# *BEST* DB Editor Tutorial

BEST DB Editor is an application to efficiently edit and manipulate databases while maintaining a high data quality level. It can be used in its full version or in limited capabilities versions for specific purposes. The full version (default) has three main working modes: *Data Entry Transactions*, *Database Management*, and *Dataset Exchange*. In working mode *Data Entry Transactions* users can edit database tables by adding new records, modifying existing records, or deleting records. In *Database Management* working mode, field properties like DataType, or DataType properties or primary keys may be modified, new columns (or tables) can be added, or columns (or tables) can be deleted. Features for importing and exporting data are provided in the *Dataset Exchange* working mode.

This is a screen shot of *BEST* DB Editor in use while adding a new record to the HSQL DB table SALESDETAILS.
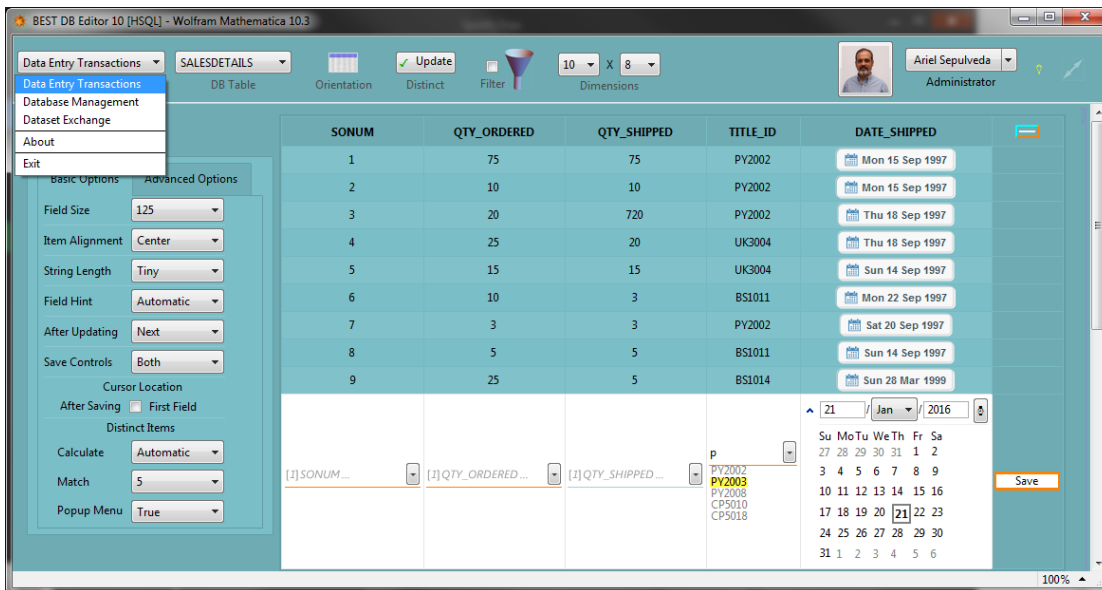
This is a screen shot of *BEST* DB Editor editing the table EDITORS for which a TableTemplate has been designed by the user. Customization included changes as: the required fields are on the first line, an image was added, only the latest edited record is shown, and the Save button was relocated.
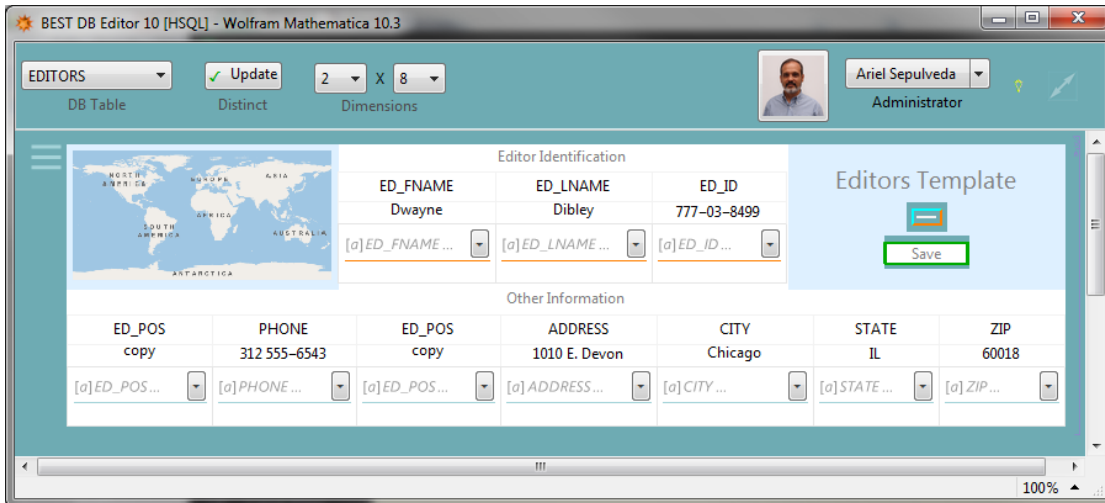
This is a screen shot of **BEST** DB Editor editing a table with a several data types: real and integer numbers, strings, dates, grahpics, graphics3D, images, images3D, binary expressions, held expressions and sound.
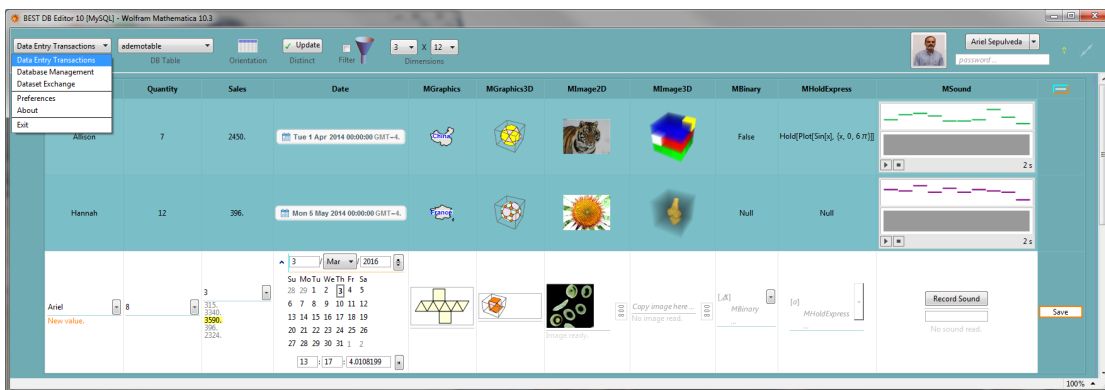
BEST DB Editor Key Characteristics

BEST DB Editor is a multi-platform database editor designed to preserve data quality by avoiding common data entry mistakes while efficiently automating common data entry processes. The main characteristics of the program are listed below.

• Automatically sets up a flexible and adjustable working environment to edit existing or create new tables in a database.

• Significantly reduces data entry errors like typing a character where a number is expected or typing a negative real number where a positive integer is expected.

• Provides quick typing suggestions to speedup data entry and increase data quality.

• Enables the creation and use of field masks to ensure the right number of characters and format for selected fields.

• Automates and simplifies data entry transactions like creating new tables or modifying the properties of existing tables (create table, delete column, modify data type, etc.).

• Provides controlled access to data by allowing the creation of user accounts with editable user capabili-

ties (Administrator, Advanced Data Entry or Data Entry).
• Allows data importing from and exporting to common data formats like xls, csv, etc.
• Can be used as a Wolfram Language function to build other applications that require a database editor.
• Runs on Windows or Mac and on database systems like MySQL, SQLServer, and HSQL.

Introduction

Getting Started

To start using the application the package needs to be loaded. If the package key has not yet been installed the user will be prompted to type the user key which is provided by Pronto Analytics (www.prontoanalytics.com).

BEST DB Editor Launcher

BEST DB Editor Launcher is made available to users in the installation process. In case it is not accessible to you use the following command to open it. You should keep that document to define and name database connections and save them for future use.

In[1]:= **Needs["BESTDBEditor`"]**

In[1]:= **BESTDBEditor[]**
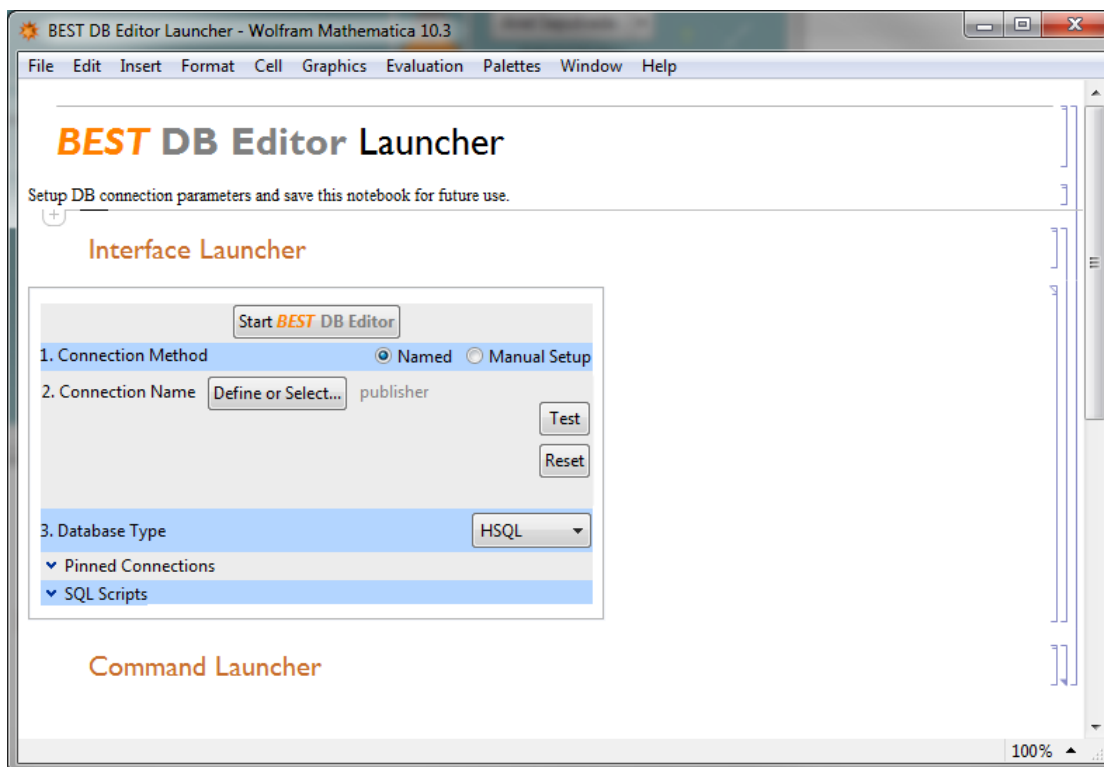
This simple interface will allow users define database connections and save them for future use. Once

the database connection is defined click on the Start *BEST* DB Editor Button.

For a Named Connection Method simply click on Define or Select... to define the connection parameters. The Connection Tool shown below will open and you should follow the steps to create a New or use an existing named connection.
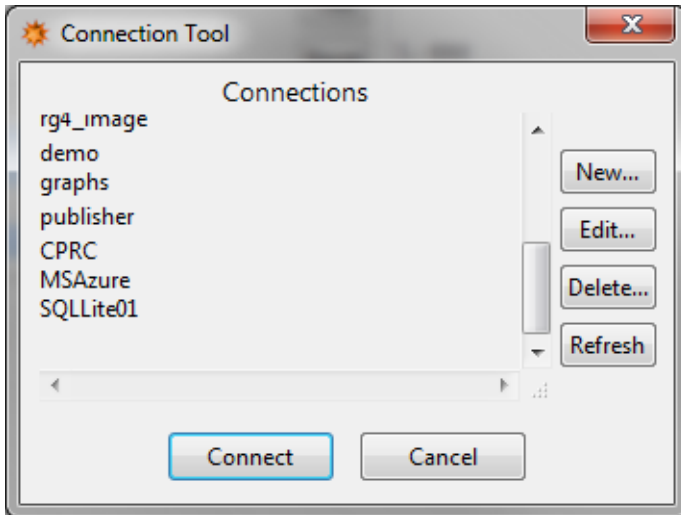
If you prefer to go through a Manual Setup then you should fill in the blanks displayed below.
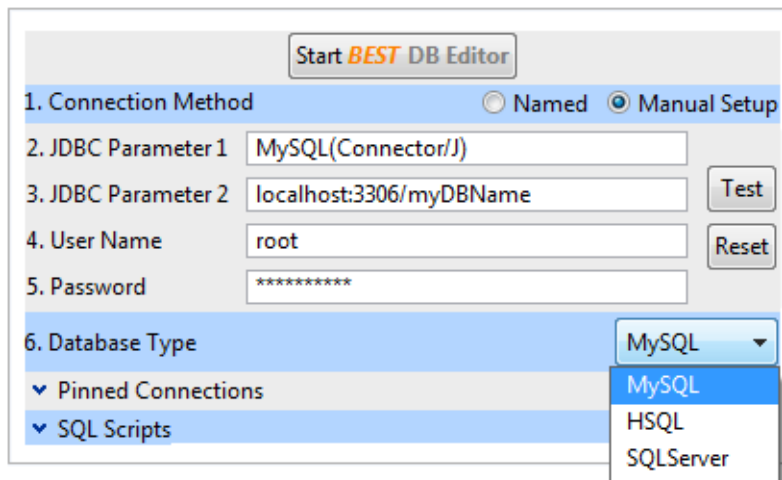
Once the database connection is set and working (use the Test button) continue to the next step and define the Database Type. Once the connection is working and the Database Type is selected click on start button Start *BEST* DB Editor .

