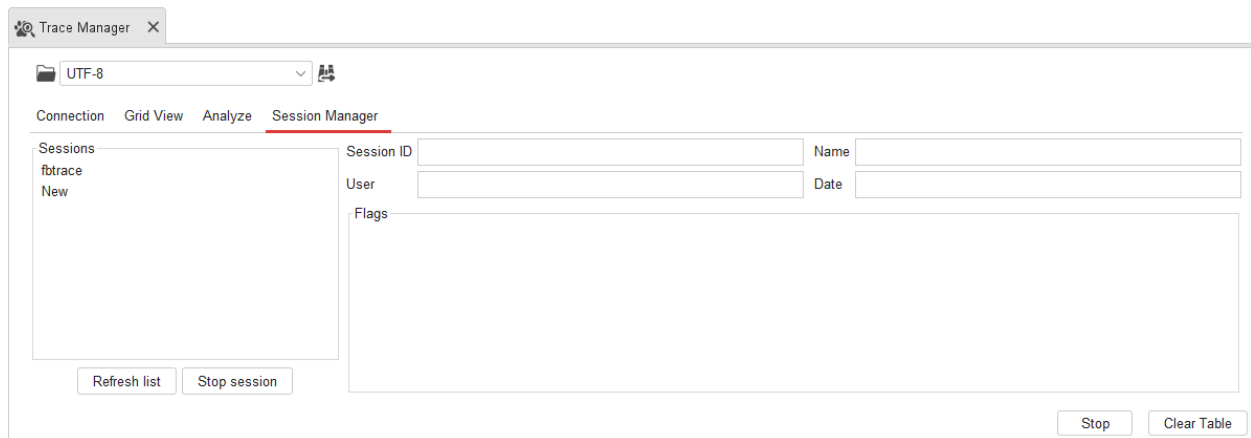
Img 11.3 — Result table

When you hover over a cell, a tooltip will show the sum of the column values and the average value. To view the full text of the query and its plan, you need to select the cell. Double-clicking will open a window with the event record in text format.

See [Trace analysis](#) for description of columns of the resulting event table.

11.3 Session Manager

The Session Manager displays a list of all currently available trace sessions. The manager tab is visible only when the current audit session is running.



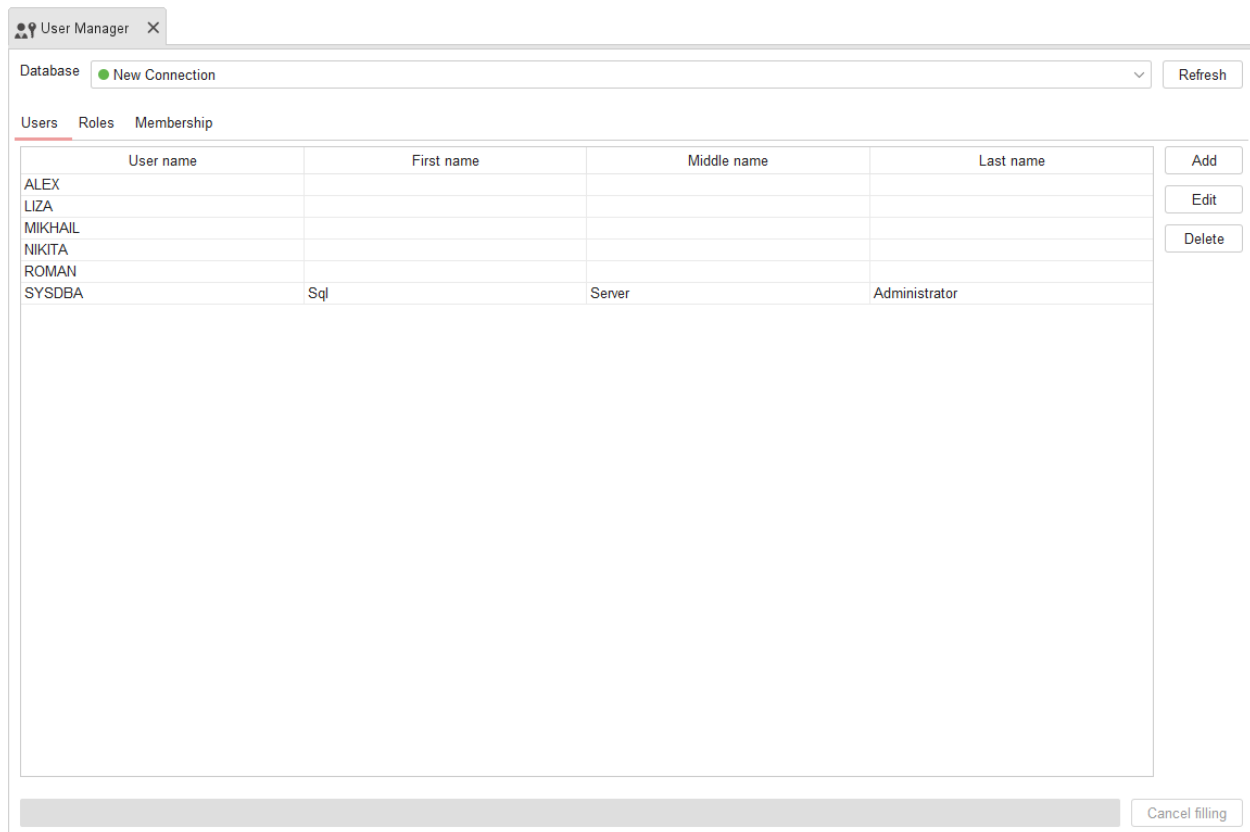
Img 11.4 — Session Manager

In the window on the left, you can select the name of the session and see information about it (ID, starting user, start time), and stop the tracing session.

Chapter 12

User manager

With the User Manager you can manage database users: add, edit and delete.

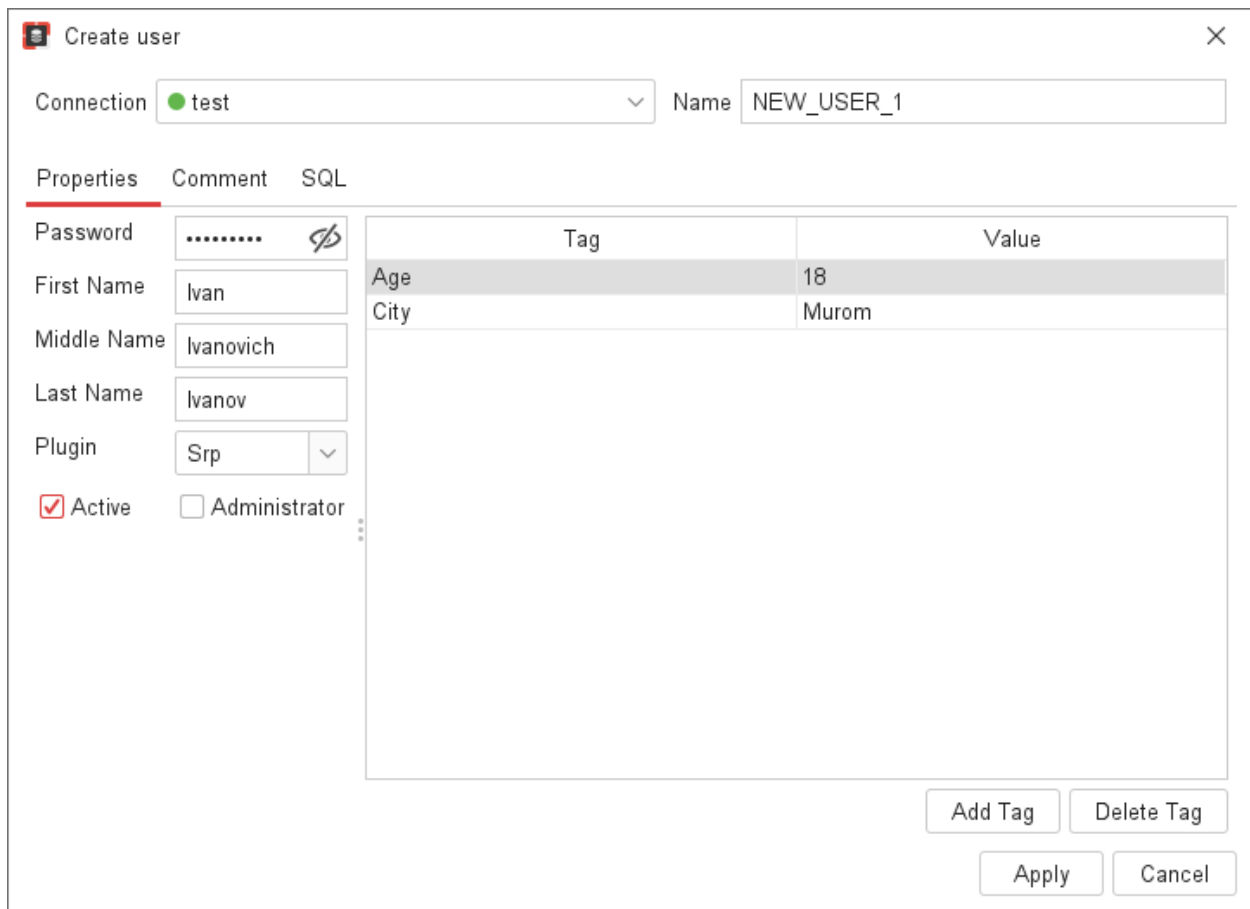


The screenshot shows the 'User Manager' application window. At the top, there's a tab labeled 'User Manager' with a close button. Below it, a 'Database' dropdown menu is set to 'New Connection' with a 'Refresh' button. The main area has three tabs: 'Users' (selected), 'Roles', and 'Membership'. The 'Users' tab contains a table with four columns: 'User name', 'First name', 'Middle name', and 'Last name'. The table lists five users: ALEX, LIZA, MIKHAIL, NIKITA, and ROMAN. Below these, there's a row for 'SYSDBA' with 'Sql' as the first name, 'Server' as the middle name, and 'Administrator' as the last name. To the right of the table are three buttons: 'Add', 'Edit', and 'Delete'. At the bottom of the window, there's a 'Cancel filling' button.

