

**LibreOffice**  
The Document Foundation

Base Handbook

*Appendix*

## Copyright

---

This document is Copyright © 2013–2015 by the LibreOffice Documentation Team. Contributors are listed below. You may distribute or modify it under the terms of either the GNU General Public License (<http://www.gnu.org/licenses/gpl.html>), version 3 or later, or the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), version 4.0 or later.

All trademarks within this guide belong to their legitimate owners.

## Contributors

Jochen Schiffers  
Hazel Russman

Robert Großkopf  
Jean Hollis Weber

Jost Lange

## Feedback

Please direct any comments or suggestions about this document to the Documentation Team's mailing list: [documentation@global.libreoffice.org](mailto:documentation@global.libreoffice.org)

Note: Everything you send to a mailing list, including your email address and any other personal information that is written in the message, is publicly archived and cannot be deleted.

## Acknowledgments

This chapter is based on an original German document and was translated by Hazel Russman.

## Publication date and software version

Published 23 December 2015. Based on LibreOffice 5.0.

## Note for Mac users

---

Some keystrokes and menu items are different on a Mac from those used in Windows and Linux. The table below gives some common substitutions for the instructions in this chapter. For a more detailed list, see the application Help.

<b>Windows or Linux</b>	<b>Mac equivalent</b>	<b>Effect</b>
<b>Tools &gt; Options</b> menu selection	<b>LibreOffice &gt; Preferences</b>	Access setup options
<i>Right-click</i>	<i>Control+click</i>	Open a context menu
<i>Ctrl (Control)</i>	<i>⌘ (Command)</i>	Used with other keys
<i>F5</i>	<i>Shift+⌘+F5</i>	Open the Navigator
<i>F11</i>	<i>⌘+T</i>	Open the Styles and Formatting window

# Contents

---

<b>Copyright</b> .....	<b>2</b>
Contributors.....	2
Feedback.....	2
Acknowledgments.....	2
Publication date and software version.....	2
<b>Note for Mac users</b> .....	<b>2</b>
<b>Barcodes</b> .....	<b>4</b>
<b>Data types for the table editor</b> .....	<b>4</b>
Integers.....	4
Floating-point numbers.....	4
Text.....	5
Time.....	5
Other.....	5
<b>Data types in StarBasic</b> .....	<b>6</b>
Numbers.....	6
Others.....	6
<b>Built-in functions and stored procedures</b> .....	<b>7</b>
Numeric.....	7
Text.....	8
Date/Time.....	10
Database connection.....	11
System.....	12
<b>Control characters for use in queries</b> .....	<b>13</b>
<b>Some uno commands for use with a button</b> .....	<b>13</b>
<b>Information tables for HSQLDB</b> .....	<b>13</b>
<b>Database repair for *.odb files</b> .....	<b>15</b>
Recovery of the database archive file.....	15
Further information on database archive files.....	16
Solving problems due to version conflict.....	23
Further tips.....	23
<b>Connecting a database to an external HSQLDB</b> .....	<b>23</b>
<b>Parallel installation of internal and external HSQLDB databases</b> .....	<b>26</b>
<b>Changing the database connection to external HSQLDB</b> .....	<b>26</b>
Changing the database connection for multi-user access.....	27
Auto-incrementing values with external HSQLDB.....	29
<b>Managing the internal Firebird database</b> .....	<b>29</b>

## Barcodes

To be able to use the barcode print function, the font ean13 . t t f must be installed. This font is freely available.

EAN13 barcodes can be created using ean13 . t t f as follows:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Number	Upper case, A=0 B=1 etc.						*	Lower case, a=0 b=1 etc.						+

See also the query **Barcode\_EAN13\_ttf\_command** in the example database Media\_without\_Macros.

## Data types for the table editor

<b>Integers</b>				
<i>Type</i>	<i>Option</i>	<i>HSQldb</i>	<i>Range</i>	<i>Storage space</i>
Tiny Integer	TINYINT	TINYINT	$2^8 = 256$   - 128 bis + 127	1 Byte
Small Integer	SMALLINT	SMALLINT	$2^{16} = 65536$   - 32768 bis + 32767	2 Byte
Integer	INTEGER	INTEGER   INT	$2^{32} = 4294967296$   - 2147483648 bis + 2147483647	4 Byte
BigInt	BIGINT	BIGINT	$2^{64}$	8 Byte
<b>Floating-point numbers</b>				
<i>Type</i>	<i>Option</i>	<i>HSQldb</i>	<i>Range</i>	<i>Storage space</i>
Decimal	DECIMAL	DECIMAL	Unlimited, up to 50 places in the GUI, fixed decimal point, perfect accuracy	variable
Number	NUMERIC	NUMERIC	Unlimited, up to 50 places in the GUI, fixed decimal point, perfect accuracy	variable
Float	FLOAT	(DOUBLE used instead)		
Real	REAL	REAL		
Double	DOUBLE	DOUBLE [PRECISION]   FLOAT	Adjustable, not exact, 15 decimal places maximum	8 Byte

<b>Text</b>				
<i>Type</i>	<i>Option</i>	<i>HSQldb</i>	<i>Range</i>	<i>Storage space</i>
Text	VARCHAR	VARCHAR	Adjustable	variable
Text	VARCHAR_IGNORECASE	VARCHAR_IGNORECASE	Adjustable, range affects sorting	variable
Text (fix)	CHAR	CHAR   CHARACTER	Adjustable, rest of actual text replaced with spaces	fixed
Memo	LONGVARCHAR	LONGVARCHAR		variable
<b>Time</b>				
<i>Type</i>	<i>Option</i>	<i>HSQldb</i>	<i>Range</i>	<i>Storage space</i>
Date	DATE	DATE		4 Byte
Time	TIME	TIME		4 Byte
Date/Time	TIMESTAMP	TIMESTAMP   DATETIME	Adjustable (0.6 – 6 means with milliseconds)	8 Byte
<b>Other</b>				
<i>Type</i>	<i>Option</i>	<i>HSQldb</i>	<i>Range</i>	<i>Storage space</i>
Yes/No	BOOLEAN	BOOLEAN   BIT		
Binaryfield (fix)	BINARY	BINARY	Like Integer	fixed
Binary field	VARBINARY	VARBINARY	Like Integer	variable
Image	LONGVARBINARY	LONGVARBINARY	Like Integer	variable, intended for larger images
OTHER	OTHER	OTHER   OBJECT		

In the table definitions, and when data types are changed in queries using the “convert” or “cast” functions, some data types expect information about the number of characters (a), the precision (g, corresponding to the total number of characters) and the number of decimal places (d). The types are CHAR(a), VARCHAR(a), DOUBLE(g), NUMERIC(g, d), DECIMAL(g, d) and TIMESTAMP(g).

TIMESTAMP(g) can have only two values: ‘0’ and ‘6’. ‘0’ means that no seconds will be stored in the decimal part (tenths, hundredths...). The precision of timestamps can be given only *directly using SQL commands*. So if you are storing timings from some kind of sport, you must set TIMESTAMP(6) using **Tools** → **SQL** in advance.

## Data types in StarBasic

<b>Numbers</b>				
<i>Type</i>	<i>Corresponds to HSQLDB</i>	<i>Initial value</i>	<i>Remarks</i>	<i>Storage requirements</i>
Integer	SMALLINT	0	$2^{16} = - 32768$ bis $+ 32767$	2 Byte
Long	INTEGER	0	$2^{32} = - 2147483648$ bis $+ 2147483647$	4 Byte
Single		0.0	Decimal: «.»	4 Byte
Double	DOUBLE	0.0	Decimal: «.»	8 Byte
Currency	Resembles DECIMAL, NUMERIC	0.0000	4 fixed decimal places	8 Byte
<b>Others</b>				
<i>Type</i>	<i>Corresponds to HSQLDB</i>	<i>Initial value</i>	<i>Remarks</i>	<i>Storage requirements</i>
Boolean	BOOLEAN	False	1 = yes, everything else: no.	1 Byte
Date	TIMESTAMP	00:00:00	Date and time	8 Byte
String	VARCHAR	Empty String	Up to 65536 characters	variable
Object	OTHER	Null		variable
Variant		Empty	Can accept any (other) data type	variable

There are great risks in data conversion, especially with numeric values. For example, primary keys in databases are most commonly of the type INTEGER. If these are read out by a macro, the variable in which they are stored must be of the type “Long”, as this corresponds in size to the “INTEGER” type in Base. The corresponding read instruction is “getLong”.

## Built-in functions and stored procedures

The following functions are available in the built in HSQLDB database. Unfortunately there are one or two functions that can only be used when “Run SQL command directly” is chosen. This will then prevent these queries from being edited.