BEST DB Editor Script (Optional)

The following information is provided for advanced users who prefer to open *BEST* DB Editor manually. To open the application simply load the package and call BESTDBEditor with its two required parameters: database connection script and database type.

In[1]:= **Needs["BESTDBEditor`"]**

The following script will open **BEST** DB Editor interface to edit the publisher HSQL database.

In[1]:= `BESTDBEditor[OpenSQLConnection["publisher"], "HSQL"]`
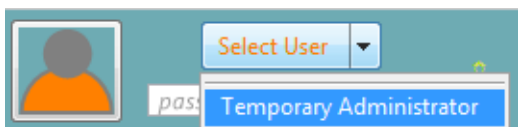
Using **BEST** DB Editor

Initially the user has to log in using the default user name automatically created. The screen shot below shows the message generated the first time **BEST** DB Editor is run on a database. Thus, the user has to use the log in as 'Temporary Administrator' with password 'password'. Afterward the user should create a new user with Administrator capabilities. This will be explained soon.
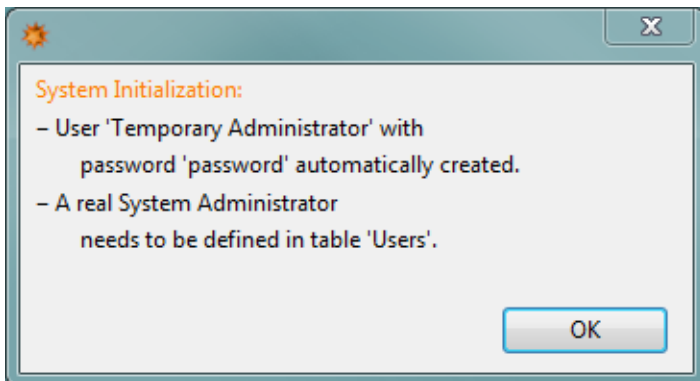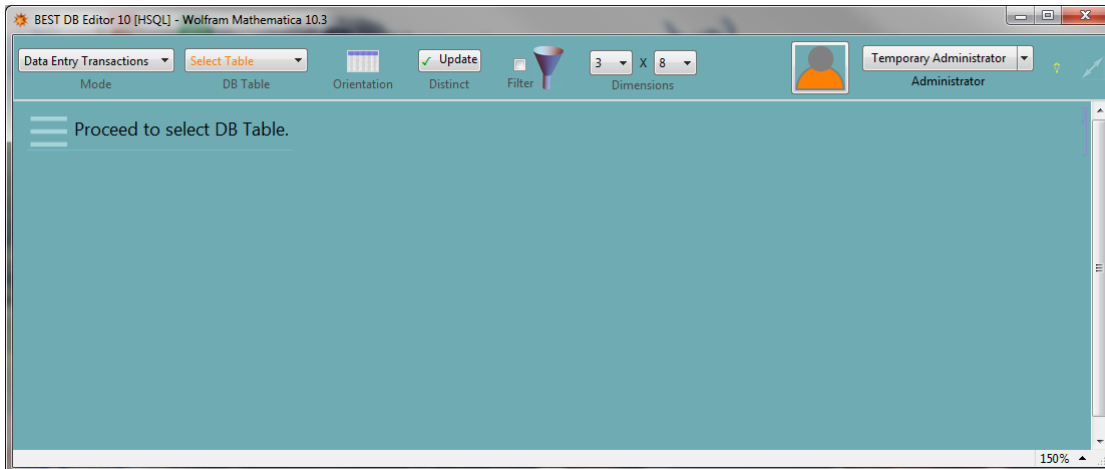

The welcome window is shown below. Note that you have to select a User Name and type in the password.
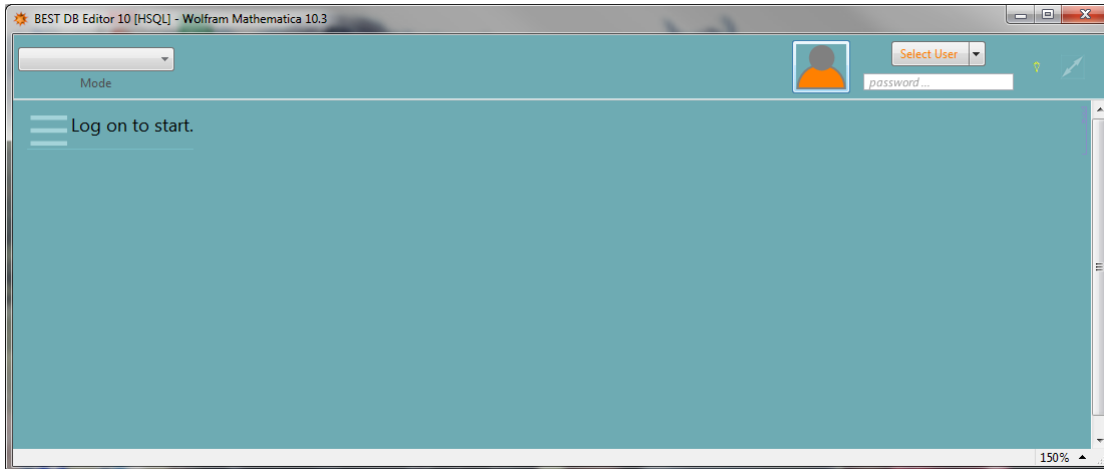
Proceed to select the default Temporary Administrator user and to type the default password which is 'password'.


Once the user is logged in several working options become available as shown below. The next section explains how to start using **BEST** DB Editor.

Working Modes Overview

BEST DB Editor provides three main working modes: **Data Entry Transactions**, **Database Management**, and **Dataset Exchange**. Each of these working modes will be discussed later. For now note that the system boots on Data Entry Transactions mode which allows editing database tables.

Before getting into more details note that the system is ready to work once the system starts. For example, selecting the table SALEDETAILS from the tables menu will open that table and allow the user to add new records or edit the sample records displayed.
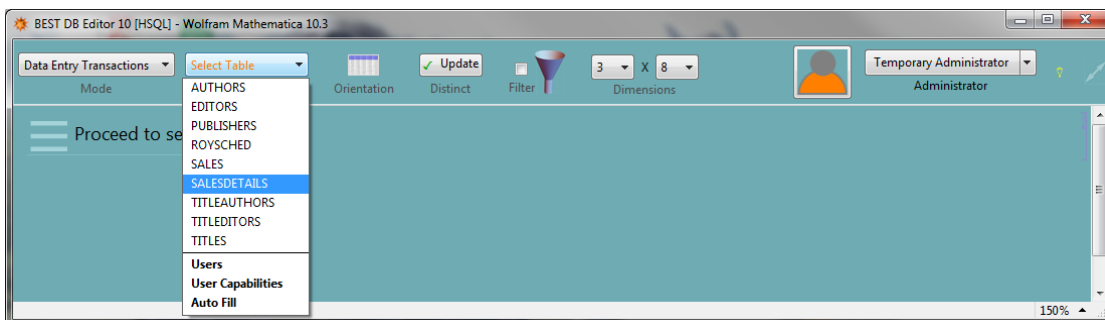

Note that each field data type has been taken into account to setup the editor to accept only the right data type and format for each field. For example, note that DATE_SHIPPED field is ready to be edited with a "date menu" to simplify editing dates and ensuring that only valid dates are entered.

Note also the field hint [1]SONUM... which implies that this field will accept only integer numbers whereas [a]TITLE_ID... will accept any string. Just as an example note that the screen shot below shows that suggestions are made once a number is typed on the QTY_SHIPPED field.
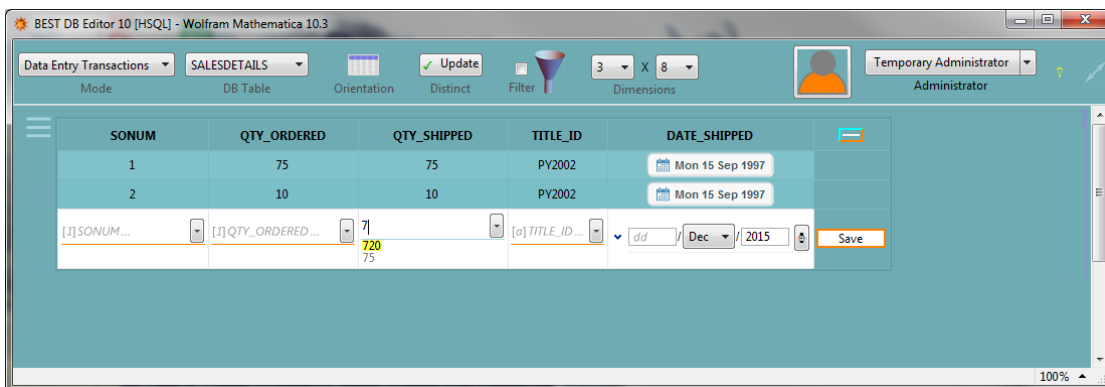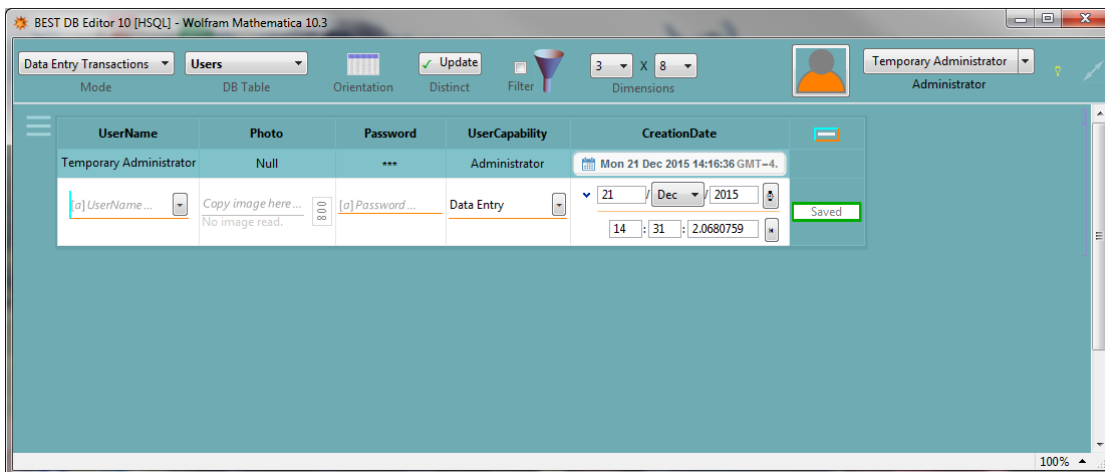
1. Data Entry Transactions

To demonstrate how the system works start creating a real user name by selecting the table Users as shown below.
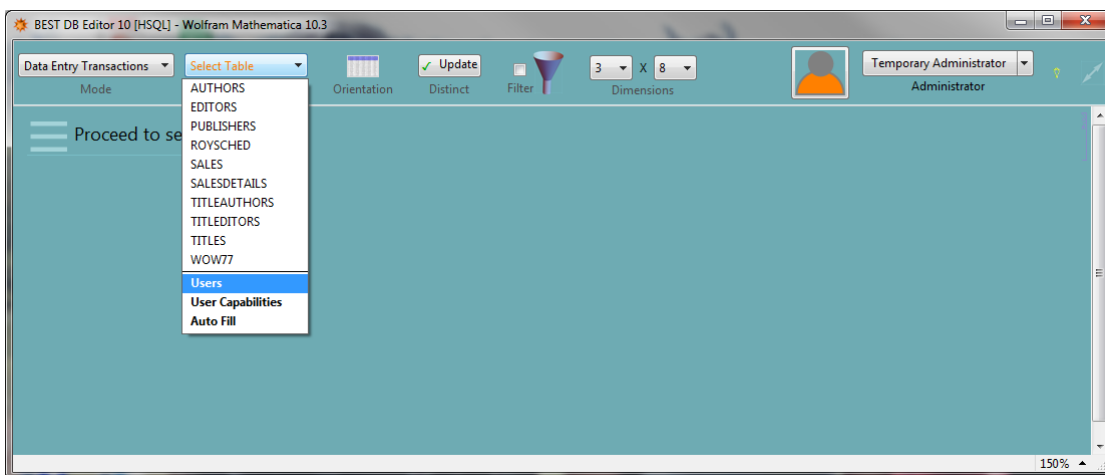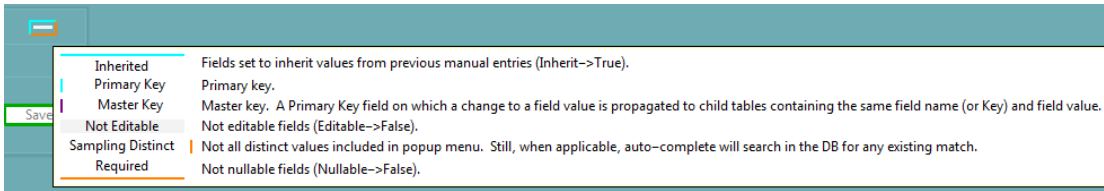

Then you need to provide the required fields (underlined orange) which are UserName, Password, UserCapability, and Creation Date.


Note that there's a legend to the different line colors or backgrounds used to display fields. For exam-

ple, in the Users table UserName is required (not nullable) and is also a Primary Key while Photo is nullable.

