



LibreOffice
Community



Getting Started Guide 7.2

Chapter 8

Getting Started with Base

Relational databases in LibreOffice

Copyright

This document is Copyright © 2021 by the LibreOffice Documentation Team. Contributors are listed below. You may distribute it and/or modify it under the terms of either the GNU General Public License (<https://www.gnu.org/licenses/gpl.html>), version 3 or later, or the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), version 4.0 or later.

All trademarks within this guide belong to their legitimate owners.

Contributors

To this edition

Jean Hollis Weber Vasudev Narayanan

To previous editions

Rob Westein	Dave Barton	Drew Jensen
Dan Lewis	Jean Hollis Weber	Hazel Russman
Kees Kriek	Olivier Hallot	Iain Roberts
JiHui Choi	Pulkit Krishna	Steve Fanning
Magnus Adielsson	Ron Faile Jr.	

Feedback

Please direct any comments or suggestions about this document to the Documentation Team's mailing list: 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.

Publication date and software version

Published September 2021. Based on LibreOffice 7.2 Community.
Other versions of LibreOffice may differ in appearance and functionality.

Using LibreOffice on macOS

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

<i>Windows or Linux</i>	<i>macOS equivalent</i>	<i>Effect</i>
Tools > Options menu selection	LibreOffice > Preferences	Access setup options
Right-click	<i>Control</i> +click or right-click depending on computer setup	Open a context menu
<i>Ctrl</i> (Control)	⌘ (Command)	Used with other keys
<i>F11</i>	⌘+T	Open the Styles deck in the Sidebar

Contents

Copyright.....	2
Contributors.....	2
Feedback.....	2
Publication date and software version.....	2
Using LibreOffice on macOS.....	2
Introduction.....	4
Planning a database.....	5
Creating a new database.....	6
Creating database tables.....	8
Using the Table Wizard to create a table.....	8
Creating a table by copying an existing table.....	12
Creating tables in Design View.....	13
Defining relationships.....	17
Creating a database form.....	19
Using the Form Wizard to create a form.....	19
Modifying a form.....	23
Entering data in a form.....	35
Quickly populate a table with data from a spreadsheet.....	37
Creating queries.....	38
Using the Wizard to create a query.....	38
Using Design View to create a query.....	40
Creating reports.....	46
Creating a report: Example.....	47
Report Wizard vs Report Design View.....	47
Vacations table report.....	47
Report Builder: another way to create reports.....	50
Accessing other data sources.....	50
Accessing a spreadsheet as a data source.....	50
Registering *.odb databases.....	51
Using data sources in LibreOffice.....	51
Viewing data sources.....	51
Editing data sources.....	52
Launching Base to work on data sources.....	52
Using data sources in Writer and Calc.....	52
Writer documents.....	53
Calc spreadsheets.....	55

Introduction

A data source, or database, is a collection of pieces of information that can be accessed or managed by LibreOffice. For example, a list of names and addresses is a data source that could be used for producing a mail merge letter. A business stock list could be a data source managed through LibreOffice.

This chapter covers creating a database, showing what is contained in a database, and how the different parts are used by LibreOffice.

Note

LibreOffice uses the terms “Data Source” and “Database” to refer to the same thing, which could be a database such as MySQL or dBase, a spreadsheet or text document holding data, or an address book.

A *database* consists of a number of *fields* that contain the individual pieces of data. Each *table* of the database is a group of fields. When creating a table, you also determine the characteristics of each field within it. *Forms* are for data entry into the fields of one or more tables which have been associated with the form. They can also be used for viewing fields from one or more tables associated with the form. A *query* creates a new table from the existing tables based upon how you create the query. A *report* organizes the information from the fields of a query or table into a document according to your requirements.

Caution

Some of Base will work without a Java Runtime Environment (JRE), but the dialogs and wizards that Base uses require JRE. In order to create reports, JRE is also required.

Please go to **Tools > Options > LibreOffice > Advanced** to select a JRE from those installed on your computer.

If a JRE is not already installed, you will need to download and install one. For Windows, you need to get Java from www.java.com. For Linux, you can download it from the same website or you can use the JRE available from the repository of your Linux version. macOS users can install a JRE from Apple Inc.

Base creates both flat and *relational databases*. This makes it fairly easy to create a database in which the fields of the database have relationships with each other.

For example: Consider a database for a library. It will contain a field for the names of the authors and another field for the names of the books. There is an obvious relationship between the authors and the books they have written. The library may contain more than one book by the same author. This is what is known as a one-to-many relationship: one author and more than one book. Most if not all the relationships in such a database are one-to-many relationships.

Consider an employment database for the same library. One of the fields contains the names of the employees while other fields contain the social security numbers and other personal data. The relationship between the names and social security numbers is one-to-one: only one social security number for each name.

If you are acquainted with mathematical sets, a relational database can easily be explained in terms of sets: *elements*, *subsets*, *unions*, and *intersections*. The fields of a database are the elements. The tables are subsets. Relationships are defined in terms of unions and intersections of the subsets (tables).

Instructions for creating a database for automobile expenses will be used to explain how to do this.

Planning a database

The first step in creating a database is to ask yourself many questions. Write them down, and leave some space between the questions to write the answers later. Using a text document on a computer for these questions and answers makes it easier to move the questions around, add additional questions, or change the answers. You may have to go through this process a few times before everything becomes clear in your mind and on paper.

Here are some of the questions and answers I developed before I created a database for automobile expenses.

What are the fields going to be?

My expenses divided into three broad areas: fuel purchases, maintenance, and vacation expenses. The annual cost for the car's license plate and driver's license every four years did not fit into any of these. It will be a table of its own: license fees.

What fields fit the fuel purchases area?

Date purchased, odometer reading, fuel cost, fuel quantity, and payment method for it. (Fuel economy need not be included, as it can be calculated using a query.)

What fields fit the maintenance area?

Date of service, odometer reading, type of service, cost of service, and next scheduled service of this type (for example, for oil changes, list when the next oil change should be). A field for notes was added to the list.

What fields fit the vacations area?

Date, odometer reading, fuel (including all the fields of the fuel table), food (including meals and snacks), motel, total tolls, and miscellaneous. These purchases are made by one of two bank cards or cash; I want a field to state which payment type was used for each item.

What fields fit into the food category?

Breakfast, lunch, supper, and snacks seem to fit. Do I list all the snacks individually or list the total cost for snacks for the day? I chose to divide snacks into two fields: number of snacks and total cost of snacks. I also need a payment type for each of these: breakfast, lunch, supper, and total cost of snacks.

What are the fields that are common to more than one area?

Date appears in multiple areas, as does odometer reading and payment type.

How will I use this information about these three fields?

While on vacation, I want the expenses for each day to be listed together. The date fields suggest a relationship between the vacation table and the dates in each of these tables: fuel and food. The date fields in these tables will be linked as we create the database.

The type of payment includes two bank cards and cash. So we will create a table with a field for the type of payment and use it in list boxes in the forms.

Tip

While we have listed fields we will create in the tables of the database, there is one more field that may be needed in a table: the field for the *primary key*, an identifier unique to each record. In some tables, a suitable field for the primary key has already been listed. In other tables such as the payment type, an additional field for the primary key must be created.

Without the primary key field in a table, any data added, deleted, or modified has to be done by using the Execute SQL Statement dialog (**Tools > SQL...**). This takes much longer than to insert it using the Table Data View dialog. But thereafter, the data is visible in the table and is available to be used in queries, forms, and reports.

Creating a new database

To create a new database, select **File > New > Database** on the Menu bar, or click the arrow next to the **New** icon on the Standard toolbar and select **Database** in the drop-down menu. You can also click the **Base Database** button in the *Create* area of the LibreOffice Start Center. If you are already working in Base, you can also press **Ctrl+N**. All of these methods open the Database Wizard.

On the first page of the Database Wizard (Figure 1), select **Create a new database**. Be sure that the **HSQLDB Embedded** entry is selected in the *Embedded database* drop-down menu; see the *Base Guide* for information about using alternative embedded database engines. Click **Next**.

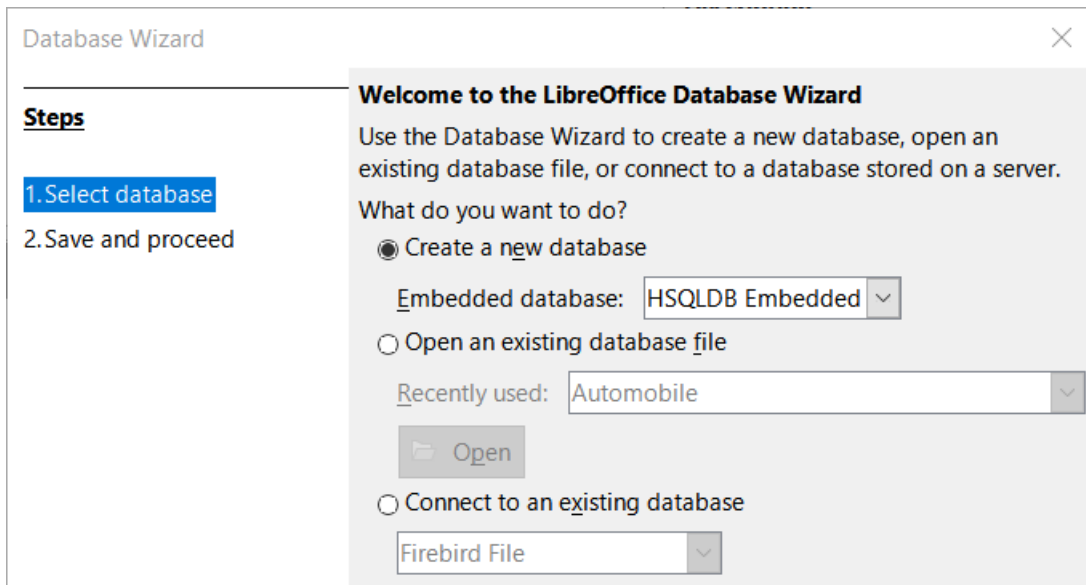


Figure 1: Creating a new database

The second page of the Database Wizard (Figure 2) has two questions. For the first question, it is advised that the database should be registered. Make sure the choice for the second question is **Open the database for editing**. Click **Finish**. The Database Wizard will prompt you to select a location to name and save the database.

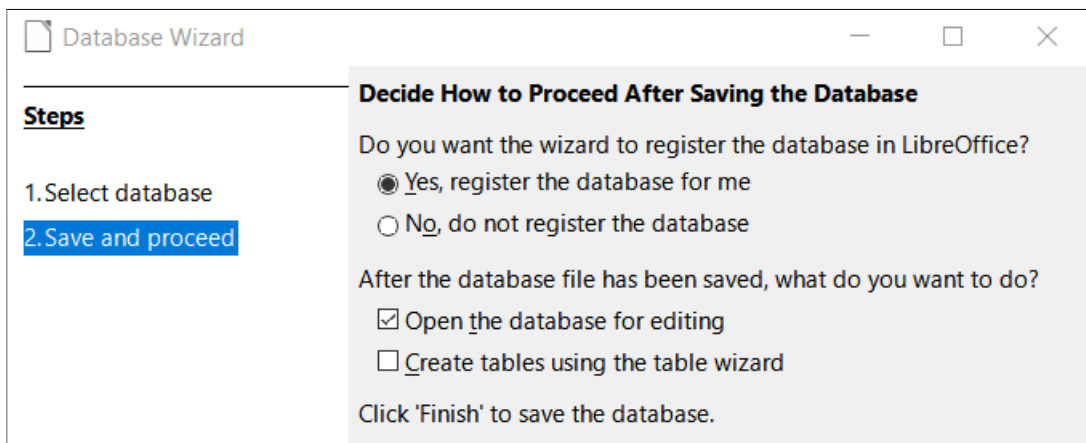


Figure 2: Registering the new database

✓ Note

In Writer and Calc, selecting **View > Data Sources**, or pressing the *Ctrl+Shift+F4* key combination, opens and closes the Data Sources window containing the list of registered databases. If a database is not registered, this window will not contain it and you cannot access it in Writer or Calc if you need to use data from it.

Save the new database with the name Automobile. This opens the Automobile.odt – LibreOffice Base window (Figure 3).

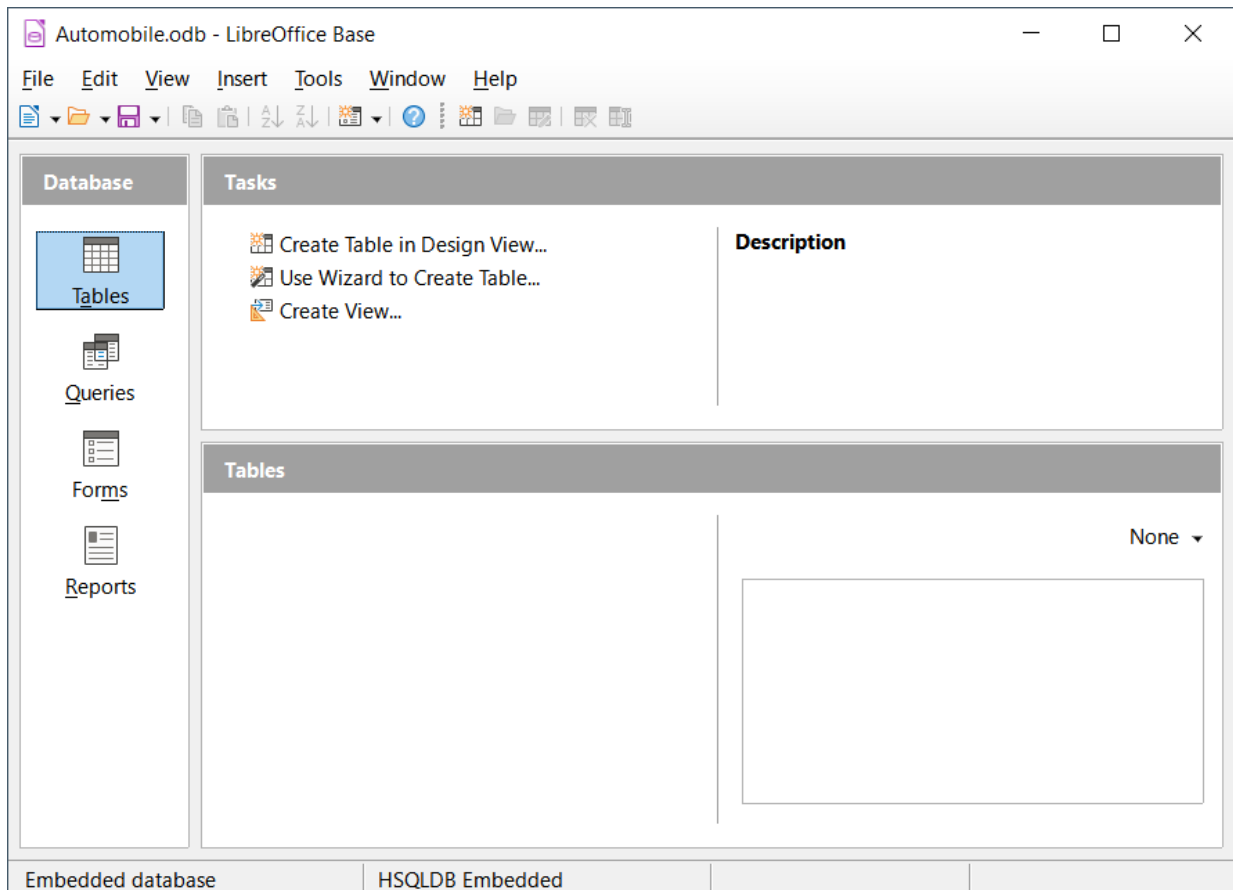


Figure 3: LibreOffice Base window

i Tip

Every time the Automobile database is opened, the Automobile.odt – LibreOffice Base window opens. Changes can then be made to the database. The title for this window is always <database name> – LibreOffice Base.

! Caution

As you create a database, you should save your work regularly. This means more than saving what you have just created. You must save the whole database as well.

For example, when you create your first table, you must save it before you can close it. This makes it part of the database in memory. But it is only when you save the database file that the table is written to disk.

✓ Note

Database files in Open Document Format are stored with the *.odb extension. This file format is actually a container of all elements of the database, including forms, reports, tables, and the data itself. The same format can also store a connection to an external database server instead of the local data, for example, to access a MySQL or PostgreSQL database server in your network.

Creating database tables

In a database, a table stores information in a group of things we call fields. For example, a table might hold an address book, a stock list, a phone book, or a price list. A database must have at least one table and may have several.

Each field of a table contains information of a single type. For example, the Phone field of an address book would only contain phone numbers. Similarly, a price list table could contain two fields: Name and Price. The Name field would contain the names of the items; the Price field would contain the amount of each item.

To work with tables, click the **Tables** icon in the *Database* list, select **View > Tables**, or press *Alt+A*. The tasks that you can perform on a table are in the *Tasks* list (see Figure 3).