Functions that work with the graphical user interface are marked [works in the GUI]. Functions that work only in direct SQL commands are marked [Direct SQL – does not work in the GUI]

<b>Numeric</b>	
As we are dealing here with floating point numbers, be sure to take care with the settings of the fields in queries. Mostly the display of decimal places is restricted, so that in some cases there may be unexpected results. For example, column 1 might show 0.00 but actually contain 0.001, and column 2, 1000. If column 3 is set to show Column 1 * Column 2, it would actually show 1.	
ABS(d)	Returns the absolute value of a number, removing a minus sign where necessary. [works in the GUI]
ACOS(d)	Returns the arc-cosine. [Works in the GUI]
ASIN(d)	Returns the arc-sine. [Works in the GUI]
ATAN(d)	Returns the arc-tangent.
ATAN2(a,b)	Returns the arc-tangent using coordinates. a is the value of the x-axis, b the value of the y-axis. [Works in the GUI]
BITAND(a,b)	Both the binary form of a and the binary form of b must have 1 at the same position to yield 1 in the result. BITAND(3,5) yields 1; 0011 AND 0101 = 0001 [Works in the GUI]
BITOR(a,b)	Either the binary form of a or the binary form of b must have 1 at the same position to yield 1 in the result. BITAND(3,5) yields 7; 0011 OR 0101 = 0111 [Works in the GUI]
CEILING(d)	Returns the smallest whole number that is not smaller than d. [Works in the GUI]
COS(d)	Returns the cosine. [Works in the GUI]
COT(d)	Returns the cotangent. [Works in the GUI]
DEGREES(d)	Converts radians to degrees. [Works in the GUI]
EXP(d)	Returns $e^d$ ( e: (2.718...) ). [Works in the GUI]

FLOOR(d)	Returns the largest whole number that is not greater than d. [Works in the GUI]
LOG(d)	Returns the natural logarithm to base e. [Works in the GUI]
LOG10(d)	Returns the logarithm to base 10. [Works in the GUI]
MOD(a,b)	Returns the remainder as a whole number, in the division of 2 whole numbers. MOD(11,3) ergibt 2, weil $3 \cdot 3 + 2 = 11$ [works in the GUI]
PI()	Returns $\pi$ (3.1415...). [works in the GUI]
POWER(a,b)	$a^b$ , POWER(2,3) = 8, since $2^3 = 8$ [works in the GUI]
RADIANS(d)	Converts degrees to radians. [works in the GUI]
RAND()	Returns a random number greater than or equal to 0.0 and less than 1.0. [works in the GUI]
ROUND(a,b)	Rounds a to b decimal places. [works in the GUI]
ROUNDMAGIC(d)	Solves rounding problems, that arise from using floating point numbers. $3.11 - 3.1 - 0.01$ is not exactly 0, but is shown as 0 in the GUI. ROUNDMAGIC makes it an actual zero value. [works in the GUI]
SIGN(d)	Returns -1, if d is less than 0, 0 if $d=0$ and 1 if d is greater than 0. [works in the GUI]
SIN(A)	Returns the sine of an angle in radians. [works in the GUI]
SQRT(d)	Returns the square root. [works in the GUI]
TAN(A)	Returns the tangent of an angle in radians. [works in the GUI]
TRUNCATE(a,b)	Truncates a to b decimal places. TRUNCATE(2.37456,2) = 2.37 [works in the GUI]
<b>Text</b>	
ASCII(s)	Returns the ASCII code of the first letter of the string. [works in the GUI]



BIT_LENGTH(str)	Returns the length of the text string str in bits. [works in the GUI]
CHAR(c)	Returns the letter corresponding to the ASCII code c. [works in the GUI]
CHAR_LENGTH(str)	Returns the length of the text in characters. [works in the GUI]
CONCAT(str1,str2)	Concatenates str1 and str2. [works in the GUI]
'str1'    'str2'    'str3' or 'str1'+ 'str2'+ 'str3'	Concatenates str1 + str2 + str3, simpler alternative to CONCAT. [works in the GUI]
DIFFERENCE(s1,s2)	Returns the sound difference between s1 and s2. Only a whole number is output. 0 means they sound the same. So 'for' and 'four' yield 0, 'king' and 'wing' yield 1, 'see' and 'sea' yield 0. [works in the GUI]
HEXTORAW(s1)	Translates hexadecimal code to other characters. [works in the GUI]
INSERT(s,start,len,s2)	Returns a text string, with part of the text replaced. Beginning with start, a length len is cut out of the text s and replaced by the text s2. INSERT(Bundesbahn, 3, 4, mmel ) converts Bundesbahn into Bummelbahn, where the length of the inserted text can be greater than that of the deleted text without causing any problems. So INSERT(Bundesbahn, 3, 5, s und B ) yields 'Bus und Bahn'. [works in the GUI]
LCASE(s)	Converts a string to lower case. [works in the GUI]
LEFT(s,count)	Returns the first count characters from the beginning of the text s. [works in the GUI]
LENGTH(s)	Returns the length of text in characters. [works in the GUI]
LOCATE(search,s,[start])	Returns the first match for the term search in the text s. The match is given as an offset number: (1=left, 0=not found) Setting a starting point within the text string is optional. [works in the GUI]
LTRIM(s)	Removes leading spaces and non-printing characters from the beginning of a text string. [works in the GUI]
OCTET_LENGTH(str)	Returns the length of a text string in bytes. This corresponds to twice the length in characters. [works in the GUI]
RAWTOHEX(s1)	Converts to hexadecimals, reverse of HEXTORAW(). [works in the GUI]
REPEAT(s,count)	Repeats the text string s count times. [works in the GUI]

REPLACE(s,replace,s2)	Replaces all existing occurrences of replace in the text string s by the text s2. [works in the GUI]
RIGHT(s,count)	Opposite of LEFT; returns the last count characters at the end of a text string. [works in the GUI]
RTRIM(s)	Removes all spaces and non-printing characters from the end of a text string. [works in the GUI]
SOUNDEX(s)	Returns a 4-character code, corresponding to the sound of s – matches the function DIFFERENCE(). [works in the GUI]
SPACE(count)	Returns count spaces. [works in the GUI]
SUBSTR(s,start[,len])	Abbreviation for SUBSTRING. [works in the GUI]
SUBSTRING(s,start[,len])	Returns the text s from the start position (1=left). If length is left out, the whole string is returned. [works in the GUI]
UCASE(s)	Converts a string to upper case. [works in the GUI]
LOWER(s)	As LCASE(s) [works in the GUI]
UPPER(s)	As UCASE(s) [works in the GUI]
<b>Date/Time</b>	
CURDATE()	Returns the current date. [works in the GUI]
CURTIME()	Returns the current time. [works in the GUI]
DATEDIFF(string, datetime1, datetime2)	Date difference between two dates- compares date/time values. The entry in string determines the units in which the difference is returned: ms=millisecond, ss=second, mi=minute, hh=hour, dd=day, mm=month, yy = year. Both the long and the short forms can be used for string. [works in the GUI]
DAY(date)	Returns the day of the month (1-31). [works in the GUI]
DAYNAME(date)	Returns the English name of the day. [works in the GUI]

DAYOFMONTH(date)	Returns the day of the month (1-31). Synonym for DAY() [works in the GUI]
DAYOFWEEK(date)	Returns the weekday as a number (1 represents Sunday). [works in the GUI]
DAYOFYEAR(date)	Returns the day of the year (1-366). [works in the GUI]
HOUR(time)	Returns the hour (0-23). [works in the GUI]
MINUTE(time)	Returns the minute (0-59). [works in the GUI]
MONTH(date)	Returns the month (1-12). [works in the GUI]
MONTHNAME(date)	Returns the English name of the month. [works in the GUI]
NOW()	Returns the current date and the current time together as a timestamp. Alternatively CURRENT_TIMESTAMP can be used. [works in the GUI]
QUARTER(date)	Returns the quarter of the year (1-4). [works in the GUI]
SECOND(time)	Returns the seconds part of the time (0-59). [works in the GUI]
WEEK(date)	Returns the week of the year (1-53). [works in the GUI]
YEAR(date)	Returns the year part of a date entry. [works in the GUI]
CURRENT_DATE	Synonym for CURDATE(), SQL-Standard, [works in the GUI]
CURRENT_TIME	Synonym for CURTIME(), SQL-Standard. [works in the GUI]
CURRENT_TIMESTAMP	Synonym for NOW(), SQL-Standard. [works in the GUI]

## Database connection

Except for IDENTITY(), which has no meaning in Base, all these can be carried out using **Direct SQL Command**.

