



“A web tool for database management.”

User's Guide 2016

OmniDB - User's Guide

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1. Introduction

DBMS stands for database management system. It may be a simple function library or even a larger system composed by several programs and processes running separately and in parallel, whose main function is to manage one or several databases hosted in a server. It has the responsibility to manipulate and to keep the consistency of data, allowing the software developers to focus on functionalities. Thus, practically any modern system that manages data utilizes some kind of DBMS, regardless of the amount of stored information.

OmniDB's first version was created as an undergrad final project in the Computer Science Course from the Federal University of Paraná. The objective was to trace a common line between popular DBMS, and to study deeply their metadata. The result was a tool capable of connecting and identifying the main structures (tables, keys, indexes and constraints), in a generic way, from 7 DBMS:

- Firebird
- MySQL
- Oracle
- PostgreSQL
- SQLite
- Microsoft SQL Server
- Microsoft Access

Since early development, *OmniDB* was designed as an web app. Consequently, it runs in any browser, from any operational system. It can be accessed by several computers and multiple users, each one of them with his/her own group of connections. It also may host any operational system, requiring only a web host that supports ASP.NET and C#. We will see further details on installation at the next chapter.

OmniDB's main objective is to offer an unified workspace with all functionalities needed to manipulate different DBMS. DBMS specific tools aren't required: in *OmniDB*, the context switch between different DBMS is done with a simple connection switch, without leaving the same page. The end-user's sensation is that there is no difference when he/she manipulates different DBMS, it just feels like different connections.

2. Installation

2.1. Requirements

In order to run OmniDB, it's necessary to install *Microsoft .NET* (in Windows) or *Mono* and *XSP* (in Linux and Mac OS X). Further installation instructions for these technologies are explained below for each OS.

2.1.1. Microsoft Windows

If you are running Microsoft Windows 7 or newer, there's a big chance you already have Microsoft .NET installed. Otherwise, you can download it [here](https://www.microsoft.com/en-us/download/details.aspx?id=42642)¹ and then click twice in the file downloaded to start installation.

2.1.2. Linux

If you are running Debian or derivatives (which includes Ubuntu), Mono is already installed in default repositories. However, if you want to utilize Mono from the [Xamarin Official Repository](http://download.mono-project.com/repo/debian)², open a terminal and type the following code:

```
sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv-keys 3FA7E0328\
081BFF6A14DA29AA6A19B38D3D831EF
echo "deb http://download.mono-project.com/repo/debian wheezy main" | sudo tee /\
etc/apt/sources.list.d/mono-xamarin.list
sudo apt-get update
```

If running Debian 8.0 or later you must also add the following repository:

```
echo "deb http://download.mono-project.com/repo/debian wheezy-libjpeg62-compat m\
ain" | sudo tee -a /etc/apt/sources.list.d/mono-xamarin.list
sudo apt-get update
```

Regardless of your preference, to install Mono and XSP, type the following:

¹<https://www.microsoft.com/en-us/download/details.aspx?id=42642>

²<http://www.mono-project.com/download/#download-lin>

```
sudo apt-get install mono-complete mono-xsp4
```

If you are running RedHat, CentOS or derivatives, you must include Xamarin's default repository. Open a terminal and type the following code:

```
su
rpm --import "http://keyserver.ubuntu.com/pks/lookup?op=get&search=0x3FA7E032808\
1BFF6A14DA29AA6A19B38D3D831EF"
yum-config-manager --add-repo http://download.mono-project.com/repo/centos/
```

Then, to install Mono and XSP:

```
yum install mono-complete xsp
```

2.1.3. Mac OS X

Download Mono's installer from the [official page](#)³ and install it in your Mac OS X.

2.2. Download and first-time execution of OmniDB

Download the most recent version of OmniDB at the [official page](#)⁴. The file will be similar to *OmniDB-1.0.zip*, according to the version. Then, extract that file, which will create a folder called *OmniDB-1.0*.

Now you should be able to run the web server that will host OmniDB, in order to access it from the web browser. The web server depends on the operational system currently installed on your machine.

2.2.1. Linux and Mac OS X

Open a terminal e enter the folder *OmniDB-1.0* that you just extracted. Then, type the following command:

```
xsp4 --port 9000
```

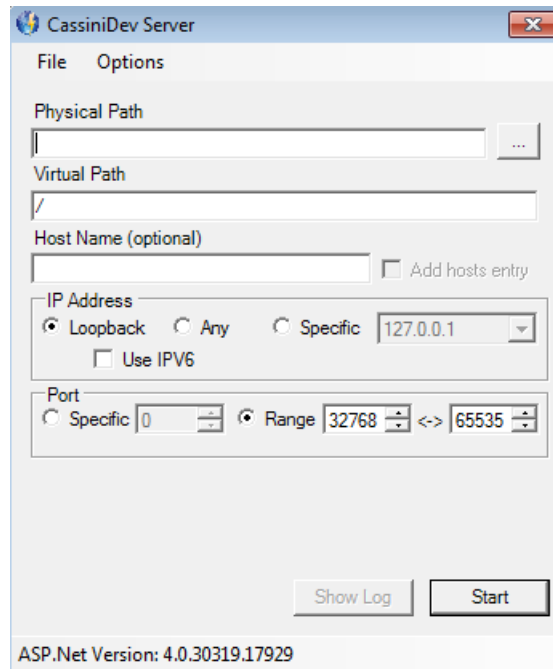
We recommend to always utilize port 9000. But you can still use another one if 9000 is already being used by another application.

³<http://www.mono-project.com/download/#download-mac>

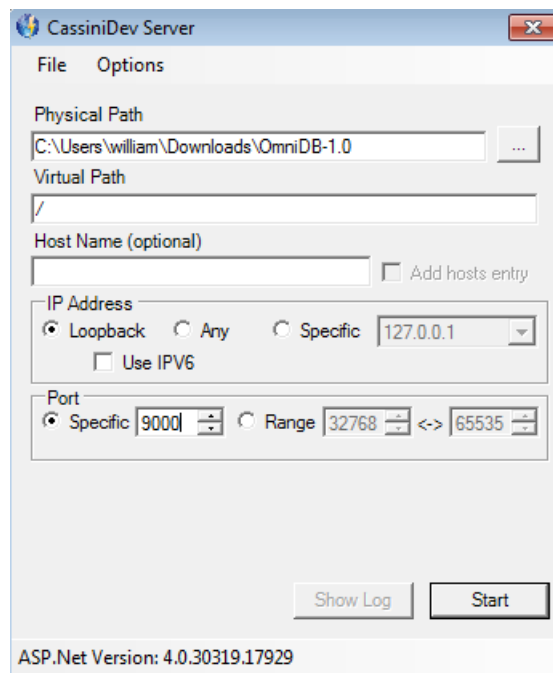
⁴<http://www.omnidb.com.br>

2.2.2. Microsoft Windows

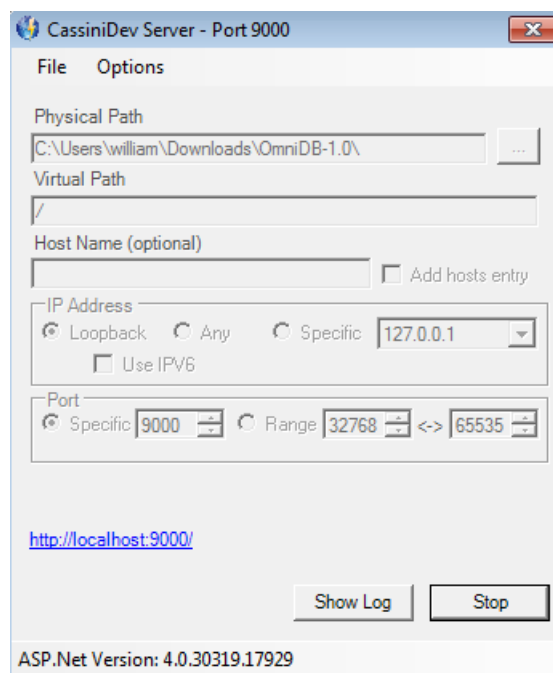
Open *Windows Explorer* and enter the folder *OmniDB-1.0* that you just extracted. Inside that folder there's a file called *cassini.exe*. Double-click it to initiate the web server *Microsoft Cassini*, which initially will look like the image below:



Change the option *Physical Path* to point at OmniDB's folder, also, switch the port to 9000 (or one that is available in case 9000 is already in use). The configuration must be set as shown below:



Then, click *Start*. Now, you should notice that Microsoft Cassini is running, according to the image below:



2.3. Accessing OmniDB in your browser

Now that the web server (XSP or Cassini) is running, you may access OmniDB web app on your favorite browser. Type in address bar: *http://localhost:9000*. If you are running in any port other than 9000, utilize the appropriate port number. If everything went fine, you shall see a page like this:



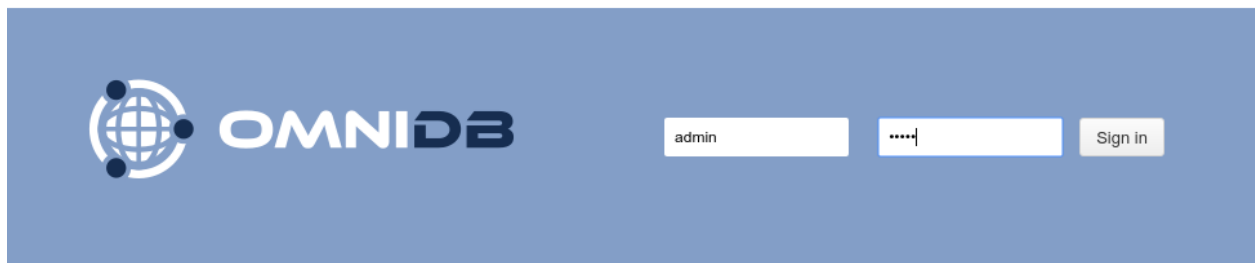
Now you know that OmniDB is running correctly. In the next chapter, we will see how to login for the first time, how to create an user and to utilize OmniDB.

3. Creating Users and Connections

Last chapter explained how to install and run OmniDB for the first time. The tool still needs a few steps before we can start using it.

3.1. Logging as user *admin*

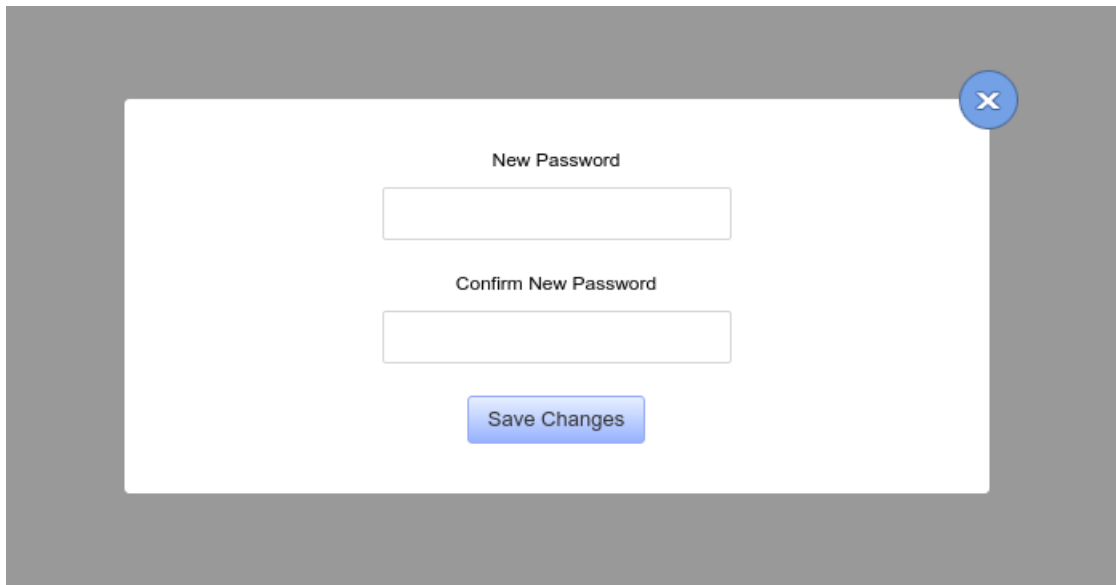
OmniDB comes only with the user *admin*, which is used to manage other users. The first thing to do is sign in as admin, the default password is *admin*.