The user Temporary Administrator will disappear once there is a real administrator in the system. So, make sure the first user created is set as Administrator in UserCapability. Click on Save to save the record. This is done only once. The next time you open the system that user will be available in the users pop up menu.
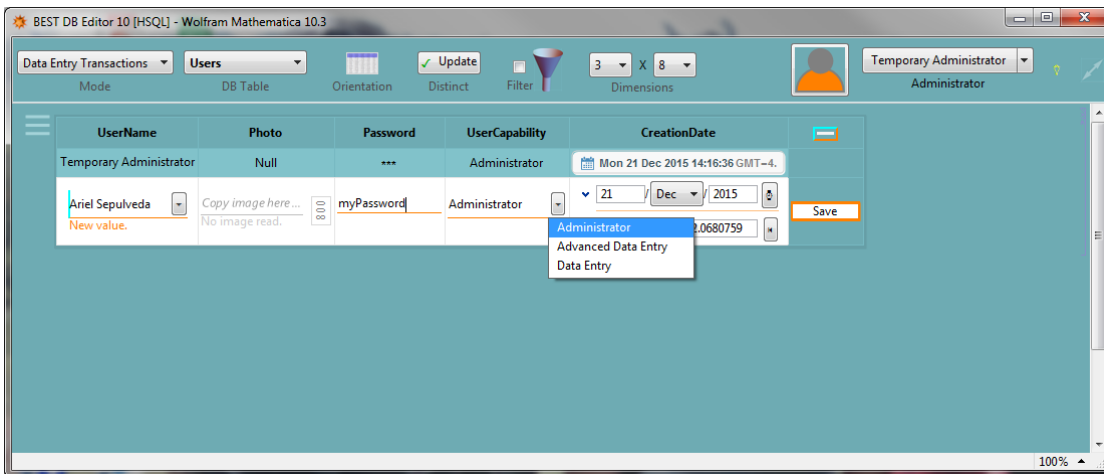
Note that when the record is saved the Temporary Administrator disappears. To edit a saved record just click on any displayed element.
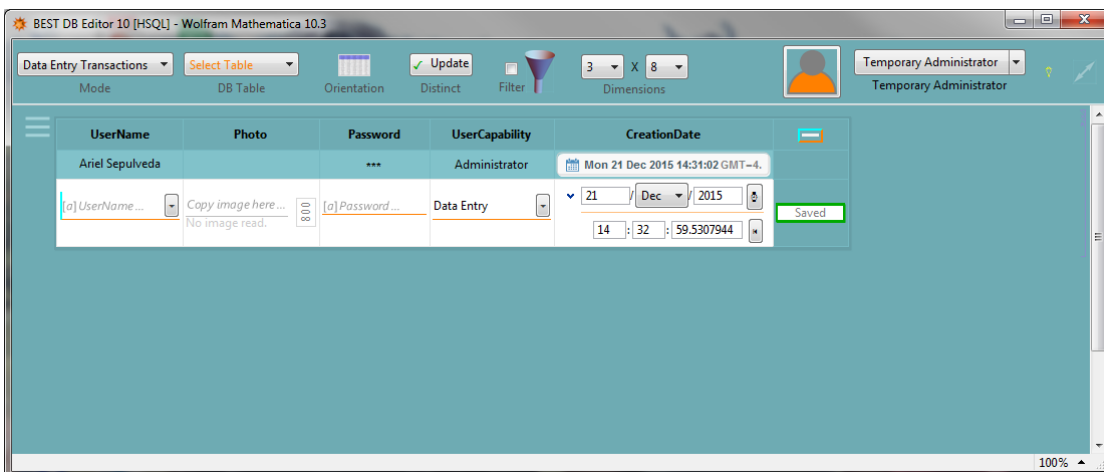
Note that *BEST* DB Editor has been set to enable editing the Users table in a friendly way. The following list contains some of the features used to setup this table. This list is a short introduction to the features *BEST* DB Editor provides for data editing because all the features enabled for this table can be easily set to edit any table other in a database.

- There is a menu besides UserName but not in the Password field. The options in the UserName

menu will increase as you add new users.

- You can copy an image in the Photo field and save that image in the database.

- There is a menu also for UserCapability but that menu will always keep the only three possible options (DataEntry, Advanced Data Entry, and Administrator). You don't have to use the UserCapability menu but you can just type in the desired UserCapability. The system will provide Auto-Complete options as you type but you will be warned if you type a value different than the allowed ones. The system will warn if a value different from the allowed ones is present in the UserCapability field.

- The CreationDate is automatically added but there is a 'Date Menu' to simplify typing or selecting only real and correctly formatted dates and times.

System

2. Database Management

This working mode will be discussed later on. For now the screen shot below shows the appearance of this section of the program. In summary, the user picks from the tabs the action to perform and the corresponding options will become available.
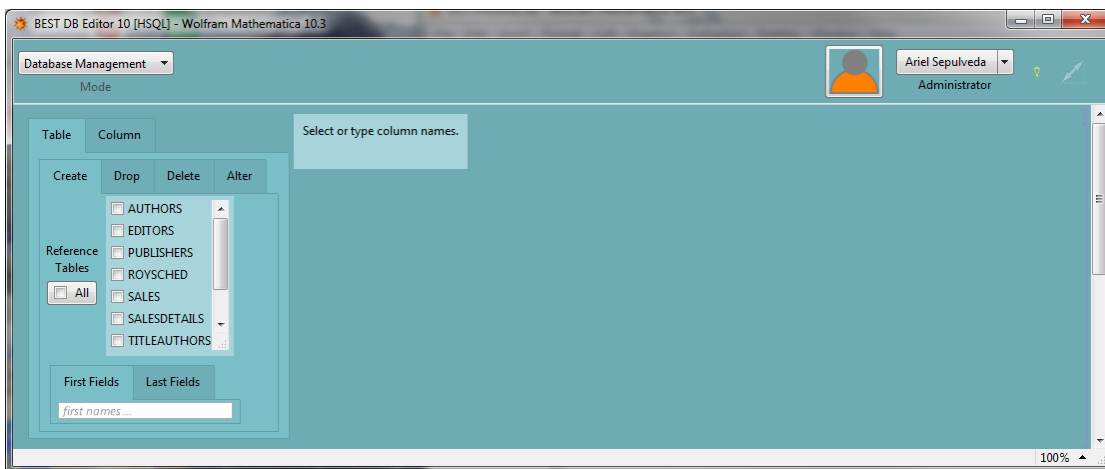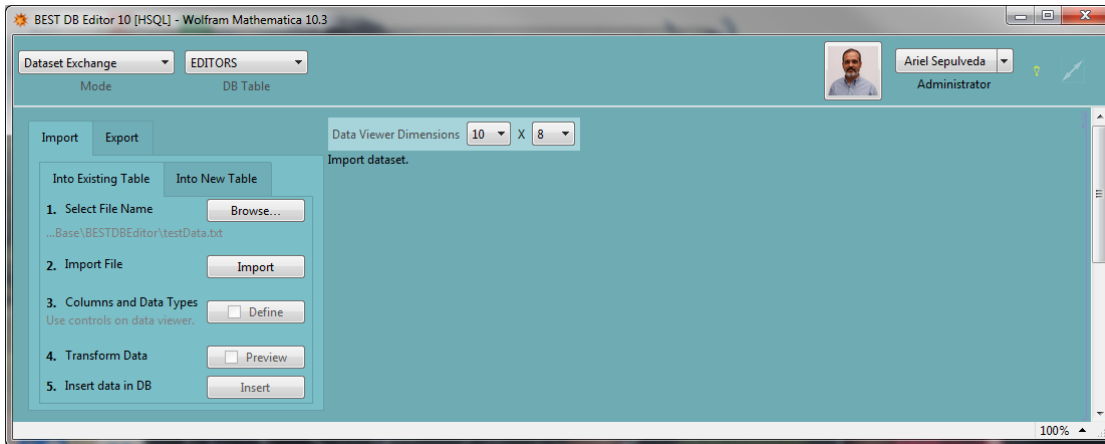

3. Dataset Exchange

Importing or exporting data is made possible in the Dataset Exchange menu. The next two screen shots show the appearance of the application on this working mode.
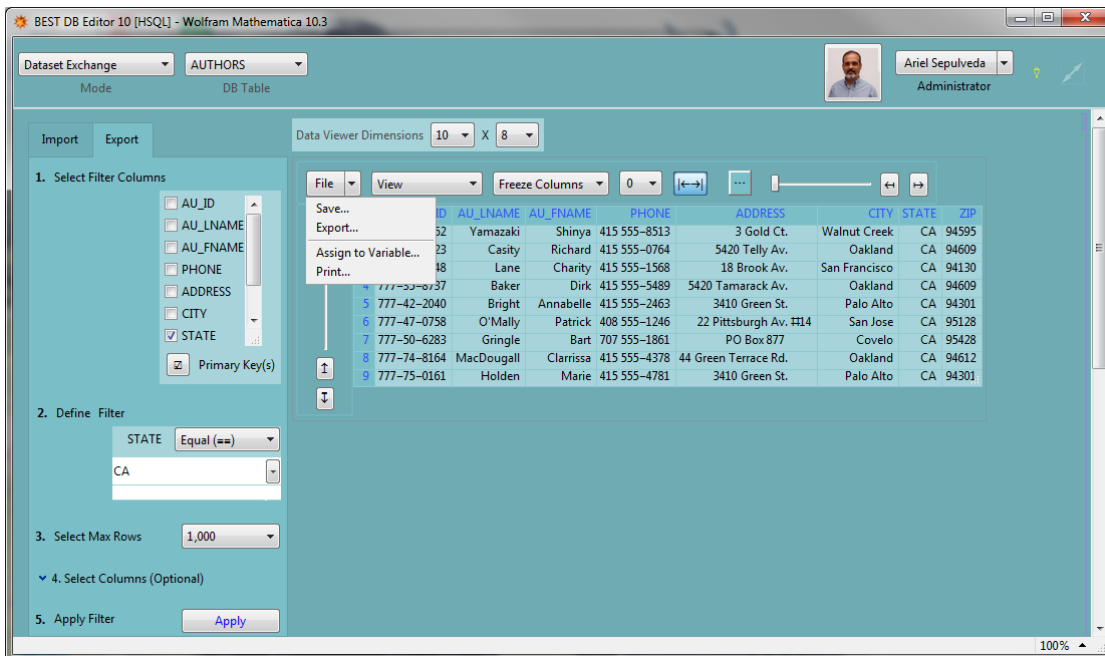
Import

To import data simply follow the step by step process shown below. You can import data Into an Existing Table or Into a New Table.

Export

To export data select the DB table, define a filter to extract data and use the Save or Export menu options in the data viewer as shown below.


Working Mode 1: Data Entry Transactions

Preferences

BEST **DB Editor** provides several ways of adjusting preferences to setup the working environment. Working preferences can be classified in two main groups; those that are made System-Wide (for all users) and those that are modified in every individual working session.

System Wide Field Preferences

Every field name is associated to a menu (see image below). The last option in that menu (Field Preferences) can be used to modify the default system wide options associated to any table field or column.
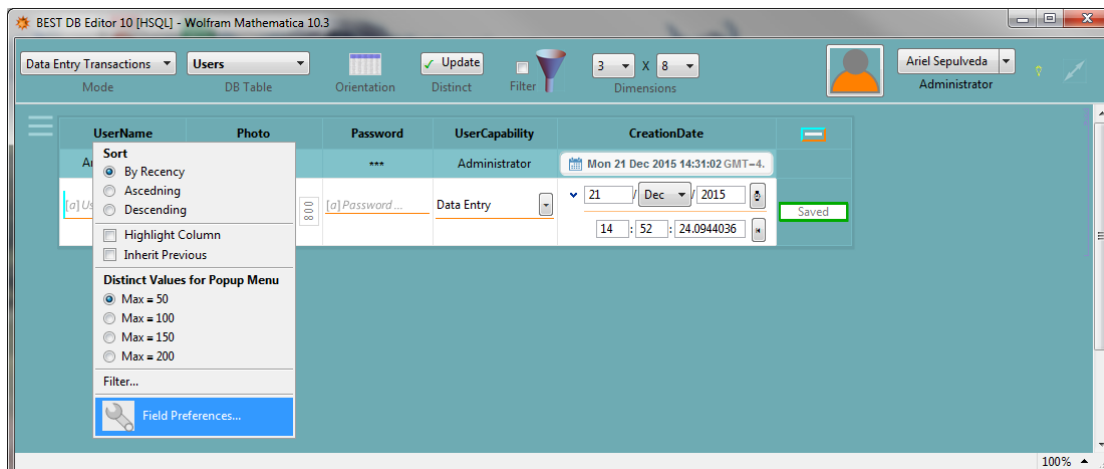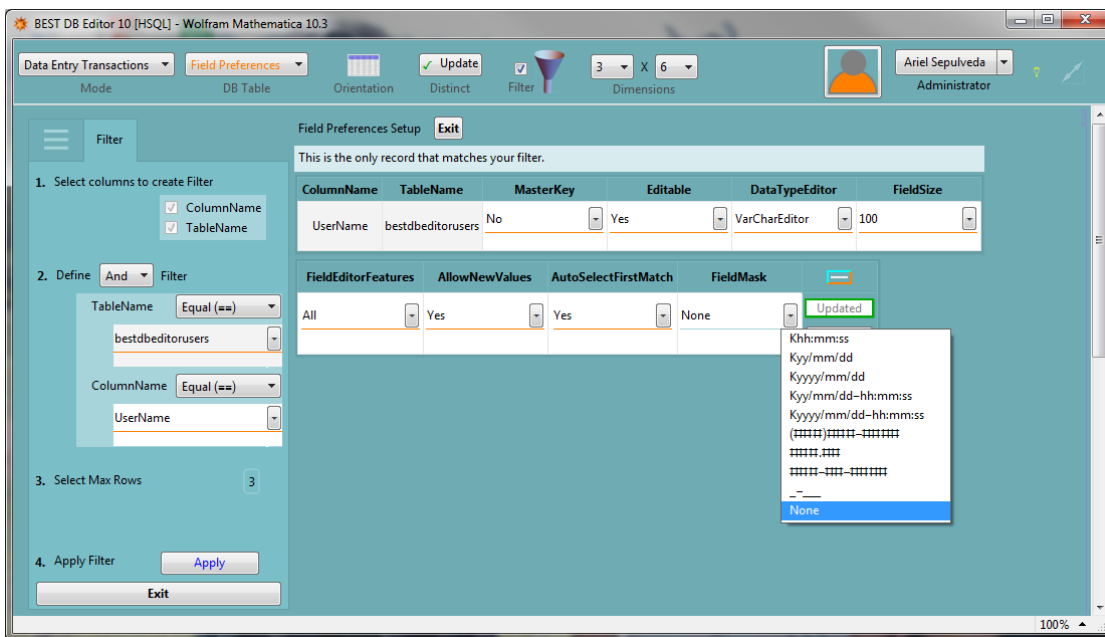

As shown in the image below the field preferences include several options. Any of these options can be changed and "Saved" in the database to modify the behavior of the field editor across all **BEST** DB **Editor** users.