User name	First name	Middle name	Last name
ALEX			
LIZA			
MIKHAIL			
NIKITA			
ROMAN			
SYSDBA	Sql	Server	Administrator

Img 12.1 — User manager

To add, edit or delete user, you should press the corresponding button and fill in all the fields in the opened window.



The 'Create user' dialog box is shown with the following fields and options:

- Connection:** A dropdown menu with 'test' selected.
- Name:** A text field containing 'NEW_USER_1'.
- Properties tab:** The active tab, showing user details.
- Password:** A text field with masked characters '.....' and a toggle icon.
- First Name:** A text field containing 'Ivan'.
- Middle Name:** A text field containing 'Ivanovich'.
- Last Name:** A text field containing 'Ivanov'.
- Plugin:** A dropdown menu with 'Srp' selected.
- Active:** A checked checkbox.
- Administrator:** An unchecked checkbox.
- Tags table:** A table with two columns: 'Tag' and 'Value'. It contains two rows: 'Age' with value '18' and 'City' with value 'Murom'.
- Buttons:** 'Add Tag', 'Delete Tag', 'Apply', and 'Cancel' are located at the bottom right.

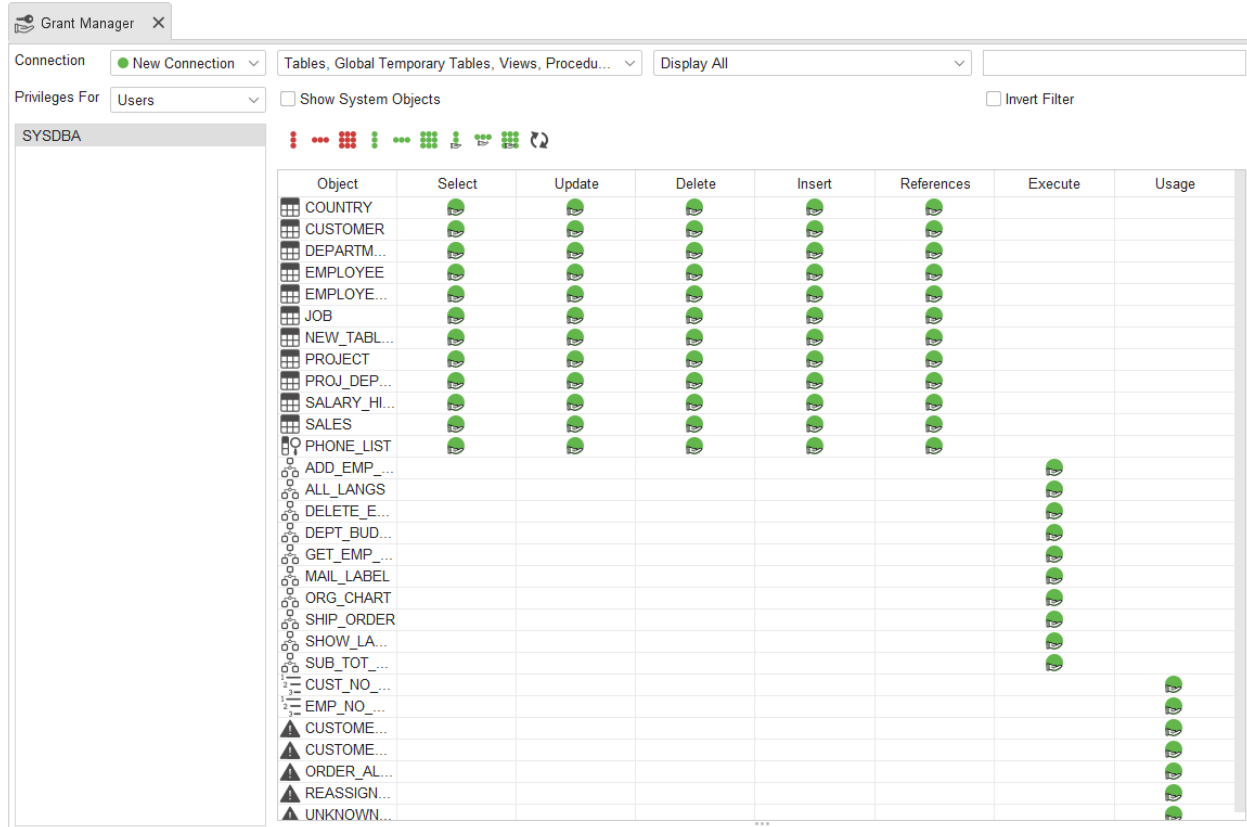
Tag	Value
Age	18
City	Murom

Img 12.2 — Adding user

Chapter 13

Grant manager

Grant manager displays privileges and allows you to manage them.

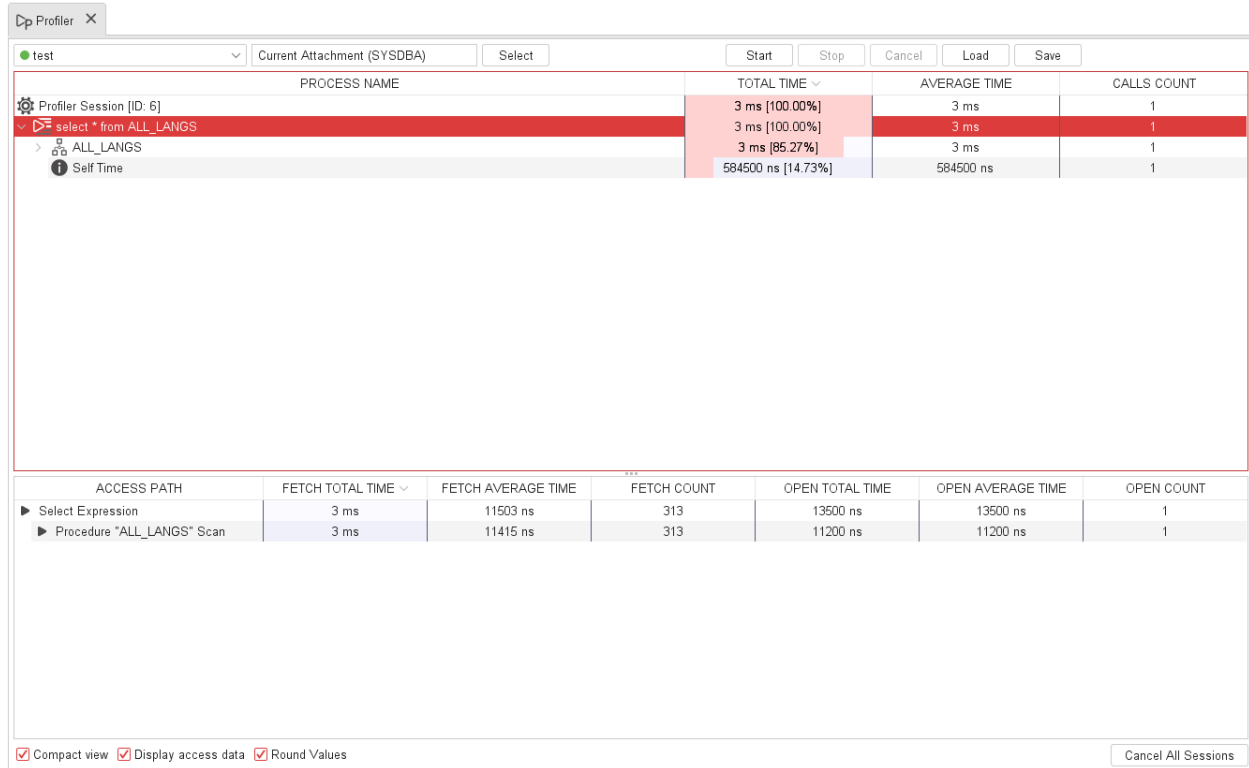


Img 13.1 — Grant manager

Chapter 14

Profiler

Profiler allows you to measure the performance and execution cost of SQL and PSQL code.