DATABASE()	Returns the name of the database to which this connection belongs. [works in the GUI]
USER()	Returns the username of this connection. [Direct SQL – does <b>not</b> work with the GUI]
CURRENT_USER	SQL standard function, synonym for USER(). [works in the GUI]

IDENTITY()	Returns the last value for an autovalue field, which was created in the current connection. This is used in macro coding to transfer a primary key in one table to become a foreign key for another table. [works in the GUI]
<b>System</b>	
IFNULL(exp,value)	If exp is NULL, value is returned, otherwise exp. Alternatively as an extension COALESCE() can be used. Exp and value must have the same data type. [works in the GUI]
CASEWHEN(exp,v1,v2)	If exp is true, v1 is returned, otherwise v2. Alternatively CASE WHEN can be used. CASE WHEN works better with the GUI. [works in the GUI]
CONVERT(term,type)	Converts term into another data type. [works in the GUI]
CAST(term AS type)	Synonym for CONVERT(). [works in the GUI]
COALESCE(expr1,expr2,expr3,...)	If expr1 is not NULL, returns expr1, otherwise expr2 is checked, then expr3 and so on. [works in the GUI]
NULLIF(v1,v2)	If v1 is equal to v2, NULL is returned, otherwise v1. [works in the GUI]
CASE v1 WHEN v2 THEN v3 [ELSE v4] END	If v1 is equal to v2, v3 is returned. Otherwise v4 is returned or NULL, if there is no ELSE clause. [Direct SQL – does <b>not</b> work with the GUI]
CASE WHEN expr1 THEN v1[WHEN expr2 THEN v2] [ELSE v4] END	If expr1 is true, v1 is returned [optionally further conditions can be set]. Otherwise v4 is returned or NULL if there is no ELSE condition. [works in the GUI]
EXTRACT ({YEAR   MONTH   DAY   HOUR   MINUTE   SECOND} FROM <date or time>)	Can replace many of the date and time functions. Returns the year, the month, the day, etc. from a date or date/time value. [works in the GUI]
POSITION(<string expression> IN <string expression>)	If the first string is contained in the second one, the offset of the first string is given, otherwise 0 is returned. [works in the GUI]
SUBSTRING(<string expression> FROM <numeric expression> [FOR <numeric expression>])	Yields part of a text string from the position specified in FROM, optionally up to the length given in FOR. [works in the GUI]
TRIM([{{LEADING   TRAILING   BOTH}}] FROM <string expression>)	Non-printing special characters and spaces are removed. [works in the GUI]

## Control characters for use in queries

---

Fields can be linked together in queries. Two fields in

```
SELECT "First name", "Surname" FROM "Table"
```

become one field by using:

```
SELECT "First name" || ' ' || "Surname" FROM "Table"
```

Here an additional space is inserted. Naturally it could be any character. As long as it is bracketed by ' ', it will be interpreted as text. Sometimes however it is necessary to insert non-printing characters such as new lines, for example in preparing reports. So here is a short list of control characters, which could be extended by a quick look at [https://en.wikipedia.org/wiki/Control\\_character](https://en.wikipedia.org/wiki/Control_character).

CHAR( 9 )	Horizontal Tab	
CHAR( 10 )	Line feed	In mailmerge letters and Report Builder, creates a line break (Linux, Unix, Mac)
CHAR( 13 )	Carriage return	Line break when combined with Carriage return in Windows <b>CHAR(13)    CHAR(10)</b> Can also be used in Linux and Mac, hence the universal variant.

## Some uno commands for use with a button

---

A button can have various uno commands directly bound to it. For this purpose you need to choose **Properties: Button > Action > Open document/web page** and then for example the **URL > .uno:RecSearch** to open the search function. Often you will need to choose **Take Focus on Click > No** if the action accesses another control directly in a way that requires it to be in focus, for example **.uno:Paste**, which can insert the contents of the clipboard.

The following list contains only a few commands. All the commands from the navigation toolbar are already usable in the button, but they can also be created via uno commands. Many commands can be discovered by using the macro recorder, which often uses a dispatcher to access them.

<b>Uno-Command</b>	<b>Used for ...</b>
.uno:RecSearch	Opens the search function in a form.
.uno:Paste	Paste from clipboard. Only works for <b>Take Focus on Click &gt; No</b>
.uno:Copy	Copies the selected content onto the clipboard. Only works for <b>Take Focus on Click &gt; No</b>
.uno:Print	Opens the print dialog for the form.
.uno:PrintDefault	Prints with the default printer without showing a dialog.

## Information tables for HSQLDB

---

Inside a database, information on all table properties and their connections to one another are stored in the *INFORMATION\_SCHEMA* area. This information allows Base macros to be created that require very few arguments for their procedures. An application is to be found in the example database in the *Maintenance* module—the *Table\_purge* procedure for the control of dialogs.

In a query, individual pieces of information and all the fields that belong can be provided in the following way:

```
SELECT * FROM "INFORMATION_SCHEMA"."SYSTEM_ALIASES"
```

In contrast to a normal table, it is necessary here to use *INFORMATION\_SCHEMA* as a prefix to the appropriate name from the following list:

```
SYSTEM_ALIASES
SYSTEM_ALLTYPEINFO
SYSTEM_BESTROWIDENTIFIER
SYSTEM_CACHEINFO
SYSTEM_CATALOGS
SYSTEM_CHECK_COLUMN_USAGE
SYSTEM_CHECK_CONSTRAINTS
SYSTEM_CHECK_ROUTINE_USAGE
SYSTEM_CHECK_TABLE_USAGE
SYSTEM_CLASSPRIVILEGES
SYSTEM_COLUMNPRIVILEGES
SYSTEM_COLUMNS
SYSTEM_CROSSREFERENCE
SYSTEM_INDEXINFO
SYSTEM_PRIMARYKEYS
SYSTEM_PROCEDURECOLUMNS
SYSTEM_PROCEDURES
SYSTEM_PROPERTIES
SYSTEM_SCHEMAS
SYSTEM_SEQUENCES
SYSTEM_SESSIONINFO
SYSTEM_SESSIONS
SYSTEM_SUPERTABLES
SYSTEM_SUPERTYPES
SYSTEM_TABLEPRIVILEGES
SYSTEM_TABLES
SYSTEM_TABLETYPES
SYSTEM_TABLE_CONSTRAINTS
SYSTEM_TEXTTABLES
SYSTEM_TRIGGERCOLUMNS
SYSTEM_TRIGGERS
SYSTEM_TYPEINFO
SYSTEM_UDTATTRIBUTES
SYSTEM_UDTS
SYSTEM_USAGE_PRIVILEGES
SYSTEM_USERS
SYSTEM_VERSIONCOLUMNS
SYSTEM_VIEWS
SYSTEM_VIEW_COLUMN_USAGE
SYSTEM_VIEW_ROUTINE_USAGE
SYSTEM_VIEW_TABLE_USAGE
```

The following query gives a complete overview of all tables in the database with field types, primary keys and foreign keys:

```
SELECT
  "A"."TABLE_NAME",
  "A"."COLUMN_NAME",
  "A"."TYPE_NAME",
  "A"."NULLABLE",
  "B"."KEY_SEQ" AS "PRIMARYKEY",
  "C"."PKTABLE_NAME" || '.' || "C"."PKCOLUMN_NAME" AS "FOREIGNKEY FOR"
FROM "INFORMATION_SCHEMA"."SYSTEM_COLUMNS" AS "A"
```

```

LEFT JOIN "INFORMATION_SCHEMA"."SYSTEM_PRIMARYKEYS" AS "B"
ON ( "B"."TABLE_NAME" = "A"."TABLE_NAME" AND "B"."COLUMN_NAME" =
"A"."COLUMN_NAME" )
LEFT JOIN "INFORMATION_SCHEMA"."SYSTEM_CROSSREFERENCE" AS "C"
ON ( "C"."FKTABLE_NAME" = "A"."TABLE_NAME" AND "C"."FKCOLUMN_NAME"
= "A"."COLUMN_NAME" )
WHERE "A"."TABLE_SCHEM" = 'PUBLIC'

```

## Database repair for \*.odb files

Regular backing up of data should be standard practice when using a PC. Backup copies are the simplest way to return to an even halfway current state for your data. However, in practice this is often lacking.

Forms, queries and reports can always be copied via the clipboard into a new database, providing that a previous version of the database has been saved. But if, for any reason, the current database can no longer be opened, the main problem becomes access to the data.

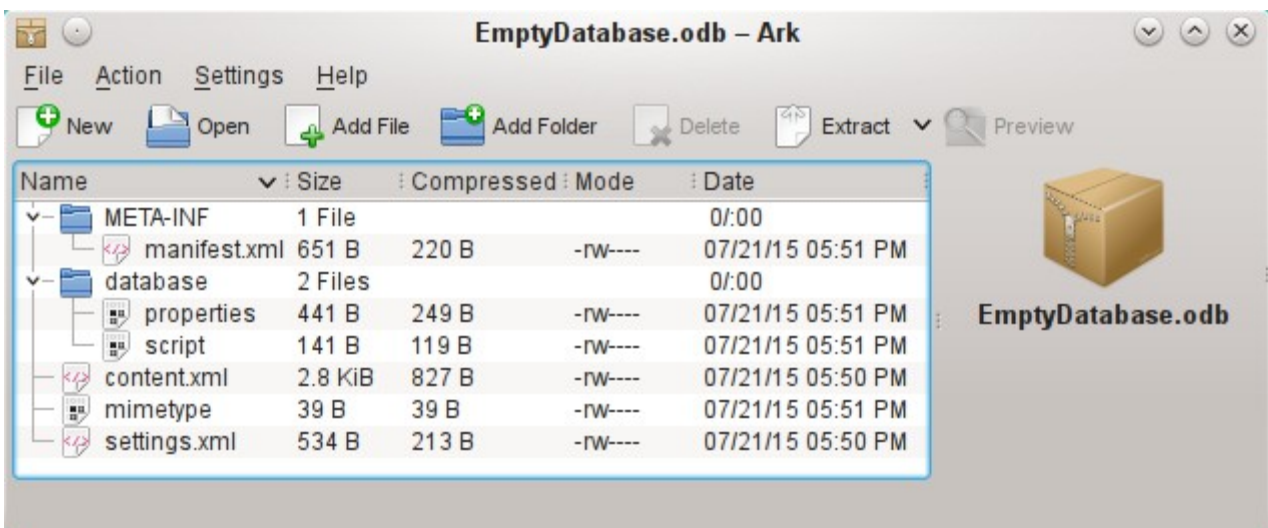
In the case of sudden PC crashes, it can happen that open databases (internal HSQLDB databases) can no longer be opened in LibreOffice. Instead, when you attempt to open the database, you are asked for a filter corresponding to the format.