- **MasterKey**: A primary key for which any change in the value for that primary key will be replicated to all tables in the DB with the same field name. In other words, changes to the value of a primary key which is also a MasterKey will be replicated to all other tables in the DB with that same field name.

- **Editable**: Whether the user can edit the field or not.

- **DataTypeEditor**: The type of editor used to modify the field. Possible values include VarCharEditor, LongVarCharEditor, RealEditor, AbsRealEditor, IntegerEditor, AbsIntegerEditor, DateTimePicker, TimePicker, DateTimeEditor, TimeEditor, AbsoluteTimeEditor, DatePicker, DateEditor, ImageEditor, SoundEditor, SymbolEditor and ExpressionEditor. This value is usually automatically set but in some cases the user may be allowed or may need to change the default value, for example change the editor from RealEditor to AbsIntegerEditor. SymbolEditor is used for symbols which can ve converted to strings while ExpresisonEditor is for *Wolfram Language* expressions that are not numbers or strings. When working with *Mathematica* expressions, sounds, graphics or images the user will most probably have to override the automatic assingment of the DataTypeEditor and make the selection that is appropriate for the field data type and contents.

- **FieldSize**: The field size shown in the editor.

- **FieldEditorFeatures**: Possible values include All, NoAutoComplete, AutoComplete, InputField. **All** means that the field editor will include all possible features; a pop up menu, auto-complete feature enabled, and an input field to type values. **NoAutoComplete** includes the same features as 'All' but auto-complete. **AutoComplete** includes and input field with auto-complete feature enabled. **InputField** is just an input field like that provided for the column Password in the Users table (auto-complete is not a good idea for passwords).

- **AllowNewValues**: Setting this feature to No will lock the field such that only the existing field values are accepted as valid. For example the user may want to limit a field named SystemState to only take a

limited amount of values (Working, Idle, Broken).

- **AutoSelectFirstMatch**: Setting this value to Yes will make that when the user hits the Return key the editor will take the closest match in the existing field values to the characters typed in the input field at the moment the user hits the Return key. Note that this feature works when the AutoComplete capability is enabled.

- **FieldMask**: Field masks are used to limit the amount and format of characters typed in a field of strings or numbers. The following characters are used as placeholders: for numbers: #, y, d, m, h, s, and for any character: _ (underscore). Any character other than the placeholders above will be used as delimiter. Use the letter K at the beginning of a Field Mask to Keep delimiters as part of the input string. For example the field mask K(###)###-#### can be used to enter phone numbers of 10 digits where the parentheses and the dash are saved in the database. To exit the Field Preferences Setup click on Exit after you modify and save your field preferences.

Working Session Preferences

The image below shows that Working Session preferences can be modified individually for each field or in a general way for all fields.
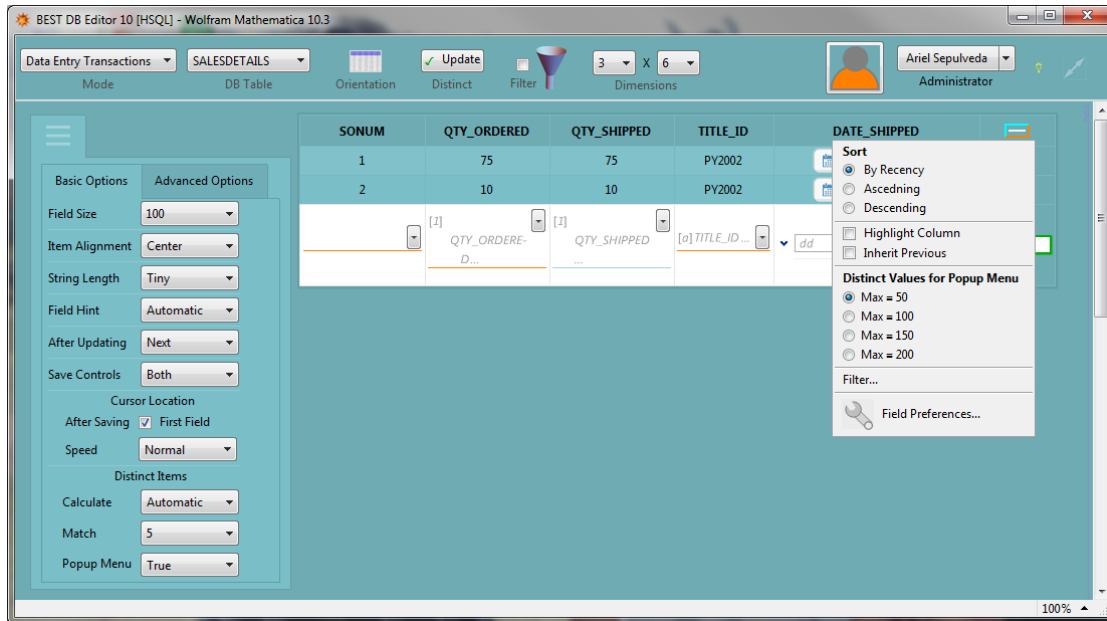
Field Preferences

- Use **Sort** to sort displayed data by a particular field. By Recency is used to order data such that the latest modified fields are shown at the bottom of the table.

- **Highlight Column** is used to change the background color a column to distinguish it from the others.

- **Inherit Previous** is used to simplify the data entry process by replicating in each new record the value previously assigned to a field. This saves lots of time as repeated record values in a column or field don't need to be entered more than once.

- **Distinct Values for Pop-up Menu** is a feature to help deciding when a Pop-up Menu should be automatically displayed or suppressed. The idea is that usually Pop-up Menus are used to select from a small set of distinct field values. If the Max is set to 50 then the Pop-up Menu will be suppressed if there are more than 50 distinct values in that field. This option is associated to the **Distinct Items** options discussed in the next section.

General Preferences: Basic Options

- **Field Size** is the default field size. This option applies to all fields which System Wide Preference FieldSize is the default value.

- **Item Alignment** is the item or cell alignment.

- **String Length** is used to control the displayed size of string fields such that fields with sentences or paragraphs are not displayed in full unless they are being edited. Options are Tiny, Small, Medium, Large, Extra Large, and All.

- **Field Hint** can take the following values: Automatic, Short, Plain, Text, and None. Automatic is the default value which combines information about the data type and the field name. Some examples are shown next:

  [1] SONUM... means that the field SONUM requires integer numbers.

[1.] SONUM... means that the field SONUM requires real numbers.

[|1|] SONUM... means that the field SONUM requires non-negative integer numbers.

[a] SONUM... means that the field SONUM is a string field.

The <u>Short</u> field hint would display hints like [a], [1], etc. <u>Plain</u> field hints display the field name whereas <u>Text</u> displays a Type Here... message.

- **After Updating** is an option to decide what to do after a record is Updated. The user may want to continue editing the <u>Same</u> record or to move to the <u>Next</u> record.

- **Save Controls** is used mostly for ergonomic purposes. When a <u>Both</u> or <u>Input Field</u> is used the user may use the Tab key to move from one field to the next until reaching 'Save' where pressing the Enter or Return key will save the record. This feature should be set along with the next option.

- **After Saving** a record the user may want to place the Cursor Location right on the First Field. *To get a predictable behavior of this feature the user may have to adjust the **Speed** at which the cursor is placed inside the input field. In some operating systems enabling this feature may crash the application.*

General Preferences: Advanced Options

- **Tips** are used to display as tooltips information associated to each field preferences as shown in the image below.

- **Calendar** can be set to <u>Type Date</u> which is the default behavior or <u>Pick Date</u> to pick a data from a calendar grid. Note that the default calendar display may be changed from its default {Day, Month, Year}. Changing this *display* does not affect the way dates are saved in the database.

- **Images** have two options: **Max Size** is used to limit the image max size to avoid saving large images in the database. **Display** is simply the size used to display the image in the table.

- **Distinct to Menu** is used to decide for which data types a pop up menu with distinct values should be displayed. Most probably a pop up menu will not be required or recommended for a field where images are saved (Binary, VarBinary, Blob, etc.).

- **Heap Space** setter may be used to increase Java Heap Space when importing large spreadsheet data files.
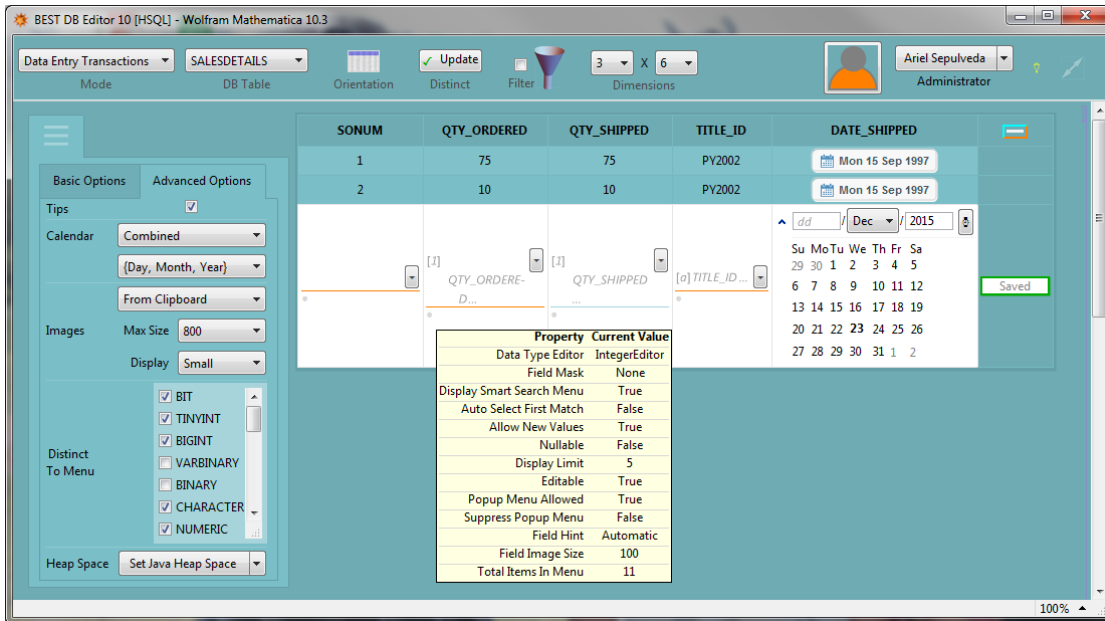
## Record Update Using Filters