The Profiler window displays a session profile for a query. The main table shows the following data:

PROCESS NAME	TOTAL TIME	AVERAGE TIME	CALLS COUNT
select * from ALL_LANGS	3 ms [100.00%]	3 ms	1
ALL_LANGS	3 ms [85.27%]	3 ms	1
Self Time	584500 ns [14.73%]	584500 ns	1

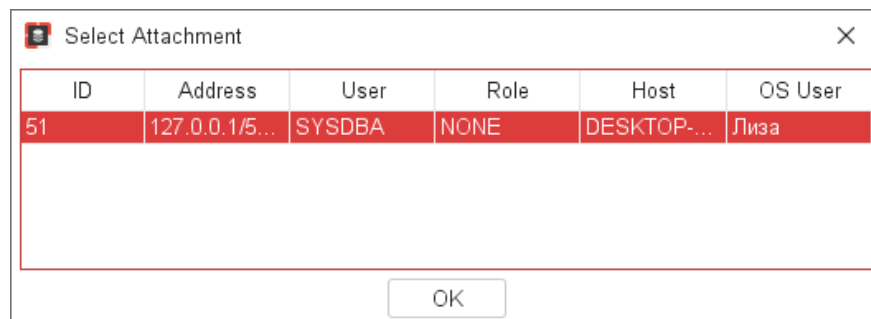
Below the main table, the Access Path table is shown:

ACCESS PATH	FETCH TOTAL TIME	FETCH AVERAGE TIME	FETCH COUNT	OPEN TOTAL TIME	OPEN AVERAGE TIME	OPEN COUNT
Select Expression	3 ms	11503 ns	313	13500 ns	13500 ns	1
Procedure "ALL_LANGS" Scan	3 ms	11415 ns	313	11200 ns	11200 ns	1

At the bottom of the window, there are checkboxes for ☒ Compact view, ☒ Display access data, and ☒ Round Values, along with a **Cancel All Sessions** button.

Img 14.1 — Profiler

1. Select the connection of interest from the drop-down list.
2. Click the Select button and in the window that opens, select the user connection to be profiled:



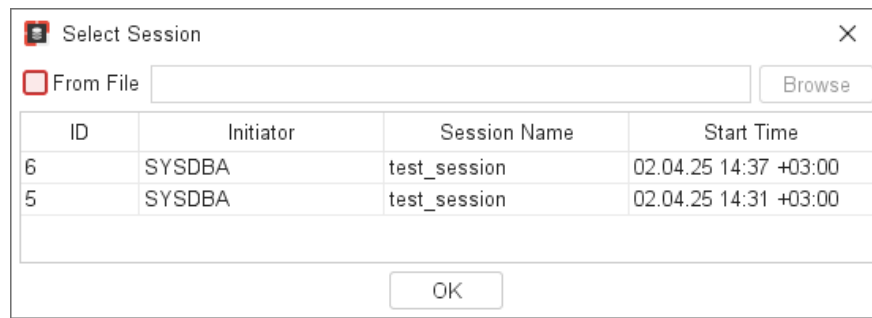
The 'Select Attachment' dialog box contains the following table:

ID	Address	User	Role	Host	OS User
51	127.0.0.1/5...	SYSDBA	NONE	DESKTOP-...	Лиза

An **OK** button is located at the bottom of the dialog box.

Img 14.2 — Selecting a user connection to profile

You can also open a saved profiler session by clicking the Load button:



Img 14.3 — Saved Sessions

Formats for displaying the result:

- Compact view - Displays an overall view of query execution. Repeating processes within a common parent will be merged into one. This is the default value.
- Display access data - Displays/hides the plan for executing the request. Enabled by default.
- Round values - If the total or average time is greater than 1000000ns, it will be converted to a larger unit until the value is less than 1000000ns. Enabled by default.

Cancel All Sessions button cancels all profiling sessions for the selected connection (with the specified ATTACHMENT_ID).

In compact view, for each non-last node (except for ROOT NODE - the root node) there is a node Total time, which shows the time spent without taking into account child processes.

In result table displays information collected by the profiler, viz:

- Process name or SQL code;
- Time per process in nanoseconds (including child processes) and the percentage of time from the parent process;
- Average time per process in nanoseconds (including child processes) for repetitive processes combined into one node;
- Number of calls of the recurring processes.

При двойном клике по узлу откроется окно просмотра данных:



Img 14.4 — Data view

A Profiler session can be run for a single query from the Query Editor by clicking the Run in Profiler button. In this case the following will be executed:

1. Starts profiler session.
2. Query in the editor will be executed.
3. Profiler session will finish.
4. Displays profiler panel with the collected information.

Chapter 15

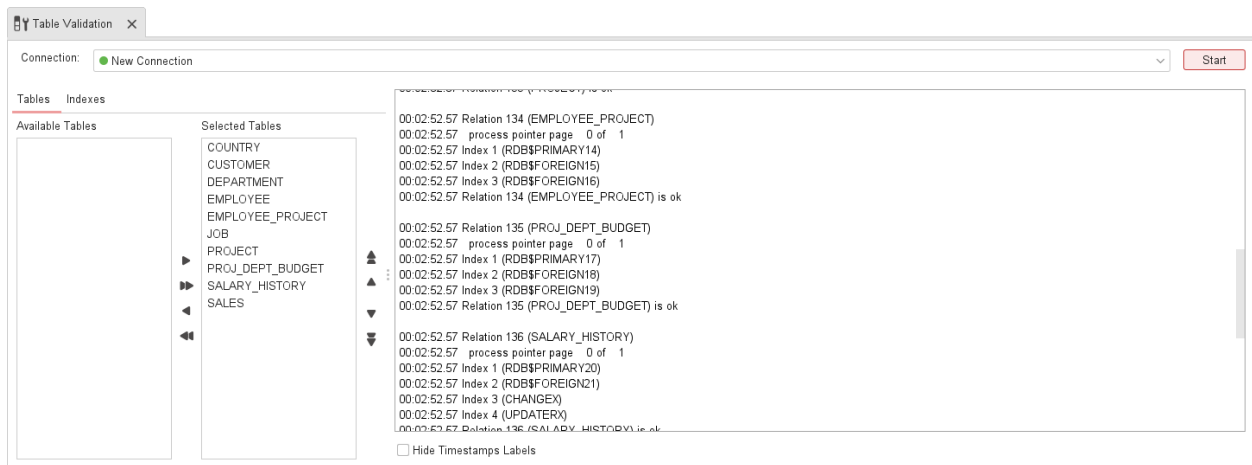
Table validation

Database validation allows you to perform low-level consistency checks for data on disc.

Online validation can do following:

- validate some (or all) user tables in the database; system tables are not validated;
- validate some (or all) indexes;

This tool performs online table validation only. Other ODS validations such as Header, PIP, TIP, Generators pages are not performed.



Img 15.1 — Table validation

Chapter 16

Import data

This tool is used to import data from a file into a table. Import from XLSX, XML and CSV files is supported.

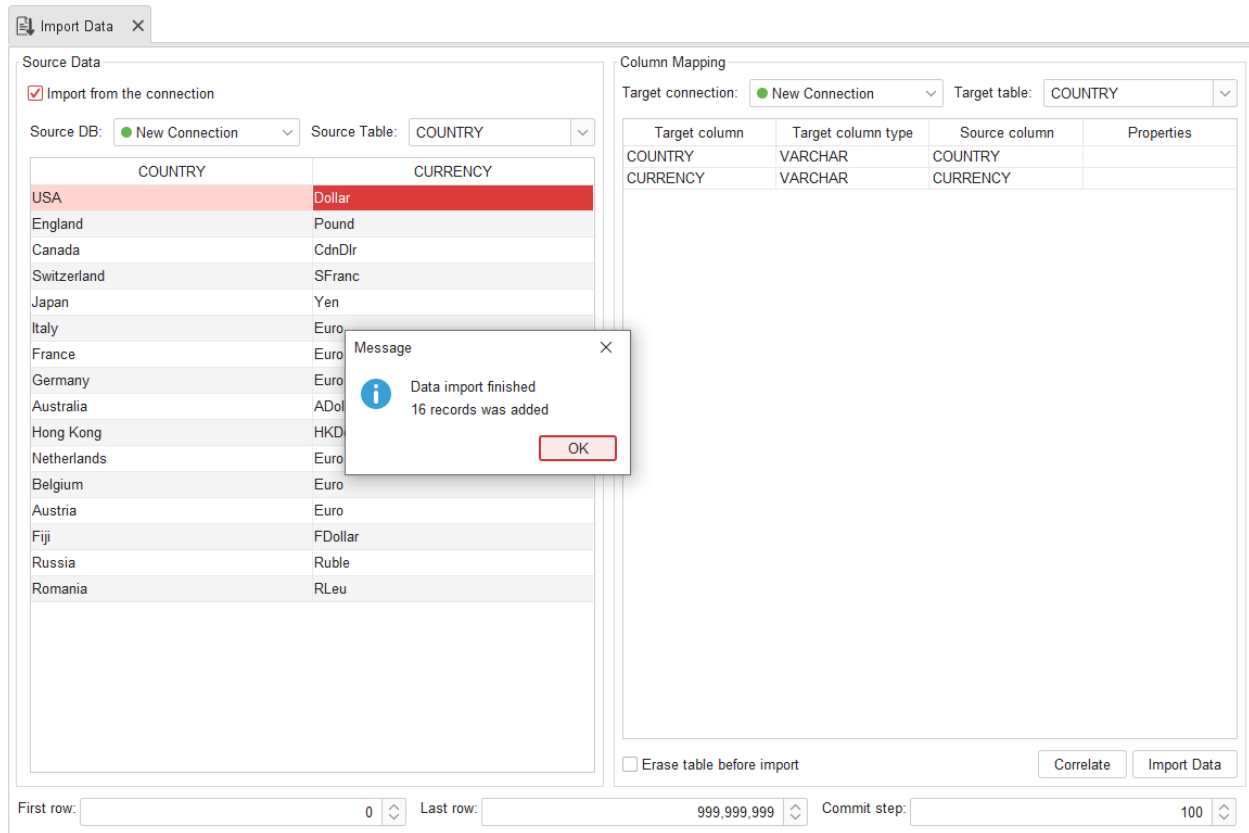
Img 16.1 — Import data

Data import parameters:

- Import from the connection - Allows to select the database as source.
- Data file - Path to data source file. Import from XLSX, XML and CSV files is supported.
- Blob file - Path to source file with blobs (with .lob extension).
- Target connection - Database the import will be performed to.
- Target table - Table the import will be performed to.
- Separator - Type of data separator in CSV files.
- Page number - For XLSX files allows to select the page of excel-file to import data from.
- First row - Row starting from which data will be imported.
- Last row - The row after which data import will be stopped. Rows that do not fall in the range between the first and last imported row will be ignored.
- Commit step - The number of records after which the transaction will be committed and data will be saved in the table.
- Erase table before import - Defines if target table should be cleared of data that was in it before

import.