The next window is the user management interface, which can be accessed only with the user admin.



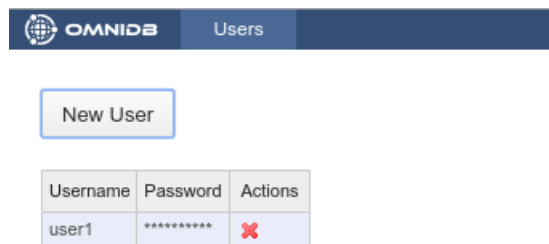
At the top right corner of the screen next to the logged username there are the options logout, information (that shows a popup with basic information about the tool) and also a gear icon that can be used to change basic settings of the current user. As admin you can only change its password, which is highly recommended.




A modal dialog box with a white background and a grey border. It contains two text input fields. The first field is labeled "New Password" and the second is labeled "Confirm New Password". Below the second field is a blue button labeled "Save Changes". A blue circular close button with a white 'X' is in the top right corner.

3.2. Creating the first user

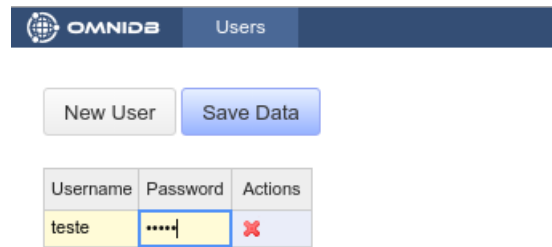
After clicking on the *New User* button the tool inserts a new user called *user1* (if that is the first user).



The interface shows a dark blue header bar with the OMNIDB logo and a "Users" tab. Below the header is a "New User" button. Underneath is a table with three columns: Username, Password, and Actions.

Username	Password	Actions
user1	*****	

You will have to change the username and password and then click on the *Save Data* button.



The screenshot shows the OMNIDB Users management interface. At the top, there is a dark blue header with the OMNIDB logo and the word "Users". Below the header, there are two buttons: "New User" and "Save Data". Underneath these buttons is a table with three columns: "Username", "Password", and "Actions". The table contains one row with the username "teste", a password field with four asterisks, and a red cross icon in the Actions column.

Username	Password	Actions
teste	****	✖

You can create as many users as you want and also delete users by clicking on the red cross at the actions column. Now you can logout.

3.3. Logging with the first user

Let us sign in as the user we just created.



The screenshot shows the OMNIDB login interface. It features the OMNIDB logo on the left. To the right of the logo are two input fields: one for the username "teste" and one for the password "****". To the right of the password field is a "Sign in" button.

Notice that you were redirected to a different window, which has two links: *Connections* and *Main*.



The screenshot shows the OMNIDB interface after logging in. The top header is dark blue with the OMNIDB logo and the words "Connections" and "Main". On the right side of the header, there is a green dot, the username "teste", a gear icon, an information icon, and a "Logout" link. Below the header, there is a "New Connection" button. Underneath this button is a table with eight columns: "Technology", "Server", "Port", "Service", "Schema", "User", "Password", and "Actions".

Technology	Server	Port	Service	Schema	User	Password	Actions
------------	--------	------	---------	--------	------	----------	---------

3.4. Creating connections

At the moment OmniDB supports 7 different DBMS: Firebird, MySQL, Oracle, PostgreSQL, SQLite, Microsoft SQL Server and Microsoft Access. Each technology has its unique characteristics, and the information required to establish a connection to each of them can also be different. OmniDB stores data to each connection according to the selected technology.

SGBD	Server	Port	Service	Schema	User	Password
Access			File path			
Firebird	IP Address	Port	File path		User	Password
MySQL	IP Address	Port	Database name		User	Password
Oracle	IP Address	Port	Database name		User	Password
PostgreSQL	IP Address	Port	Database name	Schema	User	Password
SQLite			File path			
SQL Server	IP Address	Port	Database name	Schema or empty for default	User	Password

Notice that the path to the file (when dealing with Firebird, SQLite and Access) can be absolute or relative to the path where OmniDB was installed. When connecting to Firebird database files it might be necessary to change the file permissions (check Firebird's online documentation).

We will now create two connections with SQLite databases that come with OmniDB:

- **databases/basecadastro.db**
- **databases/northwind.db**

To create the connections you have to click on the button *New Connection* and then choose the connection and fill the other fields. After filling all the fields for both connections, click on the *Save Data* button.

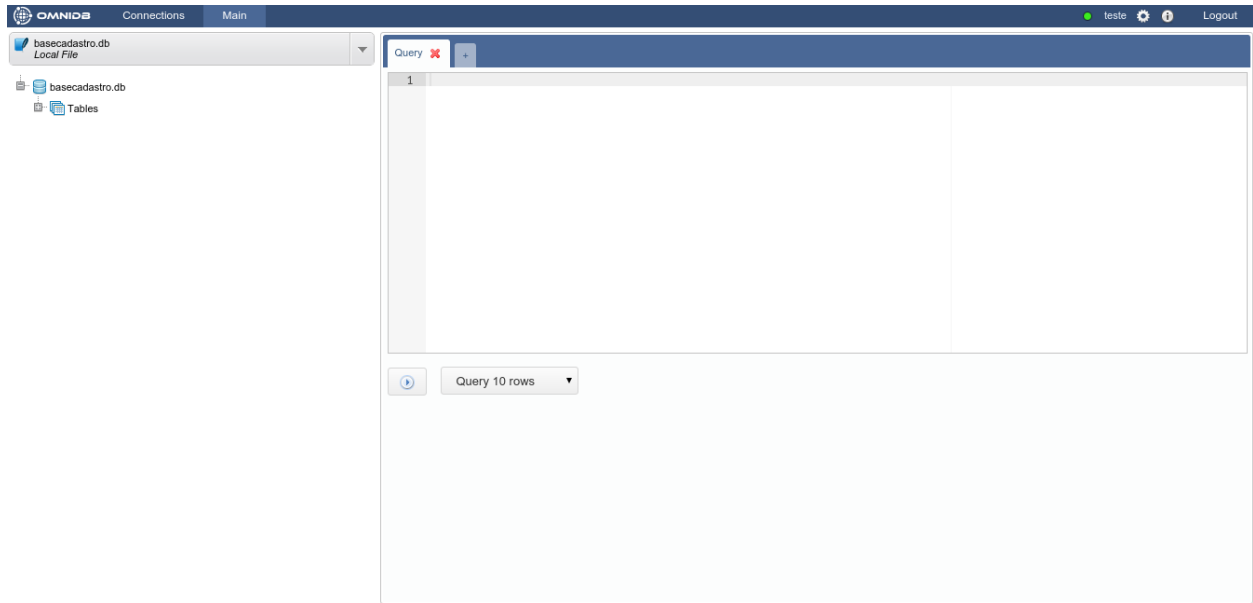
The screenshot shows the OmniDB interface with the 'Connections' tab selected. A 'New Connection' button is visible. Below it, a table lists two connections:

Technology	Server	Port	Service	Schema	User	Password	Actions
sqlite ▼			databases/basecadastro.db			*****	✖ 🛠
sqlite ▼			databases/northwind.db			*****	✖ 🛠

For each connection there is an actions column where you can delete and test them. Be advised that when handling SQLite databases, if the file does not exist it will be created (if the user that is running the server have permission to do so).

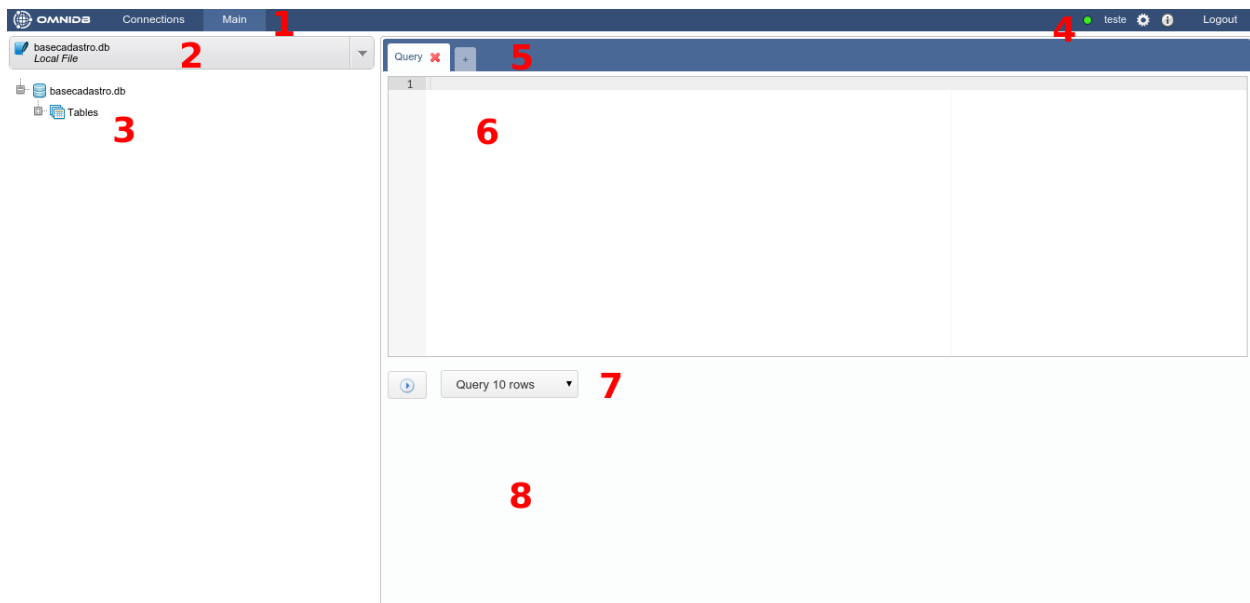
4. Main Window

After creating at least one connection the user can enter the *Main Window*. This interface will be your workspace.



4.1. Sections of the main window

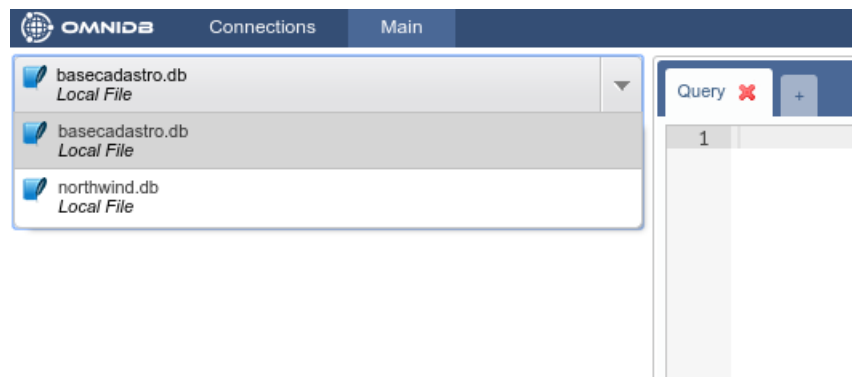
This interface has several elements:



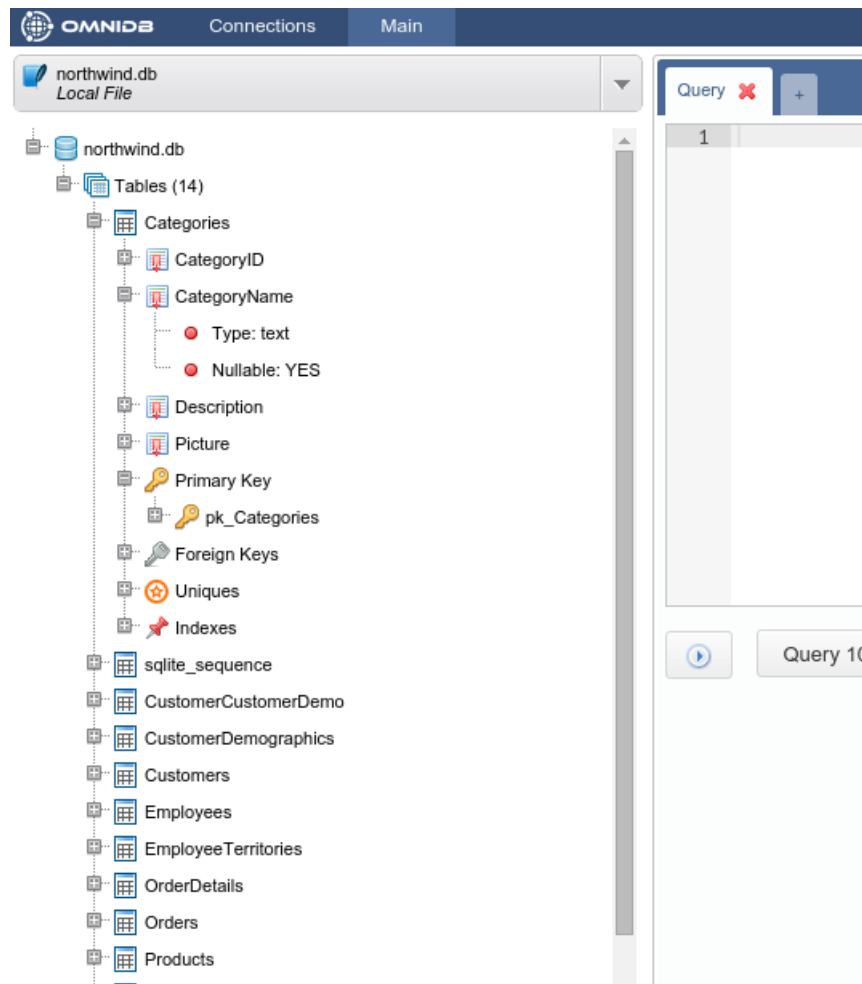
- **1) Links:** Enables the user to navigate between connections and main window
- **2) Connections selector:** Shows all connections and let the user select the current one.
- **3) Structures tree of the current connection:** Displays a tree with all tables of the current connection. For each table displays columns, primary, foreign and unique constraints and also indexes.
- **4) Options:** State of the connection with the web server, username, settings, information and logout.
- **5) Tabs with SQL editors:** OmniDB lets you work with multiple SQL editors at the same time. Each editor is inside a tab that can be renamed and removed.
- **6) Current SQL editor:** Editor of the current tab, with syntax highlighting and autocomplete.
- **7) Options of the current SQL editor:** Action button and editor mode (script, execute or query).
- **8) Result:** Shows a grid with the result when dealing with queries or command details when executing scripts.

4.2. Knowing your workspace

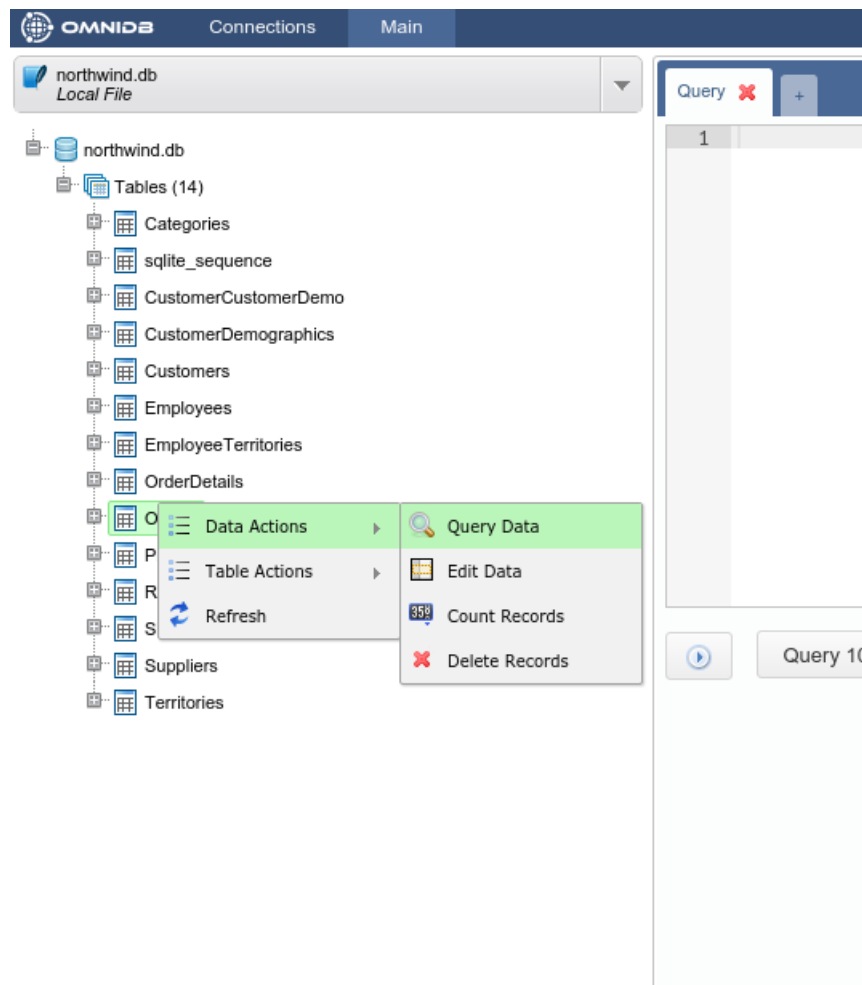
Take a look at your connections selector. OmniDB always points to the first available connection but you can change it by clicking on the selector.



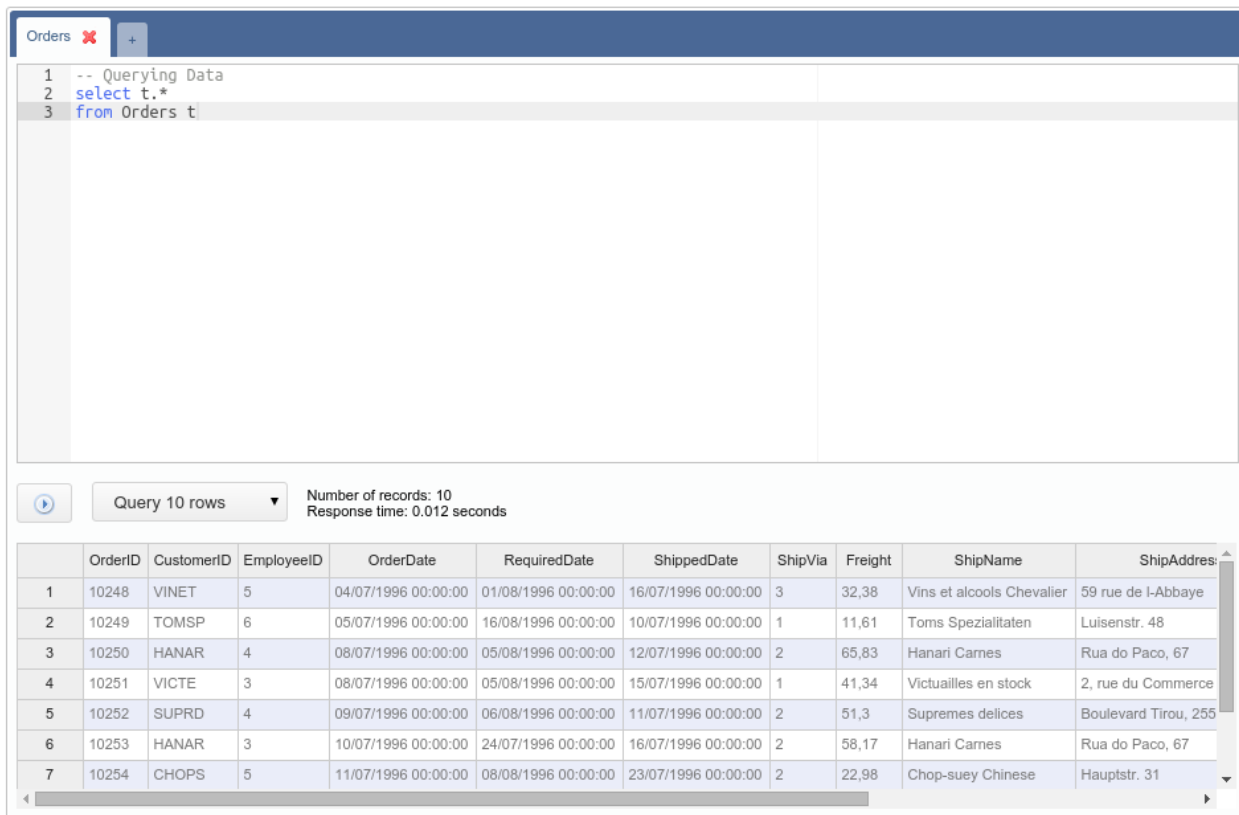
Select the *northwind.db* connection. Now go to the tree right below the selector and click to expand the node Tables. You will see all tables contained on this database. Expand any table and you will see its columns, primary key, foreign keys, unique constraints and indexes. Each column is also expandable, displaying data type and nullable constraint.



In order to view records inside a table, right click it and choose *Data Actions > Query Data*.



Notice that OmniDB fills the current SQL editor with a simple query to list table records. The records are displayed in a grid right below the editor. This grid can be controlled with keyboard as if you were using a spreadsheet manager (Microsoft Office Excel, LibreOffice Calc). You can also copy data from single cells or block of cells (that can be selected with the mouse) and paste on any spreadsheet manager.



The screenshot shows a SQL editor window titled "Orders" with a red close button and a plus icon. The query editor contains the following SQL code:

```
1 -- Querying Data
2 select t.*
3 from Orders t
```

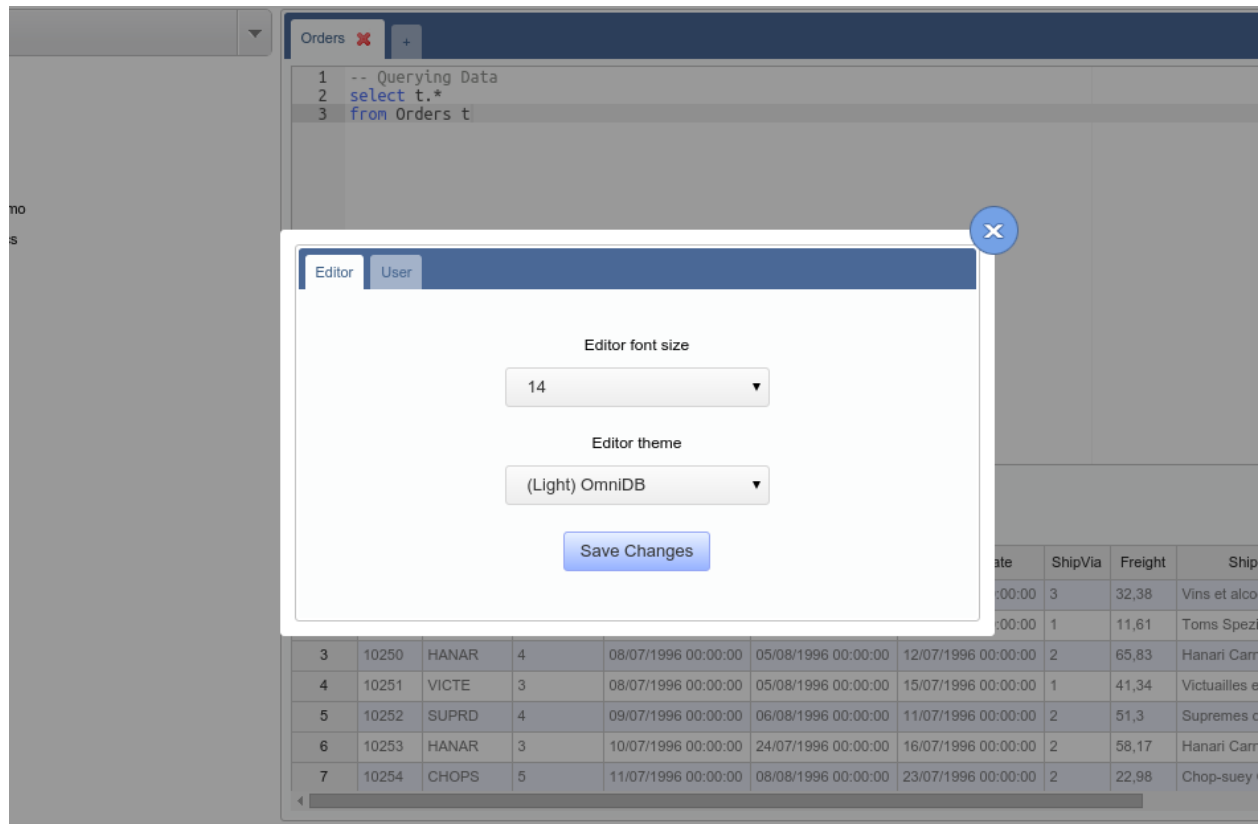
Below the query editor, there is a "Query 10 rows" button and a status bar indicating "Number of records: 10" and "Response time: 0.012 seconds". The results are displayed in a table with the following columns: OrderID, CustomerID, EmployeeID, OrderDate, RequiredDate, ShippedDate, ShipVia, Freight, ShipName, and ShipAddress.