Records displayed on screen can be modified by just clicking on the displayed field. To modify other records use the Filter option.
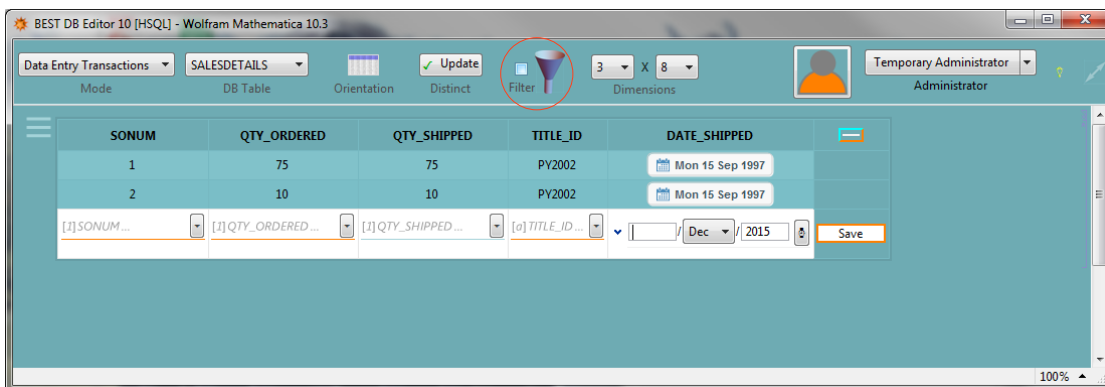
Filters can be defined based on one or more fields. The image below shows a filter for SONUM and QTY_ORDERED. Note the logical Or selected to wrap the two conditions defined. Once the conditions are defined click on Apply to execute the filter. The records displayed are ready to be edited. If the filter results on more records than the Dimensions limit only some of the matching records are displayed. Increasing the max rows in Dimensions may help displaying all matching records.
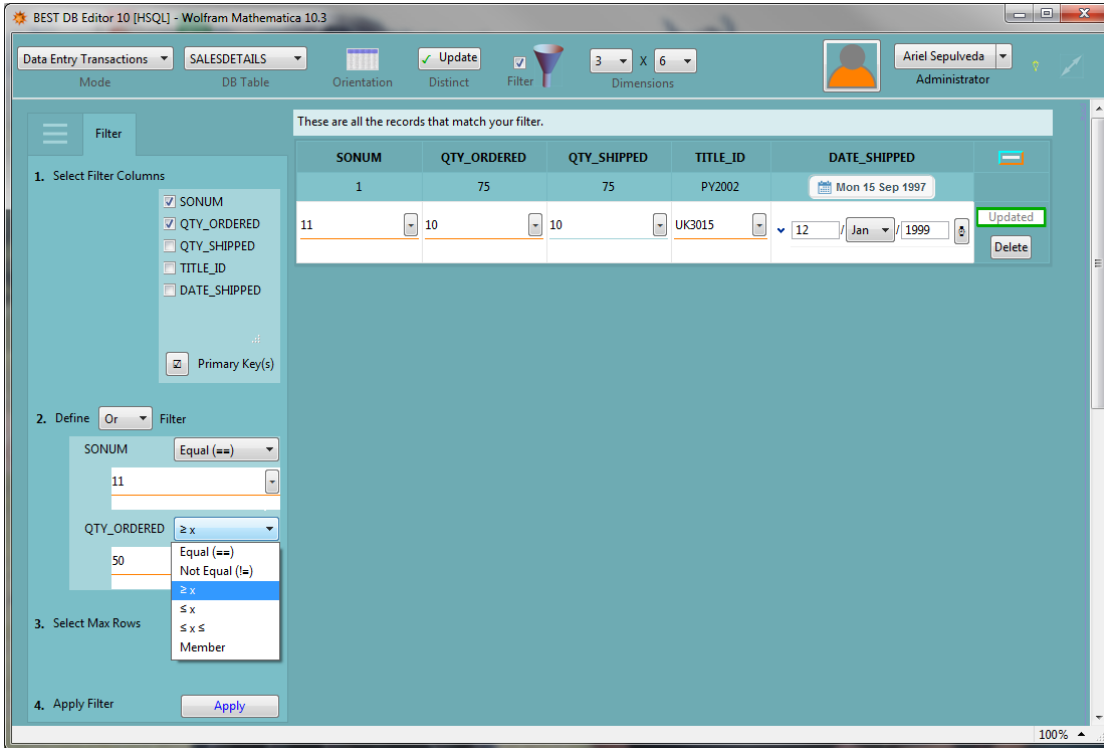
Picking values from a list to create a query is also possible as shown below.
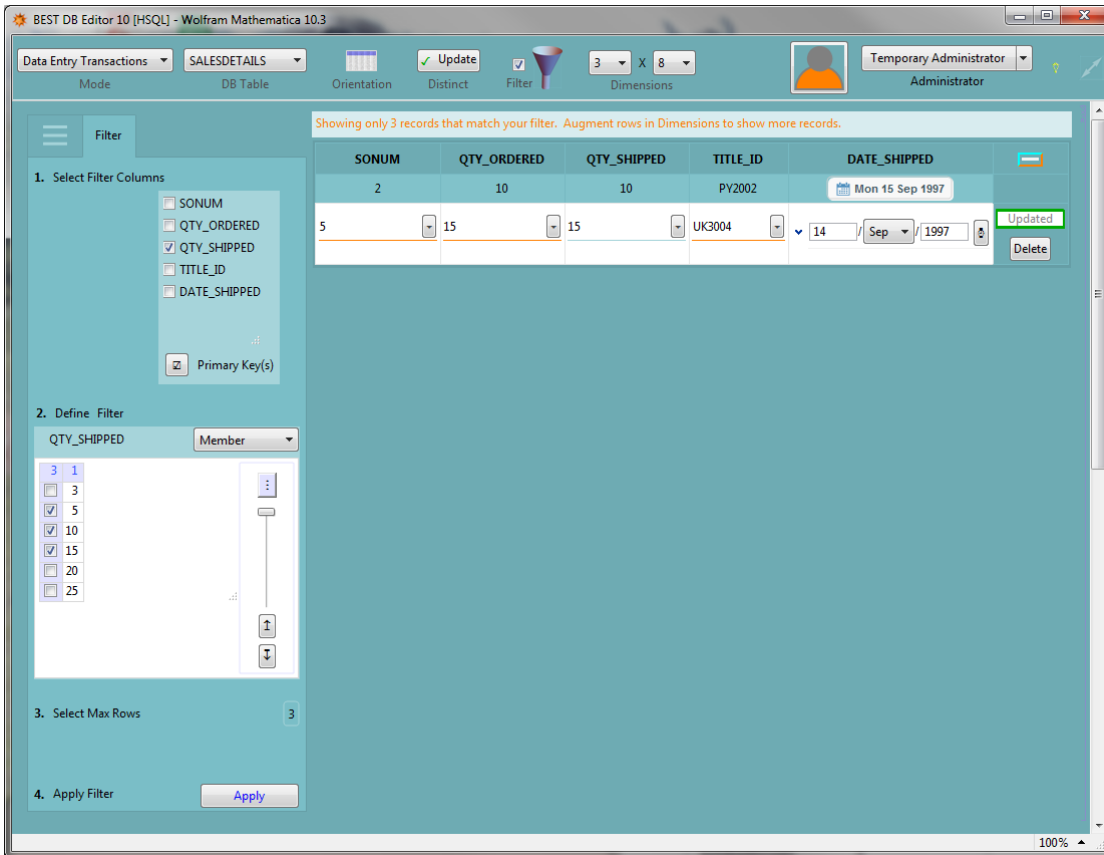
Users and User Capabilities

BEST DB Editor requires at least one Administrator user. This administrator is allowed to add more users which can be any of the three capabilities: Administrator, Advanced Data Entry, and Data Entry. Administrators have all capabilities but other user groups have default and editable capabilities.

Data Entry users can't access Database Management tools (create new tables, columns, etc.), nor modify System Wide Field Preferences. Besides these standard restrictions, the privileges granted to users can be modified in the **User Capabilities** table.
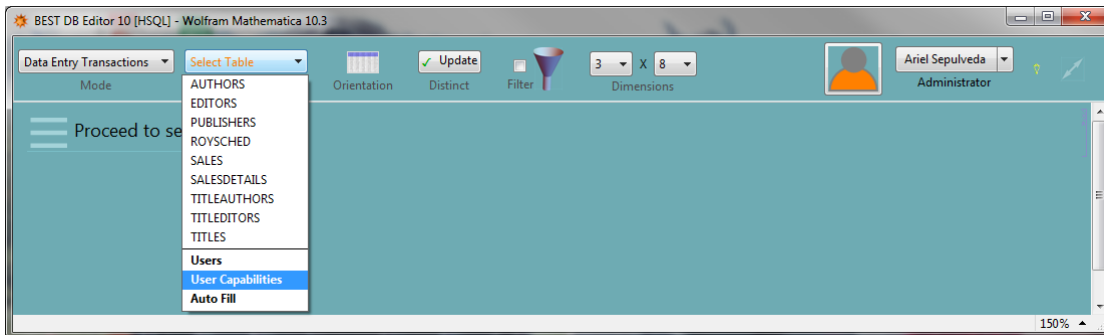
In the User Capabilities table administrators can disable capabilities (Save Record, Delete Record, or Update Record) to users (e.g. John D.) or user groups (e.g. Data Entry).

The table below shows an example setup where Advanced Data Entry users have been disabled the capability of deleting records from the table Sales, and the capability of updating records in any table has been disabled to all Data Entry users. Any number of records can be added to this table to set the system as desired.
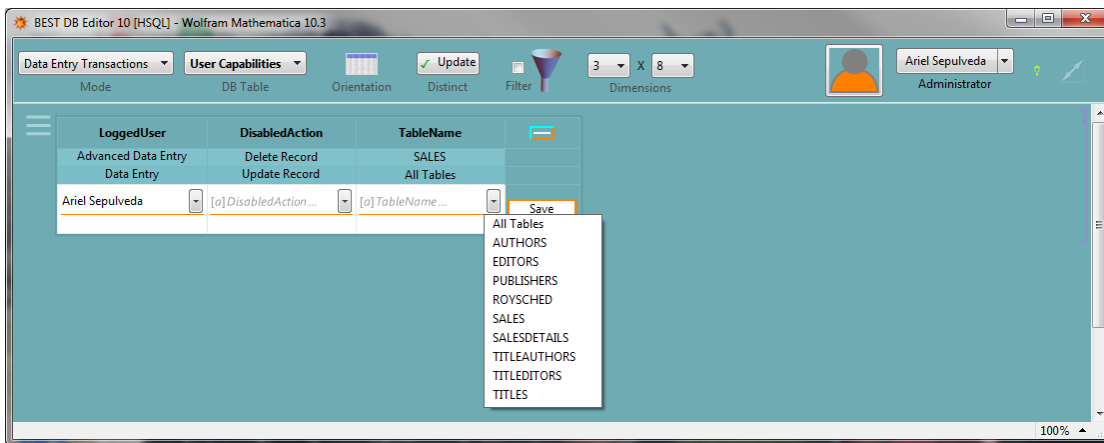
Table Auto Fill

BEST DB Editor enables the automation of auto-fill records in linked tables. The table **Auto Fill** is used for this purpose. Note that this feature is different than that discussed in the Working Session Field Preferences section. There the system replicates in fields the previously typed values, here the system is set to copy in other tables the information in a set of predefined fields.
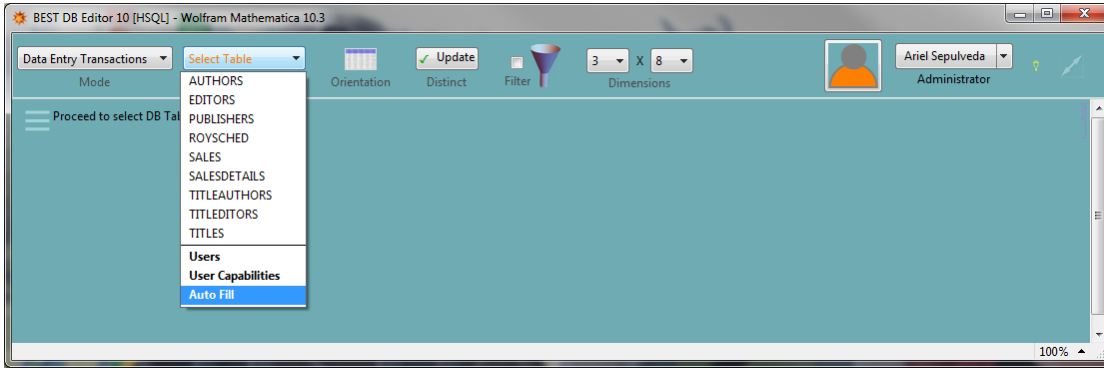
For example, consider a database where the table Sales and SalesDetails are linked by the SoNum field. It may make sense to automatically add a record in SalesDetails every time a record is appended to the Sales table.
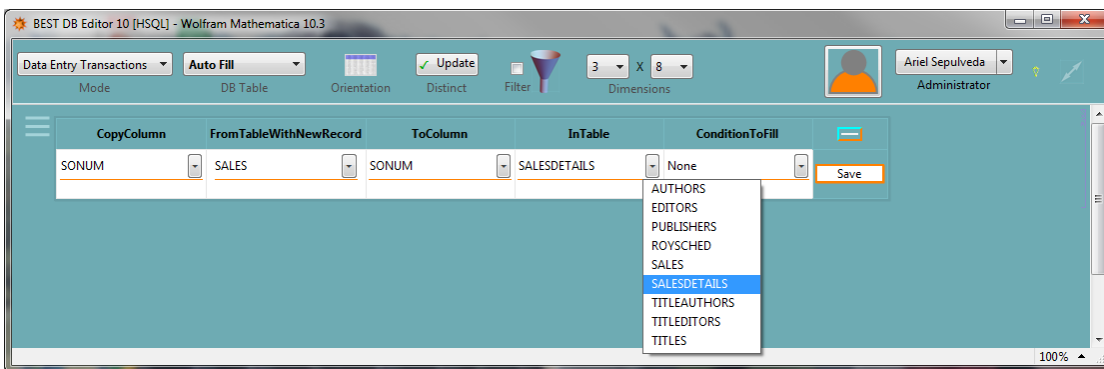