- Source column - Column name from which data should be imported. The Correlate button automatically assigns the imported columns to the target columns by their names.
- Properties - Import BLOB as a file or as text.



Img 16.2 — Example of filling in fields for import

Chapter 17

Data generator

Data Generator tool is intended for quick and convenient filling of table fields with a large amount of data.

Connection: New Connection

Table: SALES

Records: 100

Commit after: 500

Batch Size: 100

☒ Enable execution logging ☐ Stop on error ☐ Use batches to insert data Start Stop

Generator Output

Selected/Deselected	Name	Type	Required
<input checked="" type="checkbox"/>	PO_NUMBER	CHAR(8)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	CUST_NO	INTEGER	<input checked="" type="checkbox"/>
<input type="checkbox"/>	SALES_REP	SMALLINT	<input type="checkbox"/>
<input checked="" type="checkbox"/>	ORDER_STATUS	VARCHAR(7)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	ORDER_DATE	TIMESTAMP	<input checked="" type="checkbox"/>
<input type="checkbox"/>	SHIP_DATE	TIMESTAMP	<input type="checkbox"/>
<input type="checkbox"/>	DATE_NEEDED	TIMESTAMP	<input type="checkbox"/>
<input type="checkbox"/>	PAID	CHAR(1)	<input type="checkbox"/>
<input checked="" type="checkbox"/>	QTY_ORDERED	INTEGER	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	TOTAL_VALUE	DECIMAL(9,2)	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	DISCOUNT	FLOAT	<input checked="" type="checkbox"/>
<input type="checkbox"/>	ITEM_TYPE	VARCHAR(12)	<input type="checkbox"/>
<input type="checkbox"/>	AGED	COMPUTED BY s...	<input type="checkbox"/>

Generation method

☒ Random

☐ Get from other table

☐ Get from list

☐ Use NULL

Max Length: 0

Max Length: 1

Charset: NONE

☐ Use Only This Symbols

1

Img 17.1 — Data generator

Select a table. Fields and their types will be displayed. Choose checkbox for the field if you want to generate data for it. Otherwise this field will be filled with NULL values.

Specify number of records to be generated. Generating large amounts of data may take some time.

In Commit after field, enter the number of rows after insertion that will commit.

Errors may occur during generation. By default, they are not written to log file. Tick the corresponding checkbox so that all errors are recorded in the log.

If errors occur during the generation process for some records (e.g. due to column constraints), the generator continues by default. This behaviour can be changed by ticking the Stop on error checkbox.

Method of generation can be selected for each field of the table:

- Random - Depending on the field type, different generation parameters are configured.
- Get from another table - In this method you need to select a table, column and number of records. The records from the table are selected randomly in the specified number, then the main table is filled from this list of values.
- Get from list - The values of the list form the content of the field. The list must consist of elements of the corresponding data type. The delimiter can be any single character or escape-sequence starting with a backslash (\). The list itself can be entered manually in the field provided for this purpose, or loaded from a file.
- Autoincrement - For auto increment the initial value, step and direction of step movement (up or down) are configured.

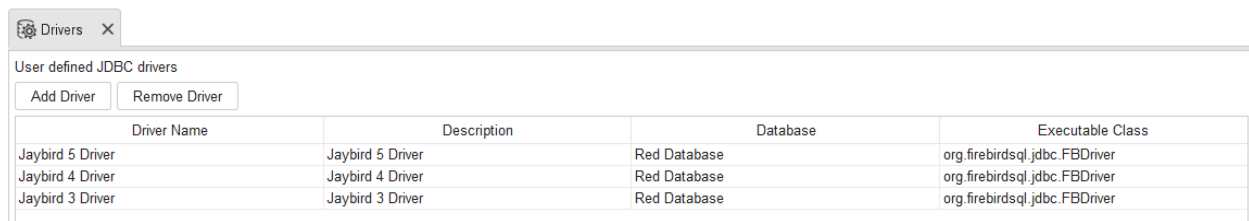
Chapter 18

System

18.1 Drivers

Drivers pane lists all installed JDBC drivers.

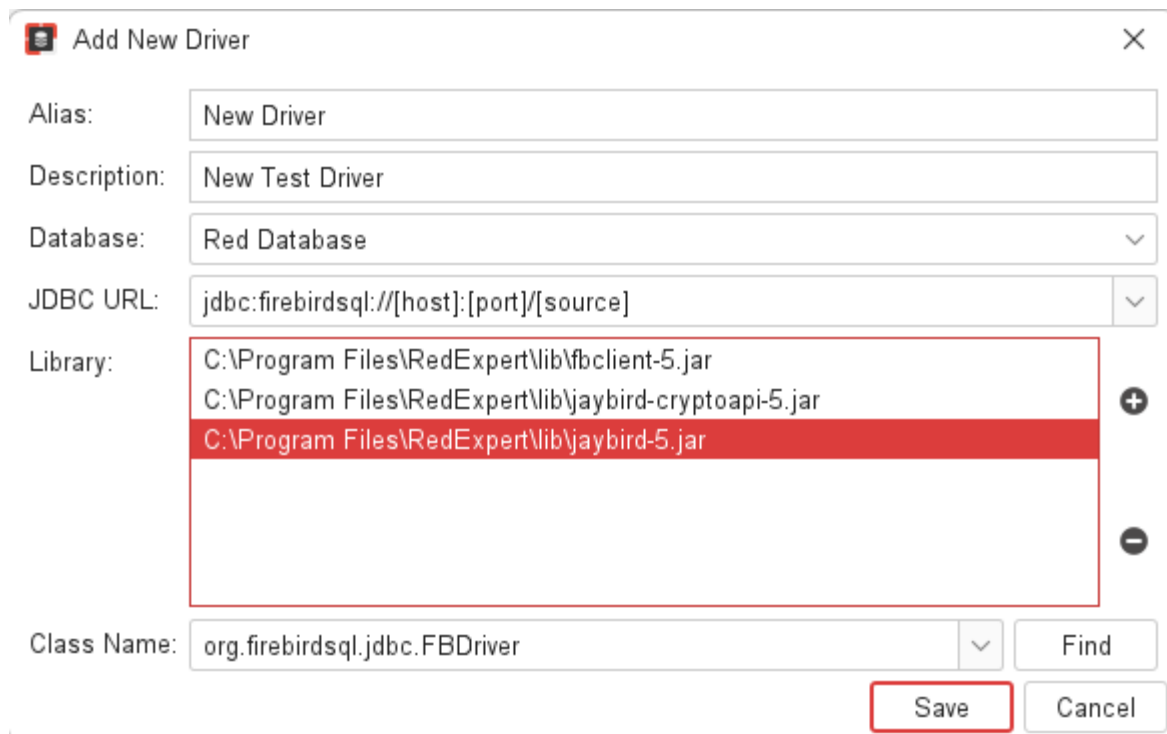
Libraries Jaybird 3 Driver, Jaybird 4 Driver, Jaybird 5 Driver are installed in Red Expert by default, that allows to work with Firebird and Red Database.



Driver Name	Description	Database	Executable Class
Jaybird 5 Driver	Jaybird 5 Driver	Red Database	org.firebirdsql.jdbc.FBDriver
Jaybird 4 Driver	Jaybird 4 Driver	Red Database	org.firebirdsql.jdbc.FBDriver
Jaybird 3 Driver	Jaybird 3 Driver	Red Database	org.firebirdsql.jdbc.FBDriver

Img 18.1 — Drivers

To add a new driver, click on Add Driver button and fill in all fields. See [Parameters for adding a driver](#) section for detailed description of the fields.