	OrderID	CustomerID	EmployeeID	OrderDate	RequiredDate	ShippedDate	ShipVia	Freight	ShipName	ShipAddress
1	10248	VINET	5	04/07/1996 00:00:00	01/08/1996 00:00:00	16/07/1996 00:00:00	3	32,38	Vins et alcools Chevalier	59 rue de l-Abbaye
2	10249	TOMSP	6	05/07/1996 00:00:00	16/08/1996 00:00:00	10/07/1996 00:00:00	1	11,61	Toms Spezialitaten	Luisenstr. 48
3	10250	HANAR	4	08/07/1996 00:00:00	05/08/1996 00:00:00	12/07/1996 00:00:00	2	65,83	Hanari Carnes	Rua do Paco, 67
4	10251	VICTE	3	08/07/1996 00:00:00	05/08/1996 00:00:00	15/07/1996 00:00:00	1	41,34	Victuailles en stock	2, rue du Commerce
5	10252	SUPRD	4	09/07/1996 00:00:00	06/08/1996 00:00:00	11/07/1996 00:00:00	2	51,3	Supremes delices	Boulevard Tirou, 255
6	10253	HANAR	3	10/07/1996 00:00:00	24/07/1996 00:00:00	16/07/1996 00:00:00	2	58,17	Hanari Carnes	Rua do Paco, 67
7	10254	CHOPS	5	11/07/1996 00:00:00	08/08/1996 00:00:00	23/07/1996 00:00:00	2	22,98	Chop-suey Chinese	Hauptstr. 31

You can edit the query on the SQL editor, writing simple or more complex queries and clicking on the action button. You can control how many records should be displayed (10, 100, 1000 or all rows). More details in chapter 8.

4.3. Changing User Settings

By clicking on the gear icon (top right corner of the screen) a popup with two tabs will show up. The first one lets you change editor settings and the other lets you change your password.



There are two options on the *editor* tab:

- *Editor font size*: Font size of all SQL editors. The default value is 14 but you can choose any value between 10 and 18;
- *Editor theme*: Color scheme of all SQL editors. OmniDB comes with a lot of different themes. They change background color, font and even syntax highlight colors.

Notice that when changing the settings of the tab editor, they will be applied after refreshing the page.

The screenshot shows a database application window. At the top, there's a tab labeled 'Orders' with a red 'x' and a '+' icon. Below the tab, a query editor displays the following SQL code:



```
1 -- Querying Data
2 select t.*
3 from Orders t
```

A modal dialog box is centered on the screen with the message: "Configuration changed. Please reload the page to apply the changes." and an "Ok" button.


Below the dialog, there's a status bar showing "Query 10 rows" and "Number of records: 10 Response time: 0.012 seconds". Below this is a table with the following data:


	OrderID	CustomerID	EmployeeID	OrderDate	RequiredDate	ShippedDate	ShipVia	Freight	Ship
1	10248	VINET	5	04/07/1996 00:00:00	01/08/1996 00:00:00	16/07/1996 00:00:00	3	32,38	Vins et alco
2	10249	TOMSP	6	05/07/1996 00:00:00	16/08/1996 00:00:00	10/07/1996 00:00:00	1	11,61	Toms Spezi
3	10250	HANAR	4	08/07/1996 00:00:00	05/08/1996 00:00:00	12/07/1996 00:00:00	2	65,83	Hanari Carr
4	10251	VICTE	3	08/07/1996 00:00:00	05/08/1996 00:00:00	15/07/1996 00:00:00	1	41,34	Victuailles e
5	10252	SUPRD	4	09/07/1996 00:00:00	06/08/1996 00:00:00	11/07/1996 00:00:00	2	51,3	Supremes c
6	10253	HANAR	3	10/07/1996 00:00:00	24/07/1996 00:00:00	16/07/1996 00:00:00	2	58,17	Hanari Carr
7	10254	CHOPS	5	11/07/1996 00:00:00	08/08/1996 00:00:00	23/07/1996 00:00:00	2	22,98	Chop-suey

By selecting font size 16 and theme *(Dark) Monokai*, your editor will have the following appearance:

Orders  

```
1 -- Querying Data
2 select t.*
3 from Orders t
```



Query 10 rows 

Number of records: 10
Response time: 0.017 seconds

	OrderID	CustomerID	EmployeeID	OrderDate	RequiredDate	ShippedDate	ShipVia	Freight	ShipName	ShipAddress
1	10248	VINET	5	04/07/1996 00:00:00	01/08/1996 00:00:00	16/07/1996 00:00:00	3	32,38	Vins et alcools Chevalier	59 rue de l-Abbaye
2	10249	TOMSP	6	05/07/1996 00:00:00	16/08/1996 00:00:00	10/07/1996 00:00:00	1	11,61	Toms Spezialitaten	Luisenstr. 48
3	10250	HANAR	4	08/07/1996 00:00:00	05/08/1996 00:00:00	12/07/1996 00:00:00	2	65,83	Hanari Carnes	Rua do Paco, 67
4	10251	VICTE	3	08/07/1996 00:00:00	05/08/1996 00:00:00	15/07/1996 00:00:00	1	41,34	Victuailles en stock	2, rue du Commerce
5	10252	SUPRD	4	09/07/1996 00:00:00	06/08/1996 00:00:00	11/07/1996 00:00:00	2	51,3	Supremes delices	Boulevard Tirou, 255
6	10253	HANAR	3	10/07/1996 00:00:00	24/07/1996 00:00:00	16/07/1996 00:00:00	2	58,17	Hanari Carnes	Rua do Paco, 67
7	10254	CHOPS	5	11/07/1996 00:00:00	08/08/1996 00:00:00	23/07/1996 00:00:00	2	22,98	Chop-suey Chinese	Hauptstr. 31

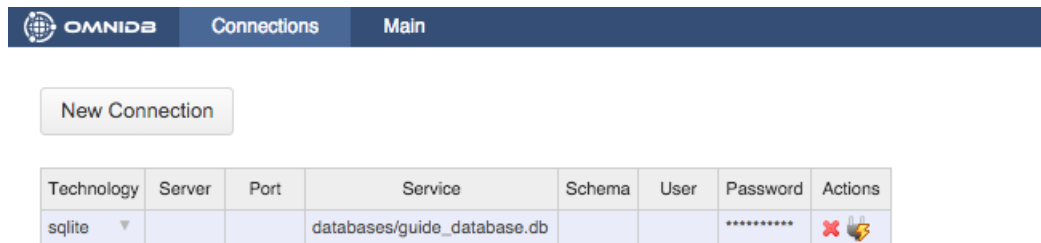
5. Table Creation

OmniDB has a table creation interface that lets you configure columns, constraints and indexes. A couple observations should be mentioned:

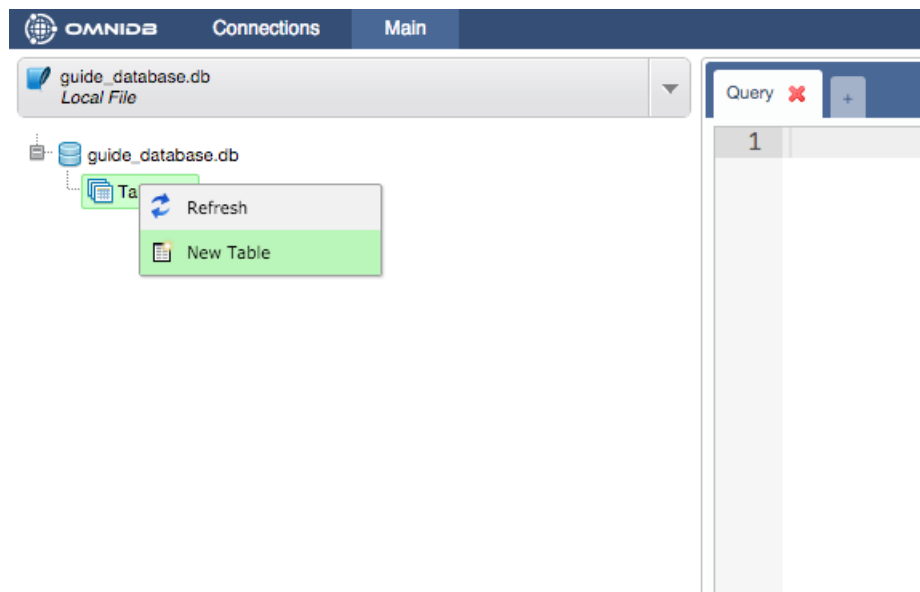
- Most DBMS automatically create indexes when primary keys and unique constraints are created. Because of that, the indexes tab is only available after creating the table.
- Each DBMS has its unique characteristics and limitations regarding table creation and the OmniDB interface reflects these limitations. For instance, SQLite does not allow us to change existing columns and constraints. Because of that, the interface lets us change only table name and add new columns when dealing with SQLite databases.

5.1. Creating tables

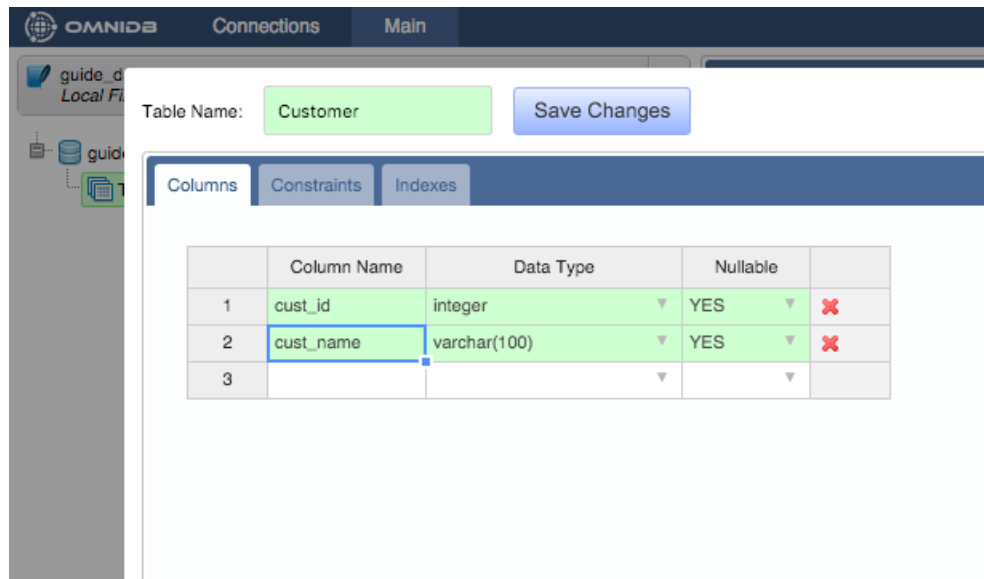
We will create example tables (Customer and Address) in a SQLite database that will also be created. To create the database, go to the connections window and create a new connection.