After saving the record shown in the image above the system will keep a record of all entries made to the Sales table such that the corresponding SoNum record is correctly added in SaleDetails.
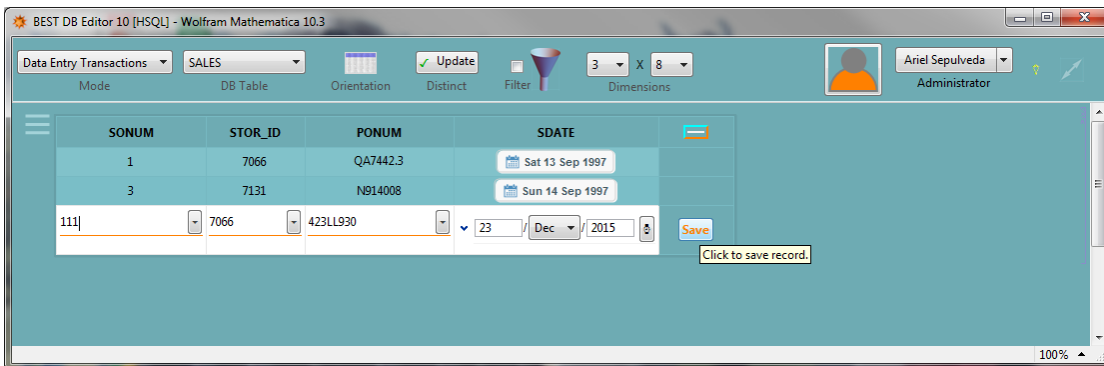
Note how a Next button appears besides the table menu. The SoNum value corresponding to each record added to the Sales table will be saved and once all the necessary records have been added to the Sales table the user may click on Next to start adding the necessary records to the SaleDetails table.
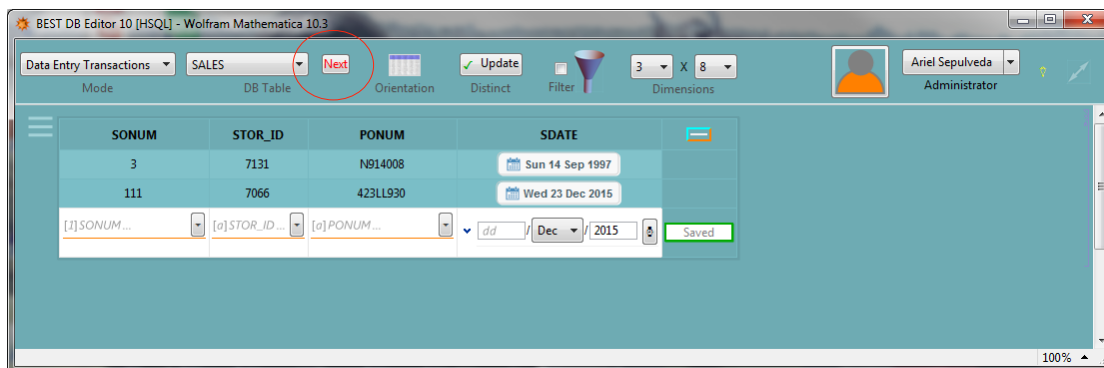
Clicking on Next will open the SaleDetails table with the corresponding SoNum value.
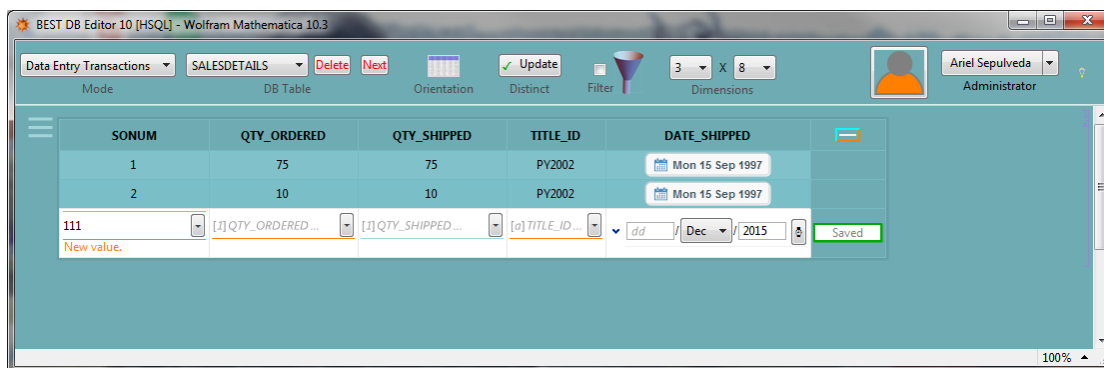
Working Mode 2: Database Management

Database Management section provides basic ways to work with an existing database. In summary, users can Create, Alter or Delete Tables or Columns.
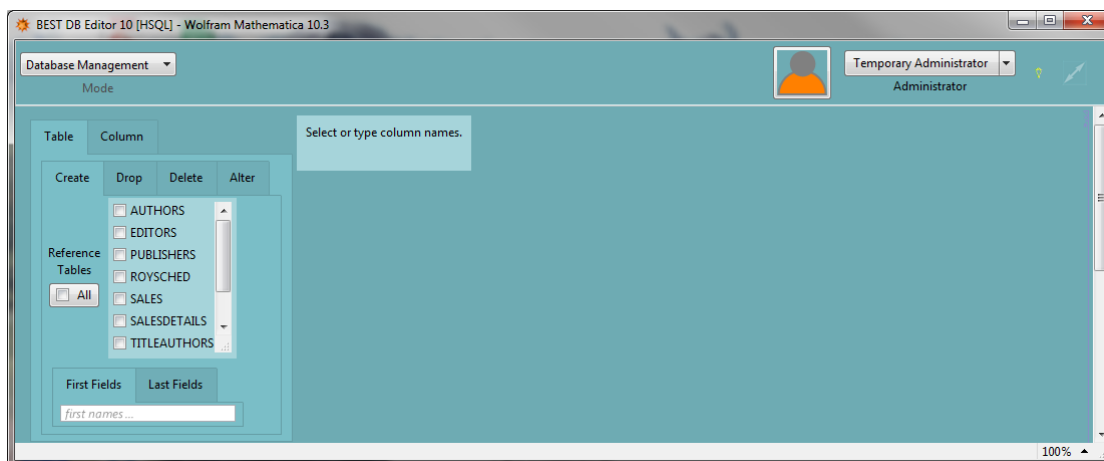
Create Table

To create a table the process is as follows: select reference tables (optional), and the desired fields from each selected table. In the First Fields and Last Fields tabs new field names can be typed sepa-

rated by commas. Each selected or newly defined field can be modified in the following properties: Nullable, PrimaryKey, DataType and DataLength (when applicable). Once fields have been set the new table named and pressing the button Create Table in Database will create the new table.
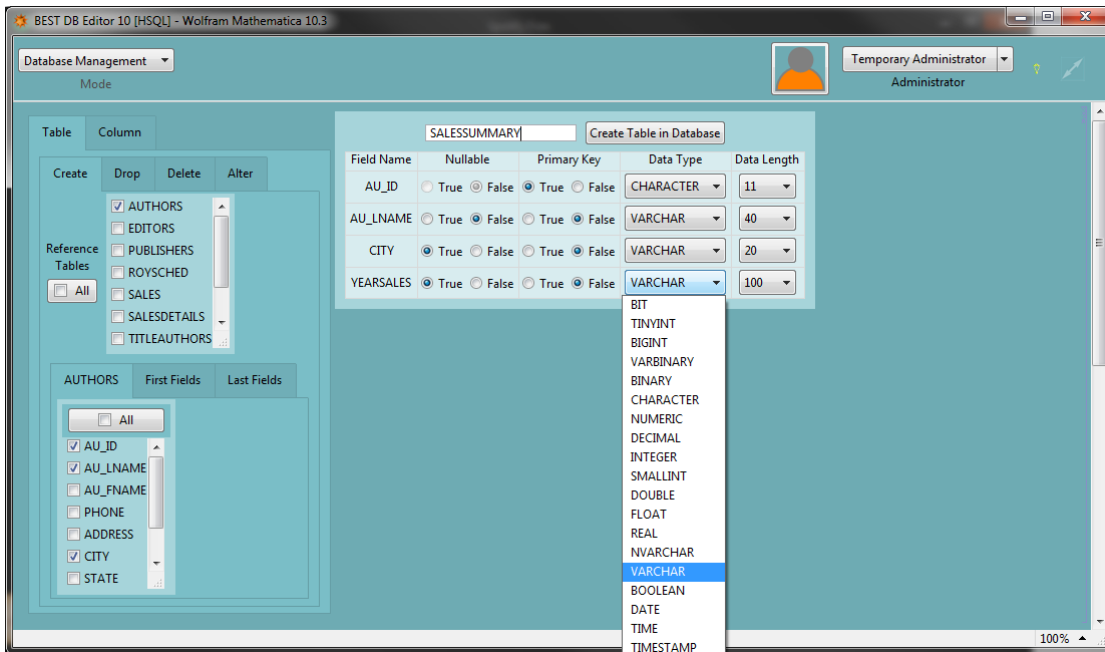
Once the new table is created it is available for editing.
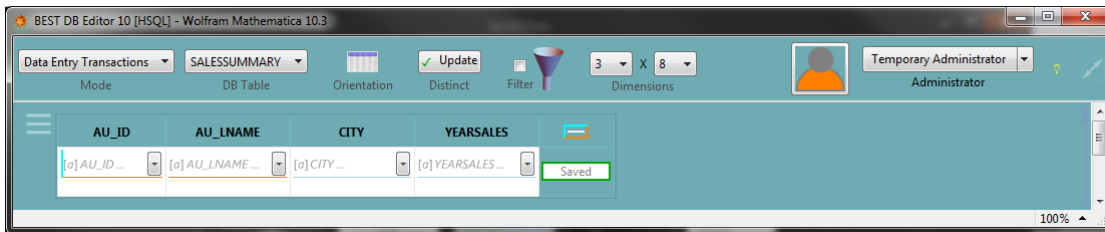
Drop Table

Drop Table use is straightforward. Just select the tables to drop from database and confirm the intention of dropping the tables after the Drop Selected Tables button is pressed. Note that dropping a table permanently deletes the table (including and all fields and field properties) from the database.
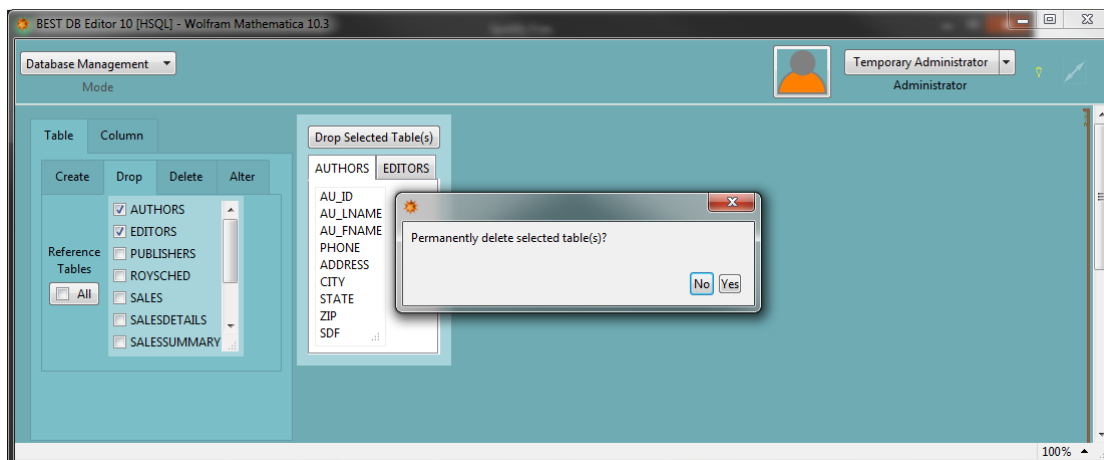
Delete Table

To delete tables just select the tables to delete from database and confirm the intention of delete the tables after the Delete Data from Selected Tables button is pressed. Note that dropping a table permanently deletes all the data in the table but the table and all its field properties remain defined in the database.
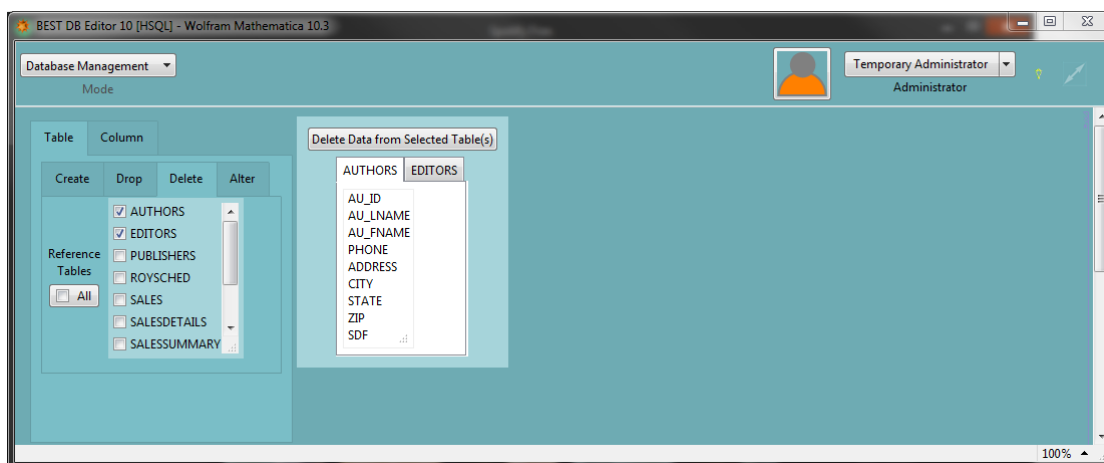

Alter Table

Alter Table menu can be used to rename a field or to make it a Primary Key. Just select the table and the fields to be modified, make the modifications and click on the Alter Table button.
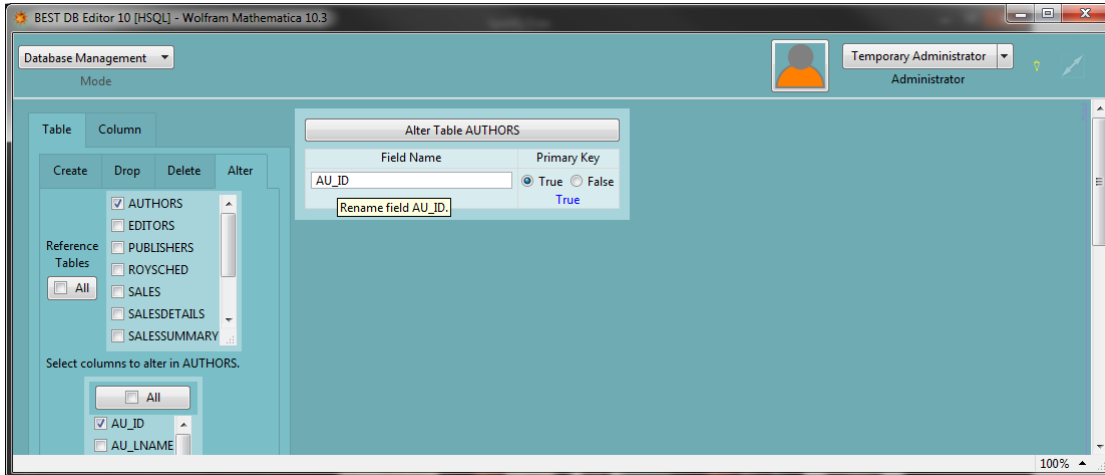
Create Column