Figure 4: Creating a table using Wizard

Using the Table Wizard to create a table

Wizards are designed to do the basic work. Sometimes this is not sufficient for what we want; in those cases we can use a wizard as a starting point and then build upon what it produces.

The Table Wizard in Base contains two categories of suggested tables: business and personal. Each category contains sample tables from which to choose. Each table has a list of available fields. We can delete some of these fields and add other fields.

A field in a table is one bit of information. For example, a price list table might have one field for item name, one for the description, and a third for the price.

Since none of the fields we need for our Automobile database are contained in any of the sample wizard tables, we will create a simple table using the wizard that has nothing to do with our database. This section is merely an exercise in explaining how the wizard works.

The Table Wizard permits the fields of the table to come from more than one suggested table. We will create a table with fields from three different suggested tables in the wizard.

Click **Use Wizard to Create Table**. This opens the Table Wizard (Figure 5).

Step 1: Select fields

We will use the CD-Collection sample table in the Personal category and Employees in the Business category to select the fields we need.

- 1) *Category*: Select **Personal**. The *Sample tables* drop-down list changes to a list of personal sample tables.

- 2) *Sample tables*: Select **CD-Collection**. The *Available fields* area changes to a list of available fields for this table.
- 3) *Selected fields*: By selecting each field and using the > button, move the following fields from the *Available fields* list to the *Selected fields* list in this order: CollectionID, AlbumTitle, Artist, DatePurchased, Format, Notes, and NumberofTracks.

Select fields for your table

This wizard helps you to create a table for your database. After selecting a table category and a sample table, choose the fields you want to include in your table. You can include fields from more than one sample table.

Category **1**
 Business Personal

Sample tables **2**
 CD-Collection

Available fields		Selected fields 3
Rating	<input type="button" value=">"/> <input type="button" value=">>"/> <input type="button" value="<"/> <input type="button" value="<<"/>	CollectionID
Review		AlbumTitle
Producer		Artist
PurchasedAt		DatePurchased
RecordLabel		Format
ReleaseYear		Notes
PurchasePrice		NumberofTracks
MusicCategoryID		

Figure 5: Selecting fields from Personal category

- 4) To select fields from another sample table, select **Business** as the Category. Select **Employees** in the drop-down list of sample tables. Use the > button to move the Photo field from the *Available fields* list to the *Selected fields* list. It will be at the bottom of the list, directly below the NumberofTracks field.
- 5) If you make a mistake in selecting fields, click on the field name in the *Selected fields* list and use the < button to move it from the *Selected fields* list back to the *Available fields* list.
- 6) If you make a mistake in the order of the selected fields, click the field name that is in the wrong order and use the up and down arrows on the right side of the *Selected fields* list to move it to the correct position.
- 7) Click **Next**.

i Tip

You can double-click a field in the *Available fields* list to transfer it to the *Selected fields* list. Similarly you can double-click a field in the *Selected fields* list to transfer it back to the *Available fields* list.

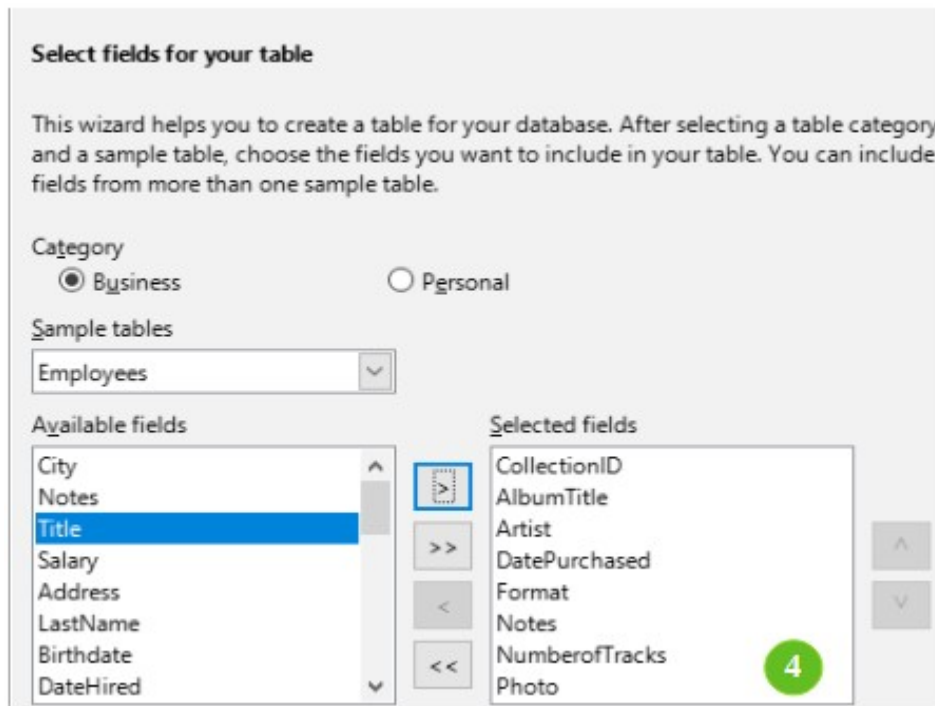


Figure 6: Selecting fields for the table

Step 2: Set field types and formats

In this step you give the fields their properties. When you click a field, the information on the right changes. (See Figure 7.) You can then make changes to meet your needs. Click each field, one at a time, and make the changes listed below.

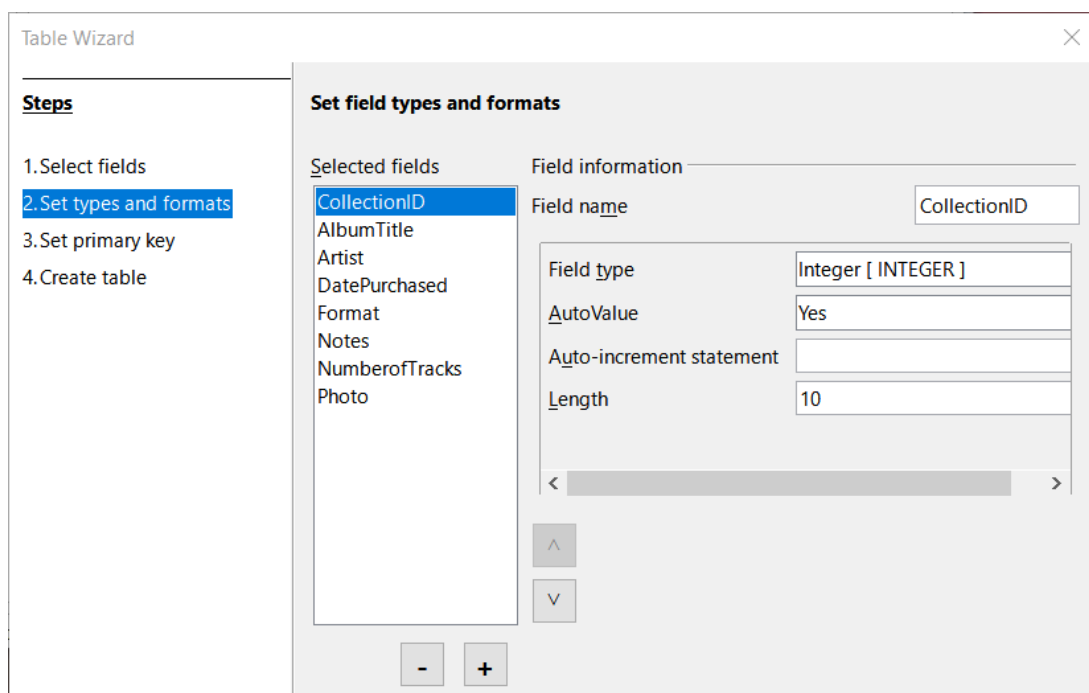


Figure 7: Changing field types

✓ Note

If any of these fields requires a mandatory entry, set *Entry required* to **Yes**. A blank field will then not be allowed. In general, only set *Entry required* to **Yes** if something **must** always be put in that field. By default, *Entry required* is set to **No**. (The *Entry required* option is not visible in Figure 7 because *AutoValue* has been set to **Yes**.)

- **CollectionID**: Change *AutoValue* from **No** to **Yes**. (example of a mandatory entry)
- **AlbumTitle**:
 - *Entry required*: Leave *Entry required* as **No**, unless all of your music is in albums.
 - *Length*: Unless you have an album title that exceeds 100 characters counting the spaces, do not change the length.
- **Artist**: Use most of the default settings. Since music always has artists, set *Entry Required* to **Yes**.
- **Date Purchased**: *Field type*: default setting. *Entry required* should be **No**. (You may not know the date.)
- **Format**: Only change the *Entry Required* setting: from **No** to **Yes**.
- **Notes**: No changes are required.
- **NumberofTracks**: Change the *Field type* to **Small Integer [SMALLINT]**, which allows for 32768 tracks.
- **Photo**: Use the default settings.

✓ Note

In Base the maximum length of each field must be specified on creation. It is not easy to change this later, so if in doubt specify a greater length. Base uses VARCHAR as the field format for text fields. This format uses only the actual number of characters in a field up to the limit set, so a field containing 20 characters will occupy only 20 characters even if the limit is set at 100. Two album titles containing 25 and 32 characters respectively will use space for 25 and 32 characters and not 100 characters.

Another text format is CHAR, which has a fixed length. If the limit is set to 100 characters, every entry into this field will have a length of 100 regardless of whether the actual length is 1 or 100.

✓ Note

Each field has a *Field type*, which must be specified. Types include text, integer, date, and decimal. If the field is going to have general information in it (for example, a name or a description), use text. If the field will always contain a number (for example, a price), the type should be decimal or another numerical field. The wizard picks the right field type, so to get an idea of how this works, see what the wizard has chosen for different fields.

i Tip

Up and down arrows are available on this page (not shown in Figure 7) and you can use these to reorder the list of fields. Also + and – buttons are available and you can use these to remove fields from the list or to add new fields.

When you have finished, click **Next**.

Step 3: Set primary key

- 1) **Create a primary key** should be checked.
- 2) Select option **Use an existing field as a primary key**.
- 3) In the *Fieldname* drop-down list, select **CollectionID**.
- 4) Check **Auto value** if it is not already checked. Click **Next**.

Note

A primary key uniquely identifies an item (or record) in the table. For example, you might know two people called “Randy Herring” or three people living at the same address and the database needs to distinguish between them.

The simplest method is to assign a unique number to each one: number the first person 1, the second 2, and so on. Each entry has one number and every number is different, so it is easy to say “record ID 172”. This option is chosen here: CollectionID is just a number assigned automatically by Base to each record of this table.

Step 4: Create table

- 1) If desired, rename the table at this point. If you rename it, make the name meaningful to you. For this example, make no changes.
- 2) Leave the option **Insert data immediately** checked.
- 3) Click **Finish** to complete the Table Wizard. Close the Table Data View window created by the Table Wizard. You are now back to the main window of the database with the listing of the tables, queries, forms, and reports. Notice that a table named CD-Collection is now listed in the *Tables* portion of the window.
- 4) Click the **Save** button on the Standard toolbar at the top of the main window.

Creating a table by copying an existing table

If you have a large collection of music, you might want to create a table for each type of music you have. Rather than creating each table from the wizard, you can make copies of the original table, naming each according to the type of music contained in it.

- 1) Click on the **Tables** icon in the Database area of the LibreOffice Base window to see the existing tables.
- 2) Right-click on the **CD-Collection** table icon. Choose **Copy** in the context menu.
- 3) Move the mouse pointer below this table, right-click, and select **Paste**. The Copy table dialog opens.
- 4) Change the Table *name* to *CD-Jazz* and click **Next**.

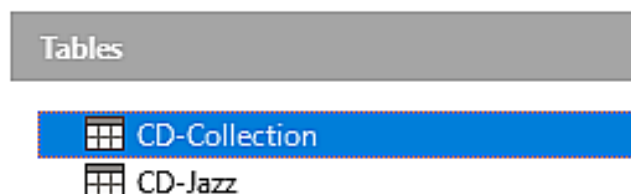


Figure 8: Creating copies of original table

Tip

Using the four action buttons on this page, you can move selected fields, or all fields, in either direction. You can also double-click to move a field from one list to the other.

- 5) Click the >> button to move all the fields from the left box to the right box and click **Next**.
- 6) Since all the fields already have the proper field type, no changes should be needed. However, this is the time and place to make any changes if they are needed. (See Caution below for the reason why.) Click **Create**. The new table is created.
- 7) Click the **Save** button on the Standard toolbar at the top of the LibreOffice Base window.

Caution

Once tables have been created using the wizard, and data has been entered, editing a table should be very limited. You can add or delete fields, but adding a field requires you to enter the data for that one field for every existing record with an entry for that field.

Deleting a field deletes **all the data** once contained in that field. Changing the field type of a field can lead to data being lost either partially or completely. When creating a new table, it pays to create the fields with the correct names, length, and format before you add any data.

Deleting a table removes all of the data contained in every field of the table. **Unless you are sure, do not delete a table.**

Creating tables in Design View

Design View is a more advanced method for creating a new table, in which you directly enter information about each field in a table. We will use this method for the remaining tables of our Automobile database.

Note

While the field types and formatting are different in Design View, the concepts are the same as in the Table Wizard.

The first table to be created is **Fuel**. Its fields are FuelID, Date, FuelCost, FuelQuantity, Odometer, and PaymentType.

- 1) Click **Create Table in Design View** in the *Tasks* area of the LibreOffice Base window. Base opens the LibreOffice Base: Table Design dialog.
- 2) FuelID field: Type *FuelID* as the first *Field Name* entry. Press the *Tab* key to move to the *Field Type* column. Select **Integer [INTEGER]** as the field type in the drop-down list. (The default setting is Text [VARCHAR].)

Tip

A shortcut for selecting from the Field Type drop-down list: press the key for the first letter of the choice. You can cycle through the choices for a given letter by repeatedly pressing that key.

- a) Change the *Field Properties* in the bottom section of the dialog. Change *AutoValue* from **No** to **Yes**.
- b) Set *FuelID* as the primary key. Click in the *Field Name* cell directly below *FuelID*. The dialog automatically sets *FuelID* as the primary key and places a key icon in front of *FuelID* (Figure 9).

	Field Name	Field Type
▶	FuelID	Integer [INTEGER]
<		
AutoValue Yes		

Figure 9: Defining the primary key field

Tip

Certain of the integer field types (Integer and BigInt for example) have an *AutoValue* field property. When using one of these field types, your selection of **Yes** for *AutoValue* automatically makes the field the primary key.

Primary keys for any other field type must be selected by right-clicking the rectangle before the field and selecting **Primary Key** in the context menu.

Note

The primary key serves only one purpose: to identify each record uniquely. Any name can be used for this field. We have used *FuelID* for convenience, so we know to which table it belongs.

- 3) All other fields (Date, FuelCost, FuelQuantity, Odometer, and PaymentType):
 - a) Type the next field name in the *Field Name* column.
 - b) Select the field type for each field.
 - For *Date* use **Date[DATE]**. (Press the *D* key to select it.)
 - *FuelCost*, *FuelQuantity*, and *Odometer* use **Number [NUMERIC]**. (Press the *N* key once to select it.)
 - *PaymentType* uses **Text [VARCHAR]**, the default setting.
 - c) *FuelCost*, *FuelQuantity*, and *Odometer* also need changes in the *Field Properties* section (Figure 10).
 - *FuelCost*: Change the *Length* to 5 and *Decimal places* to 2. Click the *Format example* ellipsis button (...) (Figure 10). This opens the Field Format dialog (Figure 11). Use **Currency** as the *Category* and your currency as the *Format*. My currency has two decimal places. Use what is appropriate for yours.
 - *FuelQuantity*: Change *Length* to 6 and *Decimal places* to 3. (Many fuel pumps measure fuel to thousandths of a gallon in the USA.)
 - *Odometer*: Change the *Length* to 10 and the *Decimal places* to 1.
 - d) Repeat steps a) through c) until you have entered all of the fields.