The problem here is that part of the data in an open database is contained in working memory and is only temporarily copied to intermediate storage. Only when the file is closed is the whole database written back into the file and repacked.

## Recovery of the database archive file

To get access again to your data, you may find the following procedure helpful:

- 1) Create a copy of your database for the steps that follow.
- 2) Try to open the copy with an archiving program. In the case of \*.odb files, we are dealing with a compressed format, a Zip archive. If the file cannot be opened directly, try renaming it from \*.odb to \*.zip. If that does not open it, your database is past saving.
- 3) The following folders will always be seen after opening a database file in an archiving program:



- 4) The database file must be decompressed. The most important information, as far as the data is concerned, are in the subfolder database in the files data and script.



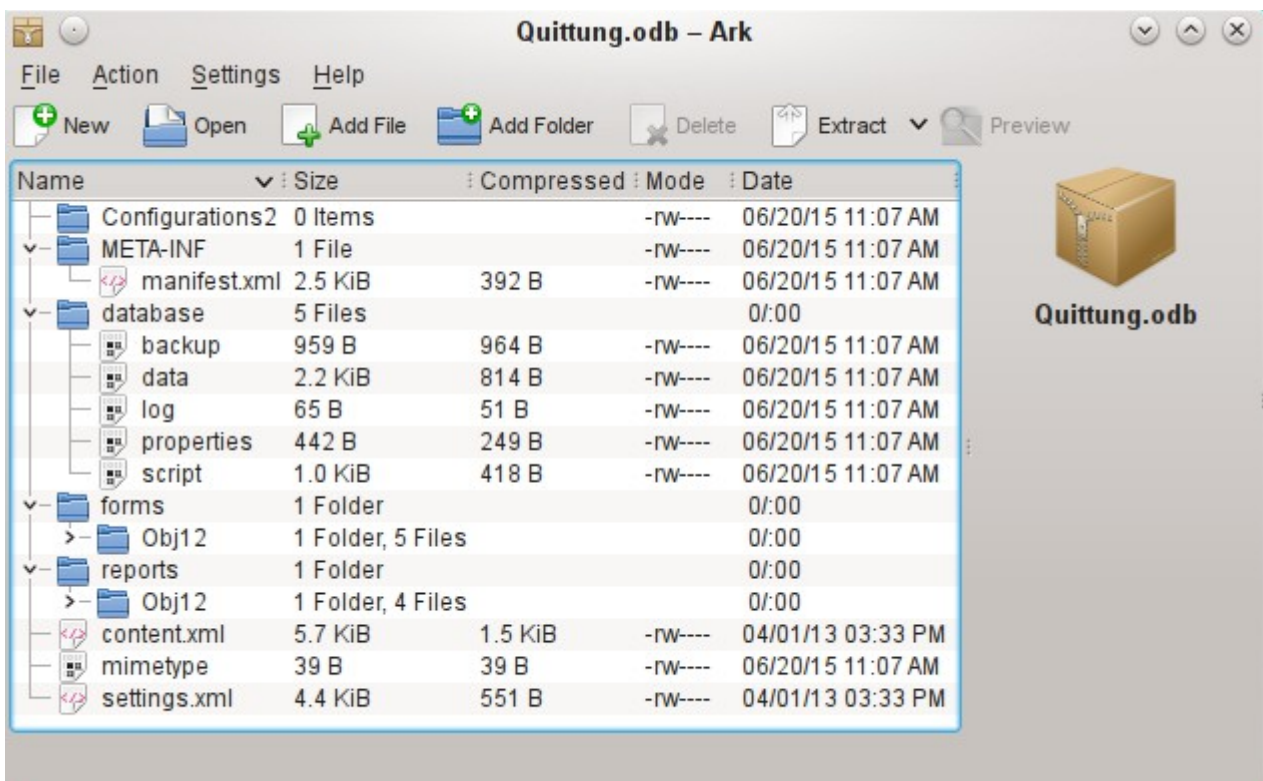
- 5) It may be necessary to look at the script file and test it for contradictions. This step can, however, be left for the testing stage. The script file contains above all the description of the table structure.
- 6) Create a new empty database file and open this file with the archiving program.
- 7) Replace the files data and script in the new database file with the files unpacked in step 4.
- 8) Close the archiving program. If it was necessary to rename the file to \*.zip before opening it in the archiving program (this depends on your operating system), now rename it again to \*.odb.
- 9) Open the database file in LibreOffice. You should be able to access your tables again.
- 10) How far your queries, forms, and reports can be recovered in a similar way must be the subject of further testing.

See also: <http://forum.openoffice.org/en/forum/viewtopic.php?f=83&t=17125>

## Further information on database archive files

In practice, a database archive file contains not only the basic folder for the database, and the folder "META-INF" which is specified for the OpenDocument format, but also additional folders for storing forms and reports. A description of the basic structure of the OpenDocument format can be found at <http://de.wikipedia.org/wiki/OpenDocument> zu finden.

The following view shows a database containing tables, a form and a report. It is not apparent that the database also contains a query. Queries are not stored in separate folders but in the "content.xml" file. The information necessary to run a query is after all only a simple piece of SQL code.



*Database file which contains stored information for a form and a report in addition to the database.*



Here is an overview of one of the database archive files.

## mimetype

application/vnd.oasis.opendocument.base

eine

This little text file contains only the notice that this archive file is a database file in OpenDocument format.

## content.xml einer Datenbank ohne Inhalt

```
<?xml version="1.0" encoding="UTF-8"?>
<office:document-content
xmlns:office="urn:oasis:names:tc:opendocument:xmlns:office:1.0"
xmlns:style="urn:oasis:names:tc:opendocument:xmlns:style:1.0"
xmlns:text="urn:oasis:names:tc:opendocument:xmlns:text:1.0"
xmlns:table="urn:oasis:names:tc:opendocument:xmlns:table:1.0"
xmlns:draw="urn:oasis:names:tc:opendocument:xmlns:drawing:1.0"
xmlns:fo="urn:oasis:names:tc:opendocument:xmlns:xsl-fo-compatible:1.0"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:meta="urn:oasis:names:tc:opendocument:xmlns:meta:1.0"
xmlns:number="urn:oasis:names:tc:opendocument:xmlns:datastyle:1.0"
xmlns:svg="urn:oasis:names:tc:opendocument:xmlns:svg-compatible:1.0"
xmlns:chart="urn:oasis:names:tc:opendocument:xmlns:chart:1.0"
xmlns:dr3d="urn:oasis:names:tc:opendocument:xmlns:dr3d:1.0"
xmlns:math="http://www.w3.org/1998/Math/MathML"
xmlns:form="urn:oasis:names:tc:opendocument:xmlns:form:1.0"
xmlns:script="urn:oasis:names:tc:opendocument:xmlns:script:1.0"
xmlns:ooo="http://openoffice.org/2004/office"
xmlns:ooow="http://openoffice.org/2004/writer"
xmlns:oooc="http://openoffice.org/2004/calc"
xmlns:dom="http://www.w3.org/2001/xml-events"
xmlns:db="urn:oasis:names:tc:opendocument:xmlns:database:1.0"
xmlns:xforms="http://www.w3.org/2002/xforms"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:rpt="http://openoffice.org/2005/report"
xmlns:of="urn:oasis:names:tc:opendocument:xmlns:of:1.2"
xmlns:xhtml="http://www.w3.org/1999/xhtml"
xmlns:grddl="http://www.w3.org/2003/g/data-view#"
xmlns:tableooo="http://openoffice.org/2009/table"
xmlns:drawooo="http://openoffice.org/2010/draw"
xmlns:calcext="urn:org:documentfoundation:names:experimental:calc:xmlns:calcext:1.0"
xmlns:field="urn:openoffice:names:experimental:ooo-ms-interop:xmlns:field:1.0"
xmlns:formx="urn:openoffice:names:experimental:ooxml-odf-interop:xmlns:form:1.0"
xmlns:css3t="http://www.w3.org/TR/css3-text/"
office:version="1.2">
  <office:scripts/>
  <office:font-face-decls/>
  <office:automatic-styles/>
  <office:body>
    <office:database>
      <db:data-source>
        <db:connection-data>
          <db:connection-resource xlink:href="sdbc:embedded:hsqldb"/>
          <db:login db:is-password-required="false"/>
        </db:connection-data>
        <db:driver-settings
          db:system-driver-settings=""
          db:base-dn=""
          db:parameter-name-substitution="false"/>
        <db:application-connection-settings
          db:is-table-name-length-limited="false"
          db:append-table-alias-name="false"
          db:max-row-count="100">
          <db:table-filter>
```

```

        <db:table-include-filter>
            <db:table-filter-pattern>%</db:table-filter-pattern>
        </db:table-include-filter>
    </db:table-filter>
</db:application-connection-settings>
</db:data-source>
</office:database>
</office:body>
</office:document-content>

```

It begins with the xml version and the character set used. Everything that follows is actually a single unwrapped line. The view prepared above should make things clearer. Elements that belong together are bracketed by tags.