Add New Driver

Alias: New Driver

Description: New Test Driver

Database: Red Database

JDBC URL: jdbc:firebirdsql://[host]:[port]/[source]

Library:

- C:\Program Files\RedExpert\lib\fbclient-5.jar
- C:\Program Files\RedExpert\lib\jaybird-cryptoapi-5.jar
- C:\Program Files\RedExpert\lib\jaybird-5.jar**

Class Name: org.firebirdsql.jdbc.FBDriver

Find Save Cancel

Img 18.2 — Adding driver

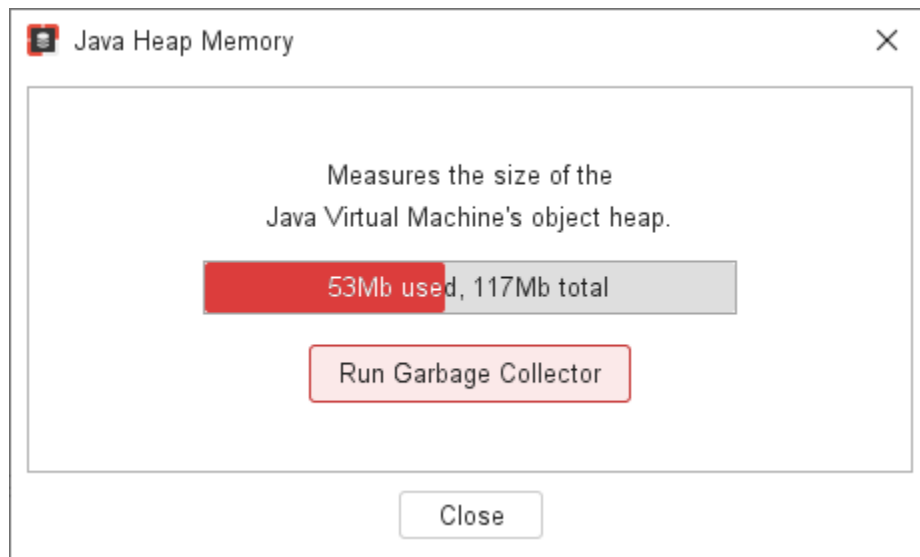
18.2 Application log

Log records all information that is output to the standard output stream, errors and warnings. Output level can be set in Settings to limit the information contained in the log.

System output log is stored in `$HOME/.redexpert/logs`. and can be opened with any text editor, but can also be viewed with Redexpert.

18.3 Heap memory status

Red Expert allows monitoring current memory usage and running gubbish collection.

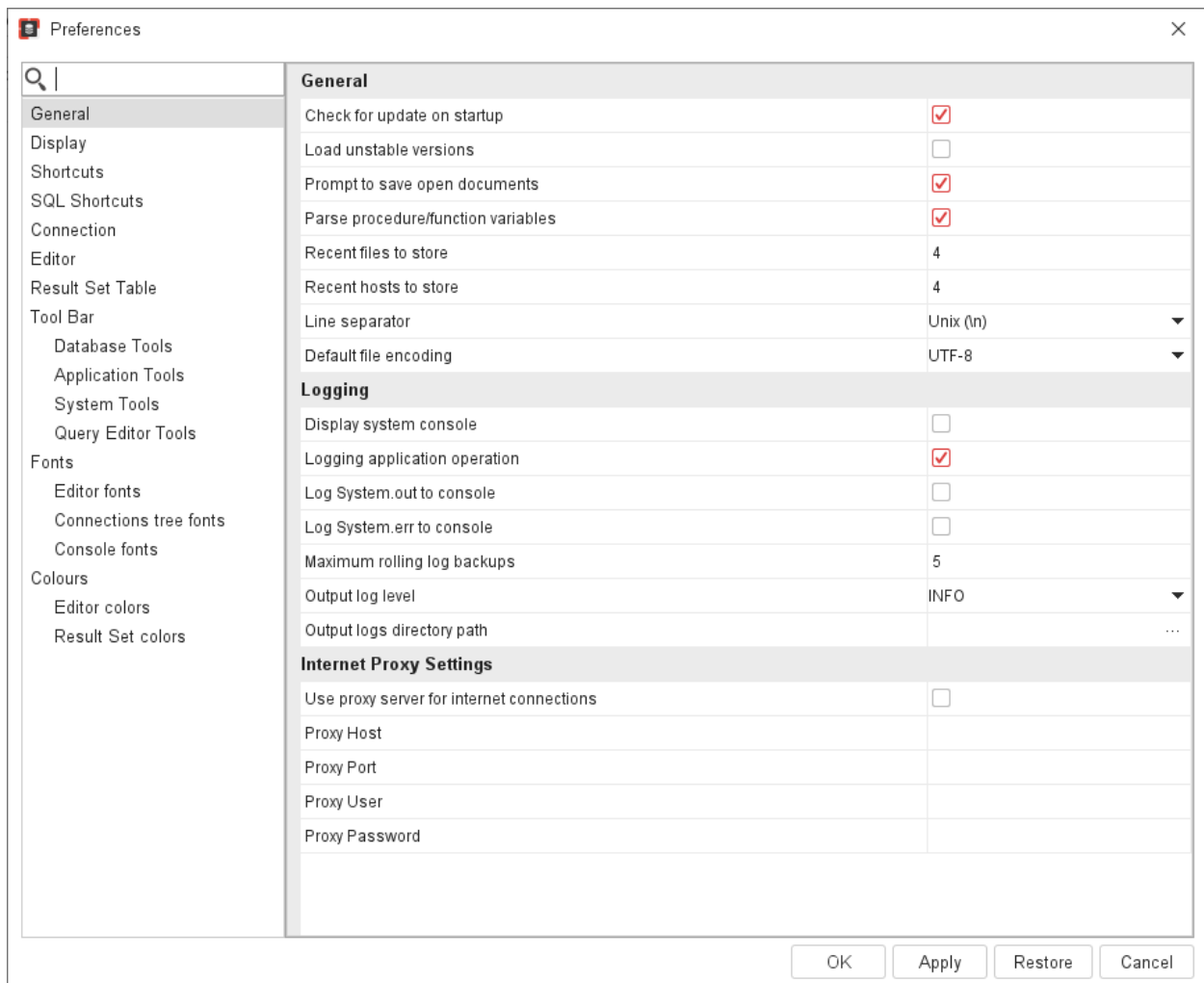


Img 18.3 — Heap memory status

18.4 Preferences

Select System → Preferences menu item to configure the application.

Almost all changes take effect when Red Expert is restarted.



Img 18.4 — Preferences

See [Application settings](#) appendix for a detailed description of settings.

18.4.1 Portability of settings


















To store Red Expert and its settings in the same folder, follow the steps below:

1. Close the programme;
2. Open .../Red Expert/config/launcher.conf file;
3. For the app.settings.directory parameter, specify the value ../redexpert and save the changes;
4. In the explorer address bar, enter the path %homepath%;
5. Move the .redexpert folder to the root of the directory where Red Expert is installed;
6. Run Red Expert.

Appendix A Toolbar








Description of each toolbar and its associated buttons and actions is provided below.

Table A.1 — Toolbar

	Description	Shortcuts
	Hide/display the connection tree.	
	Connection to selected database.	
	Connect to all databases that are added to the connection tree.	
	Refresh all objects in current connection.	
	Search object in connection tree in established connection.	Ctrl + F
	Create new connection.	Ctrl + Shift + N
	Create database.	
	Execute SQL script from file.	
	Open a database metadata comparison tool.	
	Open tool for extracting metadata into a script.	
	Open query editor.	
	Open ER diagram editor.	
	Open database statistics collection tool.	
	Open trace manager.	
	Open user manager.	
	Open grant manager.	
	Open profiler.	










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	Description	Shortcuts
	Open table validation tool.	
	Open data import tool.	
	Open test data generator.	
	Open system console.	
	View system log.	
	Open application settings.	
	Open documentation.	













A.1 Query editor toolbar

Table A.2 — Query editor toolbar

	Description	Shortcuts
	Execute SQL script.	F9
	Execute script in one query.	F5
	Execute SQL script in the profiler.	Shift + F5
	Stop execution of query.	
	Commit transaction.	Ctrl + Shift + Q
	Rollback transaction.	Ctrl + Shift + R
	Switch on autocommit mode.	
	Stop execution of SQL script when an error occurs.	
	Export query result to file.	





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	Description	Shortcuts
	Limit number of input rows.	
	Managing query bookmarks.	Ctrl + B
	Open query execution history.	Ctrl + Shift + H
	Enter previously executed query in editor.	Ctrl + Shift + Down
	Enter next query in editor.	Ctrl + Shift + Up
	Export selected dataset to file.	
	Show metadata of current result set.	
	Add filters for current result set.	
	Show query plan.	Ctrl + Shift + P
	Show transaction parameters.	
	Display results output panel.	Ctrl + E
	Change separator orientation.	Ctrl + Alt + Q










A.2 ER-diagram editor toolbar

Table A.3 — ER-diagram editor toolbar

	Description	Shortcuts
	Create table.	
	Delete selected object.	
	Add relation.	
	Delete relation between selected objects.	

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	Description	Shortcuts
	Generate SQL script to create objects from diagram.	
	Build ER-diagram of existing database.	
	Add text block.	
	Add header for diagram.	
Aa	Open font settings.	
	Open line settings.	
	Change colour of selected object.	
	Change background colour of diagram.	
	Zoom out.	
	Zoom in.	

Appendix B Description of parameters

B.1 Database connection parameters

Table B.1 — Database connection parameters

Parameter	Description
JDBC driver	Select JDBC driver from the drop-down list to create a new database. For Red Database and Firebird JDBC driver Jaybird 3 is recommended.
Connection name	Database connection name
Server name	Database server host or IP address
Port	Port for database connection
Database file	Path to database file or alias
Username	Username of user in whose name the database will be created
Password	User password
Save password	Should password be saved for connecting to database
Encrypt password	Should password be stored in encrypted form
Encoding	Specifies default character set for string (character) values of the entire database.
Page size	Size of the database page in bytes. Valid values are 4096, 8192 and 16384.