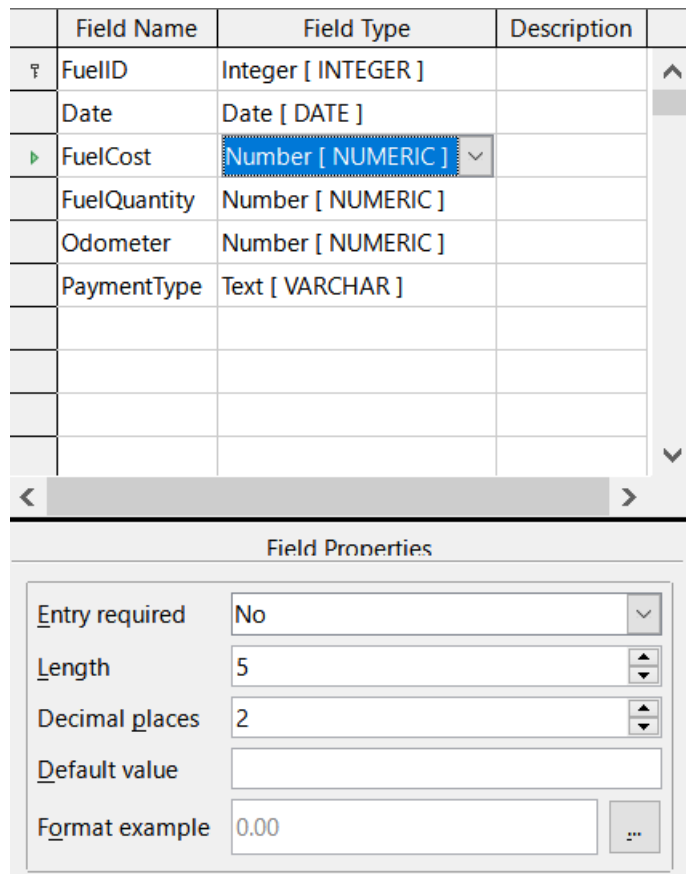


Figure 10: Changing field properties

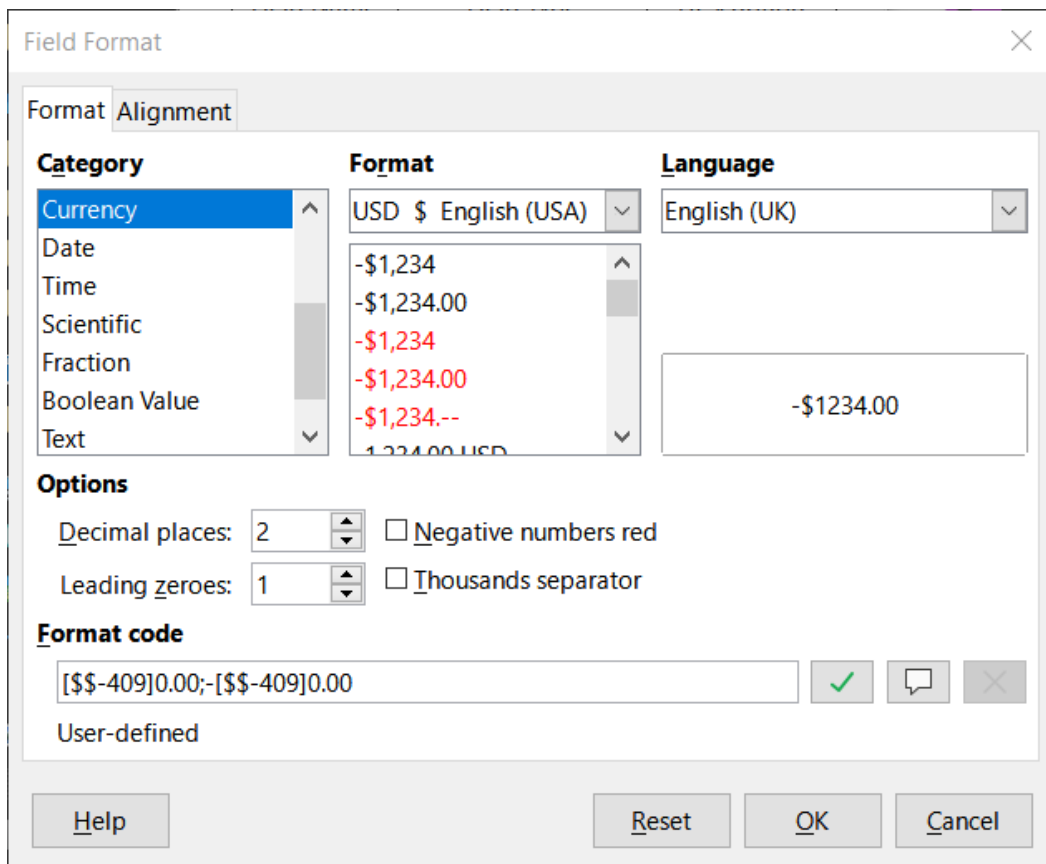


Figure 11: Format example options

- 4) To save and close the table in the Table Design dialog, select **File > Save**, or click the **Save** icon on the Standard toolbar, or press *Ctrl+S*. Name the table *Fuel*.
- 5) Close the Table Design dialog.
- 6) In the main database window, select **File > Save**, click the **Save** icon on the Standard toolbar, or *Ctrl+S* to save the database.

Follow the same steps to create the *Vacations* table. The fields, field types, and descriptions are listed in Figure 12.

	Field Name	Field Type	Description
¶	Date	Date [DATE]	
	Odometer	Number [NUMERIC]	Odometer reading
	Motel	Number [NUMERIC]	
	Tolls	Number [NUMERIC]	Total tolls
	Breakfast	Number [NUMERIC]	
	BPayment	Text [VARCHAR]	Payment type for breakfast
	Lunch	Number [NUMERIC]	
	LPayment	Text [VARCHAR]	Payment type for lunch
	Supper	Number [NUMERIC]	
	SPayment	Text [VARCHAR]	Payment type for supper
	SnackNo	Number [NUMERIC]	
	SnackCost	Number [NUMERIC]	
	SnPayment	Text [VARCHAR]	Payment type for snacks
	Miscellaneous	Number [NUMERIC]	Misc. costs
	MPayment	Text [VARCHAR]	Payment type for motel
	MiscNotes	Memo [LONGVARCHAR]	
▶	MiscPayment	Text [VARCHAR]	Payment type for misc.
	Notes	Memo [LONGVARCHAR]	

Figure 12: Fields in *Vacations* table

- 1) Make the following changes in the *Field Properties* area of the window.
 - a) *Odometer*: As described in step 3)), bullet c)) for the corresponding field of the *Fuel* table.
 - b) *Motel*, *Tolls*, *Breakfast*, *Lunch*, *Supper*, *SnCost*, and *Miscellaneous*: As described in step 3)), bullet c)) for the *FuelCost* field of the *Fuel* table.
- 2) Making *Date* the primary key in this table has to be done in a different way because this field is typed as *Date*, not *Integer*.
 - a) Right-click to the left of the field name *Date*.
 - b) Select **Primary Key** in the context menu.

Following similar steps to those above, you should use Design View to create a much simpler table entitled *Payment Type*. This table contains two fields, named *Type*, with the field type set to *Text[VARCHAR]* and *PaymentID* (field type *Integer*). Set the *PaymentID* field as the primary key for the table.

Defining relationships

Now that the tables have been created, what are the relationships between our tables? This is the time to define them based upon the questions we asked and answered in the beginning.

When on vacation, we want to enter all of our expenses at once each day. Most of these expenses are in the Vacations table, but the fuel we buy is not. So we will link these two tables using the Date fields. Since the Fuel table may have more than one entry per date, this relationship between the Vacations and Fuel tables is one to many (it is designated 1:n.)

The Fuel and Maintenance tables do not really have a relationship even though they share similar fields: Date and Odometer readings. (We are not creating the Maintenance table in these examples.)

Tip

As you create your own databases, you will also need to determine if tables are related and if so how.

- 1) To begin defining relationships, select **Tools > Relationships**. The Automobile – LibreOffice Base: Relation Design window opens and the Add Tables dialog pops up. (You can also open it by clicking the **Add Tables** icon on the Relation Design window if you ever need to do so.)
- 2) In the Add Tables dialog, use either of these ways to add a table to the Relation Design window:
 - Double-click the name of the table. In our case, do this for both *Vacations* and *Fuel*.
 - Or, for each table, click the name of the table and then click **Add**.
- 3) Click **Close** to close the Add Tables dialog when you have added the tables you want.
- 4) Define the relationship between the Vacations and Fuel tables: click the **New Relation** icon on the Standard toolbar, or select **Insert > New Relation**. This opens the Relations dialog (Figure 14). Our two tables are listed in the *Tables Involved* section.
 - a) In the *Fields Involved* section, click the drop-down list under the *Fuel* label.
 - b) Select **Date** in the list.
 - c) Click in the cell to the right of this drop-down list. This opens a drop-down list for the *Vacations* table.
 - d) Select **Date** in the list. It should now look like Figure 14.
 - e) Modify the *Update Options* and *Delete Options* section of the Relations dialog (Figure 15).
 - Select **Update cascade** in the *Update* options area.
 - Select **Delete cascade** in the *Delete* options area.
 - f) Click **OK**.
 - g) In the Relation Design dialog, click the **Save** icon or select **File > Save**.
 - h) Close the Relation Design dialog.
 - i) Click the **Save** button on the Standard toolbar at the top of the main database window.

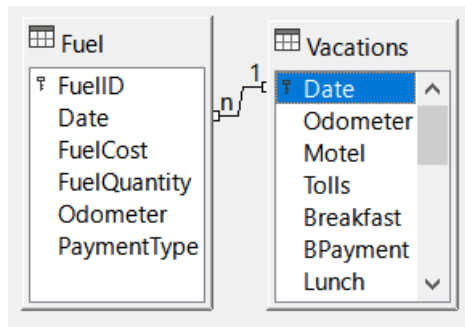


Figure 13: Designation for a 1:n relationship

Relations	
Tables Involved	
Fuel	Vacations
Fields Involved	
Fuel	Vacations
Date	Date

Figure 14: Selected fields in a relationship

i Tip

The primary key can contain more than one field. (Its foreign key¹ will contain the same number of fields.) If this were the case in Figure 14, the other fields of the primary field for the *Fuel* table would be listed under *Date*. The corresponding fields of the foreign key would be listed under *Vacations*. Detailed information about this is in the *Base Guide*.

Update Options	Delete Options
<input type="radio"/> No action	<input type="radio"/> No action
<input checked="" type="radio"/> Update cascade	<input checked="" type="radio"/> Delete cascade
<input type="radio"/> Set NULL	<input type="radio"/> Set NULL
<input type="radio"/> Set default	<input type="radio"/> Set default
<input type="button" value="Help"/>	<input type="button" value="OK"/> <input type="button" value="Cancel"/>

Figure 15: Update Options and Delete Options section

While these options are not strictly necessary, they do help. Having them selected permits you to update a table that has a relationship defined with another table which has been modified. It also permits you to delete a field from the table without causing inconsistencies.

¹ A field in a table that stores values of the primary key of records in another table.

Creating a database form

Databases are used to store data. But, how is the data put into the database? Forms are used to do this. In the language of databases, a form is a front end for data entry and editing.

A simple form consists of the fields from a table (Figure 16). More complex forms can contain much more, including additional text, graphics, selection boxes, and many other elements. Figure 17 is made from the same table with a text label (Fuel Purchases), a list box placed in PaymentType, and a graphic background.

Tip

A list box is useful when a field contains a fixed number of options. It saves you from having to type data by hand and having to double-check that the entered data is correct, and ensures that invalid options are not entered.

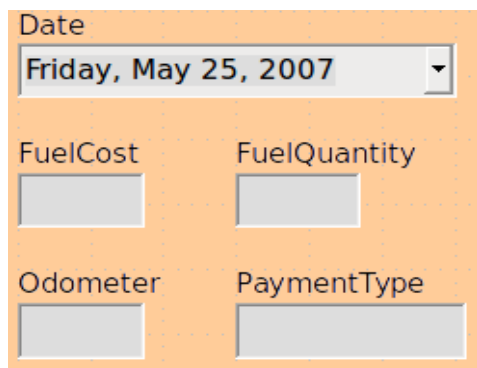


Figure 16: Fields of a simple form

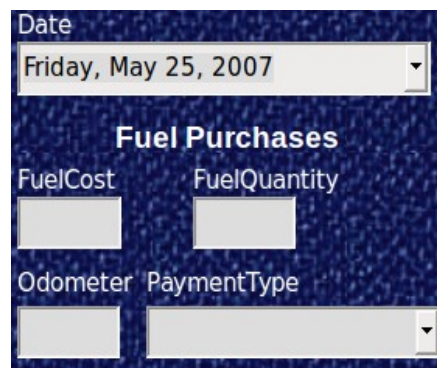


Figure 17: Simple form with additions

In our database, payments for food or fuel might be made from one of two credit cards (Dan or Kevin) or in cash, so these would be the available options for all boxes that contain payments.

To create a list box, we first need to create a small, separate table containing the name of the options. This is then linked to the corresponding field in the form. The topic is dealt with in detail in the Base Guide and will not be pursued further here.

Using the Form Wizard to create a form

We will use the Form Wizard to create a Vacations form, which will contain a form and a subform.

In the main database window (Figure 3), click the **Forms** icon in the *Database* area, select **View > Forms**, or press *Alt+M*. In the Tasks list, click **Use Wizard to Create Form** to open the Form Wizard (Figure 18). Base displays the Database Form window and the Form Wizard. Simple forms require only some of these steps, while more complex forms may use all of them.

Step 1: Select fields

- 1) On the Form Wizard dialog, under *Tables or queries* drop-down, select **Table: Vacations**. *Available fields* lists the fields for the Vacations table.
- 2) Click the **>>** button to move all of these fields to the *Fields in the form* list. Click **Next**.

Tip

Using the four action buttons in the center of this page, you can move selected fields, or all fields, in either direction. You can also double-click to move a field from one list to the other. The up and down arrows on the right can be used to re-order entries in the *Fields in the form* list.

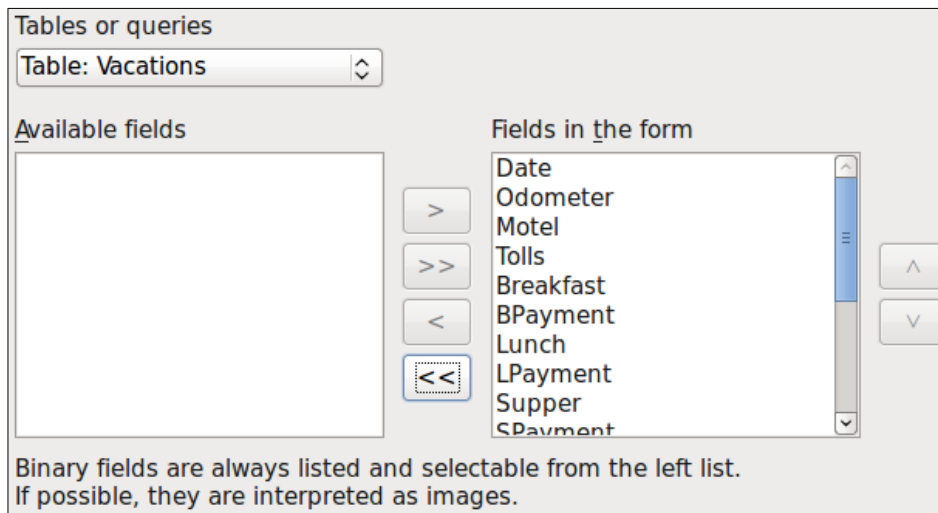


Figure 18: Selecting fields in the Form Wizard

Step 2: Set up a subform

Since we have already created a relationship between the Fuel and Vacations tables, we will use that relationship. If no relationship had been defined, this would need to be done later in the wizard (Step 4: Get joined fields).

- 1) Click the box labeled **Add Subform**.
- 2) Click **Subform based upon existing relation**.
- 3) Fuel is listed as a relation we want to add. So click **Fuel** to highlight it, as in Figure 19. Click **Next**.

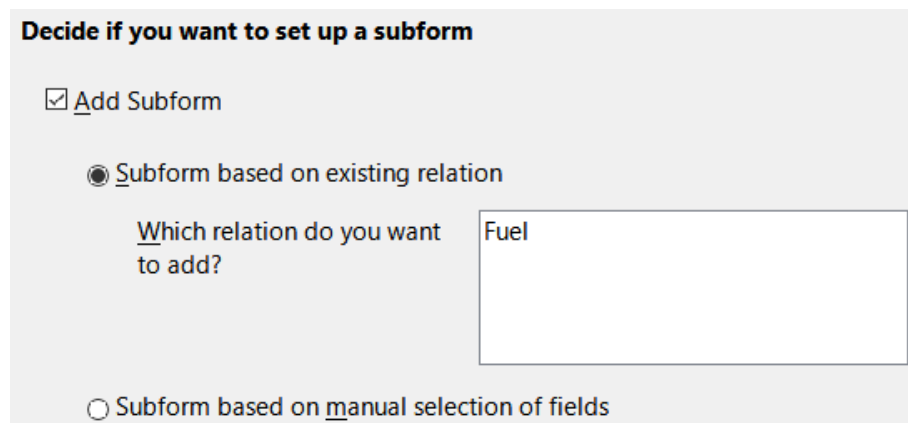


Figure 19: Adding a subform

Step 3: Add subform fields

This step is similar to Step 1: Select fields. The only difference is that not all of the fields will be used in the subform.

- 1) Fuel is preselected under *Tables or queries*.
- 2) Use the >> button to move all the fields to the *Fields in the form* list.
- 3) Click the **FuelID** field to highlight it.
- 4) Use the < button to move the **FuelID** back to the *Available* fields list (Figure 20).
- 5) Click **Next**.