The initial definitions beginning with “xmlns:” (XML namespace) give the namespaces that can be accessed from inside the file. Then somewhat more concrete terms are considered. Here it becomes clear that we are dealing with an internal HSQLDB database, and that a password is not required for access.

### content.xml for a database with contents

The following content is only an excerpt from the content.xml file for the purpose of clarifying its structure.

```

<office:scripts/>
<office:font-face-decls>
    <style:font-face style:name="F" svg:font-family=""/>
</office:font-face-decls>
<office:automatic-styles>
    <style:style
        style:name="co1"
        style:family="table-column"
        style:data-style-name="N0"/>
    <style:style
        style:name="co2"
        style:family="table-column"
        style:data-style-name="N107"/>
    <style:style style:name="ce1" style:family="table-cell">
        <style:paragraph-properties fo:text-align="start"/>
    </style:style>
    <number:number-style style:name="N0" number:language="de" number:country="DE">
        <number:number number:min-integer-digits="1"/>
    </number:number-style>
    <number:currency-style
        style:name="N107P0"
        style:volatile="true"
        number:language="de"
        number:country="DE">
        <number:number
            number:decimal-places="2"
            number:min-integer-digits="1"
            number:grouping="true"/>
        <number:text> </number:text>
        <number:currency-symbol
            number:language="de"
            number:country="DE">€
        </number:currency-symbol>
    </number:currency-style>

```

Here a field is defined as a currency field. The number of decimal places is given, the separation between the numbers and the currency symbol, and the currency symbol itself.

```

<number:currency-style
    style:name="N107"
    number:language="de"
    number:country="DE">
    <style:text-properties fo:color="#ff0000"/>
    <number:text>-</number:text>
    <number:number

```

```

        number:decimal-places="2"
        number:min-integer-digits="1"
        number:grouping="true"/>
<number:text> </number:text>
<number:currency-symbol
  number:language="de"
  number:country="DE">€
</number:currency-symbol>
<style:map style:condition="value()&gt;=0" style:apply-style-name="N107P0"/>
</number:currency-style>

```

In the second extract, it is laid down that up to a particular value, currency should appear in red (“ff0000”).

```

</office:automatic-styles>
<office:body>
  <office:database>
    <db:data-source>

```

This entry from the above content.xml file, with all its sub-entries, corresponds to an empty database archive file.

```

    </db:data-source>
    <db:forms>
      <db:component
        db:name="Receipts"
        xlink:href="forms/Obj12"
        db:as-template="false"/>
    </db:forms>

```

The database archive file contains a subsection in which details of a form are stored. The form is designated in the user interface as “Receipts”.

```

    <db:reports>
      <db:component
        db:name="Receipts"
        xlink:href="reports/Obj12"
        db:as-template="false"/>
    </db:reports>

```

The database archive file also contains a subsection in which details of a report are stored. The report is also designated in the user interface as “Receipts”.

```

    <db:queries>
      <db:query
        db:name="Sales_calc"
        db:command="SELECT &quot;a&quot;.*, ( SELECT &quot;Price&quot; *
          &quot;a&quot;.&quot;Total&quot; FROM &quot;Stock&quot; WHERE
          &quot;ID&quot; = &quot;a&quot;.&quot;Stock_ID&quot; ) AS
          &quot;Total*Price&quot; FROM &quot;Sales&quot; AS &quot;a&quot;"/>
      </db:queries>

```

All the queries are stored directly in content.xml. “&quot;” stands for double quotes. The query above in this example is actually quite complicated with many correlated subqueries. It is reproduced here in an abbreviated form.

```

    <db:table-representations>
      <db:table-representation db:name="Receipts"/>
      <db:table-representation db:name="Sales"/>
      <db:table-representation db:name="Stock">
        <db:columns>
          <db:column
            db:name="ID"
            db:style-name="co1"
            db:default-cell-style-name="ce1"/>
          <db:column
            db:name="MWst"
            db:style-name="co1"
            db:default-cell-style-name="ce1"/>
          <db:column
            db:name="Price"

```

```

        db:style-name="co2"
        db:default-cell-style-name="ce1"/>
    <db:column
        db:name="Stock"
        db:style-name="co1"
        db:default-cell-style-name="ce1"/>
    </db:columns>
</db:table-representation>
</db:table-representations>

```

This shows how various tables are to be displayed. Here the display properties of particular columns are stored: in this example, settings for the “Stock” table with its fields – “ID”, “MWSt” and so on – are stored. Apparently something has been directly entered here, changing the columns of the table a bit.

```

    </office:database>
</office:body>

```

Basically content.xml stores directly the contents of queries and information about the visual appearance of tables. In addition there is a definition of the database connection. Finally comes information about forms and reports.

### settings.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<office:document-settings
xmlns:office="urn:oasis:names:tc:opendocument:xmlns:office:1.0"
xmlns:table="urn:oasis:names:tc:opendocument:xmlns:table:1.0"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:number="urn:oasis:names:tc:opendocument:xmlns:datastyle:1.0"
xmlns:svg="http://www.w3.org/2000/svg"
xmlns:config="urn:oasis:names:tc:opendocument:xmlns:config:1.0"
xmlns:ooo="http://openoffice.org/2004/office"
xmlns:db="urn:oasis:names:tc:opendocument:xmlns:database:1.0"
office:version="1.2"/>

```

For a database without further content, only basic definitions are stored here. With content, various settings are also stored. After the start of the above definition, the following settings from the example database are stored.

```

<office:settings>
  <config:config-item-set config:name="ooo:view-settings">
    <config:config-item-set config:name="Queries">
      <config:config-item-set config:name="Calculate_sales">
        <config:config-item-set config:name="Tables">
          <config:config-item-set config:name="Table1">
            <config:config-item config:name="WindowName"
              config:type="string">Verkauf</config:config-item>
            <config:config-item config:name="WindowLeft"
              config:type="int">153</config:config-item>
            <config:config-item config:name="ShowAll"
              config:type="boolean">>true</config:config-item>
            <config:config-item config:name="WindowTop"
              config:type="int">17</config:config-item>
            <config:config-item config:name="WindowWidth"
              config:type="int">120</config:config-item>
            <config:config-item config:name="WindowHeight"
              config:type="int">120</config:config-item>
            <config:config-item config:name="ComposedName"
              config:type="string">Verkauf</config:config-item>
            <config:config-item config:name="TableName"
              config:type="string">Verkauf</config:config-item>
          </config:config-item-set>
        </config:config-item-set>
      </config:config-item-set>
    <config:config-item config:name="SplitterPosition"
      config:type="int">105</config:config-item>
    <config:config-item config:name="VisibleRows"
      config:type="int">1024</config:config-item>
  </config:config-item-set>

```

```

    </config:config-item-set>
  </config:config-item-set>
  <config:config-item-set config:name="ooo:configuration-settings">
    <config:config-item-set config:name="layout-settings">
      <config:config-item-set config:name="Tables">
        <config:config-item-set config:name="Table1">
          <config:config-item config:name="WindowName"
            config:type="string">Verkauf</config:config-item>
          <config:config-item config:name="WindowLeft"
            config:type="int">186</config:config-item>
          <config:config-item config:name="ShowAll"
            config:type="boolean">>false</config:config-item>
          <config:config-item config:name="WindowTop"
            config:type="int">17</config:config-item>
          <config:config-item config:name="WindowWidth"
            config:type="int">120</config:config-item>
          <config:config-item config:name="WindowHeight"
            config:type="int">120</config:config-item>
          <config:config-item config:name="ComposedName"
            config:type="string">Verkauf</config:config-item>
          <config:config-item config:name="TableName"
            config:type="string">Sales</config:config-item>
        </config:config-item-set>
        <config:config-item-set config:name="Table2">
          ... (identical config:type-Points as "Table1"
          <config:config-item config:name="TableName"
            config:type="string">Ware</config:config-item>
        </config:config-item-set>
        <config:config-item-set config:name="Table3">
          ... (identical config:type-Points as "Table1"
          <config:config-item config:name="TableName"
            config:type="string">Receipts</config:config-item>
        </config:config-item-set>
      </config:config-item-set>
    </config:config-item-set>
  </config:config-item-set>
</office:settings>

```

The whole overview relates to different views of windows for the (a) query “Calculate sales” and the tables “Sales”, “Stock” and “Receipts”. The last two are shown here in an abbreviated form. If these settings were absent in a defective \*.odb file, it would not matter. They would be recreated when the corresponding window was next opened.

#### META-INF/manifest.xml