To create new columns in a table simply select the table and type the new column names separated by comma. Afterward define if the field is Nullable, its Data Type, and the Data Length (when applicable).
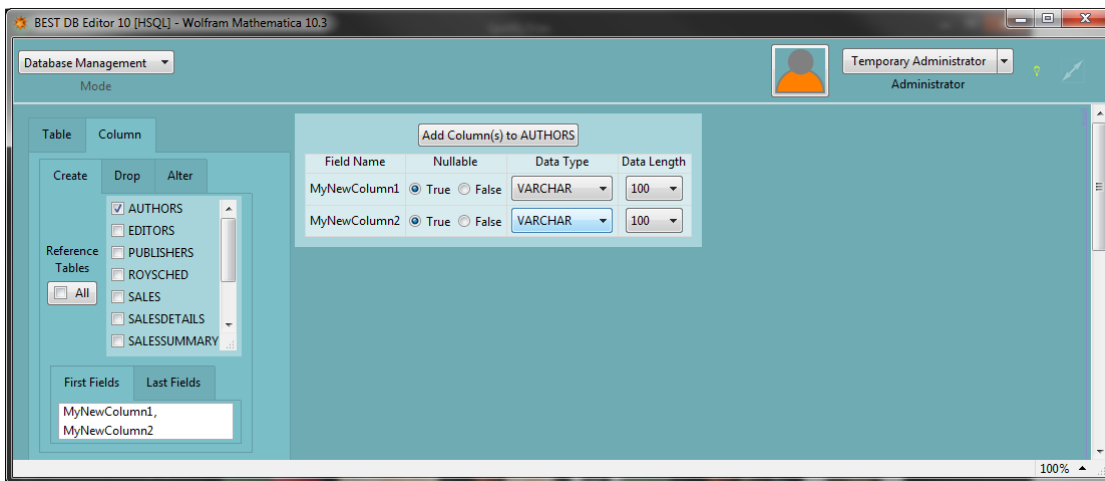
Drop Column

To drop columns simply select the table and then the columns that need to be dropped. Note that this action cannot be undone.
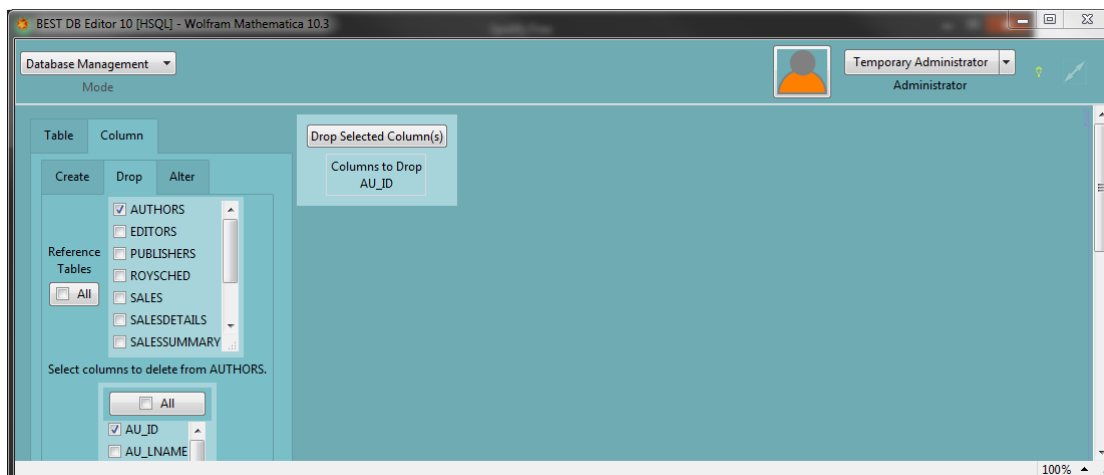
Alter Column

Fields can be altered in the following properties: Nullable, Data Type, and Data Length. The process is simple, just select the table and fields to be modified, make the necessary modifications and click on the Alter Columns in Table button.

Working Mode 3: Dataset Exchange

This section provides ways to Import and Export data. Data can be imported into an existing table or a new table can be created by selecting fields from the imported dataset.

Import

Datasets with extensions "XLSX", "XLS", "ODS", and "SXC" will be treated as spreadsheets and only the first tab will be imported. Other files like "CSV" and "TSV" will be treated as single files. In all cases data is expected to contain the table headers in the first row.   Imported datasets must have plain text

headers in the first row and the headers must not conflict with database symbols like Select, Delete, Distinct, Where, Or, And, etc. Try to avoid special characters in the headers (e.g. , * & | etc.).
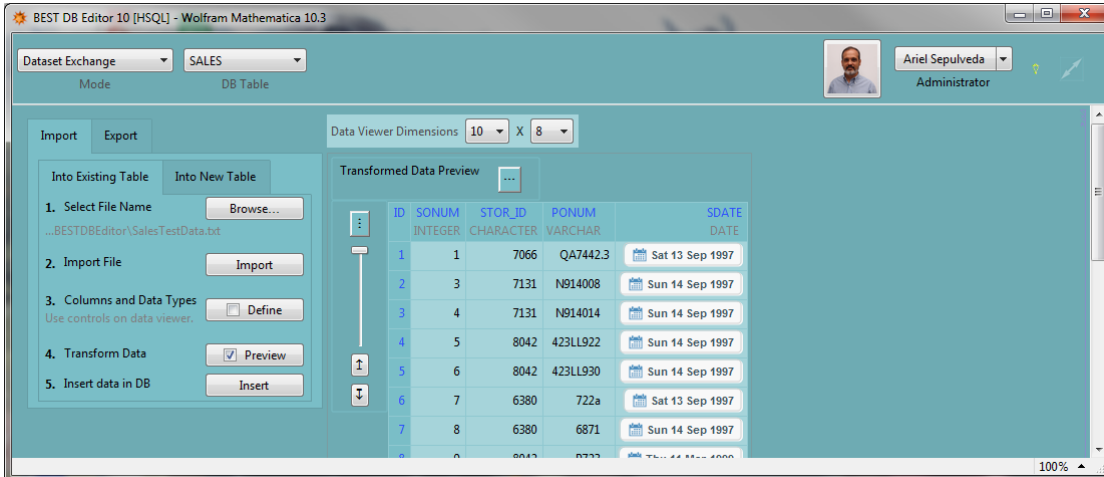
Import Into Existing Table

To initiate the process select the file and proceed to Import the data. If the data headers of the data imported does not match those of the selected table a warning message will be generated.
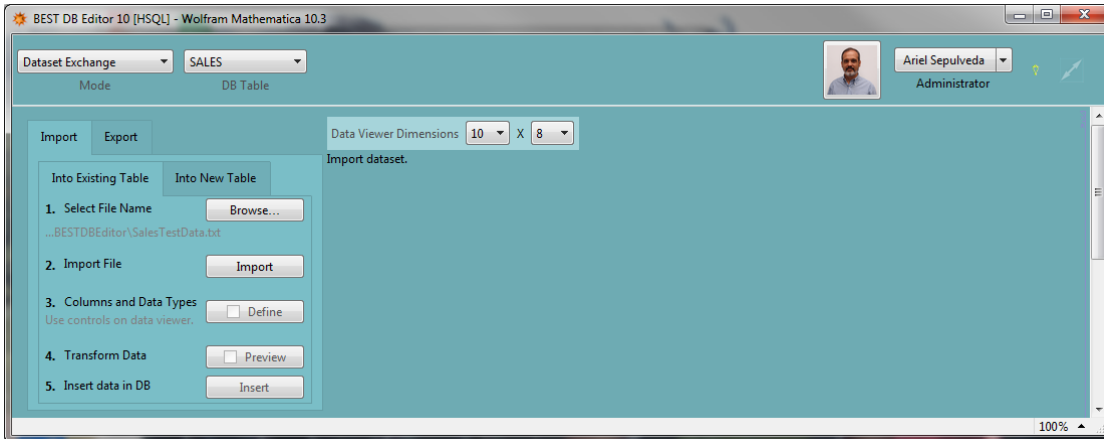
Once the dataset is imported those imported fields that match the fields in the database will show a menu with the Data Type which can be used to exclude a field from importing by selecting Excluded in the field menu.
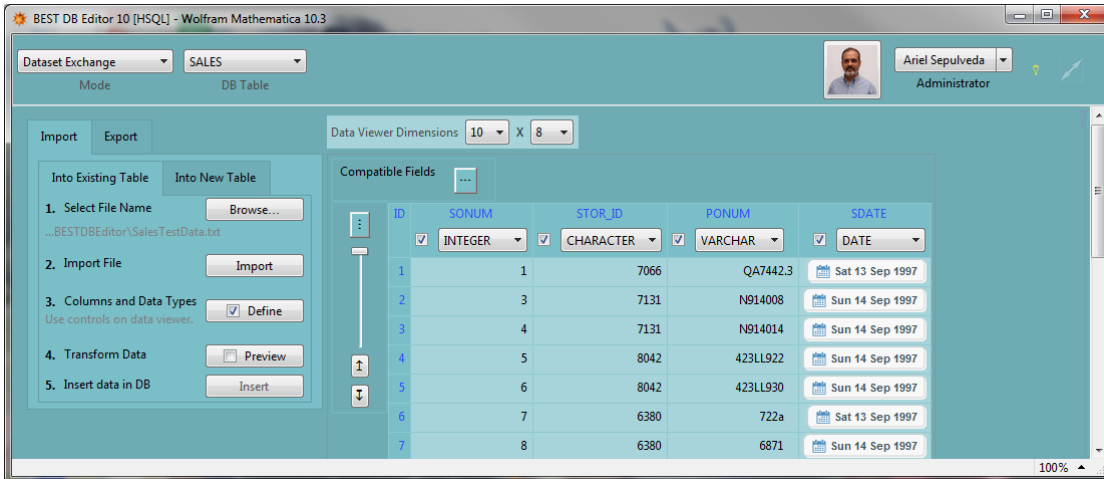
The Preview will show data after modifications are made to take into account the data type transformations.

Finally, once all the headers corresponding to the selected table are present and the transformed data looks as expected use the Insert button to insert data in the database.

Import Into New Table

To initiate the process select the file and proceed to Import the data. If the data headers of the data imported does not match those of the selected table a warning message will be generated. The data types of the fields to be created can be individually selected by the user or **the Guess button can be used to select the data type based on the Heads of the imported data**. Note that field names can be Excluded by selecting that option in the data type menu.
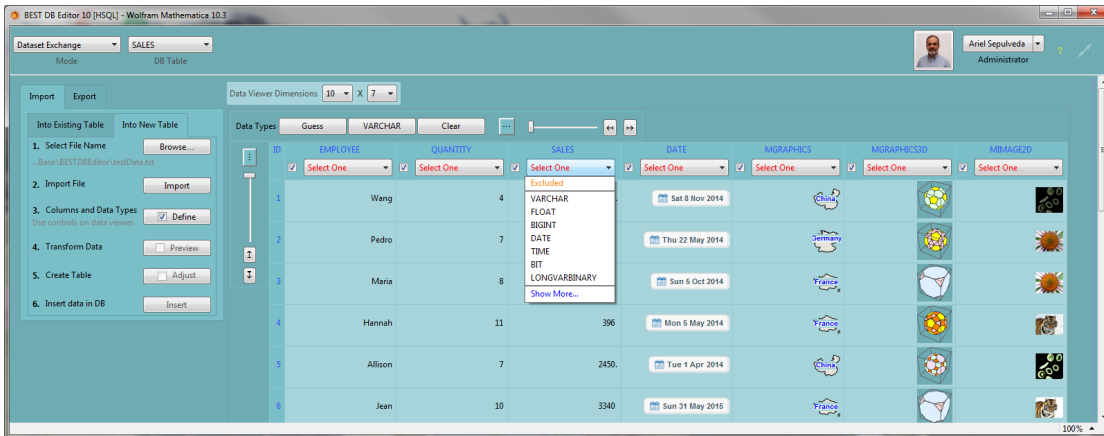
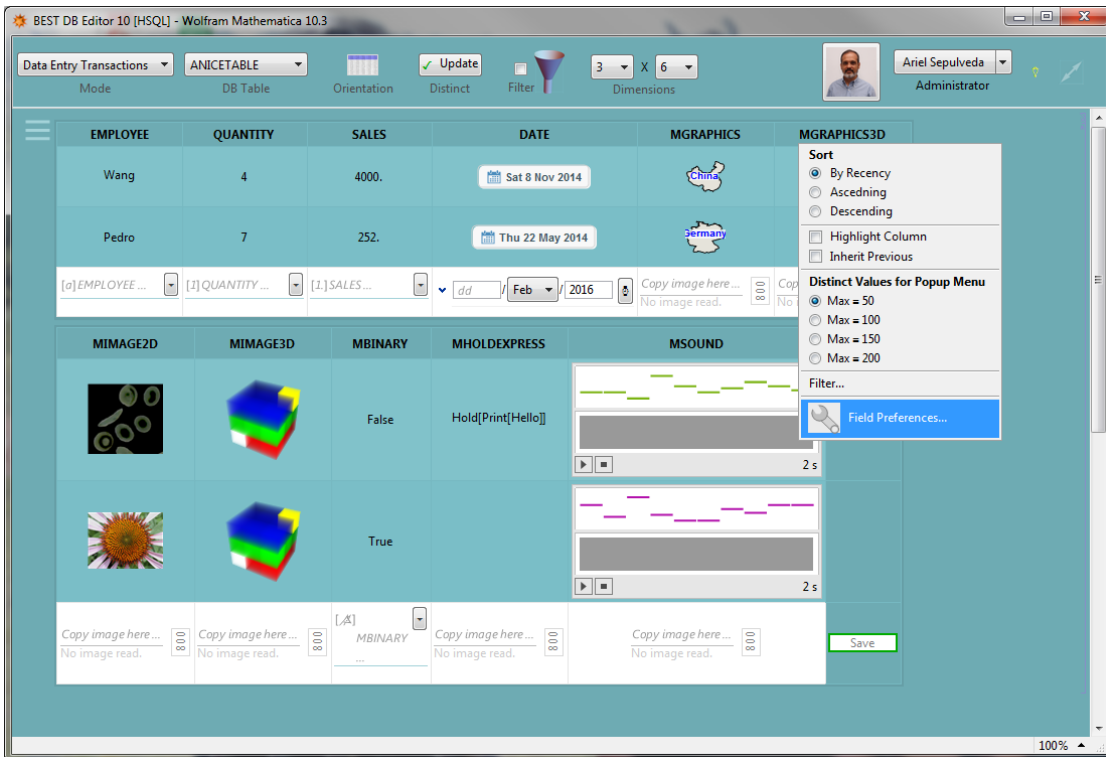The image below shows the state where the data types menu options have been selected.