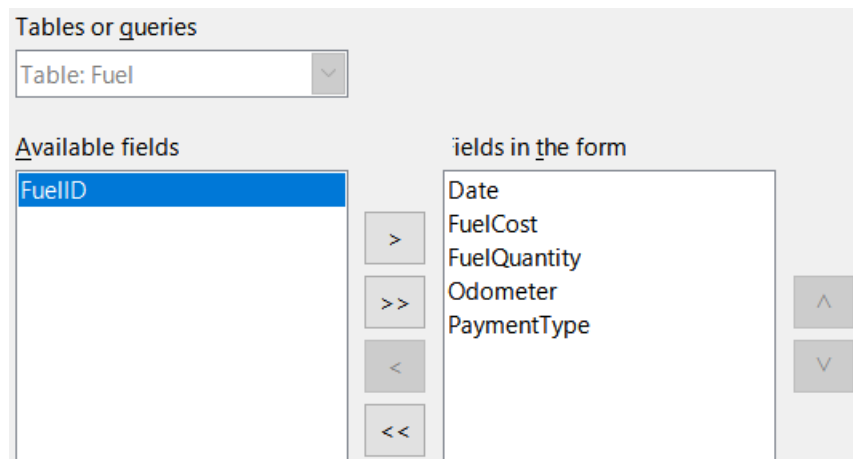


Figure 20: Selecting fields of a subform

Step 4: Get joined fields

This step is for tables or queries for which no relationship has been defined. Because this has been defined in the relationship, the wizard skips this step.

Note

It is possible to create a relationship between two tables that is based upon more than one pair of fields. How to do that and why is discussed in the *Base Guide*.

Caution

When selecting a pair of fields from two tables to use as a relationship, they have to have the same field type. That is why we used the Date field from both tables: both their field types are Date[DATE].

Whether a single pair of fields from two tables are chosen as the relationship, or two or more pairs are chosen, certain requirements must be met for the form to work.

- One of the fields from the main form must be the primary key for its table. (Date would have to be used.)
- No field from the subform can be the primary key for its table. (*FuelID* cannot be used.)
- Each pair of joined fields must have the same field type.

Step 5: Arrange controls

A control in a form consists of two parts: label and field. This step in creating the form determines where a control's label and field are placed relative to each other. The four choices from left to right are *Columnar – Labels Left*, *Columnar – Labels on Top*, *As Data Sheet*, and *In Blocks – Labels Above*.

- 1) *Arrangement of the main form*: Click the second icon (*Columnar – Labels on Top*). The labels will be placed above their field.
- 2) *Arrangement of the subform*: Click the third icon (*As Data Sheet*). (The labels are column headings and the field entries are in spreadsheet format.) Click **Next**.

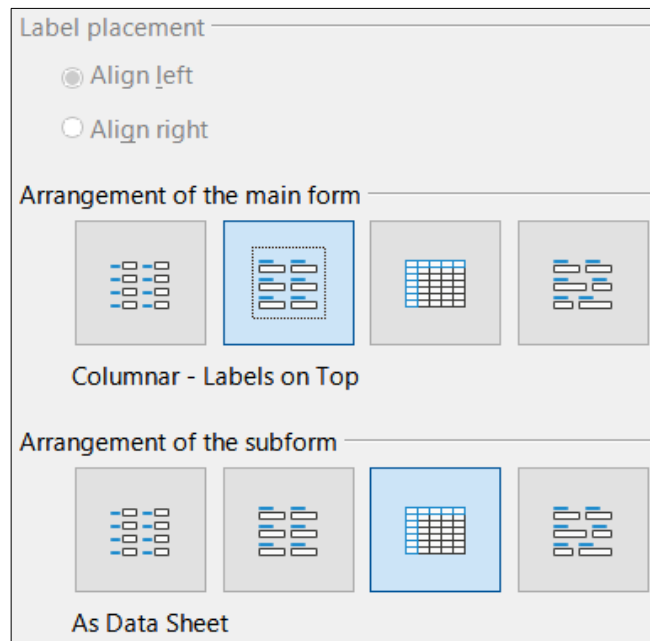


Figure 21: Arrange controls

Step 6: Set data entry

Unless you have a need for any of these entries to be checked, accept the default settings. Click **Next**.

Step 7: Apply styles

- 1) Select the color you want in the *Apply styles* list. (I chose the **Beige** option.)
- 2) Select the *Field border* you want. (I prefer the **3D look** option. You might want to experiment with the different possible settings.)
- 3) Click **Next**.

Step 8: Set name

- 1) Enter the name for the form. In this case, it is *Vacations*.
- 2) Click **Modify the form**.
- 3) Click **Finish**. The form opens in edit mode, Base displaying the Fuel – LibreOffice Base: Database Form window.

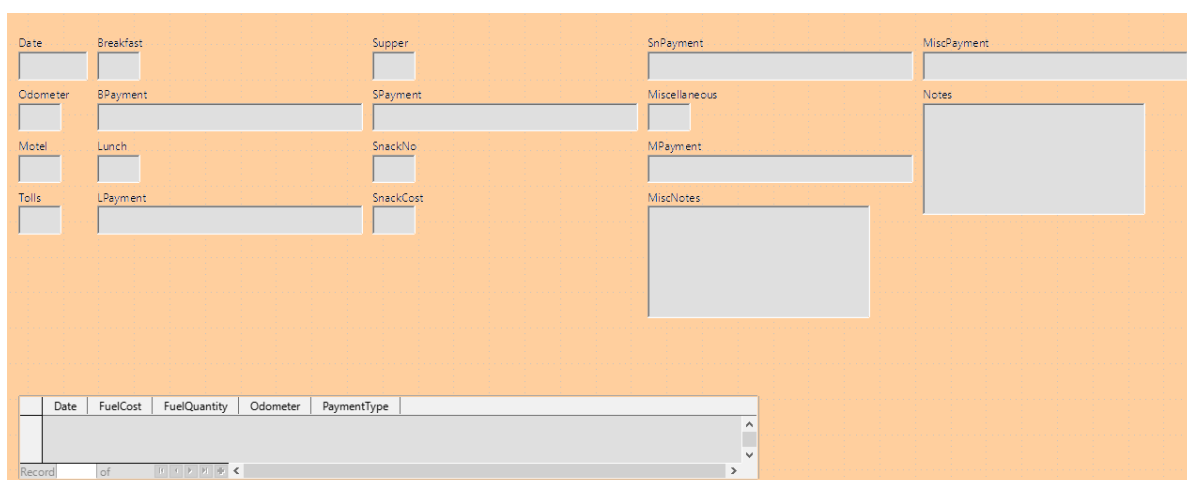


Figure 22: Basic form created using Wizard

Modifying a form

The form does not look organized at all. Every control seems to have a different size. The background is not the best color, nor are all of the labels the way we would want them.

The reason for different sized controls is that they contain different types of field data. There are three different sized controls: text, formatted, and date. Text controls have their width set to display a large number of characters. Formatted controls will usually contain numbers or decimals although they can contain a wide variety of formatting. So, these are likely going to have a limited number of characters, hence a shorter control. Date controls obviously contain dates. Most formats for them are fairly short, which is the reason for their width. However, one of the date formats is day of the week, month day, year (Thursday, October 31, 2020). This needs a larger width than 10/31/2020 or 31/10/2020 for example.

First, all of the payment type controls need to be modified. The fields need to be replaced with a list box, and each needs to be related to an existing field in the table, Payment Type. The rest of the controls require modification based upon the category into which they fall.

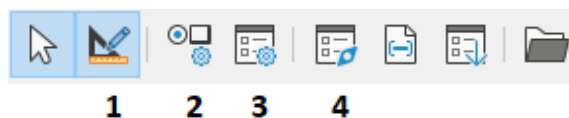
✓ Note

The steps that follow assume that the PaymentType table already contains three single-field records. These might be *Cash*, *Dan*, and *Kevin*. If necessary you could use the Form Wizard to create a very simple form to input or edit these values.

We will carry out the following steps:

- 1) Replace fields with list boxes.
- 2) Modify text controls (label field first and then the data field).
- 3) Modify date control.
- 4) Modify formatted controls.
- 5) Modify fields in the table.
- 6) Group the controls (food, fuel subform, and miscellaneous).
- 7) Modify memo control.
- 8) Add headings (for each group in the form).
- 9) Change the background to a picture, then modify some of the labels so that they can be read clearly against this background. Change the font color of the headings.
- 10) Change tab order of fields.

Figure 23 shows a section of the Form Design toolbar, identifying key icons that will be used during the following steps. Figure 24 shows the Form Navigator.



1	Design Mode	3	Form Properties
2	Control Properties	4	Form Navigator

Figure 23: Part of Form Design toolbar

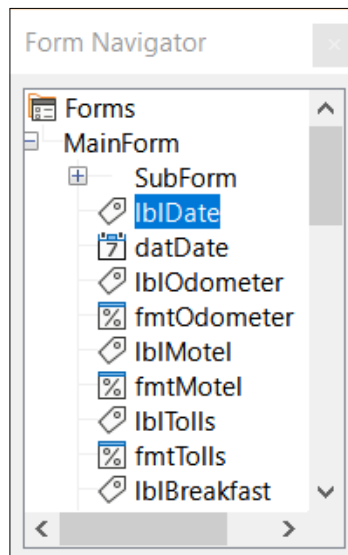


Figure 24: Form Navigator

Step 1): Replace fields with list boxes

- 1) Use the **Control Properties** and **Form Navigator** icons on the Form Design toolbar to open the corresponding dialogs. (You may need to select a control for the **Control Properties** icon to become available)
- 2) Going down the list of labels and fields in the Form Navigator, click the first text box whose name contains the word "Payment".
- 3) If both the label and text box components of the field are highlighted in the Form Navigator, double-click the text box so that only it is highlighted.

i Tip

In some cases when the Form Navigator does not have the input focus, selecting a field highlights both components (for example, label and text) of the field. If this arises, then double-clicking the required component will highlight it, and enable you to subsequently move from one component to another with a single click.

- 4) Right-click the text box in the Form Navigator and select **Replace with > List Box** in the context menu.
- 5) In the Properties dialog, the heading becomes *Properties: List Box*.
- 6) The *General* tab is selected, so scroll down to the *Dropdown* property. Change **No** to **Yes**.
- 7) Click the *Data* tab.
- 8) Go to *Type of list contents*. Change *Valuelist* to *Sql*.
- 9) The line below this becomes *List content*. Click the ellipsis (...) to the right of this property.
- 10) Base opens the SQL Command – LibreOffice Base: Query Design window and the Add Table or Query dialog. The *PaymentType* table has the entries that are required. Click it, and then click the **Add** button.
Close the Add Table or Query dialog.
- 11) In the SQL Command – LibreOffice Base: Query Design window, double-click **Type** in the table named *PaymentType*. This places *Type* in the *Field* row of the tabular area.

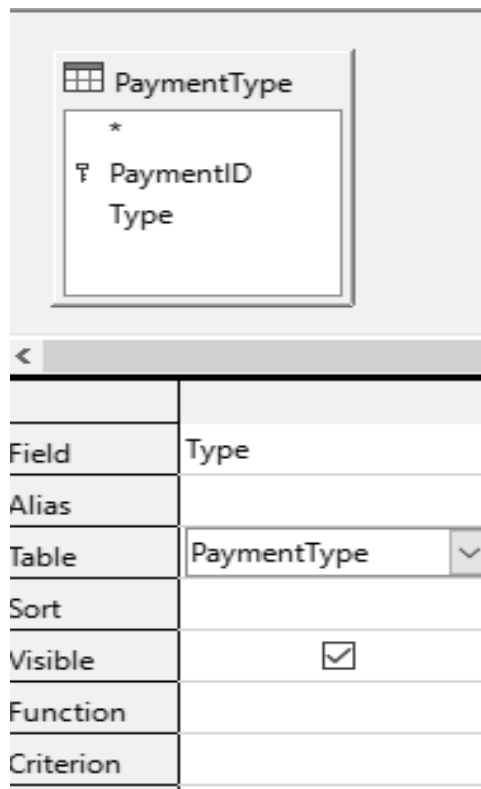


Figure 25: Selecting PaymentType

- 12) Save and close this window. The SQL code appears in the *List content* property. (SELECT "Type" FROM "PaymentType")
- 13) Change the *Bound* field value from 1 to 0.
- 14) Repeat these steps for each field containing the word "Payment", six fields in total. (See Note below before doing this.)

Tip

There are times, as in this example, when 8)) through 12)) produces the same SQL code. When this happens, copy the code. Paste the code into the *Type of list contents* property before doing 13)). It is a nice shortcut.

Step 2): Modifying text controls

These are limited to controls whose fields begin with *txt*. This is when the labels and fields are modified if necessary to make them more meaningful. In this example, all but one control contains the word "Payment". The content of these are payment types which determines that name given to them. The other one is named *Note*.

Next the size of the controls needs to be modified based upon the contents they will contain. Because it is hard to determine beforehand just how large the *Note* control needs to be, this will be done after all of the other controls are arranged in a more compact order. The rest of the controls with text will have their sizes changed now.

- 1) Rename the labels.
 - a) Locate the topmost text control in the Form Navigator.
 - b) Select the associated the control label (begins with *lbl*). Make sure that the title of the Properties dialog has become *Label Field*.
 - c) Click the *General* tab if it is not already selected.

- d) Click the down-arrow at the right end of the *Label* property to open the drop-down. Only then rename the label to *Payment Type* and press **Enter**.
- e) Click on another property to save this change.
- f) Adjust the width of the label field if necessary for the new width of the label name.
- g) Repeat a)) through f)) for each label field in the form that contains the word *Payment*.

 **Note**

This database form contains multiple controls with the same label: *Payment Type*. When this name has been entered for the first time, it can be copied. In d)) for the next label, highlight the current label name, paste the name you want, and click another property.

- 2) Resize the fields.
 - a) Make sure that you are in the edit mode, with the Form Navigator and Properties dialogs open.
 - b) In the Form Navigator dialog, click the field whose size you want to change.
 - c) Scroll down to the *Width* property in the Properties dialog.
 - d) Estimate the width required based on the set of possible values for this field and change the *Width* property to that value. In the case of our *Payment Type* fields, the text box should be wide enough for the longest possible payment type value of “Kevin”.

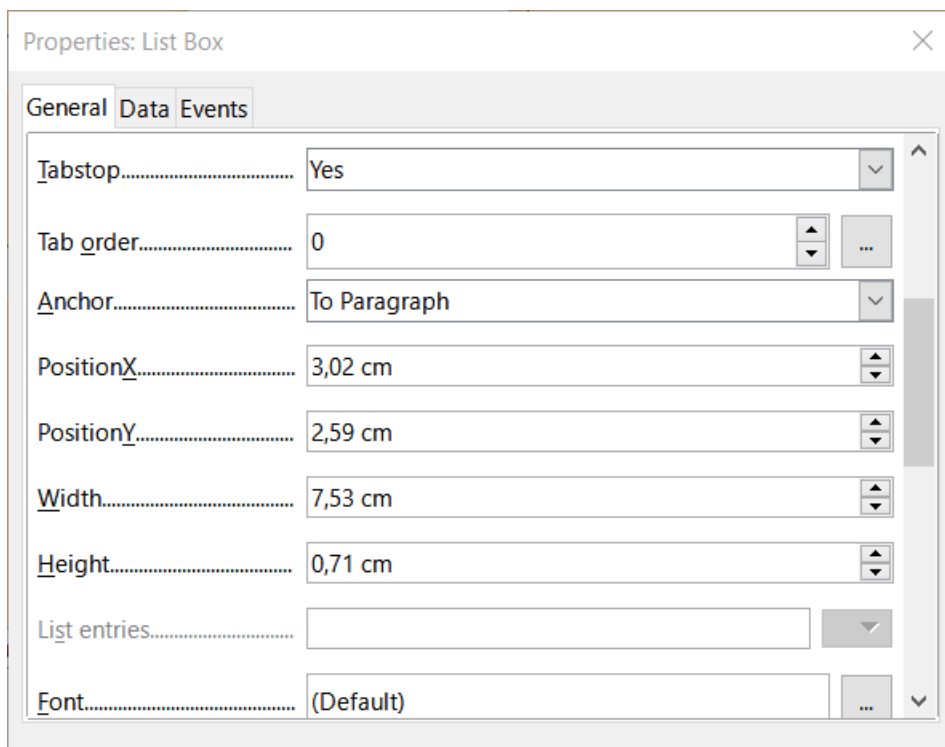


Figure 26: Modifying listbox properties

- e) Click either the *PositionY* or the *Height* property to save the change. (These are adjacent properties, but clicking on any other property will do the same thing.)
- f) Use these same steps to change the size for each of the remaining text controls, including *txtSnackNo* and all the payment type fields.