```

<?xml version="1.0" encoding="UTF-8"?>
<manifest:manifest
  xmlns:manifest="urn:oasis:names:tc:opendocument:xmlns:manifest:1.0">
  <manifest:file-entry
    manifest:full-path="/"
    manifest:media-type="application/vnd.oasis.opendocument.base"/>
  <manifest:file-entry
    manifest:full-path="database/script"
    manifest:media-type=""/>
  <manifest:file-entry
    manifest:full-path="database/properties"
    manifest:media-type=""/>
  <manifest:file-entry
    manifest:full-path="settings.xml"
    manifest:media-type="text/xml"/>
  <manifest:file-entry
    manifest:full-path="content.xml"
    manifest:media-type="text/xml"/>
</manifest:manifest>

```

This file in the META-INF folder gives the contents folder for the whole database archive. As this file deals with an empty database, there are only five file entries. A database archive that contains forms and reports will have a much more complicated META-INF file.

## database/properties

```
#HSQL Database Engine 1.8.0.10
#Sun Jul 14 18:02:08 CEST 2013
hsqldb.script_format=0
runtime.gc_interval=0
sql.enforce_strict_size=true
hsqldb.cache_size_scale=8
readonly=false
hsqldb.nio_data_file=false
hsqldb.cache_scale=13
version=1.8.0
hsqldb.default_table_type=cached
hsqldb.cache_file_scale=1
hsqldb.lock_file=true
hsqldb.log_size=10
modified=no
hsqldb.cache_version=1.7.0
hsqldb.original_version=1.8.0
hsqldb.compatible_version=1.8.0
```

The properties file contains the basic settings for the internal HSQLDB database.

## database/script

```
SET DATABASE COLLATION "German"
CREATE SCHEMA PUBLIC AUTHORIZATION DBA
CREATE USER SA PASSWORD ""
GRANT DBA TO SA
SET WRITE_DELAY 60
```

The script file contains default settings for connection to the database, the language setting, etc. The user “SA”, to be described later, appears here.

In a database with contents, this file contains the basic table definitions.

```
SET DATABASE COLLATION "German"
CREATE SCHEMA PUBLIC AUTHORIZATION DBA
```

The tables are defined before the database user is defined. First the tables are created in the cache with their fields.

```
CREATE CACHED TABLE "Stock"
  ("ID" INTEGER GENERATED BY DEFAULT AS IDENTITY(START WITH 0) NOT NULL
  PRIMARY KEY,"Stock" VARCHAR(50),"Price" DECIMAL(8,2),"MWSt" TINYINT)
CREATE CACHED TABLE "Sales"
  ("ID" INTEGER GENERATED BY DEFAULT AS IDENTITY(START WITH 0) NOT NULL
  PRIMARY KEY,"Total" TINYINT,"Stock_ID" INTEGER,"Receipt_ID" INTEGER,
  CONSTRAINT SYS_FK_59 FOREIGN KEY("Stock_ID") REFERENCES "Stock"("ID"))
CREATE CACHED TABLE "Receipts"
  ("ID" INTEGER GENERATED BY DEFAULT AS IDENTITY(START WITH 0) NOT NULL
  PRIMARY KEY,"Date" DATE)
```

Then changes in the table are made to ensure that the relationships (“REFERENCES”) are consistent.

```
ALTER TABLE "Sales" ADD CONSTRAINT SYS_FK_76 FOREIGN KEY("Receipt_ID")
  REFERENCES "Receipts"("ID")
SET TABLE "Stock" INDEX'608 20'
SET TABLE "Sales" INDEX'1872 1656 1872 12'
SET TABLE "Receipts" INDEX'2232 1'
```

After setting the position of the index in the data file (it appears here only in the script file but is never actually entered directly in SQL), the automatically incrementing fields in the tables (“AutoValues”) are set up so that they will provide the next value on entry of a new record. Suppose the last entered value in the “ID” field of the “Stock” table is 19. Auto-incrementing then starts at 20.

```
ALTER TABLE "Stock" ALTER COLUMN "ID" RESTART WITH 20
ALTER TABLE "Sales" ALTER COLUMN "ID" RESTART WITH 12
ALTER TABLE "Receipts" ALTER COLUMN "ID" RESTART WITH 1
CREATE USER SA PASSWORD ""
```

```
GRANT DBA TO SA
SET WRITE_DELAY 60
```

## Solving problems due to version conflict

If, as described in the following pages, you are using external HSQLDB, there may be a further problem with the \*.odb file connected with some LibreOffice versions. If external HSQLDB is used, the safest way is through the hsqldb.jar-archive, which is supplied with LibreOffice. If a different archive is used, it can lead to the internal database suddenly becoming inaccessible. This occurred because LibreOffice 3.3 and 3.4 had difficulty distinguishing between internal and external HSQLDB and produced warnings of an incompatibility between versions.

If the internal database can no longer be opened, the only practical solution is to use LO 3.5 or later. Alternatively an external database must be used with the supplied hsqldb.jar file. In addition, the database folder must be extracted from the \*.odb file. The properties file has an entry which leads to this error message in LO 3.3:

```
version=1.8.1 on line 11
```

This line should be changed to:

```
version=1.8.0
```

Afterwards the database folder is put back into the \*.odb package and the database can once more be opened in LibreOffice 3.3 and 3.4.

## Further tips

If for any reason the database has been opened but there is no access to the tables, you can use **Tools > SQL** to enter the **SHUTDOWN SCRIPT** command. The database can then be closed and reopened. This will not work if there has already been an error message "Error in script file".

The records in the database are stored in the \*.odb file in the subfolder "database". Here there are two files called "data" and "backup". If the "data" file is defective, it can be restored from "backup". To do this, you must first edit the "properties" file, which is also in the "database" folder. It contains a line "modified=no". Change this to "modified=yes". That informs the system that the database was not correctly closed. When you restart, the compressed "backup" file will regenerate the "data" file.

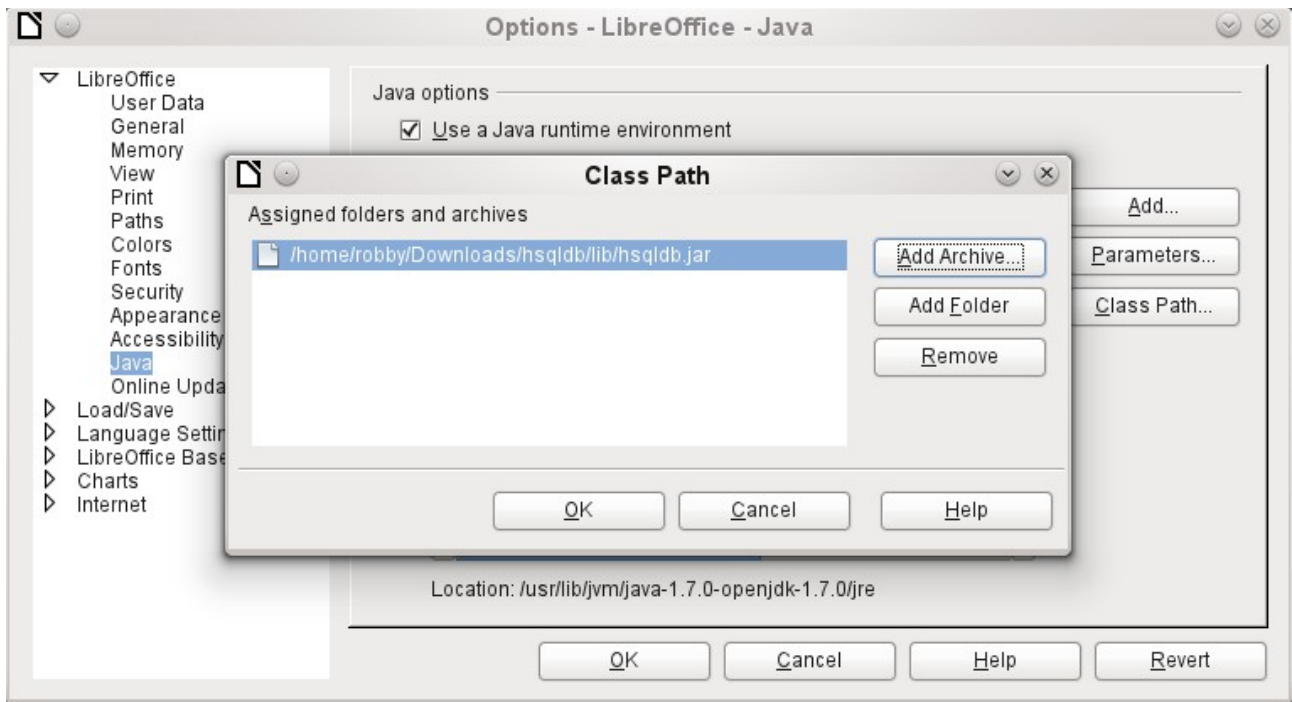
## Connecting a database to an external HSQLDB

---

Internal HSQLDB is indistinguishable from the external variant. If, as in the following description, the initial access to the database is from the outside, no server function is necessary. You just need the archive program which is supplied with LibreOffice. You will find it on the path under **/program/classes/hsqldb.jar**. The use of this archive is the safest solution, as you then get no version problems.

External HSQLDB is freely available for download at <http://hsqldb.org/>. When the database is installed, the following steps must be performed in LibreOffice:





If the database driver does not lie on the Java-Runtime path, it must be entered as a Class Path under **Tools > Options > Java**.

The connection to the external database uses JDBC. The database file should be stored in a particular directory. This directory can be freely chosen. In the following example it is in the home folder. The rest of the directory path and the name of the database are not given here.

It is important, if data in the database are to be written using the GUI, that next to the database name the words **" ;default\_schema=true"** are written. Dies kann noch durch ein **<< ;shutdown=true >>** ergänzt werden, damit die DB nach dem Schließen von LO heruntergefahren wird. This can be extended with **<< ;shutdown=true >>**, so that the database is shut down by LO.

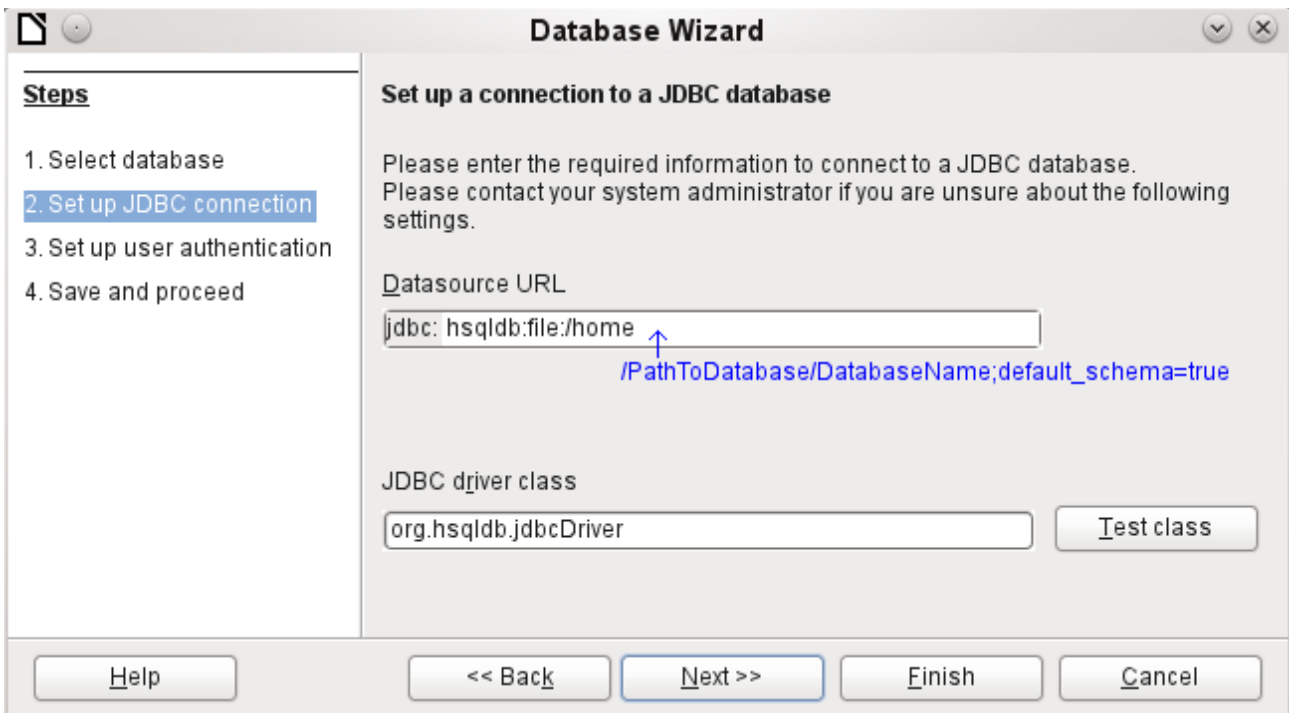
So:

```
jdbc:hsqldb:file:/home/PathToDatabase/Databasename;default_schema=true
;shutdown=true
```

In the folder you will find the files:

```
Databasename.backup
Databasename.data
Databasename.properties
Databasename.script
Databasename.log
```





The next step is to give the default user, if nothing in the HSQLDB configuration is to be changed:



This creates the connection and the database becomes accessible.

**Caution**



If an external database is edited with a version of HSQLDB 2.x, it can no longer be converted into an internal database under LibreOffice. This is because of additional functions which are not present in version 1.8.x. This terminates the invocation in the case of version 1.8.x while the script file of the database is being read in.

In the same way an external database which has once been edited with a version of the second series cannot afterwards be edited with version 1.8.x, which is compatible with LibreOffice.

## Parallel installation of internal and external HSQLDB databases

---

Including the external `hsqldb.jar` file in the class path can, in some versions, prevent internal databases from being opened. Base gets stuck because the drivers have the same name, and it tries to use the external driver for the internal database. This works the first time around. The second time, you get a message that the database cannot be opened as it was written with a newer version of HSQLDB.

To solve this problem, do not place the `hsqldb.jar` file, which is required for external databases, on LO's class path. Instead the class path for this file should be set by a macro, as shown below.

```
SUB Start
  Const cPath = "/home/robby/public_html/hsqldb_test/hsqldb.jar"
  DIM oDataSource AS OBJECT
  DIM oSettings AS OBJECT
  DIM sURL AS STRING
  sURL = ConvertToURL(cPath)
  oDataSource = ThisComponent.DataSource
  oSettings = oDataSource.Settings
  oSettings.JavaDriverClassPath = sURL
END SUB
```

Here the `hsqldb.jar` file in a Linux system is on the path shown above. This path is passed to the database just opened as its driver file.

This macro is called just once after the `*.odb` file has been opened. It writes the corresponding connection to the `Java` class into the `content.xml` file in the `*.odb` archive:

```
<db:data-source-settings>
  <db:data-source-setting
    db:data-source-setting-is-list="false"
    db:data-source-setting-name="JavaDriverClass"
    db:data-source-setting-type="string">
  <db:data-source-setting-value>
    org.hsqldb.jdbcDriver
  </db:data-source-setting-value>
  </db:data-source-setting>
  <db:data-source-setting
    db:data-source-setting-is-list="false"
    db:data-source-setting-name="JavaDriverClassPath"
    db:data-source-setting-type="string">
  <db:data-source-setting-value>
    file:///home/robby/public_html/hsqldb_test/hsqldb.jar
  </db:data-source-setting-value>
  </db:data-source-setting>
</db:data-source-settings>
```

Finally the path could be written directly into `content.xml` without using a macro. However this method is not very comfortable for an ordinary user.

## Changing the database connection to external HSQLDB

---

Internal HSQL databases have the disadvantage that data storage involves a compressed archive. Only on compression are all the data finally written. This can more easily lead to data loss than when working with an external database. The following section shows the steps necessary to successfully change an existing database from an `*.odb` archive to an external version in HSQL.

From a copy of the existing database, extract the database directory. Copy the contents into an arbitrary directory as described above. Add the database name to the resultant filenames:

```
Databasename.backup
Databasename.data
Databasename.properties
Databasename.script
```

Databasename.log

Now the content.xml file must be extracted from the \*.odb archive. Use any simple text editor to find the following lines:

```
<db:connection-data><db:connection-resource
xlink:href="sdbc:embedded:hsqldb"/><db:login db:is-password-
required="false"/></db:connection-data><db:driver-settings/>
```

These lines must be replaced with a connection to an external database, in this case a connection to a database with the name Union, in the hsqldb\_data directory.

```
<db:connection-data><db:connection-resource
xlink:href="jdbc:hsqldb:file:/home/robby/documents/databases/hsqldb_da
ta/Union;default_schema=true"/><db:login db:user-name="sa" db:is-
password-required="false"/></db:connection-data><db:driver-settings
db:java-driver-class="org.hsqldb.jdbcDriver"/>
```

If, as described above, the basic configuration of HSQLDB was not damaged, the username and the optional password must also agree.

After changing the code, content.xml must be put back into the \*.odb archive. The database directory in the archive is now surplus to requirements. The data will in the future be accessed through the external database.

## Changing the database connection for multi-user access

For multi-user access, HSQLDB must be made available over a server. How the installation of the server is carried out varies depending on your operating system. For OpenSuSE, it is only necessary to download the appropriate package and to start the server centrally using YAST (runlevel setting). Users of other operating systems and other Linux distributions can likely find suitable advice on the Internet.

In the home directory on the server (in SuSE, **/var/lib/hsqldb**), you will find, among other things, a directory called data, in which the database is to be filed, and a file called server.properties, which controls the access to the databases in this directory.

The following lines reproduce the complete contents of this file on my computer. It controls access to two databases, namely the original default database (which can be used as a new database) and the database that was extracted from the \*.odb file.