The Preview window shows data transformations (e.g. string to dates or numbers), so elements should be inspected to ensure that the correct data types have been selected.
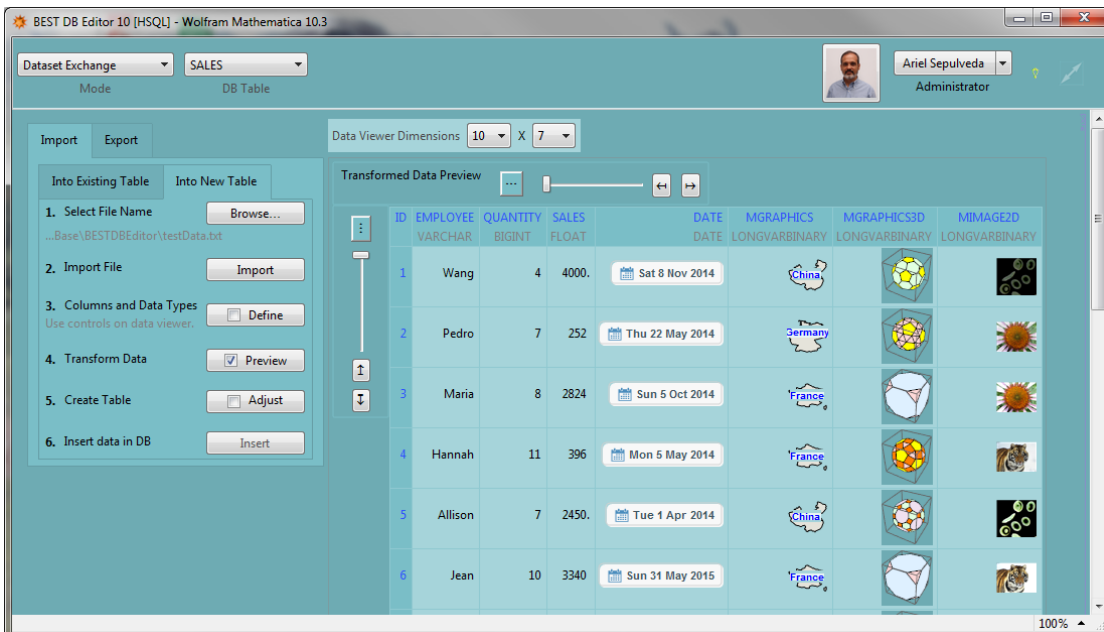
The Preview option shows data transformed based on the data types selected and the Create Table option allows the user to define data type parameters like Data Length and also whether the field will be Nullable or a Primary Key. In case there are problems creating the table read the warning messages generated for diagnosing what the problem could be.
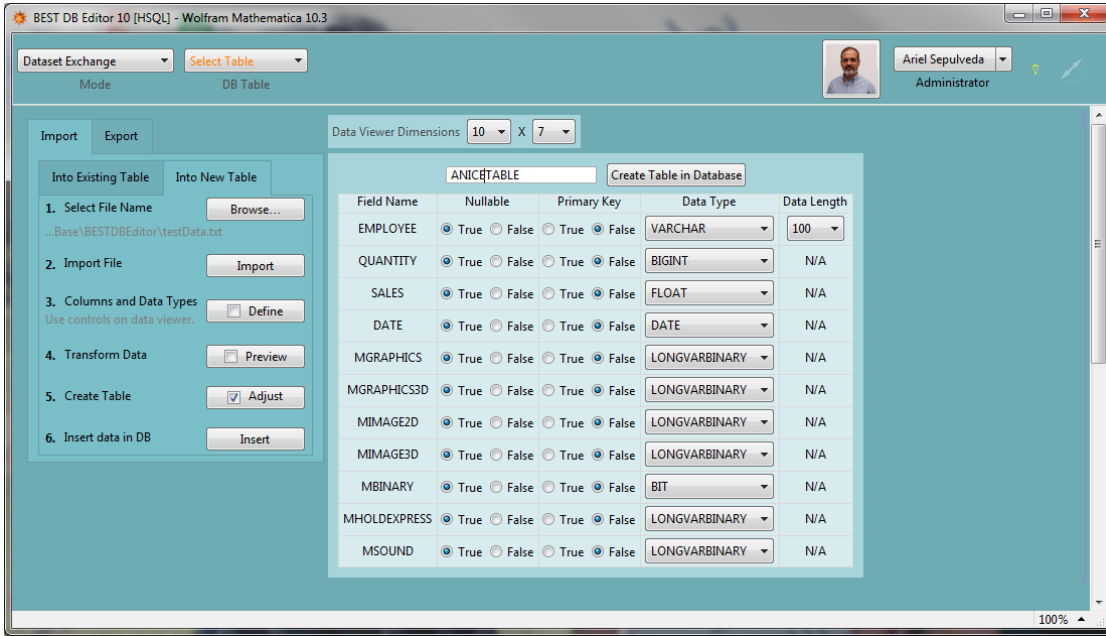
After all records are inserted in the database the table is ready to be edited as shown in the image below. Note that the field editor is not always correctly selected. **You should review all the field editors using the Field Preferences option.**
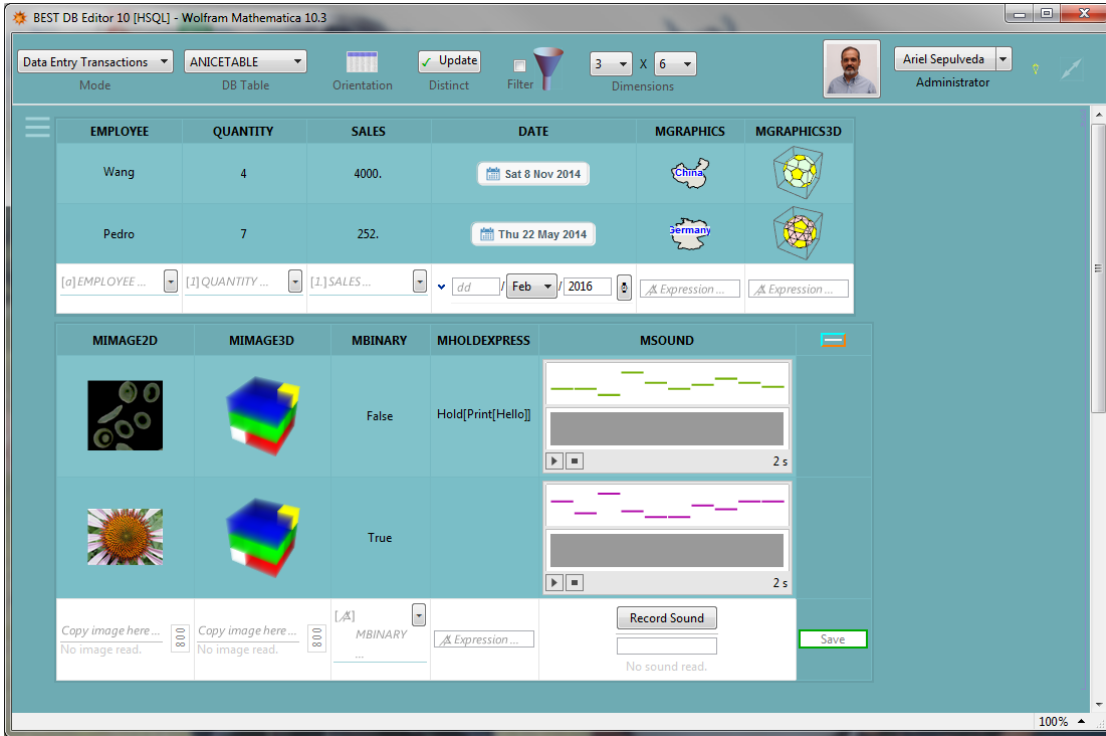
Graphics, Graphics3D, and other Expressions should be edited with the ExpressionEditor. Held expressions are edited with the HoldExpression editor and Images with ImageEditor.

This is how this table should look after the right editors are selected for each field.

Export

To export data simply select the table of interest and define a filter for the data to export as shown below.
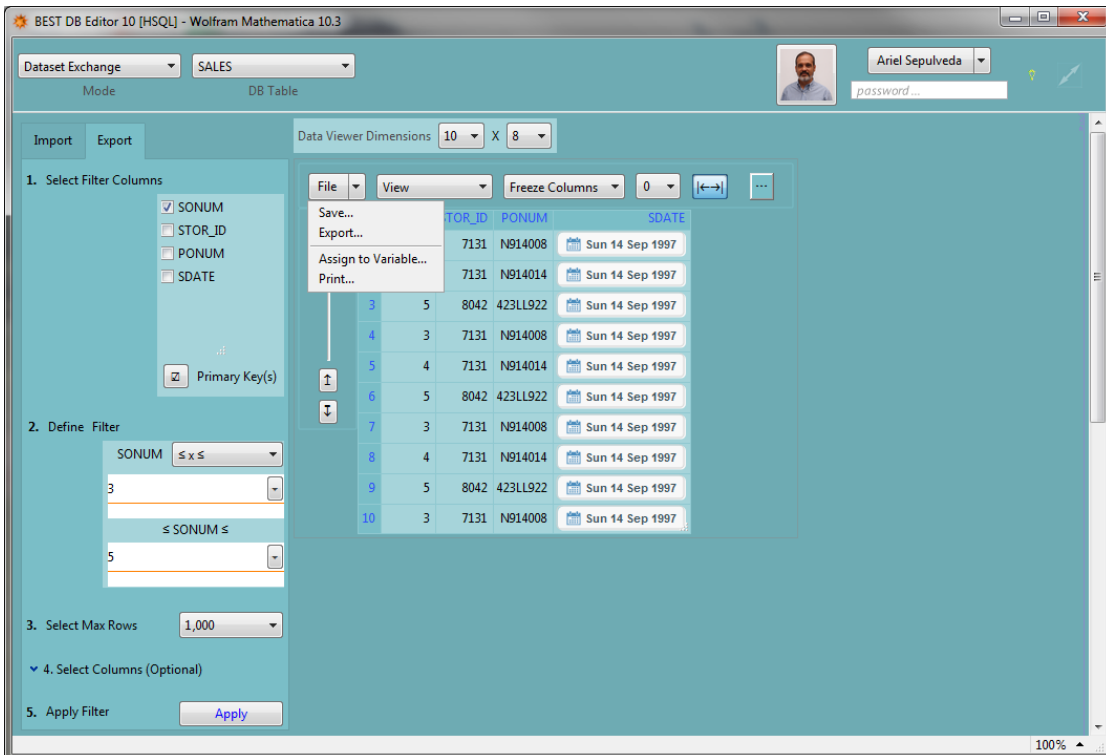
The File + Save option is used to name the exported dataset. The file extension determines the format used for exporting data. For example, using a name like myData.xls will generate a spreadsheet file in the folder shown in the Save button tooltip. Any extension supported by *Mathematica* can be used.
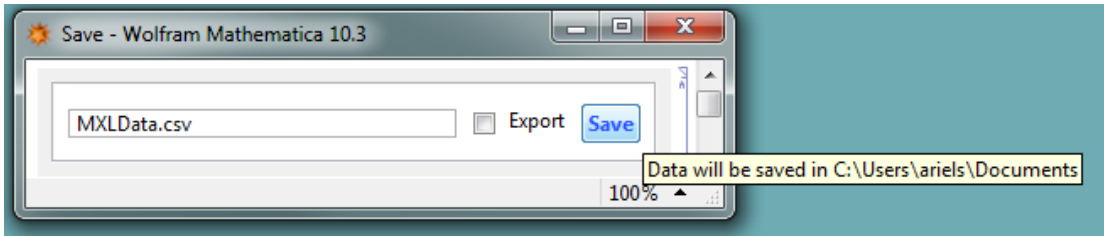
BEST DB Editor as a Wolfram Language Function

See the option "Use" for a demonstration of using *BEST* DB Editor as a Wolfram Language Function.

Limited Instances

BEST DB Editor can be used in limited ways like editing or updating tables only. This is documented in the "Use" option.