Step 3): Modify date control

- 1) With the Properties and Form Navigator dialogs open, select the **datDate** field in the Form Navigator dialog. The heading of the Properties dialog changes to Properties: Date Field.
- 2) In the *General* tab of the Properties dialog, scroll down to the *Date format* property. In the drop-down list, select the date format you desire.
- 3) Scroll down to the *Dropdown* property and select **Yes**.
- 4) Is the width of the *Date* field inappropriate for the selected format? If so:
 - a) The *Date* field has a border around it.
 - b) Move the cursor over the middle green marker on the right side of the *Date* field. It should become a horizontal double arrow. Drag this to the right to increase the width. Drag it to the left to reduce the width. (It may take several attempts to get this right.)

Step 4): Modify formatted controls

At each step, instructions have been given for which changes need to be made. With the help of the Form Navigator, make a list of the formatted fields and their labels. The fields are those with the prefix, *fmt*. (There are eight of them.)

One of these fields, Odometer, contains the odometer readings as integers. The rest are currency fields. Selecting the correct format follows the same steps.

Working with one control at a time perform the following tasks:

- 1) Check that the label of the control provides the annotation that you require. In the case of *lbSnCost*, change it to *Snack Cost*.
- 2) Click the label of the control to be modified in the Form Navigator. If the border for the label is longer or shorter than the text in the label, adjust its width as described for the *Date* field above.
- 3) Click this formatted field in the Form Navigator list.
 - a) Under the *General* tab, scroll down to the *Formatting* property.
 - b) Click the ellipsis (...) on the right to open the Format Number dialog.
 - c) For the Odometer field click **Number** in the *Category* list, otherwise click **Currency**.
 - d) Under *Format*, select the example to be used.
 - e) Select the desired number of decimal places (one for *Odometer*, two otherwise).
 - f) Select the desired number of leading zeros.
 - g) **Negative numbers red**: check if yes, remove the check if no.
 - h) **Thousands separator**: check if yes, remove check if no.
 - i) Click **OK**.
 - j) If the width of the field is not correct for the selected format, adjust its width as described for the *Date* field above.
- 4) Repeat these steps for each field name in the Form Navigator that begins with *fmt*.

Step 5): Modify fields in the table

The labels in these controls form the headings of the columns. The values of the field are in the column. The Form Navigator does not show any information about them. So modifications must be done using the Properties dialog.

The controls in a table control require the same types of modification as have already been discussed. To change things, click the header to be able to access that particular control's properties.

- 1) Click the *Date* label (the column named *Date*).
 - a) Scroll to the *Date format* property. In the drop-down list, select the format you desire, if different from the default setting.
 - b) Scroll to the *Width* property. Adjust the width if necessary.
 - c) Scroll to the *Dropdown* property. If you want to have a small calendar pop-up window, select **Yes**.
- 2) Click the *FuelCost* label.
 - a) Open the drop-down list for the *Label* property. Add a space between *Fuel* and *Cost*. Press *Enter*.
 - b) Scroll to the *Formatting* property. Click the ellipsis (...) on the right. Select *Currency* from the *Category* column. Uncheck *Negative numbers red* and *Thousands separator*. Click **OK**.
 - c) Scroll to the *Width* property. Adjust the width if necessary.
 - d) Change the *Alignment* property if you do not want data to be to the left. Select **Center** to put the data in the middle of the cell.
- 3) Click the *FuelQuantity* label.
 - a) Open the drop-down list for the *Label* property. Add a space between *Fuel* and *Quantity*. Press *Enter*.
 - b) Scroll to the *Formatting* property. Change if needed to show three decimal places.
 - c) Scroll to the *Width* property. Adjust the width if necessary.
 - d) Change the *Alignment* property if you do not want data to be to the left. Select **Center** to put the data in the middle of the cell.
- 4) Click the *Odometer* label.
 - a) Scroll to the *Formatting* property. Change if needed to show one decimal place.
 - b) Scroll to the *Width* property. Adjust the width if necessary.
 - c) Change the *Alignment* property if you do not want data to be to the left. Select **Center** to put the data in the middle of the cell.
- 5) Click the *PaymentType* label.
 - a) Right-click this label to open a context menu to add a list box. Select **Replace with > List Box** in the context menu.
 - b) Open the drop-down list for the *Label* property. Add a space between *Payment* and *Type*. Press *Enter*.
 - c) On the *Data* tab, change the *Type of list contents* property to **Sql**.
 - d) Paste the SQL code `SELECT "Type" FROM "PaymentType"` into the *List content* property. (This is a shortcut method – see the Tip on page 25 and the detailed instructions above it if you want more details).

Step 6): Group the controls

This is a suggested layout which looks reasonably well organized. Use this one or create one that appeals to you. The controls may be wider or narrower than yours because of the content that will be in them. Note that this layout has left space for the additional labels that will be added later.

- 1) Three icons need to be activated on the Form Design toolbar: **Display Grid**, **Snap to Grid**, and **Helplines While Moving**. If this toolbar is on the side of the form, click the double arrow (») to open a sub toolbar showing them. If the toolbar is on the top or bottom of the form, they are on the right end of it. If there is a double arrow at the end, click it to reveal them. Make sure they are highlighted as in this figure.



Figure 27: Help for moving controls

Tip

You can also control the **Display Grid**, **Snap to Grid**, and **Helplines While Moving** options using the **View > Grid and Helplines** menu.

- 2) Some of the controls need to be moved in pairs so the Form Navigator needs to remain open. Close the Properties dialog now.

Date	Fuel Cost	Fuel Quantity	Odometer	Payment Type

Figure 28: Form suggested layout

Note

When moving a control, it is tempting to use the *PositionX* and *PositionY* properties to place the control exactly where you want it to be. **Do not do this.** This will place the control's label and field on top of each other. These properties can be used to move a label or field to a specific location, but are not designed to move a control. Use the **Position and Size** icon on the Form Design toolbar to move a control or group of selected controls.

The list in the Form Navigator reveals which controls needed to be grouped based upon their names:

- *lblMotel / fmtMotel* with *lblMPayment / txtMPayment*;
- *lblBreakfast / fmtBreakfast* with *lblBPayment / txtBPayment*;
- *lblLunch / fmtLunch* with *lblLPayment / txtLPayment*;
- *lblSupper / fmtSupper* with *lblSPayment / txtSPayment*;
- *lblSnackNo / txtSnackNo* with *lblSnCost / fmtSnCost* and with *lblSnPayment / txtSnPayment* (group these three controls together);
- *lblMiscellaneous / fmtMiscellaneous* with *lblMiscPayment / txtMiscPayment*.

That is six groups of controls; each one will be moved separately.

The layout shows, for each of these groups, an order as to where each control of a group goes. For most of them, the first control holds the cost, and the second contains the payment type in a row. The snacks places the number of snacks followed by the cost and then the payment type. The miscellaneous controls contains the payment below the cost.

- 3) Before moving an entire group to a new location, move the controls within the group to where you want them to be relative to each other, such as the order mentioned in the last paragraph.
 - a) Click on the first control, placing a border around it.
 - b) Place the cursor over the label or field where it changes its shape.
 - c) Drag it to an open area of the form.
 - d) Using the same method, move the second control to the correct position relative to the first control.

As soon as you begin to move it, the helplines will appear. Use them to line up the edges of the controls before releasing the cursor.
 - e) If there is a third control, move it to the correct position relative to the second one.
- 4) Move the controls for the group to where you want them:
 - a) Click the first component in the Form Navigator list.
 - b) Use the standard *Control+Click* and *Shift+Click* mechanisms until all of the labels and fields in this group are highlighted.
 - c) Place the cursor over one of the labels or fields changing the arrow.
 - d) Drag the group to where you want its controls to be.
- 5) Repeat for the other controls using these same steps. If a group is going to be below another group of controls, use the helplines to line up the left end of the two groups (for example: first control under left control).

Step 7): Modify memo control

The size of the *Note* control allows it to be moved into a place on the form that permits the controls of the form to be organized without changing the size of the *Note* control. This might not always be the case. If the size had needed modification, this is done using the same methods as for other text controls.

The other modification is adding scrollbars. The choices are none, vertical, horizontal, or both.

- 1) To change the size of this control, follow the same steps for changing the size for any text control.
- 2) If necessary, move the control to the required position using the same steps described above for grouping the controls (Step 6)).
- 3) Click the **Control Properties** icon on the Form Design toolbar if the Properties dialog is not open.
- 4) Select the *txtNotes* control in the Form Navigator dialog.
- 5) On the Properties dialog, click the *General* tab if it is not selected.
- 6) Scroll down to the *Text type* property.
- 7) Select the **Multi-line** option in its drop-down list.
- 8) Scroll down to the *Scrollbars* property.
- 9) In its drop-down list, select the option you need (**None**, **Vertical**, **Horizontal**, or **Both**).
- 10) Close the Properties dialog.

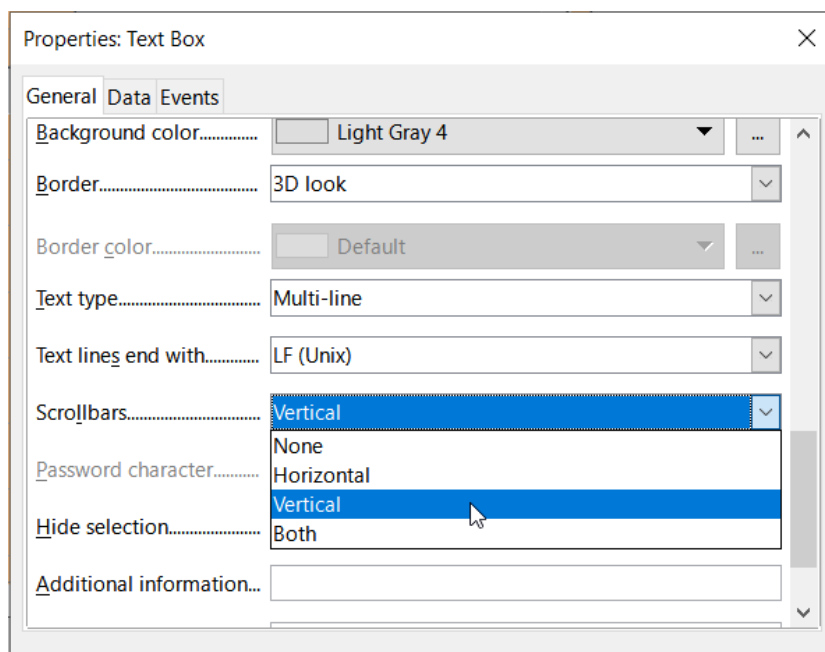


Figure 29: Scroll bar selections in the Properties dialog

Step 8): Add headings

This task is easier to complete if you have end-of-paragraph markers visible. You should turn them on by selecting **View > Formatting Marks**, or by clicking the **Toggle Formatting Marks** icon on the Standard toolbar, or by pressing *Ctrl+F10*.

- 1) Make sure that the cursor is in the top left hand corner of the Database Form window. If it is not, click in that corner to move the cursor there.
- 2) Press the *Enter* key repeatedly to move the cursor down until it aligns with the gap between the *Date* field and the *Breakfast* field.

- 3) Use the *Set Paragraph Style* drop-down list on the Formatting toolbar to select the **Heading 2** style.
- 4) Use the space bar to move the input cursor along the empty line to the position where you want the first heading to appear. Type the heading *Meals*.
- 5) Use the space bar to move the input cursor along the same line to the position where you want the second heading to appear. Type the heading *Snacks*.
- 6) Press the *Enter* key repeatedly to move the cursor down until it aligns with the gap between the *Supper* field and the table.
- 7) If necessary, use the *Set Paragraph Style* drop-down list on the Formatting toolbar to re-select the **Heading 2** style.
- 8) Use the space bar to move the input cursor along the line to the position where you want the table's heading to appear. Type the heading *Fuel Data*.

Tip

If you have experience in using styles, you can open the Styles deck by selecting **View > Styles**, or by pressing *F11*. Right-clicking the *Heading 2* style and selecting the **Modify** option in the context menu would allow you to quickly modify the appearance of all three headings. See the *Writer Guide* for details.

Step 9): Change the background

The background for a form can be a color, or a graphic (picture). You can use any of the colors in the color table at **Tools > Options > LibreOffice > Application Colors**. If you know how to create custom colors, you can use them. You can also use a picture (graphic file) as the background.

To add a color to the form background:

- 1) Right-click the form and select **Page Style** in the context menu.
- 2) Base displays the Page Style dialog (Figure 30). Make sure the *Area* tab is selected.

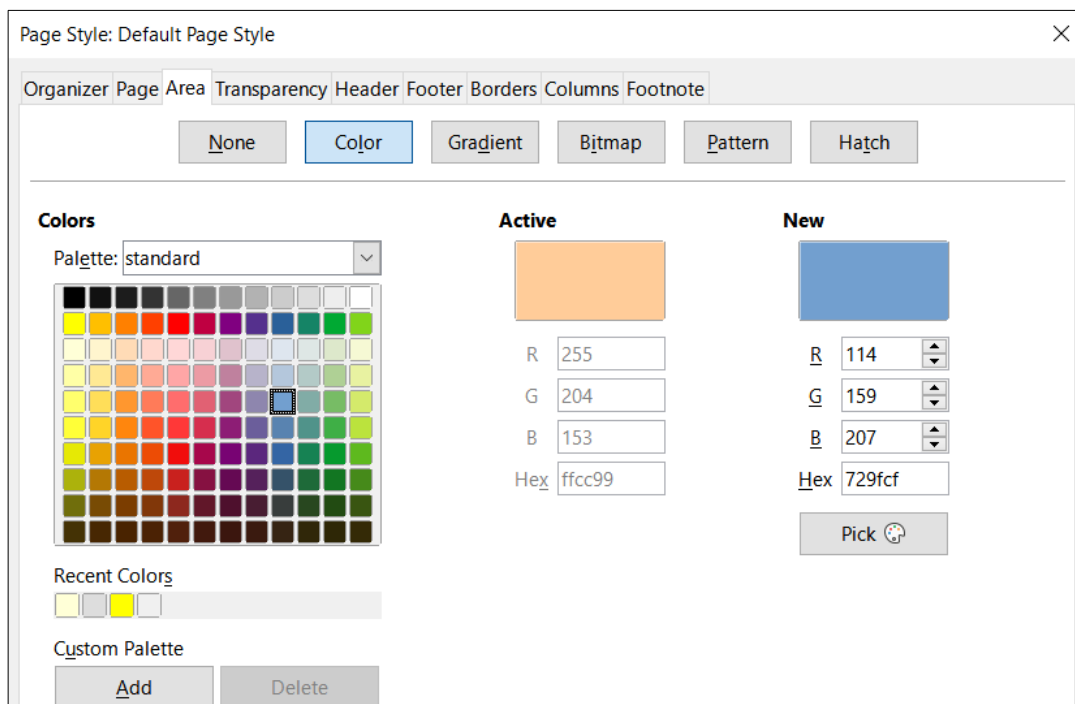


Figure 30: Page Style dialog

- 3) Select **Color** in the row of buttons near the top of the tab.
- 4) Select a color from the grid. You can change the color palette to access more choices or use the *RGB* or *Hex* boxes to specify a color, or click **Pick** for even more choices.
- 5) Click **Apply** to see what your selection will look like in your form.
- 6) Change if necessary.
- 7) Click **OK** to accept your color choice and close the dialog.

To add other form backgrounds:

- 1) Perform steps 1)) and 2)) as for adding color to the background.
- 2) Select the type of background from the row of buttons: **None**, **Gradient**, **Bitmap**, **Pattern**, or **Hatch**.
- 3) In the selected type, choose one of the selections provided or create your own. For details, see Chapter 4, Changing Object Attributes, in the Draw Guide.
- 4) Click **Apply** to see what your selection will look like in your form.
- 5) Click **OK** to accept your choice and close the dialog.

If you selected a bitmap in the list, the form might look like Figure 31.

The screenshot shows a form with a light gray background. At the top, there are five input fields: 'Date' (a dropdown menu), 'Odometer', 'Tolls', 'Motel', and 'Payment Type' (a dropdown menu). Below these are two main sections: 'Meals' and 'Snacks'. The 'Meals' section has three rows, each with a text input field and a 'Payment Type' dropdown menu. The 'Snacks' section has two rows: the first has 'Snack No.', 'Snack Cost', and 'Payment Type' (dropdown); the second has 'Miscellaneous', 'Payment Type' (dropdown), and a 'Notes' text area with a vertical scrollbar. At the bottom is a 'Fuel Data' section containing a table with columns for 'Date', 'Fuel Cost', 'Fuel Quantity', 'Odometer', and 'Payment Type'. Below the table is a 'Record' field, an 'of' field, and a set of navigation buttons (back, forward, etc.).

Figure 31: Finished form

Step 10): Change the tab order

The *Tab* key moves the cursor from field to field. This is much easier to do than to click each field to enter data into it. It also permits us to group our expenses into areas before we begin entering data. For example, all of our meal receipts can be grouped together as can our snacks and also our fuel purchases.