```
# Hsqldb Server cfg file.
# See the Advanced Topics chapter of the Hsqldb User Guide.

server.database.0    file:data/db0
server.dbname.0     firstdb
server.urlid.0      db0-url

server.database.1    file:data/union
server.dbname.1     union
server.urlid.1      union-url

server.silent       true
server.trace        false

server.port         9001
server.no_system_exit true
```

The database 0 is addressed with the name `firstdb`, although the individual files in the data directory begin with `db0`. I added my own database as Database 1. Here the database name and file begin identically.

The two databases are addressed in the following way:

```
jdbc:hsqldb:hsqldb://localhost/firstdb;default_schema=true
username sa
password
jdbc:hsqldb:hsqldb://localhost/union;default_schema=true
username sa
password
```

The suffix `;default_schema=true` to the URL, which is necessary for write access using the graphical user interface of LibreOffice, is permanently included.

If you actually need to work on the server, you will want to consider if the database needs to be password-protected for security reasons.

Now you can connect to the server using LibreOffice.

With this access data, the server can be loaded on its own computer. On a network with other computers, you must give either the host name or the IP address to the server, which in this case is running on my computer.

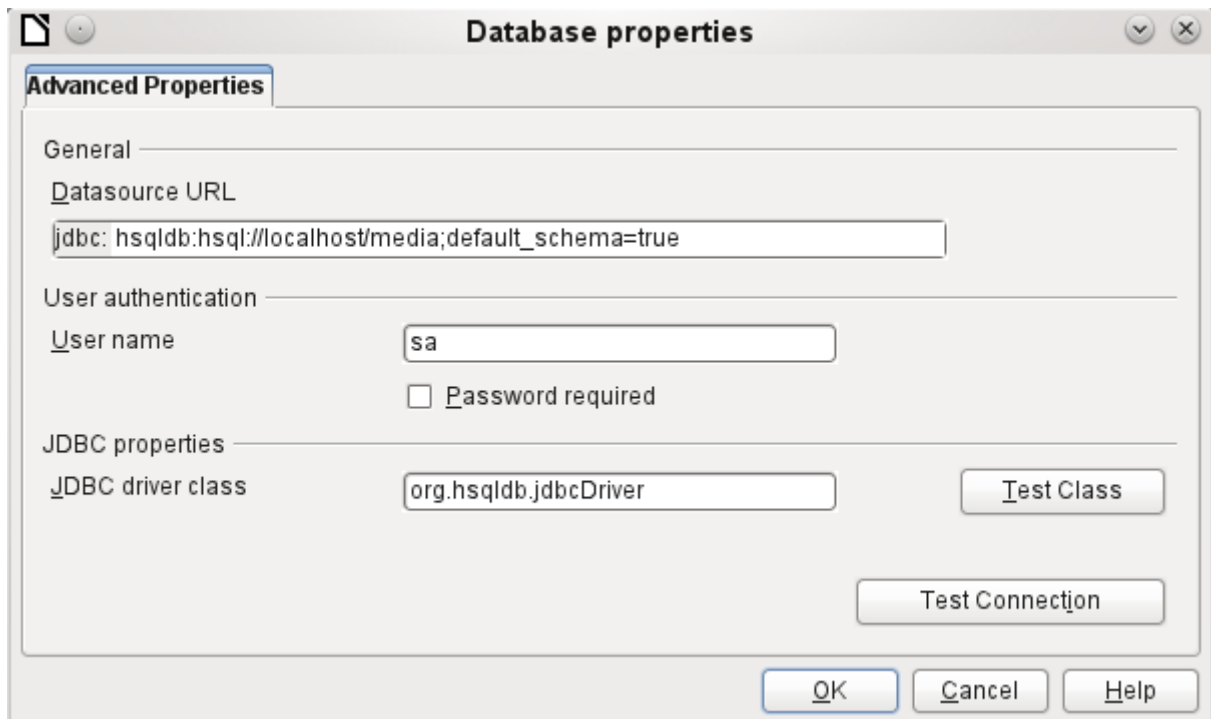
Example: My computer has the IP 192.168.0.20 and is known on the network by the name `lin_serv`. Now suppose there is another computer to be entered for connection to the database:

```
jdbc:hsqldb:hsqldb://192.168.0.20/union;default_schema=true
```

or:

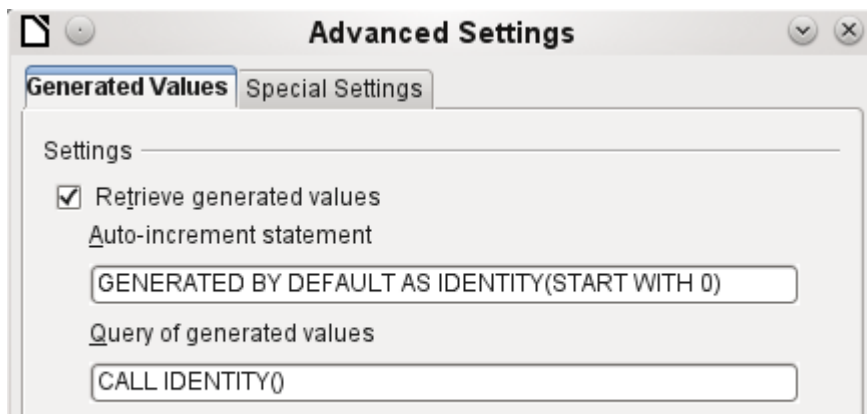
```
jdbc:hsqldb:hsqldb://lin_serv/union;default_schema=true
```

The database is now connected and we can write into it. Quickly, however, an additional problem appears. The previously automatically generated values are suddenly no longer incremented. For this purpose we need an additional setting.



## Auto-incrementing values with external HSQLDB

To use autovalues, different procedures for table configuration are needed according to the version of LibreOffice. Common to all of them is the following entry under **Edit > Database > Advance settings**:



Adding **GENERATED BY DEFAULT AS IDENTITY(START WITH 0)** causes the function of the automatically incrementing values for the primary key to be set. The GUI in LibreOffice takes up this command, but unfortunately prefaces the statement with **NOT NULL**, so that the command sequence for HSQLDB is not readable. Here you must ensure that HSQLDB gets sent the above command so that the corresponding field will contain the primary key.

### Note

In LibreOffice the entry of autovalues using the GUI is not possible for this reason. Users of these versions should first create a table with a primary key field that does *not* auto-increment and then enter directly using **Tools > SQL**:

```
ALTER TABLE "Table_name" ALTER COLUMN "ID" INT GENERATED BY  
DEFAULT AS IDENTITY(START WITH 0)
```

This assumes that the primary key field has the name ID.

In all versions of LO, reading out the latest value and incrementing to the next uses the **CALL IDENTITY()** command. This allows you to create a mini-\*.odf file, test it thoroughly, and then simply remove the tables.

All the queries, forms and reports will still be usable, as the database for the \*.odf file is still accessed in the same way, and the specific SQL commands can be used for the (real) external HSQLDB database.

## Managing the internal Firebird database

The internal Firebird database is at the moment only available as an experimental function. To create such a database, or to edit one that has been created, you must select **Tools > Options > LibreOffice > Advanced > Optional (Unstable) Options > Enable experimental features**. This path illustrates well that such a database is not suitable for everyday use.

The following link allows significant bugs in the internal Firebird database to be studied in cooperation with the LibreOffice team: [Reporting bugs for Firebird in Base](#).

Users will notice the following differences from HSQLDB:

- 1) If a field is given the type "Integer" and then declared as the primary key, it appears to be possible to give it an auto-incrementing value. However on saving, this setting disappears without notice.

- 2) When new records are entered, they are not automatically saved in the cdatabase. The save button has to be used for each entry. In the built-in HSQLDB, the explicit saving of records is not necessary.
- 3) Aliases are completely ignored in queries. An alias can be created but it will not appear in the table heading of the query.
- 4) It is not possible to create conditions, although external Firebird databases support them.
- 5) The decimal and numeric data types are faulty at present. These are the only types that ensure precise values, especially when there are decimal places. They are therefore the preferred fields for currency values. At present, only values with at most one decimal place can be entered.

### **Making AutoValues available**

The following code, entered using **Tools > SQL**, can help with the problem of auto-values not being provided.

```
CREATE TABLE "Table1" ( "ID" INTEGER NOT NULL PRIMARY KEY, "Name"
VARCHAR(20) NOT NULL );
CREATE GENERATOR GEN_T1_ID;
SET GENERATOR GEN_T1_ID TO 0;
```

After this, the SQL entry window should be closed and **View > Refresh Tables** selected. Only when the table appears, and in some cases only after an (unsuccessful) attempt to create an entry, can the following **Trigger** be created.

```
CREATE TRIGGER T1_BI FOR "Table1" ACTIVE BEFORE INSERT POSITION 0 AS
BEGIN
IF (NEW.ID IS NULL) THEN NEW.ID = GEN_ID(GEN_T1_ID, 1);
END;
```

Even after this, many entries in "Name" can be made in the table without creating an entry in "ID". The "ID" field just shows '0'. Only when **Update** is pressed, are the actual assigned values displayed. The trigger provides values that begin with 1.