B.2 Extended database connection parameters

This table lists some parameters for the Jaybird 3 driver:

Table B.2 — Extended database connection parameters

Parameter	Type	Description
isc_dpb_user_name	string	Name of the connecting user.
isc_dpb_password	string	User Password.
isc_dpb_sql_role_name	string	Role
isc_dpb_sql_dialect	byte	SQL dialect.
isc_dpb_process_id	int	Process ID.
isc_dpb_process_name	string	Process name.
isc_dpb_lc_ctype	string	Connection character encoding. This parameter tells database server what encoding should be used to send string values to client.
isc_dpb_connect_timeout	int	Connection timeout (in seconds).
isc_dpb_gss	-	Use trusted authentication Gss.
isc_dpb_num_buffers	int	Number of database pages to be cached.
isc_dpb_set_db_readonly	boolean	Set database to read-only mode.

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Parameter	Type	Description
isc_dpb_set_db_charset	string	Set character set for the database.
isc_dpb_trusted_auth	-	Informing that trusted authentication will be used.
isc_dpb_multi_factor_auth	boolean	Informing that multifactor authentication will be used.
isc_dpb_utf8_filename	-	Informing that file name passed in UTF-8 format.
isc_dpb_certificate	string	Client certificate alias for multifactor connection.
isc_dpb_verify_server	-	Flag to verify server certificate (multifactor authentication).
isc_dpb_repository_pin	string	Pin code for certificate container (multifactor authentication).
isc_dpb_wire_crypt_level	string	Sets whether to encrypt the network connection. It can take three possible values: REQUIRED, ENABLED, DISABLED and DEFAULT. By default, encryption is enabled (Enabled).

B.3 Parameters for adding a driver

Table B.3 — Parameters for adding a driver

Parameter	Description
Driver name	Driver name for identification
Description	Description of this driver
Database	Select DBMS for which this driver is used
JDBC URL	The URL address template for this JDBC driver. For example: jdbc:firebirdsql://[host]:[port]/[source].
Path	Path to jar file of JDBC driver
Class name	Class name of JDBC driver. Select the search button if the name is unknown and the system scans the jar file entered in the path field to find the driver class name

B.4 Trace manager configuration file settings

Table B.4 — Trace manager configuration file settings

Parameter	Description
log_security_incidents	Server security events (security incidents)
log_initfini/log_init	Events of start/stop of database logging
log_connections	Events of connection/disconnection to database
log_transactions	Transaction start and completion events
log_statement_prepare	Database query preparation events

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Parameter	Description
log_statement_free	Database query release events
log_statement_start	Events of start execution of queries to database
log_statement_finish	Events of finish execution of queries to database
log_procedure_start	Events of start execution stored procedures
log_procedure_finish	Events of finish execution stored procedures
log_function_start	Events of start execution stored function
log_function_finish	Events of finish execution stored function
log_trigger_start	Trigger execution start events
log_trigger_finish	Trigger execution finish events
log_context	Events of context variable value changes
log_errors	Error logging
log_warnings	Warning logging
print_plan	Print query plans
print_perf	Print query execution statistics
log_blr_requests	Direct execution events of compiled queries in internal server view - BLR
print_blr	Content of BLR requests will be converted to text representation, otherwise it will remain in binary form
log_dyn_requests	Events of direct execution of compiled metadata change queries (DDL) in the internal server view - DYN
print_dyn	Content of DYN queries will be converted to text representation, otherwise it will remain in binary form
log_privilege_changes	Privilege change events
log_changes_only	Recording only those events that changed data in the database
print_stack_trace	Print stack of server function calls when an error event is terminated
log_auth_factors	Events of verification authentication factors
log_mandatory_access	Mandate access audit
log_record_mandatory_access	Events about mandate access to records
log_object_relabeling	Events of object label change
log_record_relabeling	Events of record label change
log_services	Connection/disconnection and service start events
log_service_query	Events of service queries
include_user_filter	Regular expression to which the user name must match
exclude_user_filter	Connections from users matching this regular expression will not be logged
include_process_filter	Regular expression to be matched by the name of the user process
exclude_process_filter	Connections from processes that match this regular expression will not be logged

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Parameter	Description
include_filter	Regular expression in SQL syntax (SIMILAR TO), which must be matched by the text of SQL query.
exclude_filter	Regular expression in SQL syntax (SIMILAR TO), which must not be matched by the text of SQL query.
connection_id	Connection identify on server that will be monitored
log_filename	Log file name
max_log_size	Maximum size of log files in megabytes. A value of 0 means unlimited size
time_threshold	Events whose execution time is less than specified time (in ms) will not be logged
max_sql_length	Maximum length of one SQL query record in log file, in bytes
max_blr_length	Maximum length of BLR query to be logged, in bytes
max_dyn_length	Maximum length of DYN-query to be logged, in bytes
max_arg_length	Maximum length of one query/procedure parameter in log file
max_arg_count	Maximum number of query/procedure parameters to be logged

B.5 Trace manager events table

Description of each column in events table is given below:

Table B.5 — Description of events table columns

Parameter	Description
NUM	Row number
TSTAMP	Time and date of event
ID_PROCESS	Process ID
ID_THREAD	Thread ID
EVENT_TYPE	Event type
FAILED	In case of unsuccessful or unauthorised attempt to execute query, the result FAILED or UNAUTHORIZED is logged
ID_SESSION	Session ID
NAME_SESSION	Session name
ID_SERVICE	Service ID
USERNAME	Username
PROTOCOL_CONNECTION	Connection protocol
CLIENT_ADDRESS	IP address or computer name
TYPE_QUERY_SERVICE	Service query type
OPTIONS_START_SERVICE	Options passed to service manager from client at start
ROLE	User role

(table breaks)

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Parameter	Description
DATABASE	Database name
CHARSET	Encoding
ID_CONNECTION	Connection ID
CLIENT_PROCESS	Client process
ID_CLIENT_PROCESS	Client process ID
ID_TRANSACTION	Transaction ID
LEVEL_ISOLATION	Isolation level
MODE_OF_BLOCK	Lock mode (WAIT or NO WAIT)
MODE_OF_ACCESS	Access mode
TIME_EXECUTION	Execution time (in ms)
COUNT_READS	Number of pages read from the disc
COUNT_WRITES	Number of pages written to disc
COUNT_FETCHES	Number of pages fetched from page cache
COUNT_MARKS	Number of pages modified in page cache
ID_STATEMENT	Query ID
RECORDS_FETCHED	Number of fetched records
STATEMENT_TEXT	Query content
PARAMETERS_TEXT	Query execution parameters
PLAN_TEXT	Query plan
TABLE_COUNTERS	Table counters
DECLARE_CONTEXT_VARIABLES	Name and value of context variable
EXECUTOR	Users, roles and database objects for which privileges have been granted
GRANTOR	User who grants privileges
PRIVILEGE	Assigned/revoked privilege
PRIVILEGE_OBJECT	Object for which the privilege is granted (revoked)
PRIVILEGE_USERNAME	User assigned the privilege
PRIVILEGE_ATTACHMENT	Connection ID
PRIVILEGE_TRANSACTION	Transaction ID
PROCEDURE_NAME	Procedure name
RETURN_VALUE	Return values of procedure
TRIGGER_INFO	<trigger_name> [FOR <table_name>] (ON <database event> {BEFORE AFTER} <table event or DDL event>)
SENT_DATA	Data passed to service manager
RECEIVED_DATA	Data received by service manager
ERROR_MESSAGE	Error message text
OLDEST_INTERESTING	Number of oldest interested transaction

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Parameter	Description
OLDEST_ACTIVE	Oldest active transaction number
OLDEST_SNAPSHOT	Number of transaction that was active at the time the OAT transaction was started
NEXT_TRANSACTION	Next transaction number
SORT_MEMORY_USAGE_TOTAL	Total cache size (in bytes) allocated during the sorting process
SORT_MEMORY_USAGE_CACHED	RAM cache size (in bytes) allocated during the sorting process
SORT_MEMORY_USAGE_ON_DISK	Disc cache size

B.6 Trace analysis

Description of resulting table columns:

Table B.6 — Description of resulting table columns:

Parameter	Description
QUERY	Query text
COUNT	Query execution count
PLAN_COUNT	Query plan count
TOTAL_TIME	Total execution time in milliseconds
MIN_TIME	Minimum execution time in milliseconds
AVG_TIME	Average execution time in milliseconds
MAX_TIME	Maximum execution time in milliseconds
STD_DEV_TIME	Standard deviation of execution time
TOTAL_READ	Total pages read from disc
MIN_READ	Minimum number of pages read from disc
AVG_READ	Average number of pages read from disc
MAX_READ	Maximum number of pages read from disc
STD_DEV_READ	Standard deviation of number of pages read from disc
TOTAL_FETCH	Total number of pages read from page cache
MIN_FETCH	Minimum number of pages read from page cache
AVG_FETCH	Average number of pages read from page cache
MAX_FETCH	Maximum number of pages read from page cache
STD_DEV_FETCH	Standard deviation of number of pages read from page cache
TOTAL_WRITE	Total number of pages recorded on disc
MIN_WRITE	Minimum number of pages recorded on disc
AVG_WRITE	Average number of pages recorded on disc
MAX_WRITE	Maximum number of pages recorded on disc
STD_DEV_WRITE	Standard deviation of number of pages recorded on disc