Figure 32: Form Design toolbar with Activation Order icon circled

- 1) If it is not open already, select **View > Toolbar > Form Design** to open the Form Design toolbar.
- 2) Click the **Activation Order** icon (circled in Figure 32).
- 3) Rearrange the order of the fields in the Tab Order dialog.
 - a) If you click the **Automatic Sort** button, Base will interpret the structure of your form and propose what it considers to be a sensible tab order.
 - b) You can use the **Move Up** and **Move Down** buttons to change the position of a selected control in the list.
 - c) You can drag a control from one position to another in the *Controls* list.
 - d) You may choose to define your own tab order, or you could put the fields in the same order as that shown in Figure 33.
 - e) Click **OK**.
- 4) Save and close the form.
- 5) Save the database.

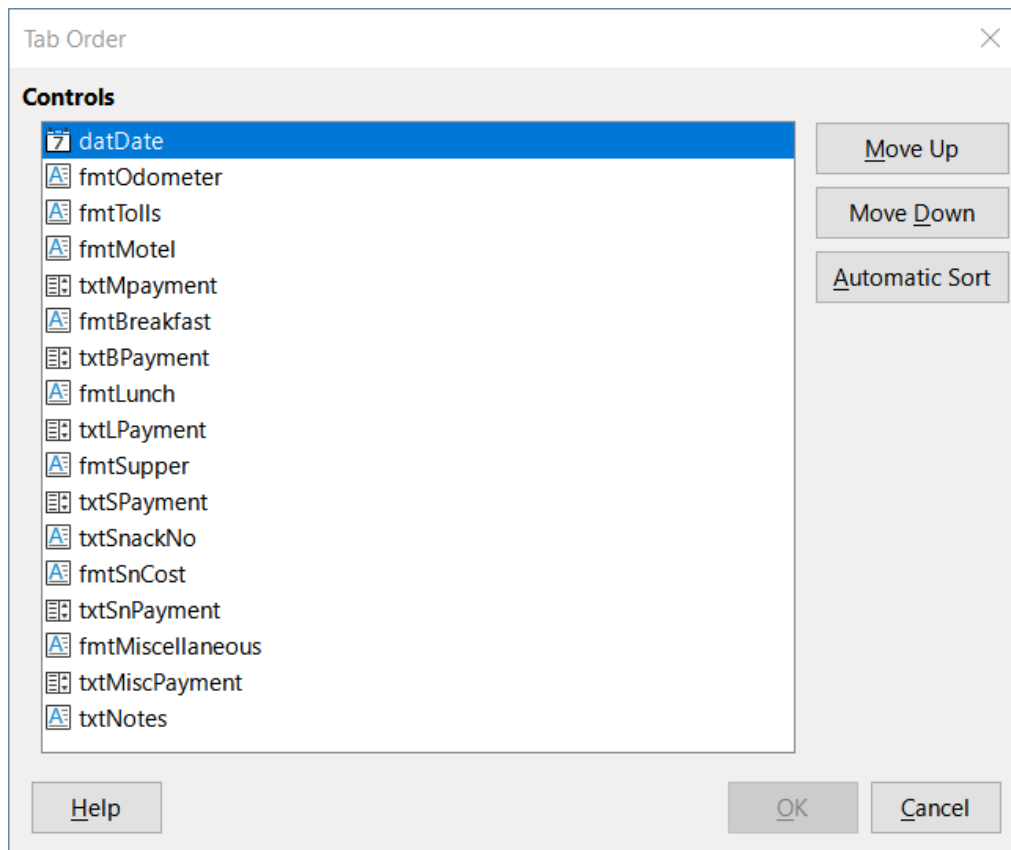


Figure 33: Possible tab order for the Vacations form

Entering data in a form

Records are used to organize the data we enter into a form. They also organize the data we enter into a subform.

Different types of fields allow different methods of data entry. In many cases, more than one method can be used.

The first step to entering data in a form is to open it from the main database window (Figure 3).

- 1) Click the *Forms* icon in the *Database* list, or select **View > Database**, or press *Alt+M*.
- 2) Find the form's name in the *Forms* list (*Vacations*).
- 3) Double-click the form's name.

Note

The order in which the following descriptions are presented assume a particular tab order for the form, and this may not match the tab order that you want to define.

The quickest way to enter a date in the *Date* field is to click the arrow that opens the drop-down calendar (Figure 34) and click the day that you want. Then press the *Tab* key to go to the next field.

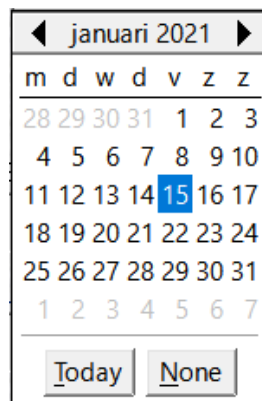


Figure 34: Calendar drop down

The *Odometer*, *Tolls*, and *Motel* fields are numeric fields. Enter values directly into them, or use the up and down arrows (if you selected to display them during form creation). When the value has been entered, use the *Tab* key to go to the next field.

- Typing the up arrow increases the value, and the down arrow decreases the value by one unit.
- The two arrows only change the numerals to the left of the decimal place.
- Numerals to the right of the decimal place must be changed by deleting them and typing the desired ones.

The *Motel's Payment Type* field is a drop-down list. If, as in my case, all of the elements of the list start with different letters, typing the first letter selects the desired entry.

- If two or more elements of the list have the same first letter, repeated typing of the first letter will cycle through these elements.
- When the selection is correct, use the *Tab* key to go to the next field.

The rest of the fields of the main form are either numeric fields or drop-down lists until we reach the *Notes* field. It is a text field. Type anything you desire in this field just as you would any simple text editor.

Note

The *Tab* key is used to move between fields. But since text fields do not have tab positions in them, they can not be used to move from one position in the field to another one. All spacing must be done by the space bar. The *Enter* key is a little more complex. It can be used to move between non-text fields. With a text field, its action depends upon whether the text field has a single line property. With it, pressing *Enter* will move the cursor to the next field. But when the field has a multi-line property, pressing *Enter* moved will only move the cursor down one line. With this field, the *Tab* key has to be used to move the cursor to the next field.

If we did not have a subform for fuel data, pressing the *Tab* key in the last field would save all of the fields, clear them, and make the form ready to accept data on the second record.

Since we have a subform, using the *Tab* key places the cursor in the first *Date* field of the subform with the date automatically entered to match the *Date* field of the main form.

The *Fuel Cost*, *Fuel Quantity*, and *Odometer* fields are numeric fields. The *Payment Type* field is a drop-down list. Enter the data just as you did in the main form, and use the *Tab* key to go to the next field.

When you use the *Tab* key to leave the *Payment Type* field, it goes to the *Date* field of the next line and automatically enters the date. Now you can enter your second set of fuel data for this day.

Date	Fuel Cost	Fuel Quantity	Odometer	Payment Type
04/19/20	\$16.00	14.690	704.2	Kevin
04/19/20	\$7.00	6.430	778.7	Dan
04/19/20	\$20.00	19.570	1,032.3	Dan
04/19/20	\$16.00	15.150	1,239.4	Cash
04/19/20	\$16.00	15.144	1,493.4	Kevin

Figure 35: Sample record of the Vacations form and subform

To move to another record when the form has a subform, click any of the fields of the main form. In this case, click the *Date* field of the main form. Then use the directional arrows at the bottom; from left to right: *First Record*, *Previous Record*, *Next Record*, and *Last Record* (all have keyboard shortcuts identified in their extended tips). To the right of these arrows is the *New Record* icon.

To create a new record while in the last record of the main form, click either the *Next Record* icon or the *New Record* icon.

Tip

The number in the Record box is the number of the record whose data is shown in the form.

If you know the number of the record you want, you can enter it into the record box and then type *Enter* to take you to that record.

Figure 35 is a record with data inserted in its fields.

Quickly populate a table with data from a spreadsheet

If you have data in a spreadsheet document that represents the layout of a database table, and you want to copy it into a table of your database, then it is possible to load the sheet contents quickly by dragging and dropping the sheet into a database table:

- 1) Open the database file in the LibreOffice Base window (Figure 3) and select the Table view.
- 2) Open the spreadsheet in Calc. Select the sheet you want to insert in the database.
- 3) Place the two windows side by side on your desktop.
- 4) Drag the sheet tab in the bottom of the Calc window into the table list of the database file. The mouse pointer shows a square with a + sign. (Sheet tab: This has the name of the sheet on it.)
- 5) Drop the sheet by releasing the mouse button.
- 6) The Copy table wizard appears to help you migrate the content to the database table.
- 7) On the first page of the wizard, select the options of the copy operation and name the database table. Each option is explained in the Help (F1).
- 8) On the second page of the wizard, select the sheet columns you want to copy into the table.
- 9) On the third page of the wizard, define the data type of each column of your table.
- 10) Click **Create** to populate the new table with the spreadsheet data.

Note

The Copy table operation copies only values and strings from the Calc spreadsheet. It **does not** copy formulas.

Creating queries

Queries are used to get specific information from a database. Their results are special tables within the database.

To demonstrate the use of queries, we will use two different methods:

- Using our CD-Collection table, we will create a list of albums by a particular artist. We will do this using the Query Wizard.
- The information we might want from the Fuel table includes what our fuel economy is. We will do this using Design View. (Queries that require calculations are best created with Design View.)

Using the Wizard to create a query

Queries created by the Query Wizard provide a list, or lists, of information based upon what one wants to know. It is possible to obtain a single answer or multiple answers, depending upon the circumstances.

In the main database window (Figure 3), click the **Queries** icon in the Database section, select **View > Queries**, or press *Alt+Q*. In the *Tasks* section, click **Use Wizard to Create Query**. The Query Wizard dialog opens (Figure 36). The information we want is which albums are by a certain musical group or individual (the album's artist). We can include when each album was bought.

✓ Note

When working with a query, more than one table can be used. Since different tables may contain the same field names, the format for naming fields in a query is *table name.field name*, with a period (.) between the table name and the field name. For example, the Lunch field of the Vacations table used in a query has the name *Vacations.Lunch*.

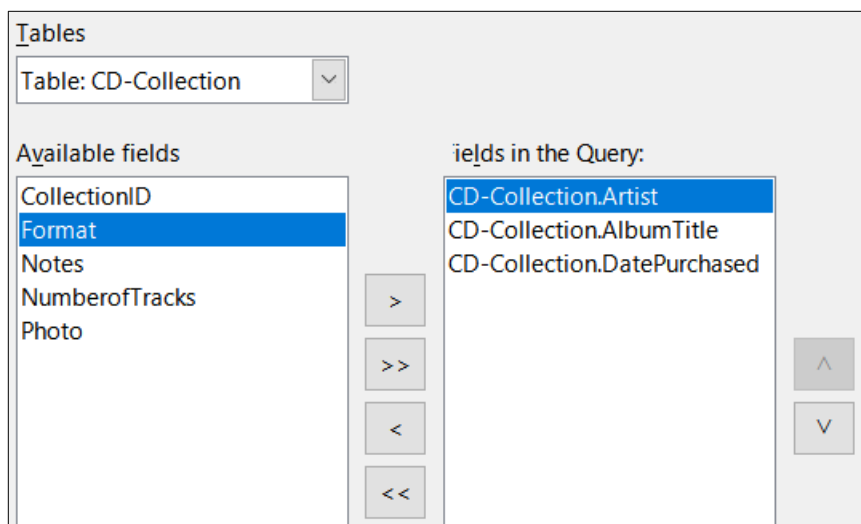


Figure 36: First page of the Query Wizard

Step 1: Select the fields

- 1) Select the **Table: CD-Collection** option in the *Tables* drop-down list.
- 2) Select fields from the CD-Collection table in the *Available fields* list.
 - a) Click *Artist*, and use the **>** button to move it to the *Fields in the Query* list.

- b) Move the *AlbumTitle* and *DatePurchased* fields in the same manner. You can also move a single field from one list to the other by double-clicking.
 - c) If you make a mistake, you can return an unwanted field from the *Fields in the Query* list to the *Available fields* list by selecting it and then typing the < button.
 - d) In other circumstances, you can use the >> and << buttons to move all fields in one list to the other list.
- 3) Click **Next**.

Tip

To change the order of the fields, select the field you want to move and click the up or down arrow to the right of the *Fields in the Query* list.

Step 2: Select the sorting order

Up to four fields can be used to sort the information of our query. A little simple logic helps at this point. Which field is most important?

In our query, the artist is most important, the album title is less important, and the date purchased is of least importance. Of course, if we were interested in what music we bought on a given day, the date purchased would be the most important.



Figure 37: Sorting order page

- 1) Click the first *Sort by* drop-down list.
 - a) Select the **CD-Collection.Artist** option.
 - b) To list the artists in alphabetical order (a-z), select **Ascending** on the right.
- 2) Click the first *Then by* drop-down list.
 - Select **CD-Collection.AlbumTitle** and then select **Ascending**.
- 3) Click the second *Then by* drop-down list.
 - Select **CD-Collection.DatePurchased** and then select **Ascending**.
- 4) Click **Next**.

Step 3: Select the search conditions

The search conditions allow us to compare the name we entered with the names of the artist in our database and decide whether to include a particular artist in our query results or not. The following options are available:

- *is equal to*: the same as
- *is not equal to*: not the same as
- *is smaller than*: comes before
- *is greater than*: comes after

- *is equal or less than*: the same as or comes before
- *is equal or greater than*: the same as or comes after
- *like*: similar to in some way
- *not like*: is not similar to
- *is null*:
- *is not null*:

Note

These conditions apply to numbers, letters (using alphabetical order), and dates.

- 1) Since we are only searching for one thing, we will use the default setting of **Match all of the following**.
- 2) We are looking for a particular artist, so select **CD-Collection.Artist** in the *Fields* drop-down and **is equal to** in the *Condition* drop-down.
- 3) Type the name of the artist in the *Value* box.
- 4) Click **Next**.

Step 4: Select the type of query

We want simple information, so the default setting: **Detailed query** is what we want. Click **Next**.

Note

Since we have a simple query, the *Grouping* and *Grouping conditions* are not needed. Steps 5 and 6 of the wizard are skipped in our query.

Step 7: Assign aliases if desired

The fields, *AlbumTitle* and *DatePurchased*, have names made up of two words without separation. Instead, aliases can be made containing two words each (*Album Title* and *Date Purchased*, respectively).

- 1) Change the alias for *AlbumTitle* to *Album Title*.
- 2) Change the alias for *DatePurchased* to *Date Purchased*.
- 3) Click **Next**.

Step 8: Overview

- 1) Make sure that the query conditions listed in the *Overview* area are the ones you wanted.
- 2) If something is wrong, use the **Back** button to move to the step that contains the error.
- 3) Then use the **Next** button to return to this Overview step.
- 4) Name the query (suggestion: *Query_Artists*).
- 5) To the right of this are two choices. Select **Display Query**.
- 6) Click **Finish**.

Base displays the LibreOffice Base: Table Data View query showing any records that match the query. Close the window when you have finished with it.

Using Design View to create a query

Creating a query using Design View is not as difficult as it may first seem. It may take multiple steps, but each step is fairly simple.

What fuel economy is our vehicle getting (miles per gallon in the USA)? This question requires us to create two queries, with the first query used as part of the second query.

Step 1: Open the first query in Design View

- Click **Create Query in Design View** in the *Tasks* area of the main window. Base displays the Add Table or query dialog (Figure 38) and the LibreOffice Base: Query Design window.

Step 2: Add tables to window

- 1) In the Add Table or query dialog, click **Fuel** to highlight it.
- 2) Click **Add**.
- 3) Click **Close**.
- 4) Base closes the Add Table or Query dialog and includes the Fuel table in the upper area of the Query Design window.

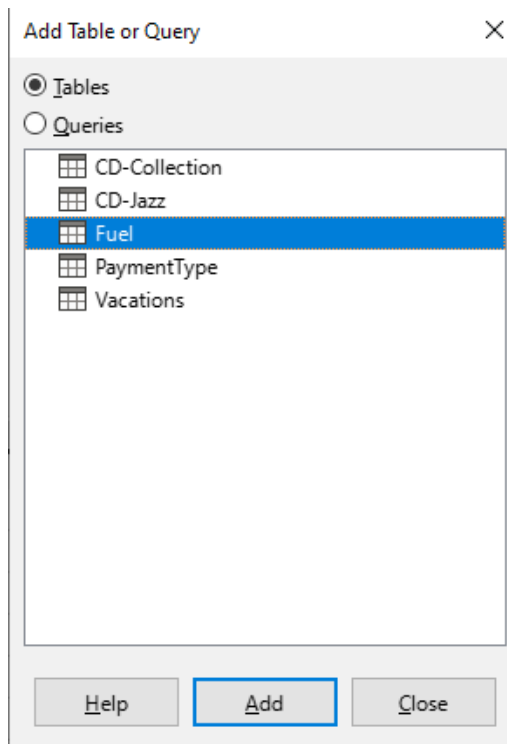


Figure 38: Add Table or Query dialog

Tip

Move the cursor over the bottom edge of the *Fuel* table (Figure 39) and drag the edge to make it longer and easier to see all of the fields in the table.