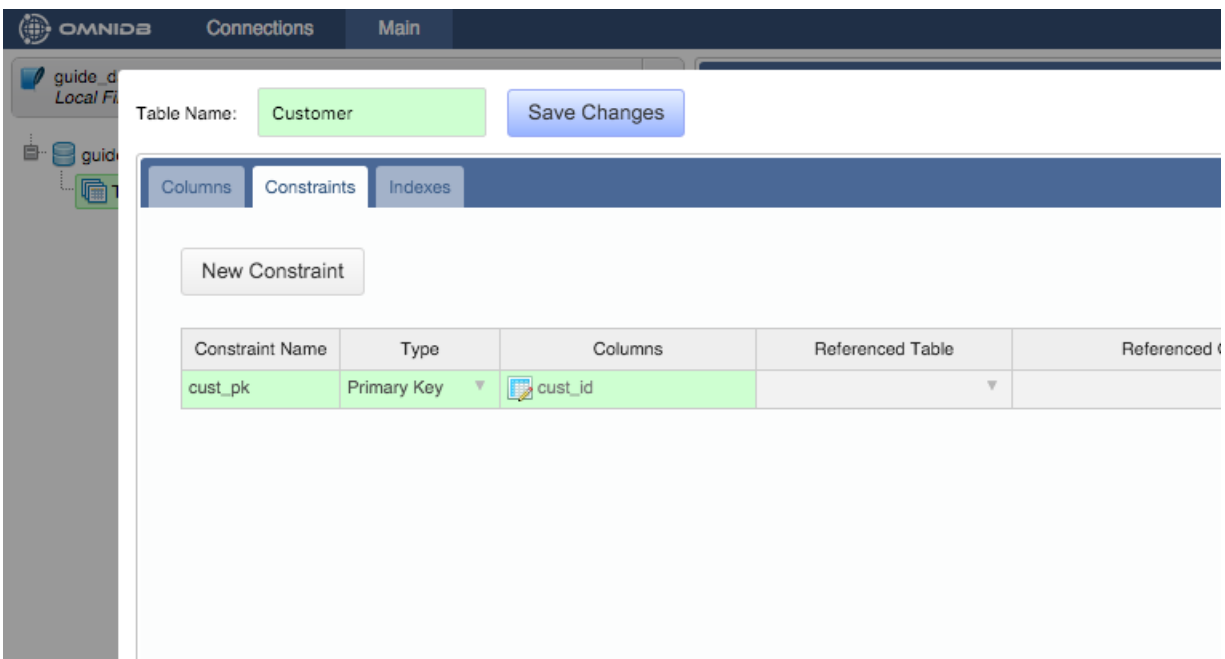


Go back to the main window, right click on the *Tables* node and select the *New Table* action:

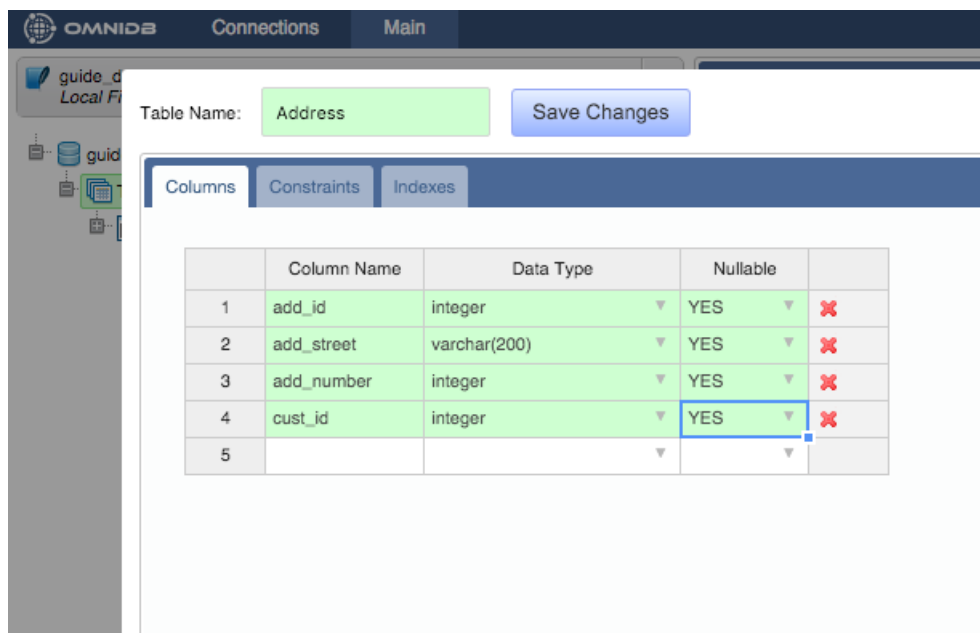


We will create the table Customer with a primary key that will be referenced by the table Address:

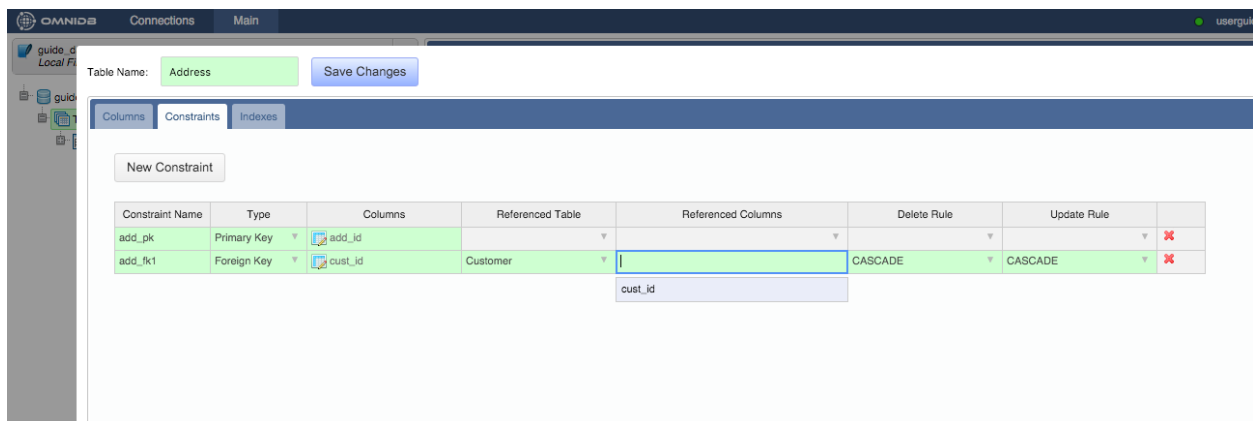




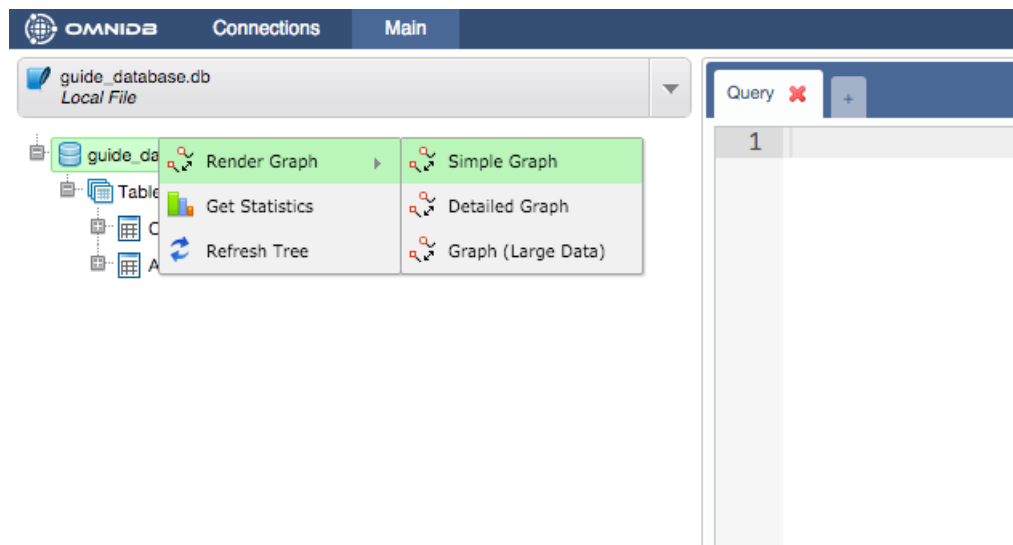
And then, create the table Address with a primary key and a foreign key:

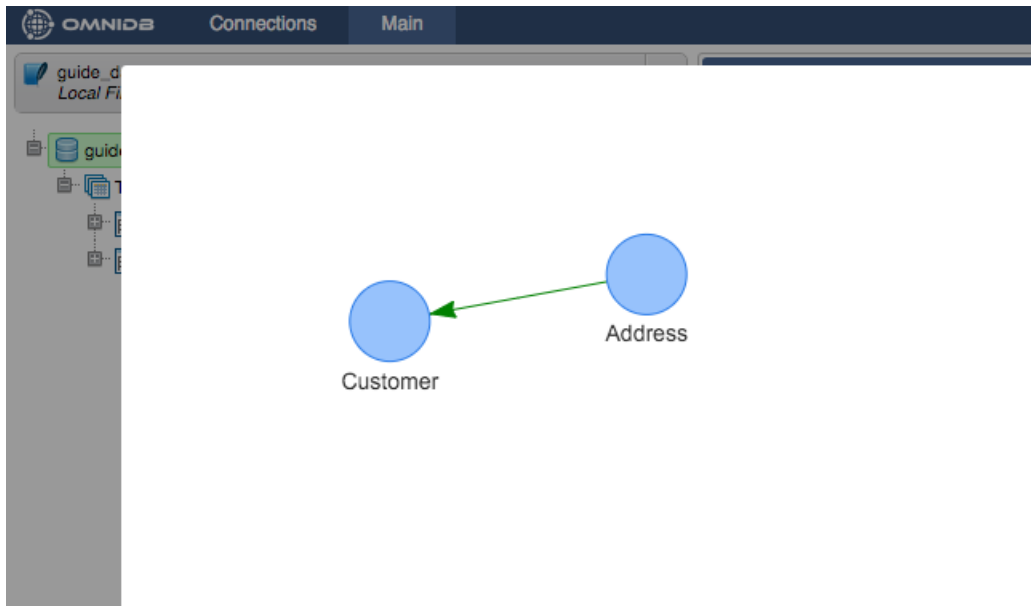


OmniDB automatically searches for primary key and unique constraints when selecting a table during foreign key creation:



At this point we have two tables. The database structure can be seen with the graph feature by right clicking on the root node of the tree and selecting *Render Graph > Simple Graph*:

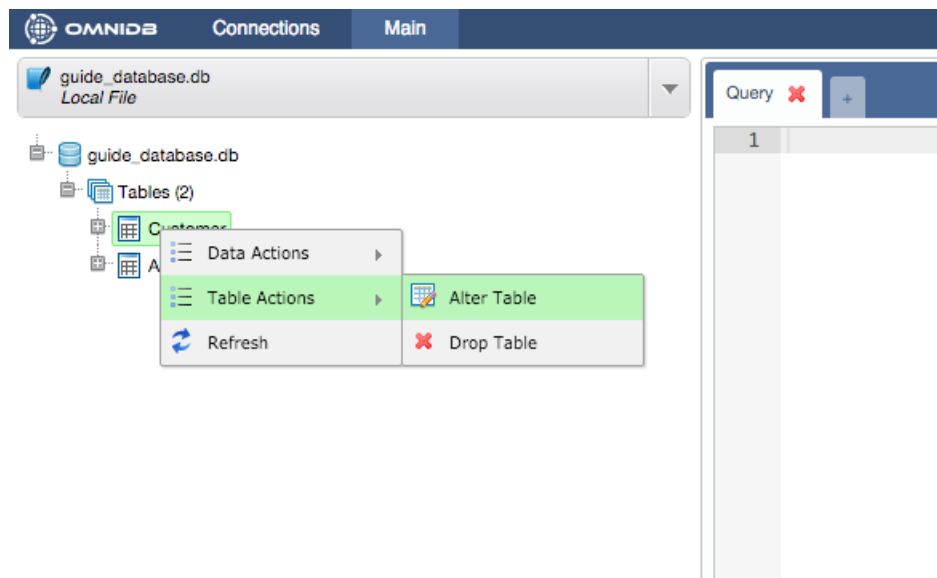




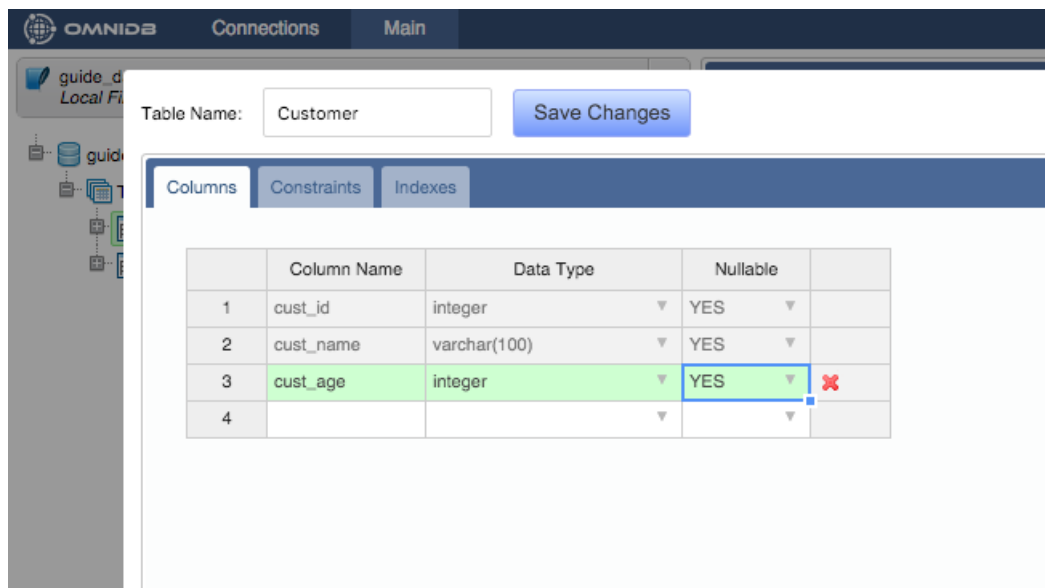
6. Altering and Removing Tables

6.1. Editing Tables

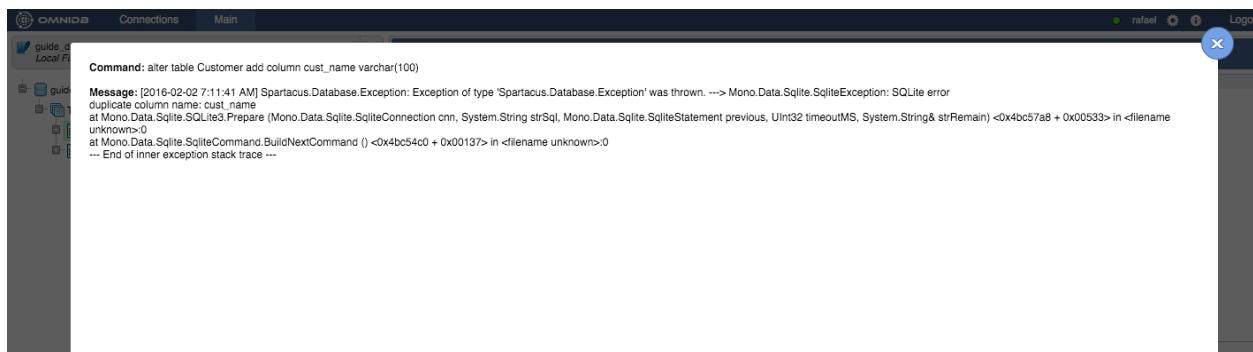
OmniDB also lets you edit existing tables (always following DBMS limitations). To test this feature we will add a new column to the table `Customer`, created on the last chapter. To access the alter table interface just right click the table node and select the action *Table Actions > Alter Table*:



Add the column `cust_age` and save:



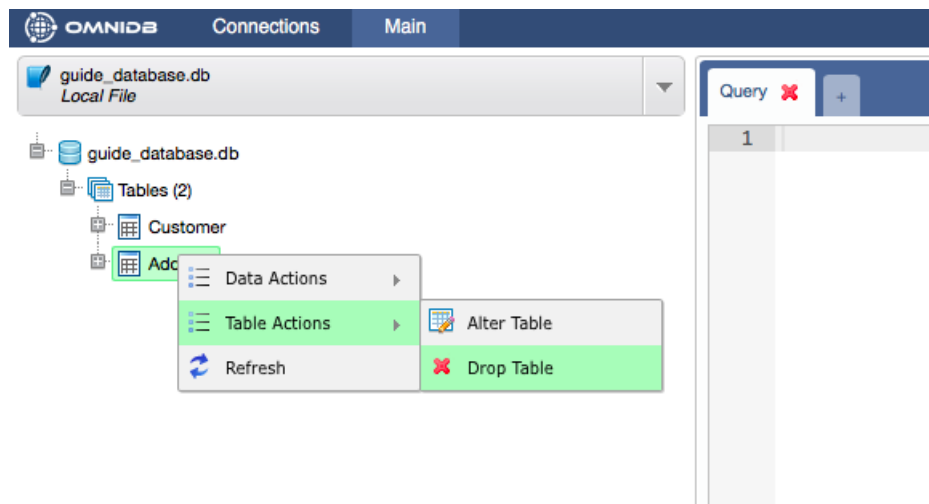
The interface is capable of detecting errors that may occur during alter table operations. To demonstrate it we will try to add the column *cust_name*, which already belongs to this table:



The interface indicates the command and the error that occurred.

6.2. Removing Tables

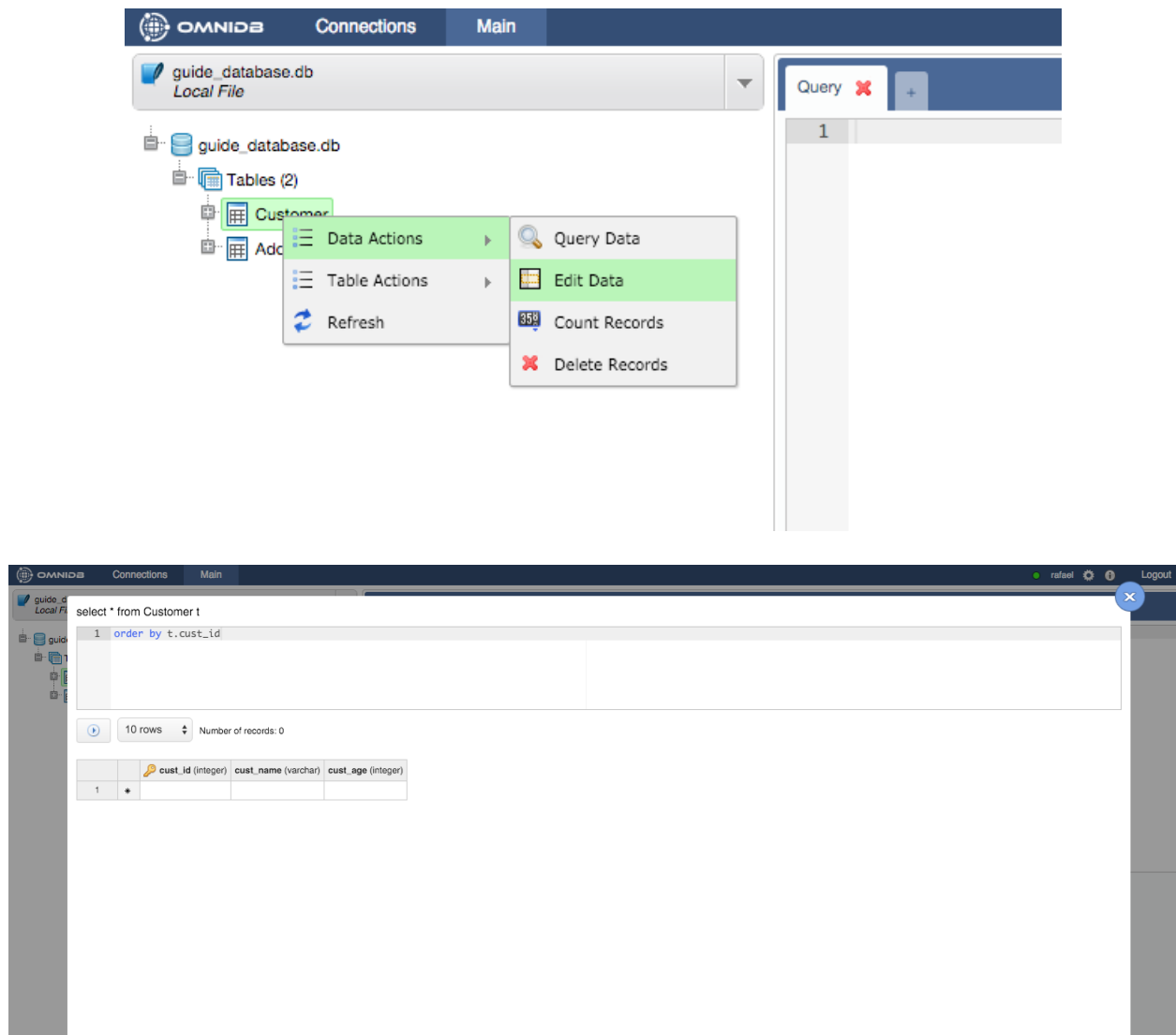
In order to remove a table just right click the table node and select the action *Table Actions > Drop Table*:



7. Data Management

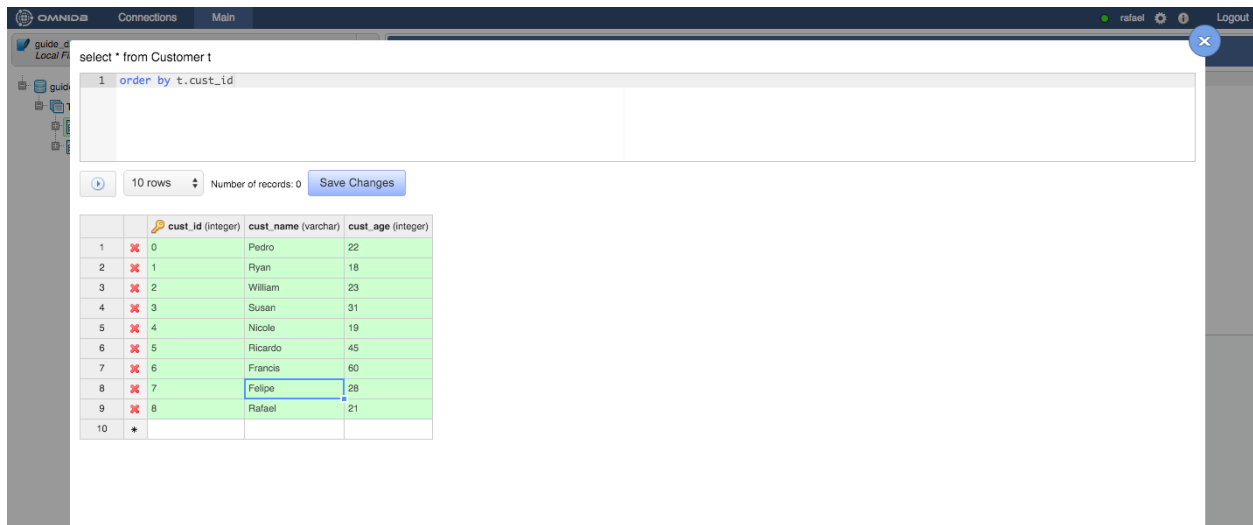
The tool allow us to edit records contained in tables through a very simple and intuitive interface. Given that only a few DBMS have unique identifiers for table records, we opted to allow data editing and removal only for tables that have primary keys. Tables that do not have it can only receive new records.