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Parameter	Description
TOTAL_MARK	Total number of pages edited in page cache
MIN_MARK	Minimum number of pages edited in page cache
AVG_MARK	Average number of pages edited in page cache
MAX_MARK	Maximum number of pages edited in page cache
STD_DEV_MARK	Standard deviation of number of pages edited in page cache
TOTAL_RSORT	Total RAM used for sorting (in bytes)
MIN_RSORT	Minimum RAM used for sorting (in bytes)
AVG_RSORT	Average RAM used for sorting (in bytes)
MAX_RSORT	Maximum RAM used for sorting (in bytes)
STD_DEV_RSORT	Standard deviation of RAM used for sorting
TOTAL_DSORT	Total temporary file size used in query (in bytes)
MIN_DSORT	Minimum temporary file size used in query (in bytes)
AVG_DSORT	Average size temporary files used in query (in bytes)
MAX_DSORT	Maximum temporary file size used in query (in bytes)
STD_DEV_DSORT	Standard deviation of temporary file size used in query

B.7 Database statistics

B.7.1 Statistics of data pages

Table B.7 — Statistics of data pages

Parameter	Description
name	Table name
primary pointer page	First page number of indirect pointers to pages storing table data
index root page	Page number, which is first page of index pointers to table indexes
pointer pages	Total indirect pointer pages to pages storing table data
data pages	Total pages that store table data. This count includes pages storing unconfirmed versions of records and garbage because gstat cannot distinguish them from each other
data page slots	Number of database page pointers contained in the pointer pages. Must be equal to number of data pages
primary pages	Number of pages equal to (Data pages - Secondary pages)
secondary pages	Number pages on which no primary versions of records are stored
swept pages	Number of pages that have only primary versions of records, and all of them were created by committed transactions. Such data pages should be skipped by sweep procedure

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Parameter	Description
empty pages	Number of pages with no records
full pages	Number of full pages
big record pages	Number of pages that are filled with only one record
blob pages	Number of pages with blobs
average record length	Average size of a compressed record in bytes
total records	Total number of rows in table
average version length	Average length of old versions in bytes
total versions	Total number of old versions in table
max versions	Maximum chain of old versions to be recorded
average fill	Histogram of memory usage distribution for all pages allocated in table
total formats	Total formats in RDB\$FORMATS table
used formats	Number of used formats
average fragment length	Average fragment size in bytes
total fragments	Number of fragments in all records
max fragments	Maximum number of fragments per record
average unpacked length	Average record size in bytes (not compressed)
compression ratio	Ratio of average uncompressed key length (Average prefix length + Average data length) to average compressed key length (Average key length).
blobs	Number of all blobs (level 0, 1 and 2)
total length	Blob size, in bytes
level <n>	Number of blobs per level
table size(without blobs)	Table size in bytes (data pages * page size). Calculated column
size with blobs	Aggregate size of table data (table size(without blobs) + blobs total length). Calculated column
size with blob pages	(table size(without blobs) + blob pages * page size). Calculated column
size with indices	Aggregate size of table data and aggregate size of all indices on table. Calculated using following formula: $X = S + \sum_{i=0}^n E_i,$ S – size with blob pages; n – number of indexes in table; E – estimated index size in bytes (estimated full size).
range <percentage full>	Number of pages that are filled by specified percentage

B.7.2 Index statistics

Table B.8 — Index statistics

Parameter	Description
name	Index name
table name	Table name
real selectivity	Calculated using following formula: $1 / (\text{nodes} - \text{totalDup})$
average data length	Average length of each key in bytes. This is likely smaller than actual sum of column sizes because Red Database uses index compression to reduce the amount of data stored on an index sheet page
total dup	Total number of index duplicate rows
max dup	Number of nodes that have the highest number of duplicates. Will always be zero for unique indices. If the number is large compared to the number in total dup, it is a sign of low selectivity
root page	Index root page number
depth	Number of levels in index tree page. If the depth of the index page tree exceeds 3, access to records through the index will not be maximised. To reduce the depth of the index page tree, increase the page size. If increasing the page size does not reduce the depth, increase the page size again
leaf buckets	Number of the lowest level (leaf) pages in the index tree. These are pages that contain pointers to records. High-level pages contain indirect links.
leaf full size	Size of the lowest level (leaf) pages in the index tree (leaf buckets * page size). Calculated column
estimated full size	Approximate index size in bytes. Calculated using following formula: $N = L * (1 + \frac{A}{P})^{D-1} * P$ N – approximate index size in bytes; L – number of lowest level pages (leaf pages) in index tree (leaf buckets); A – average node size in bytes (average node length); P – average node size in bytes (average node length); D – number of levels in index tree page (depth).
nodes	Total number of records indexed in the tree. Must be equal to the number of indexed rows in the tree, although the gstat report may include nodes that were deleted but not cleaned up in the garbage collection. May also include multiple items for records that have had their index key changed
average node length	Average node size in bytes
average key length	Average key size in bytes including compression. The length of each key is added 1 to 5 bytes depending on the key size and prefix. The average key size is then calculated
compression ratio	Average key and prefix length in bytes

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Parameter	Description
average prefix length	Average size (in bytes) used by node prefixes
average data length	Average length of each key in bytes. This is likely smaller than the actual sum of column sizes, because Red Database uses index compression to reduce the amount of data stored on an index sheet page
clustering factor	It is a measure of how much I/O the database would perform if it had to read every row in the table by index, in index order. That is, it shows how ordered the rows in the table are by the index values. If the value is close to the total number of pages, then the table is very well ordered. In this case, index entries on the same page of the index sheet usually point to rows that are in the same data pages. If the value is close to the total number of rows, then the table is very disordered. In this case, it is unlikely that index entries on the same page of the index sheet point to the same data pages
ratio	Ratio of Clustering factor to the total number of nodes in the index
full size	Index size in bytes. Calculated by the formula: $L * (1 + \frac{A}{P})^{D-1} * P$, L – number of the lowest level pages (leaf pages) in the index tree (leaf buckets); A – average node size in bytes (average node length); P – database page size (page size); D – number of levels in a page of index tree(depth).

B.7.3 Tablespace statistics

Table B.9 — Tablespace statistics

Parameter	Description
name	Tablespace name
full path	Path to tablespace file
table count	Number of tables in the tablespace
index count	Number of indexes in tablespace

Appendix C Application settings

C.1 General

Table C.1 — General settings

Parameter	Description
Check for updates at startup	If enabled, the application will report new versions.
Load unstable versions	Enable/disable the ability to update to an unstable version of the application.
Prompt to save open documents	Ask to save changes before closing the document. If off, changes are not saved.
Parse procedure and function variables	Display procedure and function variables when viewing detailed information about an object
Recent file to store	Number of files displayed in the menu item Edit → Recent Files
Recent hosts to store	Number of last entered hosts displayed in the drop-down list for selection.
Line separator	The character to be used as a delimiter
Default file encoding	Default file encoding

Table C.2 — Logging

Parameter	Description
Display system console	Display/hide system console
Login application operation	Log application events to the system log
Log system out to console	Output System.out stream to console
Log system errors to console	Output System.err stream to console
Maximum rolling log backups	Number of log files saved. When the log (system.log) reaches a size greater than 1MB, the recording continues to a new file (system.log.1), etc. When the number of files equals the number specified in this parameter, the files will be overwritten. If 0 is specified, the number of files is unlimited.

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Parameter	Description
Output event log level	<p>Level of output to the output status log and the output console:</p> <ol style="list-style-type: none"> 1. FATAL - captures very serious errors that are likely to cause the application to stop being used; 2. ERROR - captures serious errors that need to be checked but will not terminate the application; 3. WARN - captures potentially dangerous situations; 4. INFO - informs about events of application operation at a high level; 5. DEBUG - informs about events at a lower level for debugging the application (for developers); 6. TRACE - detailed logging for very low-level debugging; 7. ALL - all of the above levels. <p>Levels are ordered and each next level incorporates previous levels.</p>
Path to logs directory	Specifies absolute or relative path to the logs directory containing log files. For example, if the relative path logs is specified, log files will be created at the path /<path_to_app>/logs.

Table C.3 — Internet proxy settings

Parameter	Description
Use proxy server for internet connections	Use/do not use a proxy server for internet connections
Proxy host	Name or IP of proxy server
Proxy port	Proxy server port number
Proxy user	User name for authorisation on proxy server (if required)
Proxy password	User password for authorisation on the proxy server (if required)

C.2 Display settings

Table C.4 — General

Parameter	Description
Display splash screen at startup	Show/skip splash screen at startup
Maximum window on startup	Open application window full screen at startup
Status bar	Show/hide status bar
Connections	Show/hide connection information window

Table C.5 — Appearance

Parameter	Description
Look and feel	Application design
Interface language	Application Language
Use anti-aliased fonts	Display the font smoothly by blurring corners

C.3 Shortcuts

Table C.6 — Shortcuts

Command	Shortcuts	Description
Upper case	Ctrl + Shift + U	Converts the selected text to uppercase
Execute SQL script	F9	Executes SQL-script in the query editor
Execute in the profiler	Shift + F5	Executes in the profiler the SQL script in the query editor
Execute single query	F5	Execute with a single query the SQL script in the query editor
Data generator		Open test data generator tool
Documentation	F1	Open application documentation
Drivers		Open the drivers window
Duplicate text up	Ctrl + Alt + Up	Duplicate the line the cursor is pointing at in the query editor to the line above it
Duplicate text down	Ctrl + Alt + Down	Duplicate the line the cursor is pointing to on the line below in the query editor
Comment text	Ctrl + Slash	Comment out the current line in the query editor
Replace	Ctrl + R	Find and replace the specified text
Commit transaction	Ctrl + Shift + C	Commit transaction
Extract database meta-data into SQL script		Open export metadata tool
Change separator orientation	Ctrl + Alt + Q	Change the application window layout
Find previous	Shift + F3	Search specified text
Find next	F3	Search specified text
SQL command history	Ctrl + Shift + H	Open the history of executed queries
User Manager		Open User Manager
Grant Manager		Open Grant Manager
Preferences		Open application settings
Lower case	Ctrl + Shift + L	Makes the selected text lower case
About		Open programme information
System console window		Open the system console
Rollback all changes	Ctrl + Shift + R	Rollback transaction

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Command	Shortcuts	Description
Open file	Ctrl + O	Add selected file text to the query editor
Go to	Ctrl + G	Go to the specified line in the query editor
Print	Ctrl + P	Open the print window
Print plan	Ctrl + Shift + P	Show the plan of the query that is in the query editor
Show/hide editor output	Ctrl + E	Show/hide the output pane in the query editor
Previous statement	Ctrl + Shift + Down	Insert a previously executed SQL script into the query editor
Check for updates		Check that the version of the application you are using is up to date
Profiler		Open Profiler
ER-diagram editor		Open ER-diagram editor
Query Editor		Open the query editor
Move up	Alt + Up	Move selected text one line higher
Move down	Alt + Down	Move the highlighted text to the line below
Next statement	Ctrl + Shift + Up	Insert the following saved SQL script into the query editor
Create database		Open the window of database creation
New Connection	Ctrl + Shift + N	Open the Create Connection window
Heap memory status		Open a window with current information about the memory status
Save	Ctrl + S	Save
Save As	Ctrl + Shift + S	Save as
Compare database meta-data		Open the database comparison tool
Database Statistics		Open the statistics tool
Trace Manager		Open Trace Manager
SQL format	Ctrl + Shift + F	Format the selected text fragment

C.4 SQL templates

Templates simplify the writing script. After pressing the space bar, the specified abbreviation will be converted into full text, for example: SF → SELECT * FROM.

You can add your own templates using the corresponding button.

C.5 Connection

Table C.7 — General

Parameter	Description
Startup connection	Automatically connect on startup
Server connection timeout (sec)	Time during which the application will try to connect to the database. If the connection is not established before it expires, an error will occur.
Timeout shutdown diagnostics (ms)	When an error occurs from the server, Red Expert checks if the connection is active. The parameter defines the time during which the application will wait for a response from the server. If the timeout is reached, the connection will be disconnected.
Connection username at opening .fdb	User name, from which the connection will be made when opening .fdb
Connection password at opening .fdb	Password, with which connection will be executed when opening .fdb
Connection charset at opening .fdb	Charset with which the connection will be executed when opening .fdb

Table C.8 — Tree connection

Parameter	Description
Node height	Distance between nodes in pixels
Connect on double-click	Connect to database after double-clicking on it in connection tree.
Sort alphabetically	Sort nodes in the connection tree alphabetically
Show folders for tables	Form folders for table information in the connection tree
Show system objects	Show/hide system objects in the connection tree
Show connection properties panel	Show/hide connection parameters panel
Show full DB statistics	Display full database statistics in the connection parameters panel
Search in columns	Search not only in the connection tree objects, but also in the column names.

C.6 Editor

Table C.9 — General

Parameter	Description
Auto-complete only hotkeys	Suggest autocompletion only when Ctrl+Space is pressed
Auto-complete keywords on	Suggest autocompletion of keywords in the query editor
Auto-complete database objects on	Suggest autocompletion of database objects in the query editor
Default editor auto-commit	Automatically commit changes after query execution
Recycle resultset tabs	Close the previous result set when executing a query
Remove comments for execution	Remove SQL comments in queries at runtime and send the query without them to the server
Print all SQL to output panel	Add the full text of the query to the output pane
Print extended query plan	Add a detailed query outline to the output pane

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Parameter	Description
Open a new editor for new open connection	Switch to a new tab of the query editor when a connection is established
Use multiple connections	Add the ability to specify multiple connections in which to execute the query
Convert tabs to spaces	Convert tabs to spaces
Tab size	Number of spaces to replace the tabulation with during conversion
Limit the returned rows count	Return no more strings than specified in the Maximum number of returned strings parameter.
Maximum returned rows count	Maximum number of rows that can be in the result set
Undo count	Number of returns to previous states. The return command is activated by pressing Ctrl+Z (Windows).
History count	The number of queries that can be stored in the history. When the specified number is reached, old queries will be deleted from the history

Table C.10 — Display

Parameter	Description
Tools panel	Display the query editor toolbar
Transaction Parameters	Display transaction parameters
Status bar	Show/hide status bar
Line numbers	Display line numbers in the query editor
Wrap line	Automatically move a line if it does not fit in the query editor.
Current line highlight	Highlight in colour the line on which the cursor is located

C.7 Result set table

Table C.11 — Result set table

Parameter	Description
Column resizable	Enable/disable the ability to change the size of columns in the result set
Column reordering	Enable/disable the ability to drag and drop columns, swapping them in places
Row number header	Show/hide row numbers in the resulting table
Column width	Column width in the resulting table
Column height	Row height in the resulting table
Save column widths between queries	Maintain the same column width in the resulting table
Date pattern format	Date template for DATE data type. The table below describes the template parameters in detail

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Parameter	Description
Time pattern format	Time template for the TIME data type. The table below details the template parameters
Timestamp pattern format	Timestamp template for the TIMESTAMP data type. The table below details the parameters of the template
Time with time zone pattern format	Time template for the TIME WITH TIME ZONE data type. The table below details the template parameters
Timestamp with time zone pattern format	Timestamp time template for the TIMESTAMP WITH TIME ZONE data type. The table below details the parameters of the template
Null value cell text	Text to be added for NULL values
Transpose when single row result	Transpose a result consisting of a single row
Align numeric values	Arrangement of numeric values in a cell
Align text values	Alignment of text values in a cell
Align boolean values	Aligning boolean values in the cell
Align null values	Aligning null values in a cell
Align other values	Alignment of other types of values in the cell
Use form for adding/deleting records	Open a window when adding data to the table
Use other colour for null when adding/deleting records	Highlight a cell with a null value with a colour
Fetch size	Number of records to be retrieved when opening the dataset table
Maximum records returned	Maximum number of records to be returned in the resulting table

C.7.1 Datetime templates

Table C.12 — Datetime templates

Symbol	Description	Presentation	Examples
G	era	text	AD; Anno Domini; A
u	year	year	2004; 04
y	year-of-era	year	2004; 04
D	day-of-year	number	189
M/L	month-of-year	number/-text	7; 07; Jul; July; J
d	day-of-month	number	10
Q/q	quarter-of-year	number/-text	3; 03; Q3; 3rd quarter
Y	week-based-year	year	1996; 96
w	week-of-week-based-year	number	27
W	week-of-month	number	4
E	day-of-week	text	Tue; Tuesday; T

(table breaks)

(table breaks)

Symbol	Description	Presentation	Examples
e/c	localized day-of-week	number/-text	2; 02; Tue; Tuesday; T
F	day-of-week-in-month	number	3
a	am-pm-of-day	text	PM
B	period-of-day	text	in the morning
h	clock-hour-of-am-pm (1-12)	number	12
K	hour-of-am-pm (0-11)	number	0
k	clock-hour-of-day (1-24)	number	24
H	hour-of-day (0-23)	number	0
m	minute-of-hour	number	30
s	second-of-minute	number	55
S	fraction-of-second	fraction	978
A	milli-of-day	number	1234
n	nano-of-second	number	987654321
N	nano-of-day	number	1234000000
O	localized zone-offset	offset-O	GMT+8; GMT+08:00; UTC-08:00
X	zone-offset 'Z' for zero	offset-X	Z; -08; -0830; -08:30; -083015; -08:30:15
x	zone-offset	offset-x	+0000; -08; -0830; -08:30; -083015; -08:30:15
p	pad next	pad modifier	1
'	escape for text	delimiter	
"	single quote	literal	'

C.8 Tool bar

Table C.13 — Visibility

Parameter	Description
Database tool bar	Display/hide the database toolbar
Application tool bar	Display/hide application toolbar
System tool bar	Display/hide the system toolbar

The Database Tools, Application Tools, System Tools, and Editor Tools tabs contain settings for defining the tool set of the respective panels.

C.9 Fonts

Font settings for the query editor, connection tree, and system console fonts.

C.10 Colours

Settings for the colours that are used in the application.