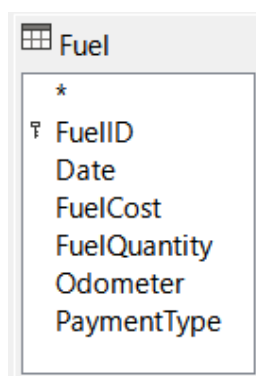


Figure 39: Fuel table in query

Step 3: Add fields to the table at the bottom

- 1) Double-click the *FuelID* field in the Fuel table.
- 2) Double-click the *Odometer* field.
- 3) Double-click the *FuelQuantity* field.
- 4) Double-click the *FuelCost* field.

The query table at the bottom of the Query Design dialog should now have four columns (Figure 40).

Field	FuelID	Odometer	FuelQuantity	FuelCost
Alias				
Table	Fuel	Fuel	Fuel	Fuel
Sort				
Visible	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 40: Query table

Step 4: Set the criterion for the query

We want the query to include FuelID values that are greater than 0.

- 1) Type *>0* in the *Criterion* cell under *FuelID* in the query table.
- 2) Click the **Run Query** icon on the Query Design toolbar (circled in red in Figure 41), or click **View > Run Query**, or press *F5*.



Figure 41: Run Query icon in Query Design toolbar

Base presents the results of the query in the area above the query table.

Figure 42 shows the Fuel table with my entries. The query results based upon the Fuel table are shown in Figure 43.

	FuelID	Date	FuelCost	FuelQuantity	Odometer	PaymentType
▶	0	07-01-21	\$16.00	14,690	704,0	Kevin
	1	07-01-21	\$7.00	6,430	778,7	Dan
	2	07-01-21	\$20.00	19,570	1032,0	Dan
	3	07-01-21	\$16.00	15,150	1239,4	Cash
	4	07-01-21	\$16.00	14,144	1493,4	Kevin

Figure 42: Fuel table

	FuelID	Odometer	FuelQuantity	FuelCost
▶	1	778,7	6,430	\$7.00
	2	1032,0	19,570	\$20.00
	3	1239,4	15,150	\$16.00
	4	1493,4	14,144	\$16.00

Figure 43: Query of Fuel table

Step 5: Save and close the query

Since this query contains the final odometer reading for our calculations, name it *End-Reading* when saving it. Then close the query. Now click the **Save** icon in the main database window.

Step 6: Create the query to calculate the fuel economy

- 1) Click **Create Query in Design View** in the *Tasks* area of the main window to open a new query.
- 2) Base opens the LibreOffice Base: Query Design window and the Add Table or Query dialog.
- 3) Add the Fuel table to the query just as you did in **Step 2: Add tables to window** but **do not** close the Add Table or Query dialog.
- 4) Add the End-Reading query to this query.
 - a) Click **Queries** to get the list of queries in the database (Figure 44).
 - b) Click **End-Reading**.
 - c) Click **Add**, and then click **Close**.
 - d) Base closes the Add Table or Query dialog and displays the *Fuel* table and *End-Reading* query in the upper area of the Query Design window.

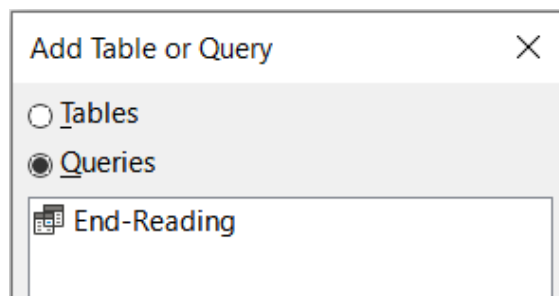


Figure 44: Selecting queries to add to another query

Step 7: Add fields to the table at the bottom of the query

We are going to calculate the fuel economy. To do this we need the fuel quantity and distance traveled. Since the fuel quantity we want to use is the final odometer reading, we will use the *End-Reading* query to get it. We will also use the *Odometer* field from both the *Fuel* table and *End-Reading* query.

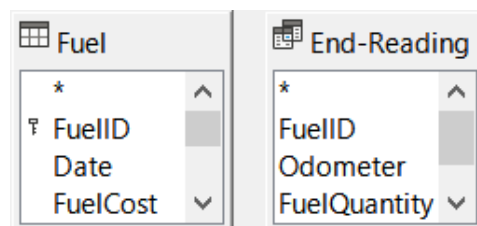


Figure 45: Tables in this query

- 1) Double-click *FuelQuantity* in the *End-Reading* query.
- 2) Double-click *Odometer* in the *End-Reading* query.
- 3) Double-click *Odometer* in the *Fuel* table.

Field	FuelQuantity	Odometer	Odometer
Alias			
Table	End-Reading	End-Reading	Fuel
Sort			
Visible	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 46: Added fields to the query

Step 8: Enter the FuelID difference field

We want the difference between the *FuelID* value of the *Fuel* table and *FuelID* value of the *End-Reading* query to equal one (1).

- 1) Type `"End-Reading"."FuelID" - "Fuel"."FuelID"` in the field to the right of the *Odometer* field of the *Fuel* table (Figure 47).
- 2) Type = '1' in the *Criterion* cell of this column.
- 3) Leave the *Visible* cell of this column unchecked.
- 4) Calculate the distance traveled:
 - Type in the next empty *Field* cell (Figure 48):
`"End-Reading"."Odometer" - "Fuel"."Odometer"`
 - In the *Alias* row, type *Distance*.
 - Type > '0' in the *Criterion* cell.
- 5) Calculate fuel economy: Type
`("End-Reading"."Odometer" - "Fuel"."Odometer")/"End-Reading"."FuelQuantity"`
in the next column to the right of the word *Field* (Figure 49).
- 6) Type *Fuel Economy* as the alias.

<code>"End-Reading"."FuelID" - "Fuel"."FuelID"</code>
<input type="checkbox"/>
<code>'1'</code>

Figure 47: Typing in calculation of fields

"End-Reading"."Odometer" - "Fuel"."Odometer"
Distance
<input checked="" type="checkbox"/>
> '0'

Figure 48: Field for distance traveled calculations

("End-Reading"."Odometer" - "Fuel"."Odometer") / "End-Reading"."FuelQuantity"
Fuel Economy
<input checked="" type="checkbox"/>

Figure 49: Fuel economy calculation field

 **Note**

When entering fields for these calculations, you must follow this format: table or query name followed by a period followed by the field name. For hyphenated or multiple-word names (table or query), use double quotes around the table or query name. The query will then add the rest of the double quotes as in Figure 49.

Use the arithmetical symbol between the two. More than one calculation can be done by using parentheses to group the arithmetical operations.

Step 9: Run the query and make some modification

After we run the query to make sure it works correctly, we will hide all of the fields that we do not need.

FuelQuantity	Odometer	Odometer	Distance	Fuel Economy
6,430	778,7	704,2	74,5	11,59
19,570	1032,3	778,7	253,6	12,96
15,150	1239,4	1032,3	207,1	13,67
14,144	1493,4	1239,4	254	17,96

Figure 50: Result of running the fuel economy query

- 1) Click the **Run Query** icon on the Query Design toolbar (Figure 41). The results are shown in Figure 50.

Two of the column headers are identical. By giving these two headers different aliases, we can distinguish them.

- 2) Add Aliases: Type the aliases as they are listed in Figure 51.

Field	FuelQuantity	Odometer	Odometer
Alias		End	Begin
Table	End-Reading	End-Reading	Fuel

Figure 51: Query table with Odometer aliases added

3) Run the query again. The results are in Figure 52.

FuelQuantity	End	Begin	Distance	Fuel Economy
6,430	778,7	704,2	74,5	11,59
19,570	1032,3	778,7	253,6	12,96
15,150	1239,4	1032,3	207,1	13,67
14,144	1493,4	1239,4	254	17,96

Figure 52: Query run with aliases

Step 10: Close, save, and name the query

My suggestion for a name is *Fuel Economy*.

- 1) Click the **Save** icon.
- 2) Name the query.
- 3) Close the query.
- 4) Save the database file.

There are obviously other calculations that can be made in this query such as cost per distance traveled and how much of the cost belongs to each of the payment types.

Note

To fully use queries requires a knowledge of set operations (*unions, intersections, and, or, complements*, or any combinations of these). Having a copy of the RDBMS manuals, is also extremely useful.

Creating reports

Reports provide information found in the database arranged in a useful way. In this respect, they are similar to queries. They are different in that they are designed to be distributed to people. Queries are only designed to answer a question about the database. Reports are generated from the database's tables, views, or queries.

All reports are based upon a single table, view, or query, so you need first to decide what fields you want to use in the report. If you want to use fields from different tables, you must first combine these fields in a single query or view. Then you can create a report from this.

For example, a report on vacation expenses includes both fuel costs and meal costs. These values are contained in fields of two different tables: Vacations and Fuel. So this report requires you to create a query or view.

Caution

Dynamic reports update only the *data* that is changed or added to a table or query. They do **not** show any modifications made to the table or query itself. For example, **after** creating the report below, open the Fuel Economy query created in the previous section. For the “End-Reading”.“Odometer” – “Fuel”.“Odometer” column, change the number 1 to the number 3 (see Figure 47). The report will be identical before and after you make the change. But if you add more data to the query and run the report again, it will contain the new data. However, all data will be based upon “End-Reading”.“Odometer” – “Fuel”.“Odometer” having the value 1. **No data** will be present in the report for which “End-Reading”.“Odometer” – “Fuel”.“Odometer” has the value 3.

Creating a report: Example

We will create a report on vacation expenses. Certain questions need to be asked before creating the report.

- What information do we want in the report?
- How do we want the information arranged?
- What fields are required to provide this information?
- Will a query or view have to be created because these fields are in different tables?
- Are any calculations required in the data before being added to the report?

The expenses for our vacation are motel, tolls, miscellaneous, breakfast, lunch, supper, snacks, and fuel. One possible report could list the totals of each of these expense groups. Another could list the expense totals for each day of the vacation. A third could list the totals for each expense group for each type of payment. (This would let us know where the money came from to pay the expenses.) Once you create a query to do any one of these, you can create a report based upon the query.

We will create two reports, one listing the expenses each day (other than fuel) and the second listing fuel statistics. The fields we need for the first report from the Vacations table are: Date, Motel, Tolls, Breakfast, Lunch, Supper, Snack Cost, and Miscellaneous. This report only requires the Vacations table. Had the report listed the total expenses for each of these fields, we would have to create a query to provide us with these totals, which is beyond the scope of this chapter.

The second report involves the Fuel table. Since this table includes fuel purchases at times other than during the vacation, we need to create a query that contains only the fuel purchased during vacation periods.

Report Wizard vs Report Design View

- 1) When you open the Report Wizard, the Report Builder also opens. As you make your selections in the wizard, these appear in layout in the Report Builder. When you have finished making your selections, you save the report, name it and then close it.
- 2) When using Design View to create a report, you open the Report Builder to design the layout of it. (There is only one layout available when the wizard is used.)

Vacations table report

To create a new report:

- 1) Click the **Reports** icon in the *Database* area of the main Base window (Figure 3), or select **View > Reports**, or press *Alt+R*.
- 2) In the *Tasks* list, click **Use Wizard to Create Report**. The Report Wizard dialog and the Report Builder window open.

Step 1: Field selection

- 1) Select **Table: Vacations** in the *Tables or queries* drop-down list.
- 2) Use the > to move these fields from the *Available fields* list to the *Fields in report* list: Date, Motel, Tolls, Miscellaneous, Breakfast, Lunch, Supper, and SnCost. The other buttons (<, >>, <<, up arrow, and down arrow) and the double-click action perform similar functions to the equivalent interactions on other wizard pages as described earlier in this chapter.
- 3) Click **Next**.

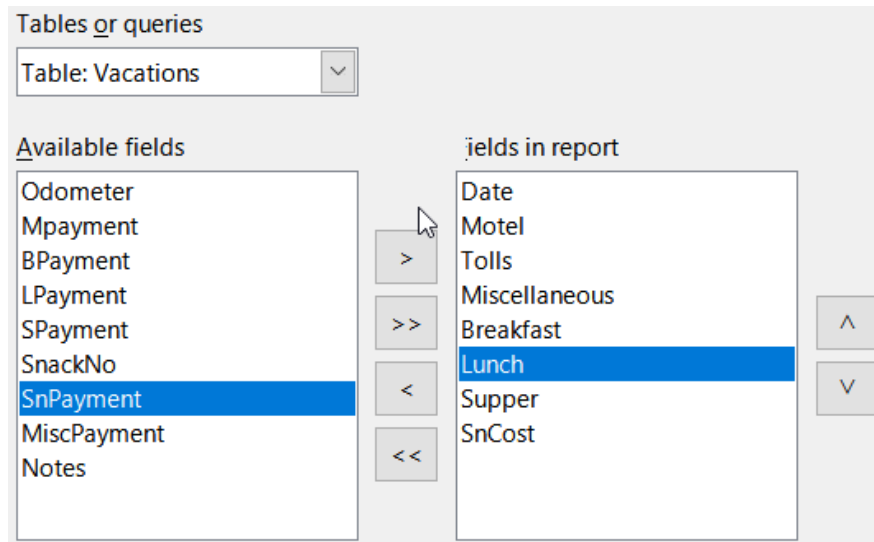


Figure 53: Adding fields to a report

Step 2: Labeling fields

Change any field labels you wish. We will shorten *Miscellaneous* to *Misc.* and expand *SnackCost* into two words.

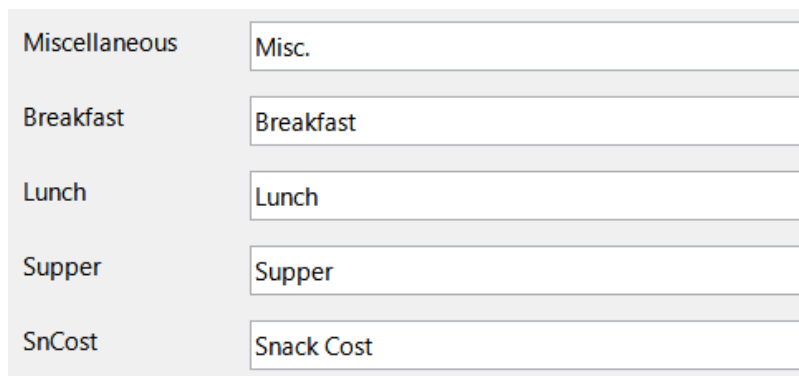


Figure 54: Giving aliases to fields

- 1) Shorten *Miscellaneous* to *Misc.*
- 2) Change *SnCost* into *Snack Cost*.
- 3) Click **Next**.

Step 3: Grouping

- 1) Since we are grouping by the date, use the > button to move the *Date* field from the *Fields* list to the *Groupings* list.

- 2) You can use the < button to return an entry in the *Groupings* list to the *Fields* list. You can use the up and down arrows to re-order entries in the *Groupings* list. You can double-click to move a field from one list to the other.
- 3) Click **Next**.

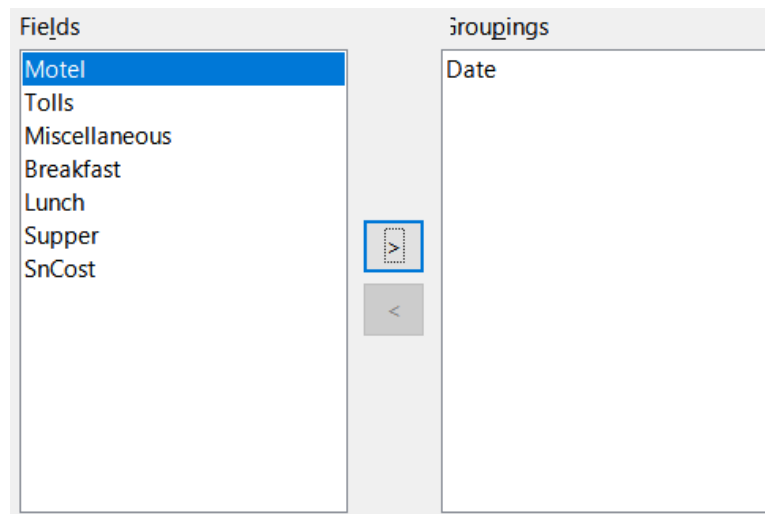


Figure 55: Selecting fields for grouping data

Step 4: Sort options

We do not want to do any additional sorting.

- Click **Next**.

Step 5: Choose layout

- 1) Select **Columnar, three columns** in the *Layout of data* list.
- 2) *Layout of headers and footers* have no possible selections.
- 3) Select **Landscape** as the *Orientation* for the page layout.
- 4) Click **Next**.

Date	Date					=Date
Motel	=Motel	Breakfast	=Breakfast	Snack Cost	=SnCost	
Tolls	=Tolls	Lunch	=Lunch			
Misc.	=Miscellaneous	Supper	=Supper			

Figure 56: Report Builder template determined by the Report Wizard

Figure 56 shows part of the final template that has been built up in the Report Builder as you reach the end of the wizard.