To access the record editing interface, right click the table node and select the action *Data Actions* > *Edit Data*:

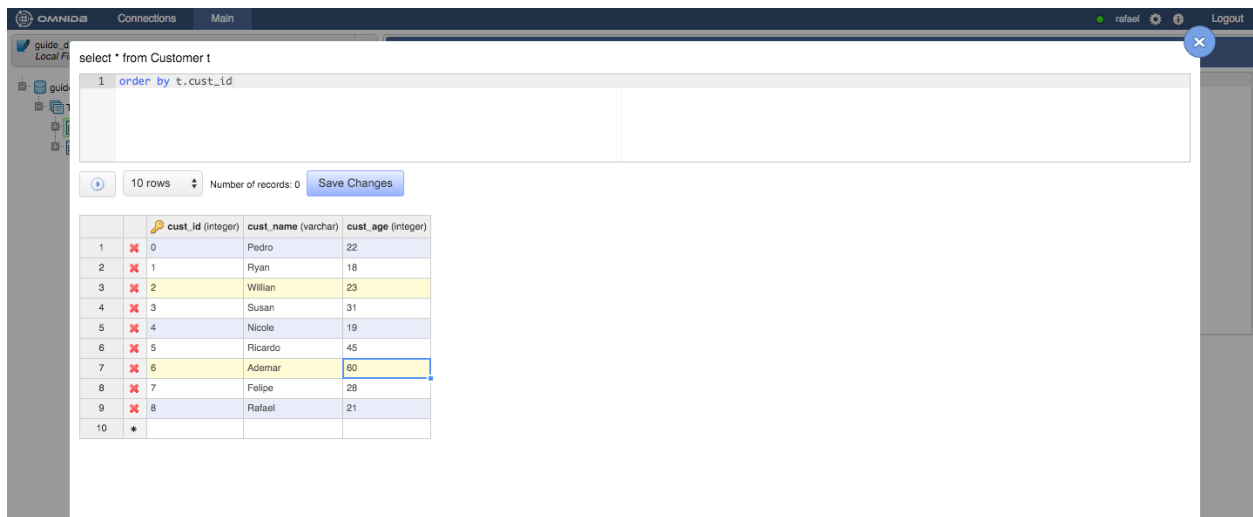


The interface has a SQL editor where you can filter and order records. To prevent that the interface requests too many records, there is a field that limits the number of records to be displayed. The records grid has column names and data types. Columns that belong to the primary key have a key icon next to their names.


The row of the grid that have the symbol * is the row to add new records. Let us insert some records in the table Customer:

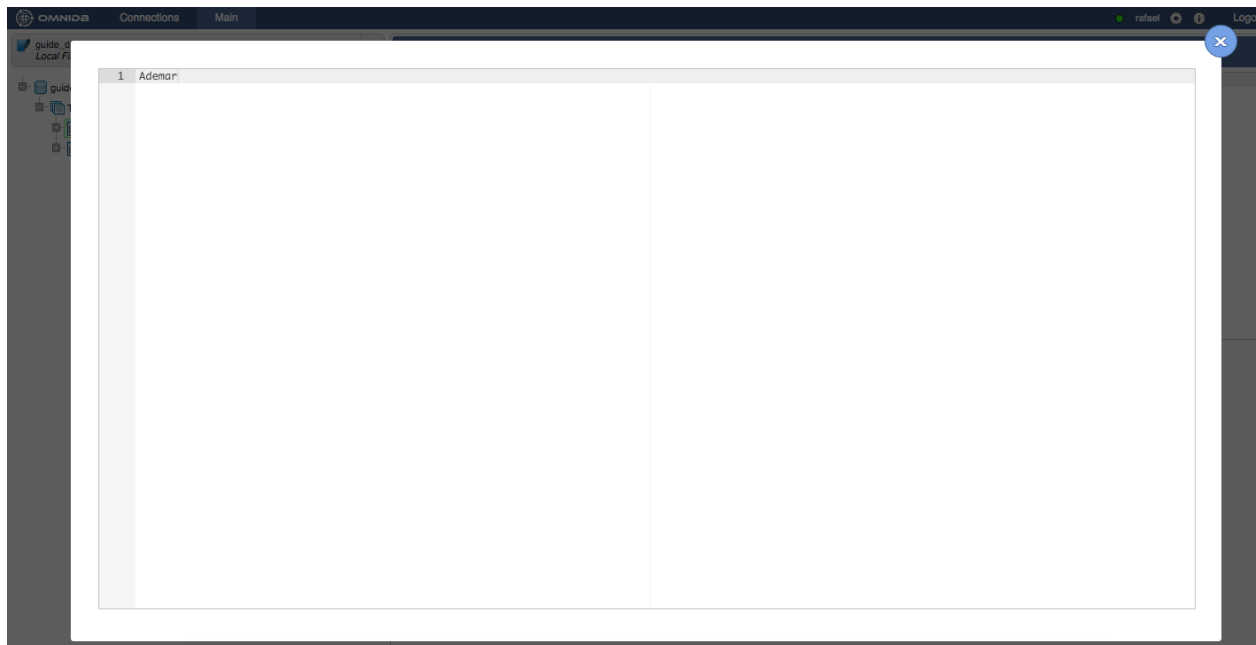


After saving, the records will be inserted and can be edited (only because this table has a primary key). Let's change the *cust_name* of some of the existing records:

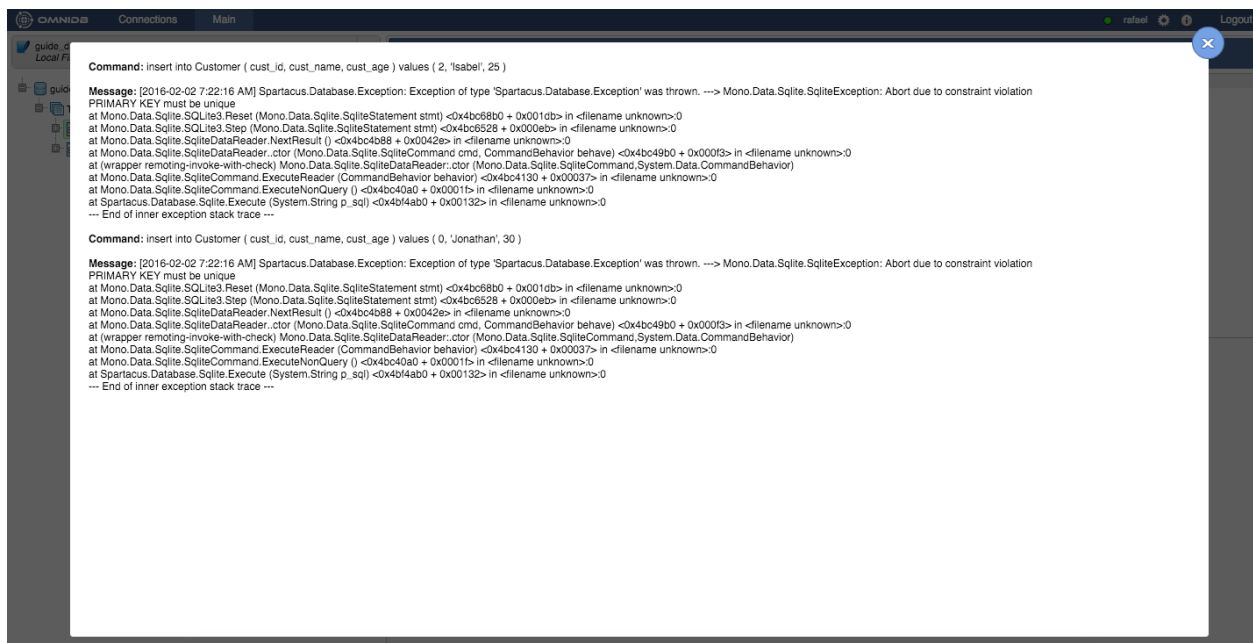


Tables can have fields with values represented by very long strings. To help edit these fields, OmniDB has an interface that can be accessed by right clicking the specific cell:

		 cust_id (integer)	cust_name (varchar)	cust_age (integer)
1	✗	0	Pedro	22
2	✗	1	Ryan	18
3	✗	2	Willian	23
4	✗	3	Susan	31
5	✗	4	Nicole	19
6	✗	5	Ricardo	45
7	✗	6	Ademar	60
8	✗	7	Felipe	
9	✗	8	Rafael	21
10	*			

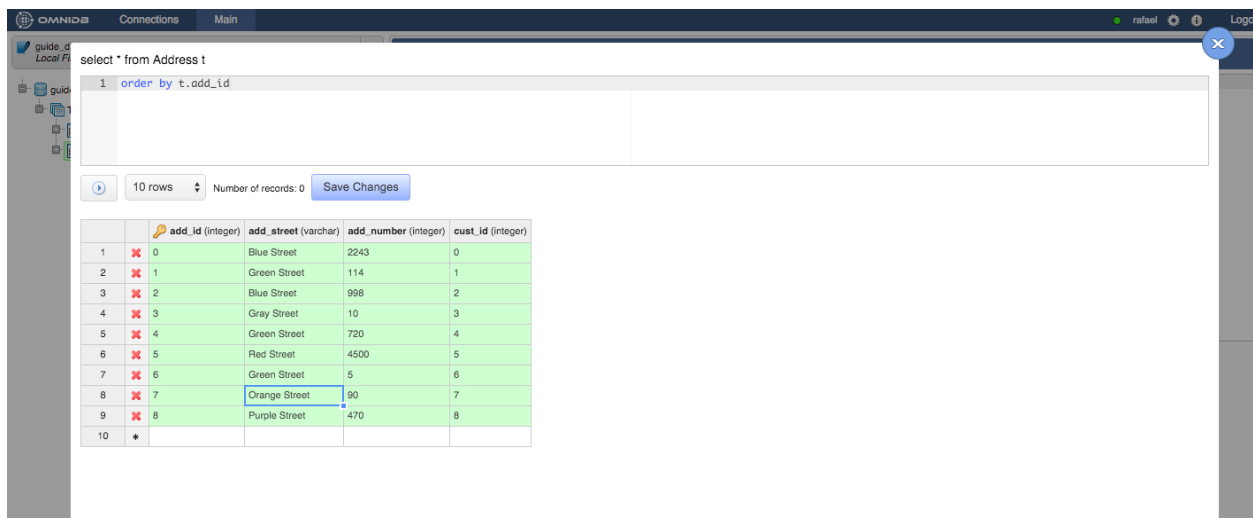


The interface detects errors that may occur during operations related to records. To demonstrate, let us insert two records with existing cust_id (primary key):



It shows which commands tried to be executed and the respective errors.

To complete this chapter, let's add some records in the Address table:



8. SQL Editor

The tool comes with a tab system where each tab contains a SQL editor, an action button, a field to select the type of command and a space to display the result.