Step 6: Create report

- 1) Title the report: *Vacation Expenses*.
- 2) Select the **Dynamic report** option.
- 3) Select the **Create report now** option.
- 4) Click **Finish**.
- 5) LibreOffice opens the output report in read-only mode in Writer.

The report (Figure 57) has been created, but it needs some editing. The date could be formatted better, and all the numbers need to be formatted as currency. It could use a heading that includes its name, its author, and the date it was prepared. If the report had more than one page, the page

numbers could be put in a footer of each page, perhaps including the total number of pages. But to do these things, you must use Report Builder.

Date	07-01-21			
Motel	50,00	Breakfast	11,00	Snack Cost 5,00
Tolls		Lunch	15,00	
Misc.	2,00	Supper	13,00	

Figure 57: Report without modifications

Report Builder: another way to create reports

With Report Builder, you can create complex and stylish database reports. You can define group and page headers, group and page footers, and calculation fields. Report Builder is installed with LibreOffice.

When we used the Report Wizard, we created a template in Report Builder for our report. If we edit our report, we open Report Builder with this template. By modifying the template, we also modify the report. For example, we can change the Date field's format, and it will change the format of all the dates contained in that field in the above report. Similarly, we can change the field formatting of any of the other fields and change the format everywhere that field appears in the report.

Report Builder can also create reports by itself. To do this, click **Create Report in Design View**. For instructions on how to use the Report Builder, see Chapter 6, Reports, in the *Base Guide*.

Accessing other data sources

LibreOffice allows data sources to be accessed and then linked into LibreOffice documents. For example, a mail merge links an external document containing a list of names and addresses into a letter, with one copy of the letter being generated for each entry.

To access a data source that is not a *.odb file:

- 1) Select **File > New > Database**, or click the arrow at the right of the **New** icon on the Standard toolbar and select the **Database** option in the menu, to open the Database Wizard.
- 2) Select **Connect to an existing database**. Select the required database type in the drop-down list. Click **Next**.
- 3) The remaining steps in the Database Wizard may vary depending on which database type you have chosen.
- 4) At some stage the wizard may prompt you to browse to, and select, the database of interest. You will normally select to register the database and open the database for editing.
- 5) Finally, click **Finish** to exit the wizard. Name and save the database in the location of your choice.

Accessing a spreadsheet as a data source

Accessing a spreadsheet is similar to accessing other databases:

- 1) Select **File > New > Database**, or click the arrow at the right of the **New** icon on the Standard toolbar and select the **Database** option in the menu, to open the Database Wizard dialog.
- 2) Select **Connect to an existing database**. Select **Spreadsheet** in the drop-down list. Click **Next**.

- 3) Click **Browse** to locate the spreadsheet you want to access. If the spreadsheet is password protected, check the *Password required* box. Click **Next**.
- 4) Make sure that the **Yes, register the database for me** and **Open the database for editing** options are selected.
- 5) Click **Finish** to exit the wizard. Name and save the database in the location of your choice.

Note

Using this method of accessing a spreadsheet, you cannot change anything in the spreadsheet using Base. You can only view the contents of the spreadsheet, run queries, and create reports based upon the data already entered into the spreadsheet.

All changes in a spreadsheet must be made in the spreadsheet itself, using Calc. After modifying the spreadsheet and saving it, you will see the changes in the database. If you create and save an additional sheet in your spreadsheet, the database will have a new table the next time you access it.

Registering *.odb databases

Databases created by LibreOffice are in the *.odb (OpenDocument Database) format. Other programs can also produce databases in this format. Registering a *.odb database is simple:

- 1) Choose **Tools > Options > LibreOffice Base > Databases**.
- 2) Under *Registered Databases*, click **New**. LibreOffice displays the Create Database Link dialog.
- 3) **Browse** to where the database is located. Make sure the registered name is correct.
- 4) Click **OK**.

Note

Sometimes after updating LibreOffice to a newer version, your list of registered database files disappears. When that happens, you can use these steps to re-register your database files with your latest version of LibreOffice.

Using data sources in LibreOffice

Having registered the data source, whether a spreadsheet, text document, external database or other accepted data source, you can use it in other LibreOffice components including Writer and Calc.

Viewing data sources

Open a document in Writer or Calc. To view the data sources available, press *Ctrl+Shift+F4* or select **View > Data Sources**. This brings up a list of registered databases, which will include Bibliography and any other registered database, such as the Automobile database created earlier in this chapter.

To view each database, click the drop-down arrow for the database's name (Figure 58). This expands to show *Queries* and *Tables*. Click the drop-down arrow for *Tables* to view the individual tables created. Now click on a table to see all the records held in it.

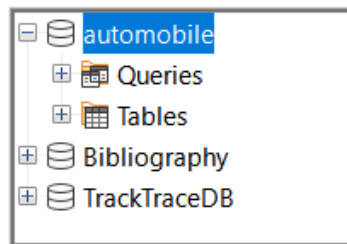


Figure 58: Databases in Data Sources window

Editing data sources

Some data sources (but not spreadsheets) can be edited in the Data Sources window. A record can be edited, added, or deleted.

View a table's data

If you click on a table, its rows and columns of data appear on the right side of the Data Sources window. Editing this data requires only a click in the cell whose data should be changed, change the data, and click in the row above or below it to save the new data.

Beneath the records are five small buttons. The first four move the cursor to the beginning, to the left, to the right, and to the end respectively. The fifth button, with a small star, inserts a new record.



Figure 59: Data Sources navigation buttons

To delete a record, right-click on the gray box to the left of a row to highlight the entire row, and select **Delete Rows** in the context window to remove the selected row.

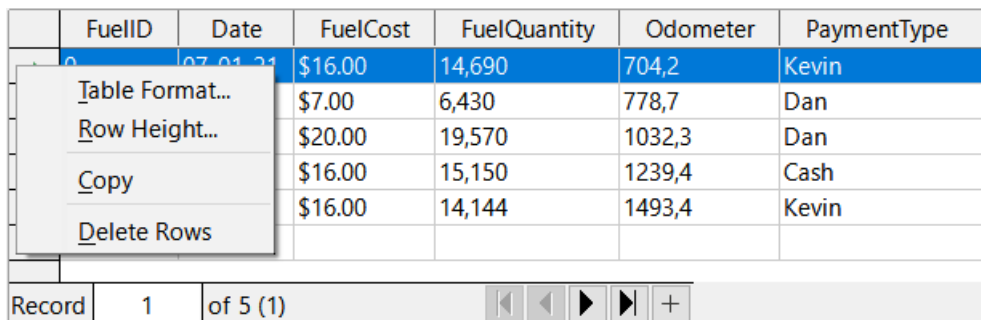


Figure 60: Deleting a row in the Data Sources window

Launching Base to work on data sources

You can launch LibreOffice Base at any time in the Data Sources window. Just right-click on a database or its *Tables* or *Queries* components and select **Edit Database File** in the context menu. Once in Base, you can edit, add, and delete tables, queries, forms, and reports.

Using data sources in Writer and Calc

Data can be placed into Writer and Calc documents from the tables in the Data Sources window. In Writer, values from individual fields can be inserted. Or a complete table can be created in the Writer document. One common way to use a data source is to perform a mail merge.



Figure 61: Toolbar for the Data Sources window

Tip

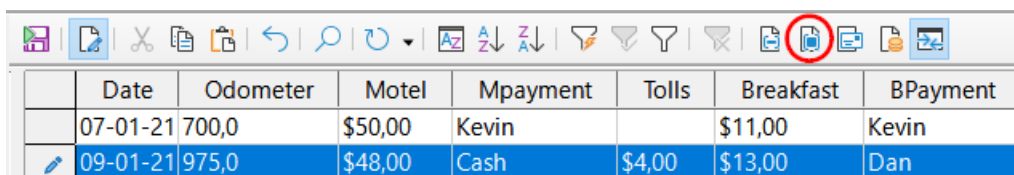
Choose **Tools > Mail Merge Wizard** or click on the **Mail Merge** icon (circled in Figure 61) in the Data Sources window to start the Mail Merge Wizard, which steps you through creating a mail merge document. See Chapter 14 in the *Writer Guide*.

Writer documents

To insert a field from a table opened in the Data Sources window into a Writer document, click on the field name (the gray square at the top of the field list) and, with the left mouse button held down, drag the field onto the document. In a Writer document, it will appear as <FIELD> (where FIELD is the name of the field you dragged).

For example, to enter the cost of meals and who paid for them on a certain date of a vacation:

- 1) Open the list of data sources (*Ctrl+Shift+F4*) and select the *Vacations* table in the *Automobile* database.
- 2) Use this sentence: "On (date), our breakfast cost (amount) paid by (name), our lunch cost (amount) paid by (name), and our supper cost (amount) paid by (name)." But only type "On, our breakfast cost paid by, our lunch cost paid by, and our supper cost paid by."
- 3) To replace (date), click the field name *Date* in the Data Sources window and drag it to the right of the word *On*. Insert an extra space if necessary. The result: *On <Date>*. If you have field shadings turned on (**View > Field Shadings**), <Date> has a gray background. Otherwise it does not.
- 4) To replace first (amount), click the *Breakfast* field name and drag it to the right of *our breakfast cost*. Make sure you have the proper spacing between the field names and the words before and after them. Result: *breakfast cost <Breakfast>*.
- 5) To replace the first (name), click the *BPayment* field name and drag it to the right of *paid by*. Result: *paid by <BPayment>*.
- 6) In the same way, fill in the rest of the fields in the sentence.
 - Use <Lunch> and <LPayment> for the second set of (amount) and (name) in the sentence.
 - Use <Supper> and <SPayment> for the third set of (amount) and (name) in the sentence.
- 7) Final result: *On <Date>, our breakfast cost <Breakfast> paid by <BPayment>, our lunch cost <Lunch> paid by <LPayment>, and our supper cost <Supper> paid by <SPayment>*.
- 8) Add data to the fields of the sentence:
 - a) Click the gray box to the left of the row of data you want to add. That row should be highlighted like the second row of Figure 62.
 - b) Click the **Data to Fields** icon in the Table Data toolbar (circled in Figure 62). This should fill the fields with the data from the row you chose.
 - c) Click another row and then click this icon again. The data in the sentence changes to reflect this selected row of data.
 - d) Save the document if you want to use it as an example later.



	Date	Odometer	Motel	Mpayment	Tolls	Breakfast	BPayment
	07-01-21	700,0	\$50,00	Kevin		\$11,00	Kevin
	09-01-21	975,0	\$48,00	Cash	\$4,00	\$13,00	Dan

Figure 62: Selected row in Data Sources window

Adding data in table format is a little easier and takes perhaps fewer steps. Some of the steps will be quite similar.

- 1) Navigate to the place you want to place the table and click the location.
- 2) *Ctrl+Click* the gray box to the left of each row of the data source that you want to be a row in your table if the rows are not consecutive. To select consecutive rows, click the gray box to the left of the top desired row and *Shift+click* the bottom desired row.
- 3) Click the *Data to Text* icon to open the Insert Database Columns dialog (Figure 63). (The *Data to Text* icon is to the left of the **Data to Fields** icon in Figure 62.)

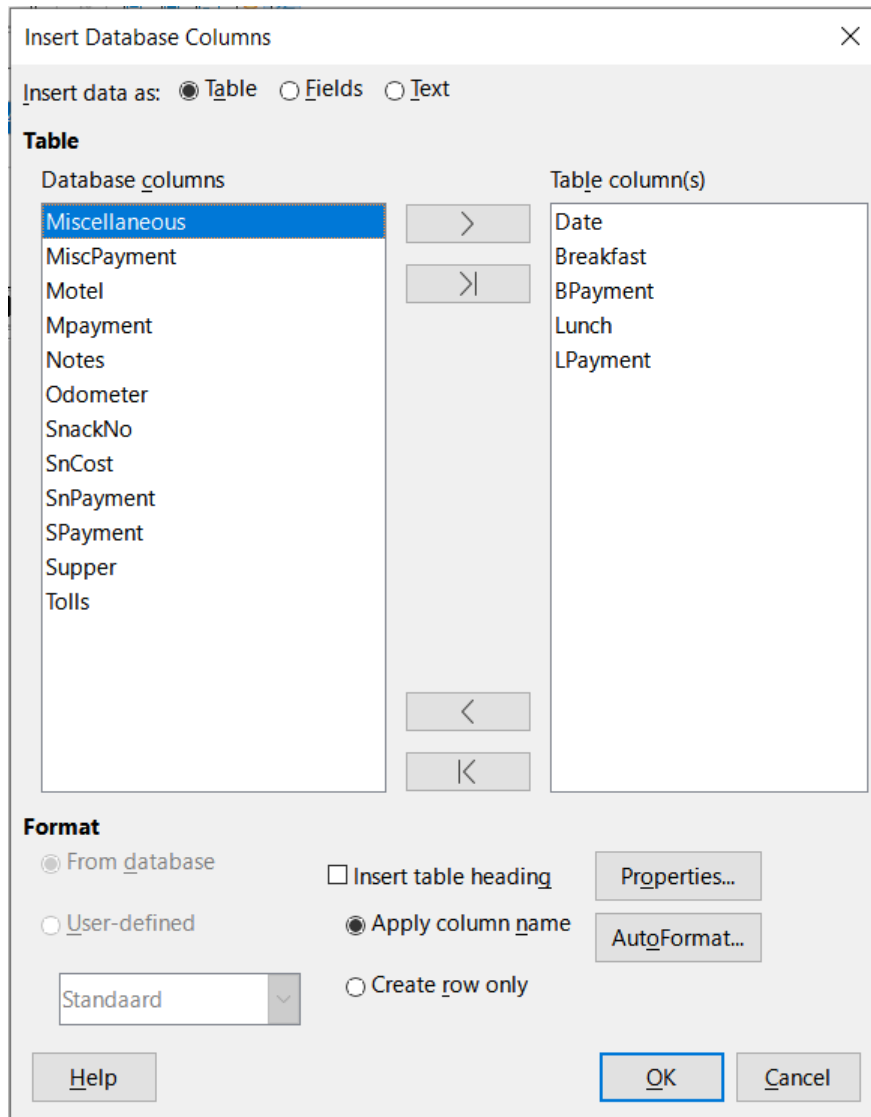


Figure 63: Insert Database Columns dialog

- 4) Move the fields you want in your table from the *Database columns* list to the *Table column(s)* list.
 - To place the fields in the order you select, click the field and use the single right arrow to move the fields in the order you desire. You can also limit the fields you use to less than all of the fields available.
 - To use all of the fields, use the double arrow pointing to the right to move all of them at one time (this icon may have a different appearance in some environments). The order of the fields in the table you create will be the same as in the data source table.

- To remove a single field from the *Table column(s)* list, click the field and use the single arrow pointing to the left.
 - You can double-click a field in one list to move it to the other list.
- 5) To start over, click the double arrow pointing to the left (this icon may have a different appearance in some environments).
 - 6) Select the settings for your table. Use the default settings as in Figure 63.
 - 7) Click **OK**. Save the document.

Calc spreadsheets

There are two ways to transfer data into a Calc spreadsheet. One enters the data into the spreadsheet cells. The other creates complete new records in the spreadsheet. While you can directly access the data inserted into the spreadsheet cells, new records created in the spreadsheet are read-only.

Entering data directly to the spreadsheet cells uses the *Data to Text* icon as when making a table in a Writer document. But there are certain differences.

The steps are straightforward.

- 1) Click the cell of the spreadsheet which you want to be the top left cell of your data, including the column names.
- 2) Use *Ctrl+Shift+F4* to open the Data Sources window and select the table whose data you want to use.
- 3) Select the rows of data you want to add to the spreadsheet:
 - Click the gray box to the left of the row (the row header) you want to select if only selecting one row. That row is highlighted.
 - To select multiple rows, hold down the *Ctrl* key while clicking the gray box of the rows you need. Those rows are highlighted.
 - To select all the rows, click the gray box in the upper left corner. All rows are highlighted.
- 4) Click the *Data to Text* icon to insert the data into the spreadsheet cells.
- 5) Save the spreadsheet.

Adding records to a spreadsheet is fairly easy. You need to have the Data Sources window open, your spreadsheet open, and the table you want to use selected.

- 1) Drag and drop the gray box containing the field name for the table's ID field (the column header) to where you want the record to appear in the spreadsheet.
- 2) Repeat until you have copied all of the fields you need to where you want them in the spreadsheet.
- 3) Select **File > Save**, or click the **Save** icon on the Standard toolbar, to name and save the spreadsheet. Close the file.

Next time you open the spreadsheet, the fields will be populated with data from the first record of the table, and the Form Navigation toolbar will appear at the bottom of the spreadsheet.

Click the arrows on the Form Navigation toolbar to view the different records of the table. (The arrows are circled in red in Figure 64.) The number in the box changes when you change the record number by clicking an arrow. The data in the fields changes to reflect the data for that particular record number.



Figure 64: Navigation arrows of a form