The SQL editor has a feature that helps a lot when creating new queries: SQL code completion. With this feature it is possible to autocomplete columns contained in a table referenced by an alias. To open the autocomplete interface you just have to type the alias and then the dot character:

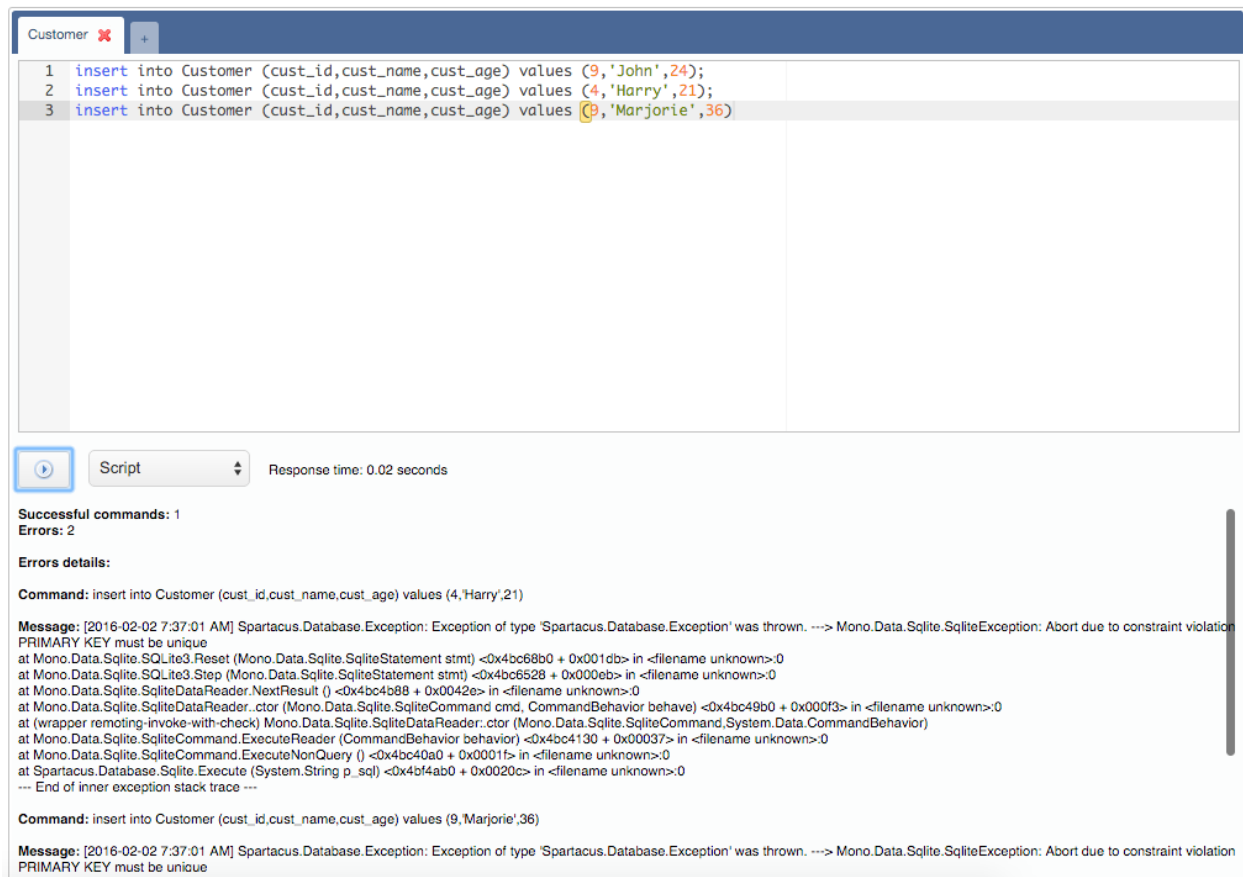


Besides autocompleting table columns the editor also searches for columns contained in subqueries:





The field to select the type of command has the following options:

- **Script:** script execution, which is a sequence of commands separated by semicolon:





The return shows the response time, the number of commands that were successfully executed, the number of commands that generated errors and a list displaying each error.

- **Execute:** execution of only one command. The return shows the response time or an error.
- **Query (10, 100, 1000, all) rows:** execution of a query that returns a set of records, which are displayed on a grid. Just like in the record editing interface each cell can be visualized separately by right clicking it:

Query  

```
1 select *
2 from (select cust.cust_name,
3         (select count(*)
4          from Address addr
5          where addr.cust_id = cust.cust_id) as num_addresses
6        from Customer cust) subquery
```

 Query 10 rows 

Number of records: 10
Response time: 0.014 seconds

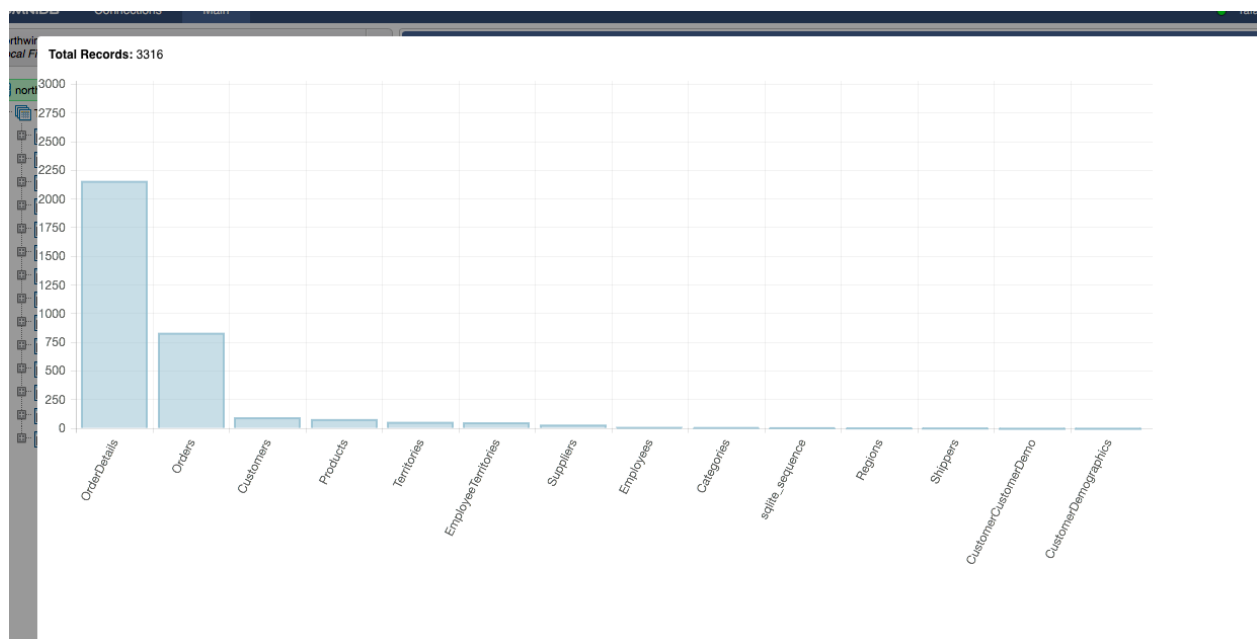
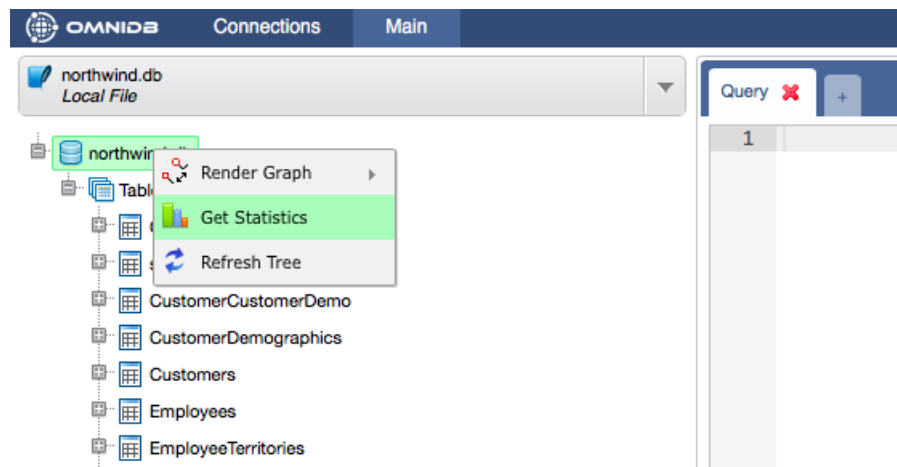
	cust_name	num_addresses
1	Pedro	1
2	Ryan	1
3	William	1
4	Susan	1
5	Nicole	1
6	Ricardo	1
7	Ademar	1
8	Felipe	1
9	Rafael	1
10	John	0

9. Additional Features

OmniDB provides other features to display useful information about the whole schema/database.

9.1. Bar chart with record count

This feature displays a bar chart with tables on the X axis and record count on the Y axis. To access it just right click the root node of the tree and then select the action *Get Statistics*:



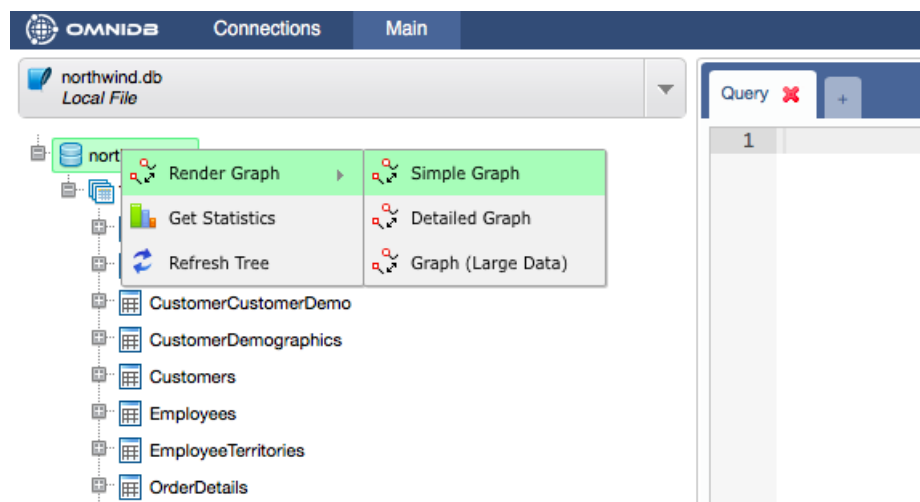
9.2. Graph with tables and relations

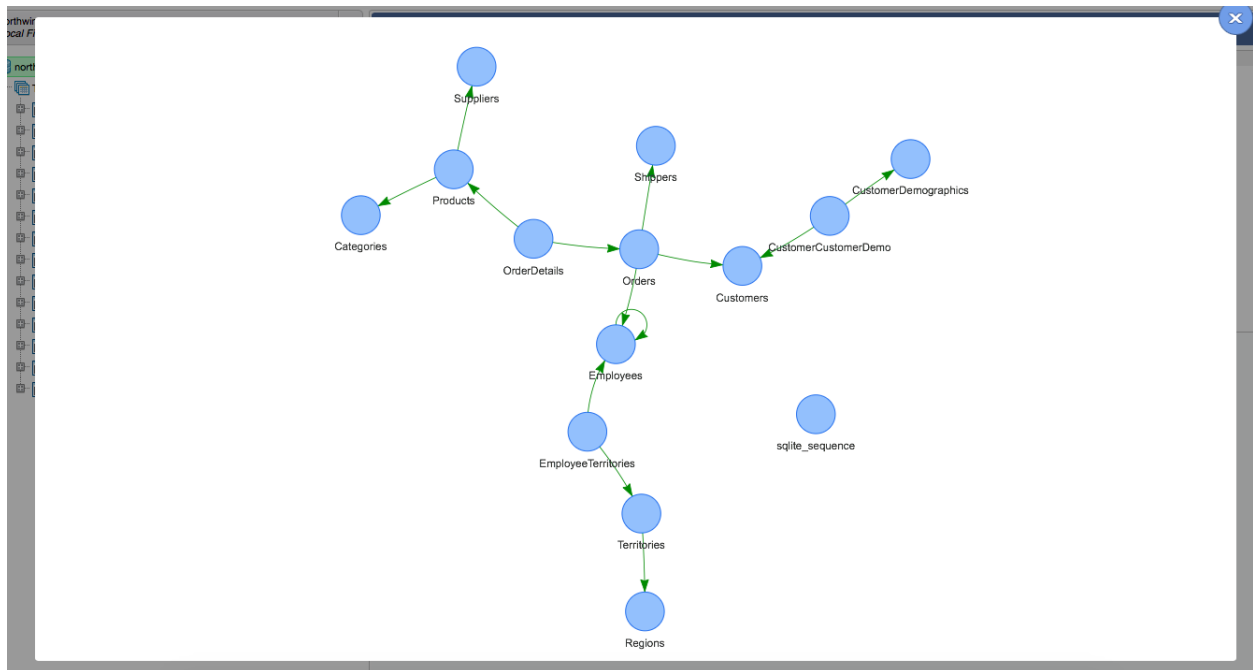
This feature displays a graph with nodes representing tables and edges representing table relationships with foreign keys.

There are two types of graphs: Simple Graph and Detailed Graph.

9.2.1. Simple Graph

To access it just right click the root node of the tree and then select the action *Render Graph > Simple Graph*:





9.2.2. Detailed Graph

This graph also comes with a color scale on record count, being able to detect denser tables. To access it just right click the root node of the tree and then select the action *Render Graph > Detailed Graph*:

