

Power*Architect User Guide

SQL Power Group Inc. [<http://www.sqlpower.ca/>]

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Chapter 1. Introduction

Data Architects, DBAs, Analysts and Designers rely on state-of-the-art Data Modeling Tools to facilitate and simplify their data Modeling efforts, while maximizing the use of their resources. The Power*Architect software allows these busy technical professionals to perform this most intricate part of their job in a fraction of the time.

SQL Power Group's Power*Architect is a visual data modeling tool which places an emphasis on speed and ease of use, and to the maximum extent possible, database platform independence. You are not required to declare up-front which platform you intend to eventually create your data model in, and in fact, the Architect makes it easy to maintain a database schema which works well in multiple database platforms simultaneously. This is a particular advantage for application developers who have to maintain a database schema for an application that works with several different backend database platforms.

Additionally, the Architect includes several features designed primarily for Data Warehouse and Data Mart design. It allows the designer to open multiple concurrent source Database connections, drag and drop source schemas, tables and columns into the data modeling playpen, and forward-engineer the resulting target database and its associated ETL template. The Architect keeps track of the original location each object was reverse-engineered from, and can produce a visual mapping report as well as a starter set of Extract, Transform, Load (ETL) procedures for use with the popular open source Kettle ETL tool from Pentaho.

The Power*Architect is a user-friendly DW data modeling tool created by data warehouse designers, and has many features geared specifically for the data warehouse architect, including:

- Access any JDBC- or ODBC-accessible source database;
- Design every aspect of the target database Data Model;
- Compare the database structure of any two databases, highlighting the structural differences and generating the required DDL to synchronize;
- Compare the Data Model data structures to an existing target database;
- Save a snapshot of all source systems' data structures in the project file, allowing data warehouse designers to evolve their target data model remotely;
- Forward engineer to Oracle, SQL Server, DB2, PostgreSQL, MySQL, and other databases;
- Produce ETL Templates containing source-to-target data mappings;

Whether you're building or maintaining your Data Warehouse data model, the Power*Architect will provide you a complete view of all required database structures and will expedite every aspect of your data warehouse design.

We firmly believe you can#Design your Data Warehouse in a fraction of the time with the Power*Architect.

In addition to all of the benefits outlined above, another key benefit of the Power*Architect is its licensing and distribution model. The Architect is free and open source software, meaning that the source code is readily available. Everyone is free to inspect, comment on, and modify the Architect's source code. Anyone who modifies the program code is invited (but not required) to contribute their changes back to the project. All contributions are subject to review and acceptance by the Power*Architect team, but we welcome contributions from the user community.

The key advantage here is that software which is developed by the actual users of that same software tends to be much easier and more fun to use, and to include the features that matter most to users.

Specifically, the Power*Architect is distributed to the public under the New BSD License. There is a large body of software already available under this license, so its terms are already well understood. Here is the license for the Power*Architect in its entirety:

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Basic Concepts

Project - a Power*Architect project consists of a view of multiple databases; you can load and save a Project to work on it at leisure.

Driver - Most programs need a distinct driver program to communicate with each different type of database. Power*Architect uses Java-based drivers, which normally come from the database vendor in the form of "JAR" ¹ files. You need to inform Power*Architect about each driver before you can use it; do this from the User Preferences panel, under JDBC Drivers (just click Add and browse to the Jar file for your driver). If you do not have the JDBC driver for a given database, you can usually obtain one from the database vendor. If that fails, you can find a directory of databases drivers on Sun's web site [<http://developers.sun.com/product/jdbc/drivers>]. There is also a permanent thread [<http://www.sqlpower.ca/forum/posts/list/401.page>] in the Architect's user support forum where users can share information about how to find and configure drivers for a particular database platform.

Playpen - This is the main area of the Power*Architect window, in which you manipulate tables and relationships. You can play here to your heart's content, knowing it will not be saved until you ask the program to save.

¹ Java Archive files; these are an extension to the file format used by PKZip/WinZip archives

Who this book is for

This book is a step-by-step guide on how to use the full capabilities of Power*Architect. It covers topics from how to install the Power*Architect through setting up database connections to engineering your data model.

We assume you are familiar with basic database terms. If you meet any terms that are unfamiliar, please refer to the Glossary at the end of this book.

This book also assumes you are familiar with basic computer operations.

We also assume you have SQL Power's Power*Architect software installed on your computer; if not, please refer to the Installation Guide below.

For the section on creating a Kettle job we assume that the reader has some basic knowledge about ETL. For more information about ETL look for *Building the Data Warehouse* by W. H. Inmon or *The Data Warehouse Toolkit: The Complete Dimensional Modeling* by Ralph Kimball and Margy Ross.

Chapter 2. Installation Guide

Power*Architect Prerequisites

To run the Power*Architect, you need a Java Runtime Environment (JRE). The Architect depends on Java 5, Standard Edition, or newer. A current JRE for common operating systems can be obtained from Sun Microsystems [<http://java.com/getjava/>]. To ensure that your JRE is up-to-date, if you are an Apple Macintosh user, you should use Software Update from the Apple Menu. If you are a Windows user, use the Java Updater (found in the Microsoft Windows Control Panel). If you use a different system such as Linux, Solaris, or BSD, you should use the normal procedures for obtaining and updating software packages on your platform (packages, ports, etc.).

How to Obtain the Power*Architect Software

The Power*Architect can be obtained from the download section [<http://download.sqlpower.ca/architect/current.html>] of the SQL Power [<http://www.sqlpower.ca/>] Website. You should only need to download one file, choosing the platform-appropriate distribution (Windows-Installer for Microsoft Windows, "DMG" for Apple Macintosh, and ".tar.gz" for other platforms). You should normally choose the download with the highest revision number available.

How to Install Power*Architect

Microsoft Windows

Double click on the Architect-setup-Windows-n.m.jar. This will launch the Microsoft Windows installer. Follow the on-screen instructions.

If you are using Windows Vista, you will need to right-click the jar file and run it with administrative privileges, since it needs to write to your Program Files directory and to modify the Windows registry (to create the project file associations).

Macintosh OS X

Double-click the architect-n.m.dmg file, then agree to the license. At this point, a new Finder window will appear with the Power*Architect icon hanging off of a rather fetching green mobile crane. Drag the Architect program icon off of the crane hook and into your Applications folder. Eject the disk image, then delete the dmg download file.

Other Platforms

Extract the Architect-generic-n.m.tar.gz package into the desired directory.

How to Run Power*Architect

Microsoft Windows

From the start menu, select All Programs. Then select the Power Architect program group. Finally, click on the Power Architect shortcut.

Macintosh OS X

From the Finder, select Applications, then select Power*Architect. To enable launching of the Architect directly from the Dock, either drag the program icon there or, while it is running, control-click on the Architect's dock icon and select Keep In Dock.

Other Platforms

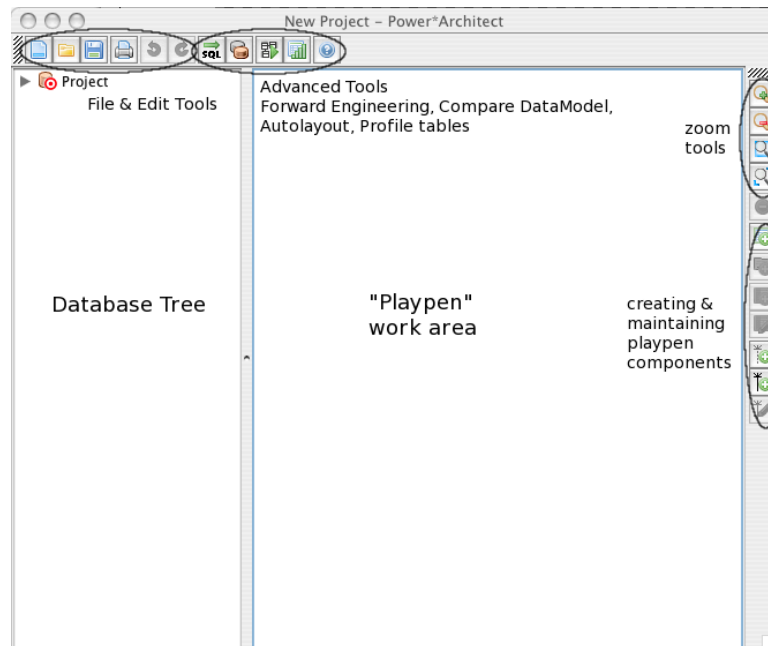
In the directory into which you extracted the Architect, run the command **java -jar architect.jar**. For larger projects, the default maximum amount of memory allowed by the Java runtime may not be enough. In that case, use a command such as **java -Xmx600m -jar architect.jar**, which increases the memory cap from the default 64MB to 600MB.

Alternatively, if your operating system has a visual filesystem browser, you may be able to launch the architect by clicking (or double-clicking) on the architect.jar file.

Chapter 3. How to Use the Power*Architect

Power*Architect User Interface

When you start the Power*Architect, you will see the Project window, shown below, which is the main view area and starting point for actions.



Database Tree - This is where you can add, maintain and explore imported connections. It uses a tree-node dropdown method. Therefore to explore inner components, you can expand components within this container as needed.

Playpen - This is the main area of the window, in which you manipulate tables and relationships. You can play here to your heart's content, knowing it will not be saved until you ask the program to save.

Playpen Components - These are the components that can go into the playpen. The playpen components are Tables and Relationships.

Zoom Tools - These tools allow you to control the magnification level of components display. There are four zoom tools. In order from top to bottom, their functions are: Zoom in, zoom out, reset zoom level default, and zoom to fit entire diagram.

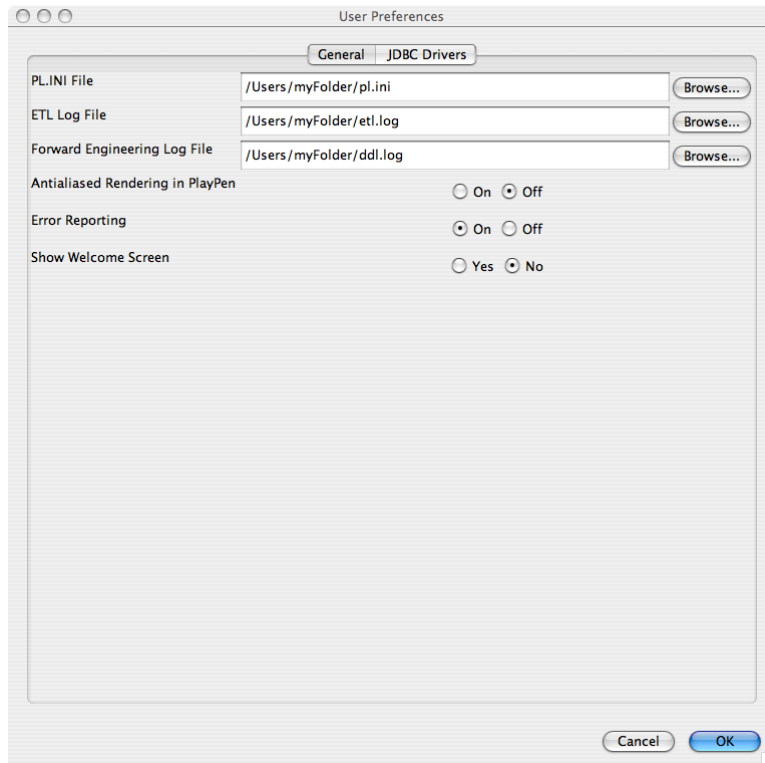
Delete - Deletes the selected component or components.

Create/Maintain Playpen Components - This is discussed in [Using Components](#) below.

Setting the User Preferences

When getting started, you need to set up some files and drivers to use the full functionality of the Power*Architect. If you have not done so already, please go to "User Preferences" under the File Menu (on

Mac OS X, this is found under the application menu) to configure the Power*Architect. The preferences dialog (shown below) will appear.



The pl.ini file stores the settings for database connections that you set up (see the JDBC Drivers section later in this chapter). If you leave this location blank, the Architect program will prompt you to use a default location when you start it up. If you have a pl.ini file from other SQL Power applications you should generally use the same file, because doing so will save you from having to re-enter all of your database connection information. The next two settings are for log files that will be written when you use the ETL and Forward Engineering functions of the application.

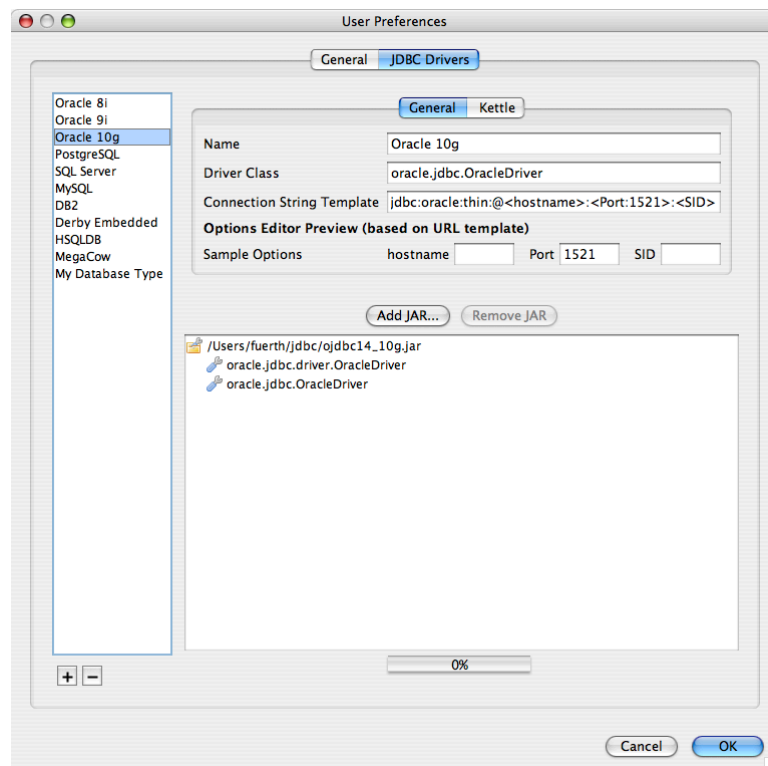
The next setting controls the operations of graphics in the PlayPen. Turning on "antialiased rendering" provides better display of the graphical database layouts shown in the PlayPen, especially when zoomed out, but may cause slower performance on some systems. We recommend that you turn it on unless you experience poor performance as a result.

The error reporting setting can be turned on to send SQL Power error reports when they occur. Error reports never include any information that could be used to identify you, nor do they include any information that could be used to deduce the contents or subject matter of your project. They simply include a Java stack trace that tells developers where in the program code the Architect encountered a failure, as well as generic information such as the version of your Java Runtime Environment, the amount of RAM the Architect is currently using, and so on. These automatic error reports help the Power*Architect development team prioritize bug fixes based on the estimated number of times a particular problem has been encountered.

The last setting, Show Welcome Screen, controls whether or not the welcome screen appears when the Power*Architect starts up.

Setting up the Architect for different database types

The Power*Architect comes pre-configured to work with several database platforms out-of-the-box. If you plan to use the Architect with Microsoft SQL Server 2000 or newer, any version of PostgreSQL, or any version of MySQL, you can safely skip this section. However, if you plan to use the Architect with another type of database, you will have to do a bit more work.



It is important to realize that this section describes the procedure for defining the general rules for how to connect to any database server of a particular type. At this point, you are not defining a connection to a specific database server.

The information about database types includes:

- The name you want to give the database type (for instance, PostgreSQL or SQL Server)
- Where to find the JDBC driver
- Which driver class within the JDBC driver JAR file to use
- The general format of a JDBC URL for this database type

If you need to configure a database type, there are two possibilities: First, if your database type is already present in the list of database types along the left-hand side of the dialog, you are in luck! All you need to do is tell the Architect the location of the JDBC driver. In that case, skip to the section Setting the JDBC Driver Location below. On the other hand, if your database platform is not listed on the left-hand side, you will need to define a new database type from scratch.

Defining a new Database Type

Start by clicking the + button near the lower left-hand corner of the dialog. This will create a new, blank entry in the list. From here, you simply need to fill in the fields as described below.

- The "Name" field is used to assign a name to the item in the list. These names will also be used to assign a type to a new connection that you are defining.
- The "Driver Class" field is the class name of the driver. This class will be contained within one of the JAR files you specified for this location.
- The "Connection String Template" field is used to define a URL template. The URL template is used by the Power*Architect to create a URL that is used to attempt a database connection. The pattern that the string must conform to is not trivial but is made up of two simpler parts, literals and variables.

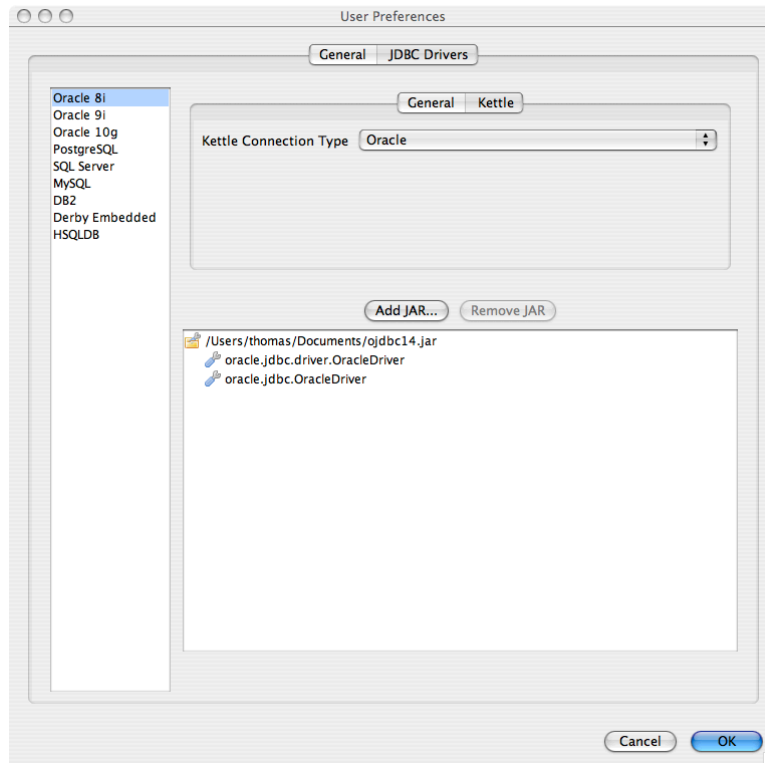
Literals are entered like normal text but may not contain angle brackets (< or >) because they are reserved for defining variables. As their name implies, literals appear in the URL in the same position and way they appear in the template.

Variables are used to make it easier for things that change often to be changed, such as the schema or database name you wish to connect to. They are defined in the template by <variable_name>:default_value>. Once a variable is defined in the template, a field labeled with the variable's name will appear below with the default value in it just below the template as a preview to what you will later be able to modify in "Connection Properties".

Note: Default values are often useful, but are optional. If you do not want a variable to have a default value, define it as <variable_name>. The default value for these variables is blank.

For example, if we wanted to connect to a Microsoft SQL Server database, the URL template might look like "jdbc:sqlserver://<Hostname>:<Port:1433>". The URL this template will output is "jdbc:sqlserver://:1433" where the 1433 was a default value. If we were to enter "localhost" in the Hostname field, we would get the URL "jdbc:sqlserver://localhost:1433". By defining the "Hostname" variable, we make it easier and quicker to connect to a generic SQL Server instance. SQL Server databases listen to port 1433 by default but can be configured to listen to others so, by giving the variable this default, we can have the most common value inserted automatically while allowing us to modify what is in the field to change the port in specific cases.

- If you click on the "Kettle" tab, there will be a drop-down menu where you can specify the type of Kettle connection to associate with the selected item. If you do not use Kettle, do not worry about this setting because it is only necessary when you wish to create a Kettle ETL jobs.



You're almost done! All that is left to do is tell the Architect where to find the JDBC driver for your database platform.

Locating the JDBC Driver

Whether you have just configured the Architect for a new database platform, or you are using one of the pre-configured platforms, the last step in setting up a database type is to locate the JAR file (or files) that contain the means for connecting to your database platform.

Nearly all database platforms we have encountered provide drivers that are fully backward compatible, meaning that it is always best to use the newest driver available regardless of the software version on the specific database server you intend to connect to. The Oracle database is one exception. It is important to match the major version number of your JDBC driver with the major version number of the Oracle database server you connect to. For example, if you are connecting to an Oracle 10g database, use the latest Oracle 10g driver. If you are connecting to an Oracle 9i database, you have to use the Oracle 9i driver. For this reason, the Architect comes pre-configured with three database types for Oracle, representing the three major versions still in regular use.

Download the JDBC driver for your database platform from the database vendor. Save this file (it will usually be one or more JAR files) in a safe and permanent location so that you will not be tempted to relocate it later on. For example, your Desktop is not an ideal location. A good strategy is to create a "JDBC" folder under your Documents folder and collect all of your JDBC driver JAR files there.

With the JDBC driver JAR file in a permanent location, click the **Add JAR...** button. Locate the JAR file in the file chooser and open it. If there is a valid driver class in it, a file tree will appear in the area below the buttons. This is a representation of the JAR file and the JDBC driver classes it contains. Select the driver you wish to use and click the "OK" button at the bottom.

A Basic Example

This section will show you how to set up ¹ a simple database "from scratch", just to get you started using the tools, without modifying any live data. If you follow the example literally, you will create a trivial "customer and orders database".

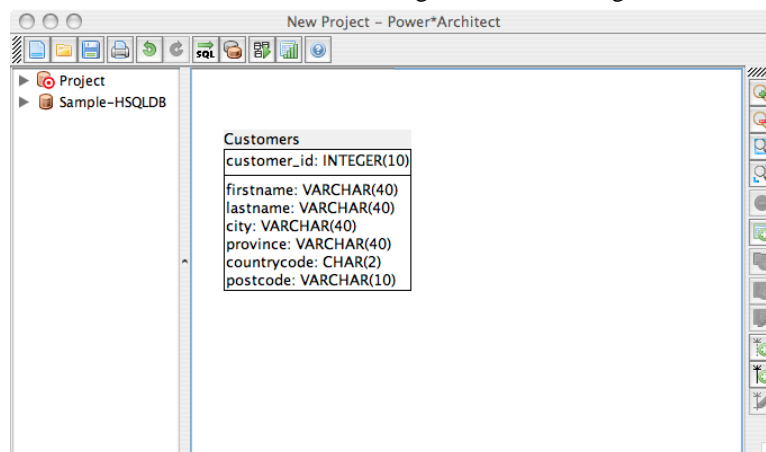
Setting Up Databases

1. Setup Driver. Select File->User Preferences and select the JDBC Drivers tab. Select the database connection type you wish to use from the list on the left. If there is already a driver for the connection type you wish to use, click OK and go on to the next step. Otherwise, click the Add button, navigate to where you have the driver Jar file installed, and click OK.
2. Create a Connection. In the Database Tree section of the main window, right click and choose Add Source Connection->New Connection. For this example you can use a name like SampleDB, for both the Connection Name and the Database name (these names do not have to be the same, but we'll keep them the same for simplicity). If you select the JDBC Driver before you type the database name, then as you type the Database name, it will be added to the DB URL, so you don't have to type it an extra time. Fill in all the fields and click OK.

Designing a Database

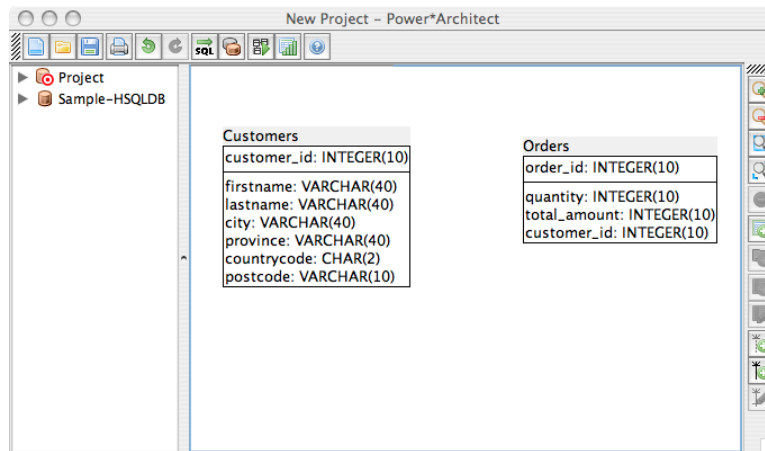
You are now ready to design some tables. For this example, we will create the Customer and Orders table shown here.

1. Click on the New Table icon at the right side. The cursor will change to a crosshair. Move the cursor near the left of the Playpen area, and click. A "New Table" will appear.
2. Double click on the title, and the Table Properties Dialog will appear. Rename this table to Customers.
3. Click on the Insert Column icon, and a "New Column" will appear. When the new column is created a property window will appear for it. Rename the column to customer_id and make it part of the primary key.
4. Insert additional columns for Firstname, Lastname, Address, City, Province, Country Code ² and Postal Code. The table should look something like the following:

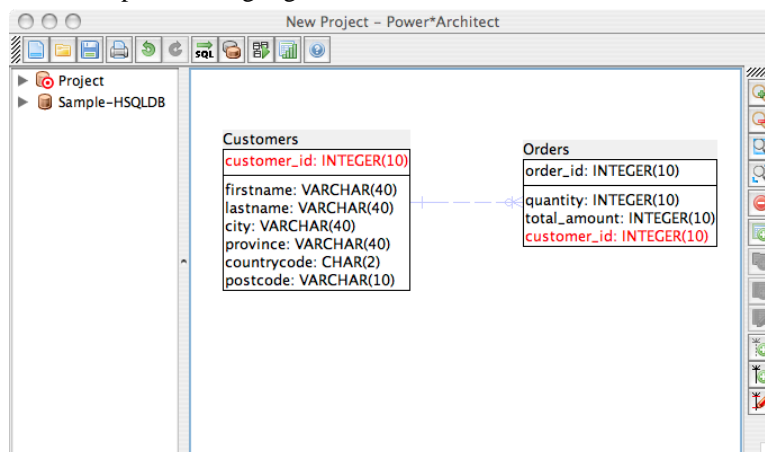


¹ Assumes you have used some vendor-specific external tool to create a new database.

5. Create a second table, and name it Orders.
6. Create columns named order_id (in the primary key), Quantity, Total Amount, and customer_id. Your project should now look something like the following:

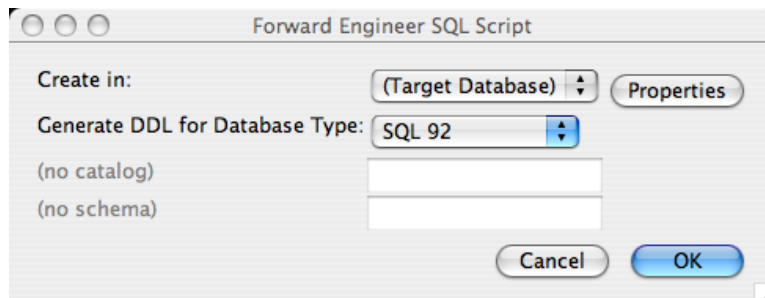


7. We need a relationship between these tables. An order should have a foreign key that refers to the customer. Click the "New Non-Identifying Relationship" icon. Select the Customers table, then the Orders table, and a link will be drawn as shown. Click on this link and the keys that take part in the relationship will be highlighted in red.

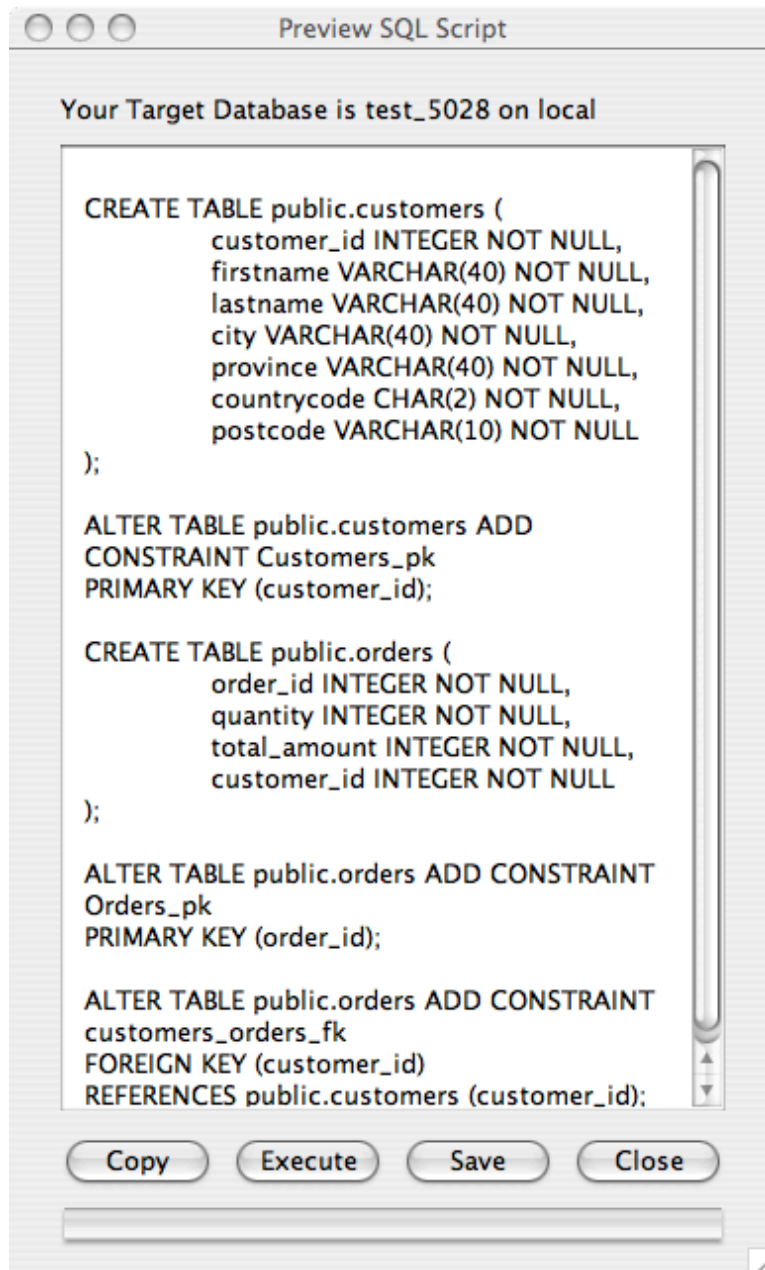


Forward Engineer

1. If you're happy with the database layout (you can always change it later), it's time to create the database. Click on the Forward Engineer button. You should see a window similar to the following:



2. Set the "Create in" database to be the source connection we defined earlier. Set the database type to be the type that was set in the user preferences. Fill in the remaining fields based on the database type that was selected and press ok. You should see a window similar to:



3. If this looks plausible, click Execute, and the tables and their relationship will be created. Congratulations! You have now created a simple database using the visual tools in Power*Architect.

Comparing Data Models

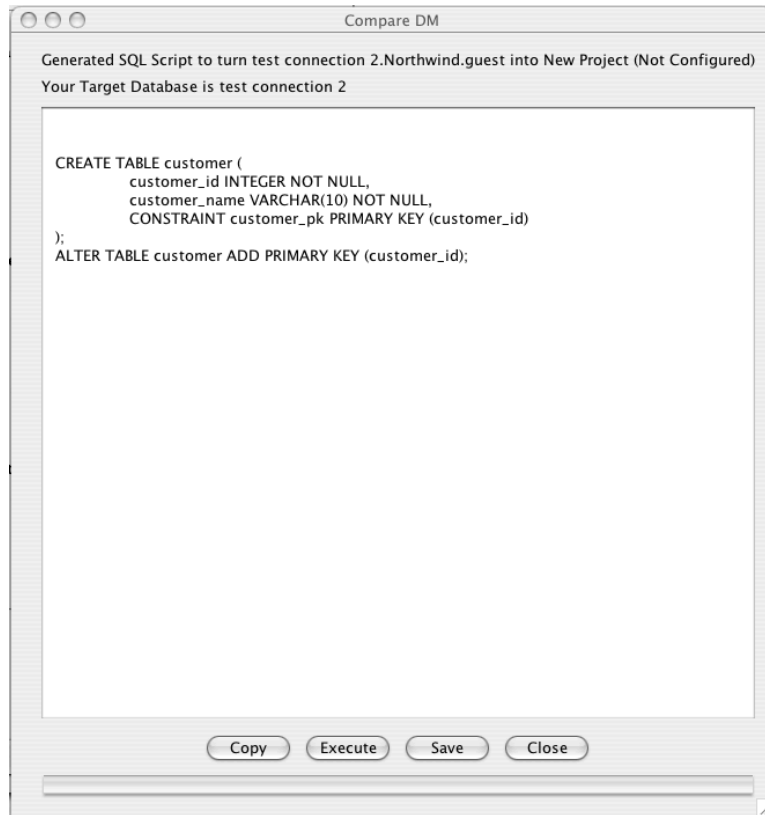
Suppose that after using this database, you realize that there should be a "shipping amount" field in the Order table (we never promised this would be completely realistic example).

1. Select the Order table by clicking on its title.

2. Click the Insert Column field and, as before, rename the New Column, this time to Shipping_Amount. Change its type to Decimal(10,2).
3. Now we need to compare two different Data Models, the original database and the current project. Click the Compare DM icon. Set the "Older" to Physical Database SampleDB (you may need to change the Schema to Public). Set the "Newer" to "Current Project" (since it is now newer than the database you created in Step 6). Set the output format to SQL.

The screenshot shows the 'Compare Data Models' dialog box. It is divided into three main sections: 'Compare Older', 'With Newer', and 'Output Format'.
- In the 'Compare Older' section, the 'Physical Database' radio button is selected. Below it, the database dropdown is set to 'Sample-HSQLDB' and the schema dropdown is set to 'PUBLIC'. There is a 'New...' button next to the schema dropdown.
- In the 'With Newer' section, the 'Current Project [example]' radio button is selected. Below it, there are dropdowns for 'Catalog' and 'Schema', both currently showing '(Choose a Connection)'. There is a 'New...' button next to the 'Schema' dropdown.
- In the 'Output Format' section, the 'SQL for SQL 92' radio button is selected. Below it are two unchecked options: 'English descriptions' and 'Suppress similarities'.
- At the bottom right, there are 'Start' and 'Cancel' buttons. The 'Start' button is highlighted in blue.

4. Click Start. You should see the SQL Preview window again, but this time with just an ADD for the column you just added:



5. Click Execute, and the new column will be added to your database table.

When you exit the program, it will ask to save your project. Since you might want to alter this in future, to experiment with some of the other tools without damaging any live data, you may wish to save the Project file.

The remainder of this document provides a more comprehensive explanation of the various functions that Power*Architect offers.

Using Diagram Components

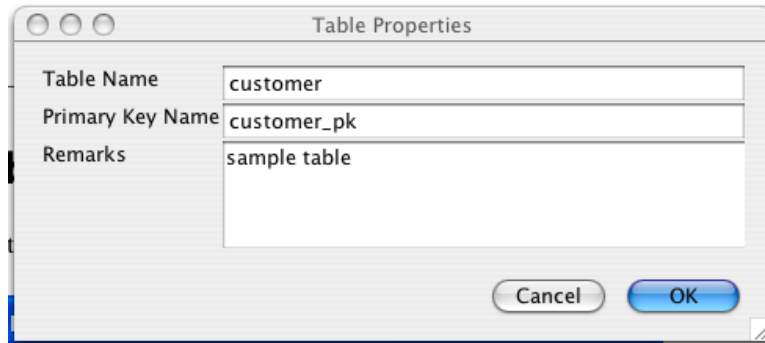
Creating New Tables



There are several ways to create new tables in Power*Architect. The first way is to click on the New Table Icon on the sidebar menu. The cursor turns into a "+" cursor indicating the mode change. Simply click on the playpen on the spot you desire to place the new table at. The second method to create a table is to right click on the playpen and select the "New Table" option. A newly created table will then be placed at the point of the right click. A third way is to type the letter T with the mouse over the playpen.

Editing Tables

To edit a table, right click on the table title and select "Table Properties". This pops up the Table Properties dialog.



In this dialog, you can:

- Change the name of the table
- Rename the primary key section of the table
- Add comments/notes about the table

Creating New Columns

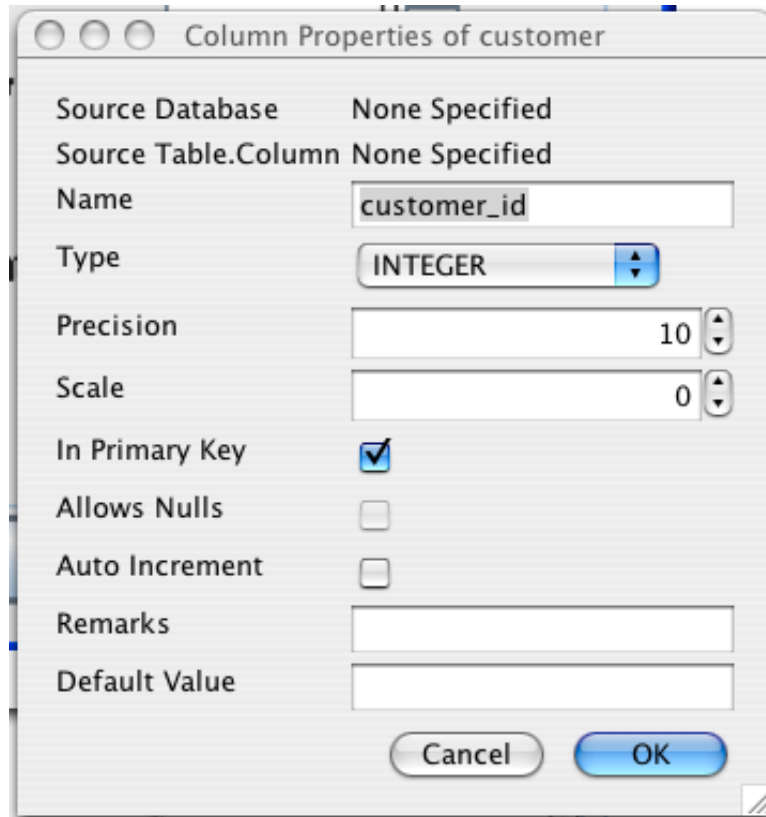


First select the table the new column will be placed in. Click on the "Insert Column" button and a column is created in the selected table. Another way to add a new column is to right click on a table and select the "New Column" option. The new column will be added to the table below the selected column. It will be placed at the bottom of the table if no columns are selected. If a table has existing columns in the primary key and you wish to create new columns within the primary key, select a column that is already in the desired primary key and then create a new column. The newly created column will be placed within the primary key as well.

Editing Columns



Select the desired column, right click and select "Column Properties...". The Edit Column Properties dialog pops up. Or you can select the column and click the "Edit Column" button on the Playpen toolbar.



In this dialog, you can:

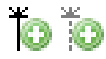


- Rename the column
- Change the type of data the column holds
- Set the precision of the data
- Set the scale
- Indicate if the column is in the primary key or not
- Indicate if the column should handle null information or not
- Indicate if auto increment is allowed or not
- Add additional comments about the column
- Set a default value for the column

A special feature of the Power*Architect is that if a column originated from a database, the Power*Architect is able to remember the database and table it originated from.

Dragging Columns

The Power*Architect allows you to drag columns within a table's key and from table to table freely. Simply select the desired columns and drag them into the desired destination. For now, only one column can be moved at a time.

Creating Non-Identifying and Identifying Relationships

 To create a relationship, select the desired type of relationship on the Playpen ToolBar. The non-identifying relationship icon is  (keyboard shortcut is shift+R). The identifying relationship icon is  (shortcut key is R). The cursor changes to the "+" cursor to indicate the mode change. First click on the parent table and then click on the child table. Once this has been done, the relationship will be created, and will appear as a link between the two tables.

If a column in the child table shares the name of the primary key of the parent table, the relationship will map to the existing column in the child

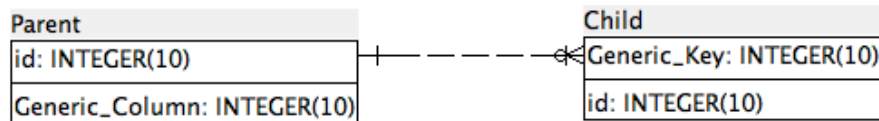
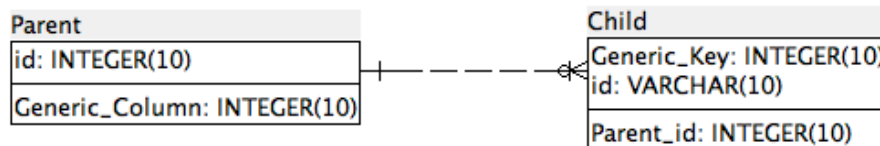



table.

If a column exists in the child table that has the same name as the primary key in the parent table but a different data type a new column will be created.



Editing a Relationship

 Right click on the relationship you wish to edit. Choose the "Relationship Properties" options. This can also be done by selecting the relationship and clicking on the relationship properties button. In both cases, the Relationship Properties dialog will appear.

In this dialog, you can:

- Rename the relationship
- Choose the relationship type
- Change the primary key end cardinality
- Change the foreign key end cardinality

Selecting Multiple Items in the Playpen

There are two ways to select multiple items in the playpen. One way is to hold down the shift key or the ctrl key as more items are being selected. The alternative method is to use the selection box.

Relocating Objects in the Playpen

The Power*Architect allows diagram objects to move around freely in the playpen. To do so, first select the items you want to move in the Playpen. Click and hold on one of the selected item and drag the items to a desired spot on the playpen.

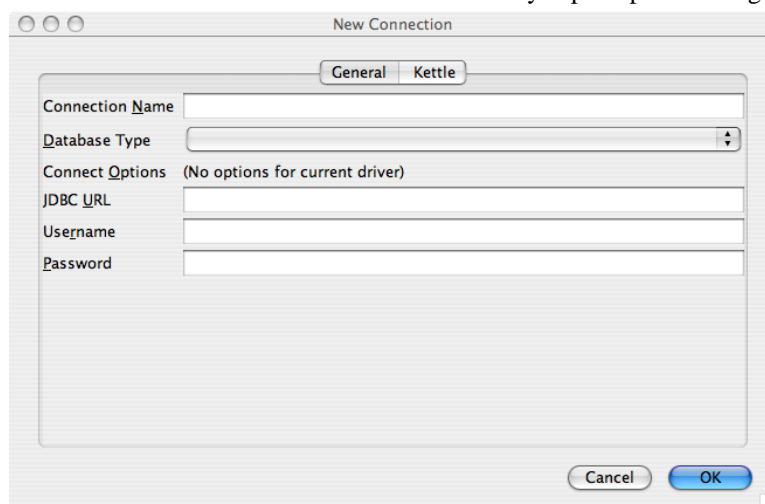
Deleting Diagram Components

Select the desired diagram components on the playpen and click on the delete items button on the Playpen Toolbar. It is also possible to delete the selected items by right clicking on one of the components and selecting "Delete Selected" or simply pressing the delete keys with the unwanted items selected.

Database Usage in Power*Architect

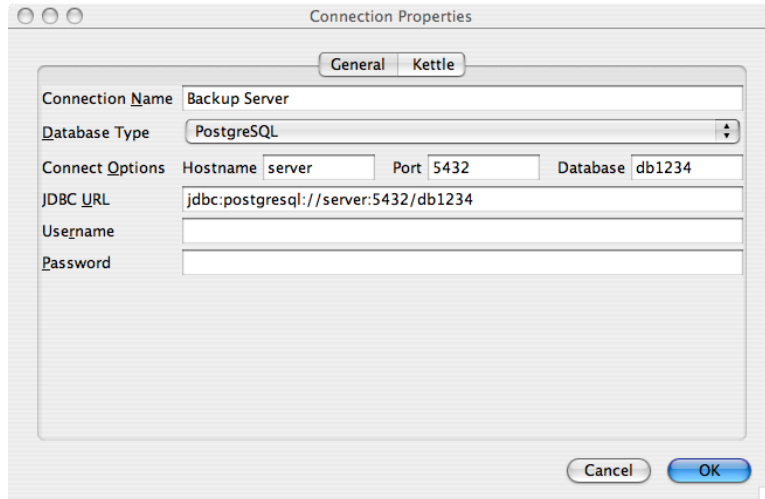
Adding a New Connection to the Power*Architect

To add a new connection, go to "Add Connections" under "Connections" menu and select "New Connection..". The other method is to right click a white space on the Database Tree and select "New Connection" under "Add Connections". Both ways open up this dialog:



You must know which type of database you wish to use before you can connect to a database. When you have selected the database type, the Connect Options will change to allow you to enter the particular

parameters that the given database driver needs. If you are using one of the fully-supported drivers, then as you enter these parameters, they will be added into the "JDBC URL" field in the order that the Java driver expects to see them (this string is sometimes called a "db URL" in Java terminology). In the example below, we've selected the PostgreSQL driver and entered the hostname and database name (the "port number" was already filled in; do not change this unless the database server software has been reconfigured to use a different value).



When you are finished, press the OK button. Any new connection will automatically be added in the user-preference.

Adding an Existing Connection

Right click on empty space in the Database Tree and go to "Add Connection" to see a list of all database connections that were previously stored on the Architect.

Editing Database Connection Properties

Select the database connection you wish to change and go to "Connections" menu and select the option "Connection Properties.." which leads you to the Connection Setting dialog. An alternate solution is to right click on the database and select "Connection Properties..." option.












Removing a Database Connection

Select the database connection you wish to change and go to "Connections" and select the option "Remove Connection". Right clicking on the database connection and selecting "Remove Connection" will perform the same action. Connections can only be removed if they are not being used as sources in the play pen.

Navigating through the Database Tree

The Database Tree works like a tree-dropdown model. Clicking on any item will cause the component to expand display the items under that specific component. Each item will have a unique icon beside its name to identify the type of object it is. The table below shows what each icon means:

Table 3.1. Database Tree Icons

Icon	Representation
	Database
	Catalog
	Schema
	Owner
	Table
	Column
	Exported Key
	Imported Key
	Index
	Index Key
	Unique Index

Moving Items from the Database Tree

To copy items from the Database Tree to the playpen, simply select the desired items in the tree and drag them onto the playpen. Depending on the size of the items dragged onto the playpen, it will take some time to load.

Undo and Redo

Like most modern application software, the Architect keeps track of your actions and allows you to undo them at a later time. Currently, the 100 most recent actions you have performed in the Architect are remembered and can be undone in sequence. If you undo too far back, you can redo any of the actions you have just undone. Be careful, however: After undoing one or more actions, once you make a new change, your redo history will be lost.

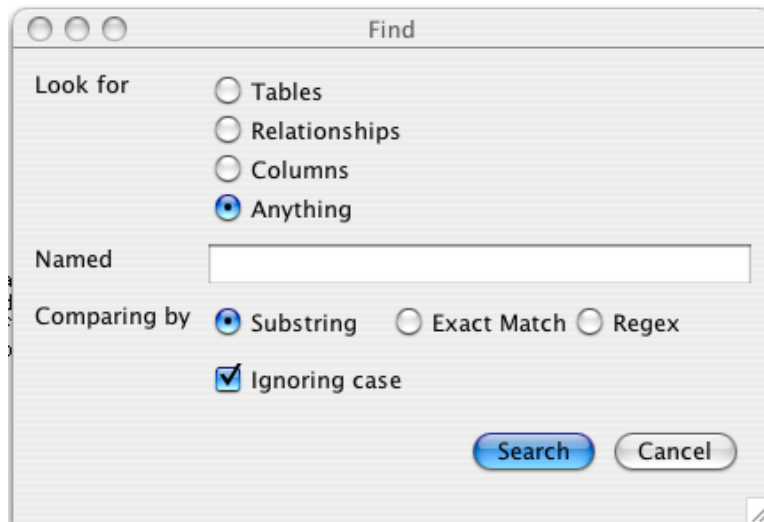
The undo and redo features can be accessed from the Edit menu, or by their keyboard shortcuts of Control-Z and Control-Y respectively (on Mac OS X, use the Command key instead of Control).

Find/Replace Function

What It Does

This function searches the playpen for any relevant matches within the search constraints and displays the resulting matches. If matches are found, you can have them selected in the playpen. This operation will

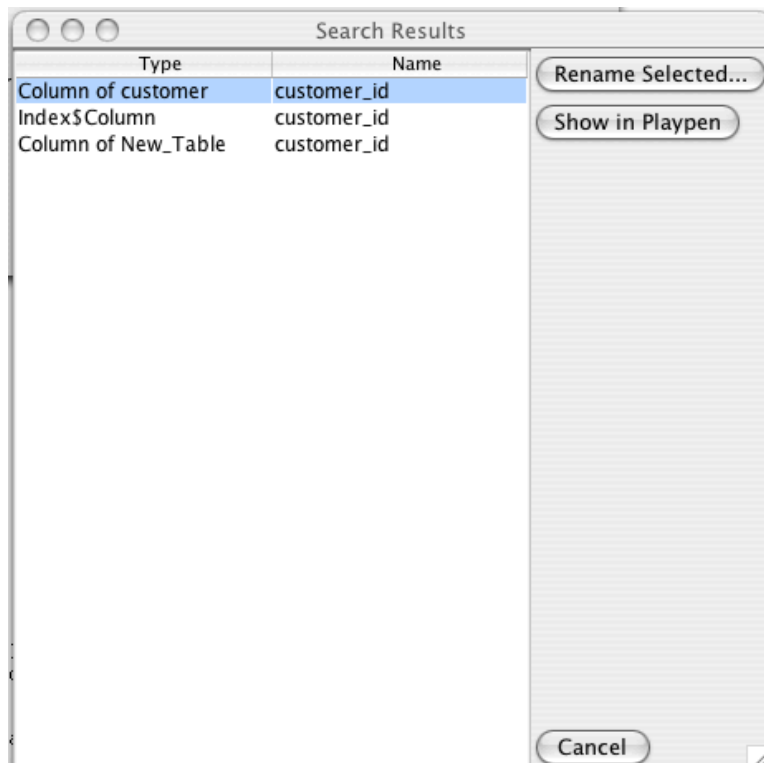
also scroll the playpen to ensure the selected item is visible on the screen. This is particularly useful with large data models that do not fit on the screen all at once.



How to Use Find / Replace Function:

Go to "Edit" under the menu bar and click on Find/Replace option. This shows the Find/Replace function. In this window, enter the search constraints and press "OK" when you are finished. This will popup a new window with your search result in a chart format.

You can rename the component by selecting the column in the list and clicking on "Rename Component". You can also have Power*Architect focus on a certain component by selecting the component in the list and press the "Show in Playpen" button.



Forward Engineering and Compare Data Model


These two functions are similar; they both involve using the PlayPen (usually) and generating SQL. The Forward Engineer function always creates a SQL script to generate a database identical with the complete current project (current PlayPen contents). The Compare DM function can output either an English-language description or a SQL script describing the differences between two databases, or stored projects, or one of these and the PlayPen.

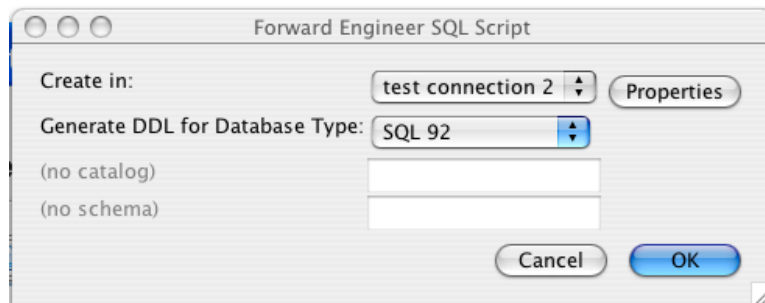
Forward Engineering

What It Does

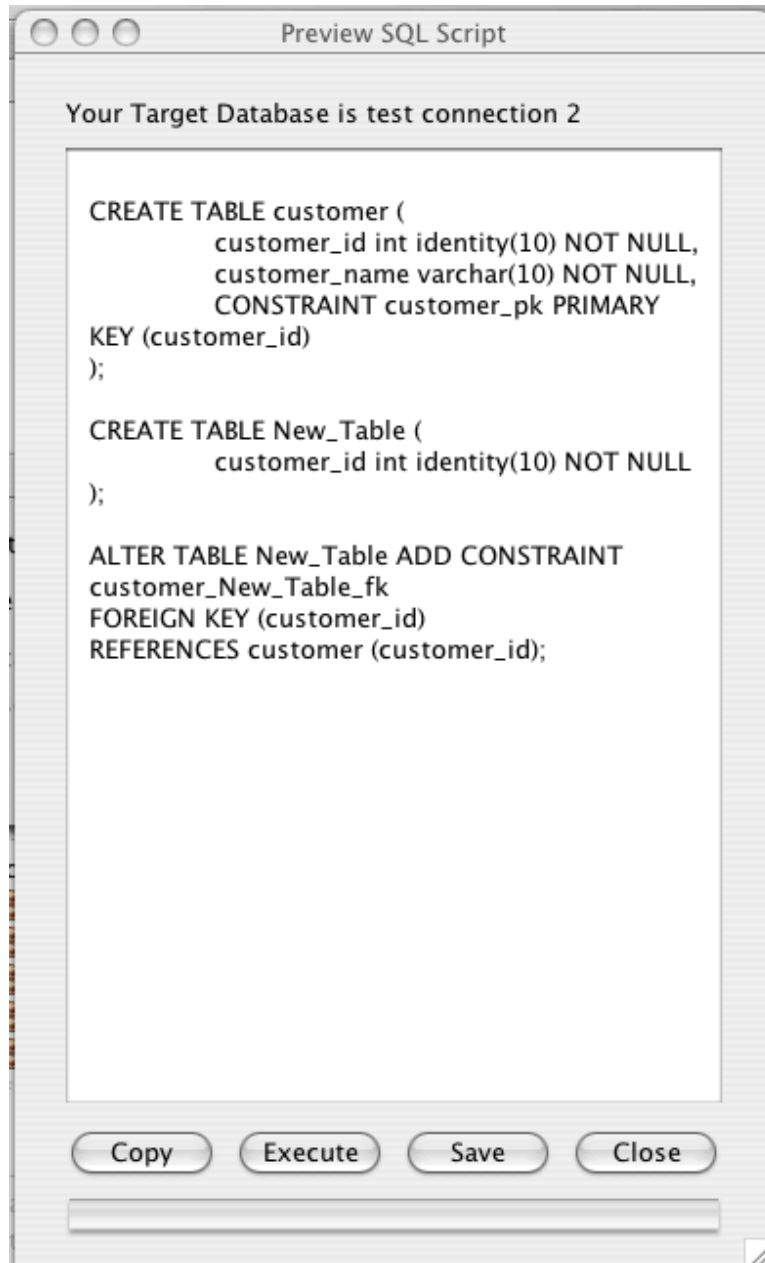
Forward Engineering creates a SQL Script that can be run to update or put the components of the current Playpen into a database

How To Use Forward Engineering

 **SQL** First set the target connection to the database you want the changes to be made in. Then go to "Tools" and click "Forward Engineering". Another way is to press the "Forward Engineering" button at the top. This pops up a dialog that looks similar to the one below:



Fill in the fields as necessary and hit "OK" when you are done. Depending on the situation, a dialog warning you of possible side-effects of creating the script may pop up. Finally a script that would create data structure currently in the Playpen will be displayed. It is the same dialog used in CompareDataModel-Part 2- In SQL Script.




Compare Data Model Function

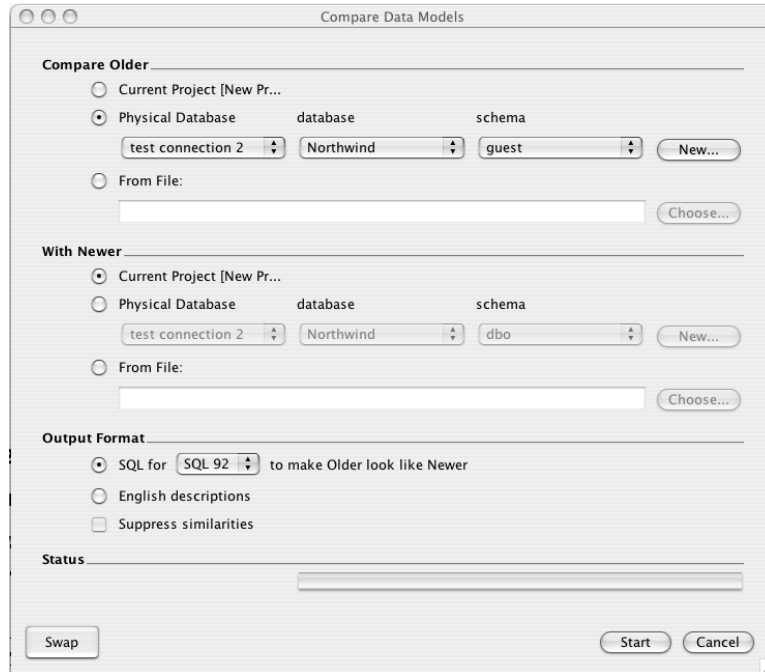
What It Does

The Compare DataModel Function takes two databases or Power*Architect projects (or one of each) or the current PlayPen, and compares and contrasts the structure of the two database/projects.

How to use Compare Data Model Function:

Part 1

 To start the Compare Data Model Function, either go to "Tools" and click "Compare Data Model" or just click the "Compare Data Model" icon on the project toolbar. This will bring up the main Compare Data Model window. Here select the source and target models you want to compare and contrast. You can choose either the current playpen, an existing database or select a saved project file function. If one of or both the source and the target has invalid models, the start button will not enable. The similarities and differences can be displayed either in SQL Script language or in English.



Part 2

English Descriptions

If this option is selected, a side-by-side document will be displayed stating the similarities and differences of the source and target in plain English. If the "Suppress Similarities" checkbox is selected then similarities will not be shown and only the differences will be displayed. The left text gives English descriptions to make the source database look like the target database. In addition to the text, they are also colour coded. You can copy the text to the clipboard by pressing the copy button, or save the results to a text file. The table below explains what each colour means.

Table 3.2. Compare Database Model Colour Codes

Colour	Explanation of the Colour Code
Black	This component exists in both databases
Green	This component only exists in this database but not the other
Red	This component does not exist on this database but exists on the other
Blue	This component is a column and is on different keys in the two databases

In SQL Script

If this option is chosen, this will produce a SQL Script in the SQL dialect chosen in Step 1 to make the source database look like the target database. You can either copy the results to the clipboard, or save the results in a text file. If the source has a valid connection database, the Execute button will enable and you can directly execute the changes. If the source does not have a valid connection, the execute button is disabled.

Auto-layout

What It Does

The auto-layout feature automatically rearranges the selected tables (all tables if none are selected) in an organized manner. It is also fun to watch.

How to Use Auto-layout



Select the tables on the playpen that you want to organize and hit the auto-layout button at the top. If one or zero tables are selected, the program will auto-layout every table in the playpen. Note that the layout algorithm may produce a few surprises when run with a small number of tables; it works best for a large or medium-sized collection of tables.

SQLRunner

What It Does

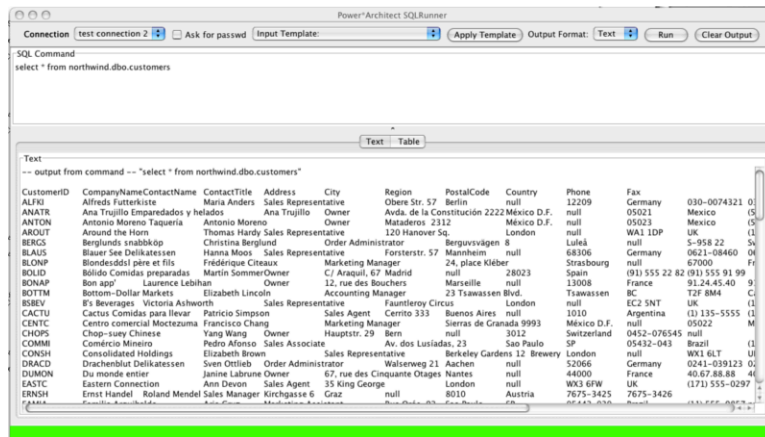
SQLRunner is a "fall-back" tool that lets you work at the raw SQL command level. This is an advanced topic and should only be used by (or made available to) those familiar with the intricacies of SQL commands and the details of your database; like a sharp knife, this tool is very useful in the hands of a skilled chef, but a slip of the fingers here can be quite messy...

SQLRunner was written by Ian Darwin, and is distributed under a liberal free-software, open-source license which permits its inclusion in programs such as Power*Architect.

How to Use SQLRunner

SQLRunner is started from the menu entry under the Tools menu, and begins with the GUI window shown below. The first thing you should do is select which database connection you wish to use. The list of Connections is the same as the main program uses, as set up in the JDBC Connections window.

The basic steps to using SQLRunner are to type a command in the top (SQL Command) window and click the Run button; the results are displayed in the bottom (SQL Results) window. To save you some typing, there is a "Statement Template" mechanism that will insert a template for SELECT, INSERT or UPDATE SQL statements (just select the template you want and click "Apply Template" and the template will replace the current Input Statement.



The command can actually be one of two kinds: either one of a half-dozen escape commands listed below, or, anything that is valid input to your database's command interface (e.g., programs such as psql or Oracle SQL*Plus™).

Table 3.3. SQLRunner Escape Characters

Escape Sequence	Action
\dt	Describe list of all tables
\dtT	Describe column names of table named T
\dmX	Set the mode, where X is the first letter of the mode (t for text, s for SQL, h for HTML or x for XML; not needed in the embedded version because the GUI has a control for this)
\oF	Send output to the given file instead of the screen (though you can usually just view the output and copy-and-paste to save parts of it into a file; does not work in GUI versions).
\q	Exit the program (not supported in embedded versions).

SQL Statements are entered one at a time, can be more than one line long, and need not end with a semicolon. These statements are not interpreted by SQLRunner itself, so anything that the given database and driver accepts can be used. For example, with Oracle™, you can use PL*SQL™ statements. With most drivers you should be able to use stored procedures. Each SQL statement is executed in its own transaction context, that is, changes are committed immediately (so be careful!).

Output (Results) Window

Command Output in the chosen format (see below) appears in the SQL Output window. A scrollbar will appear if the information cannot all be seen at once.

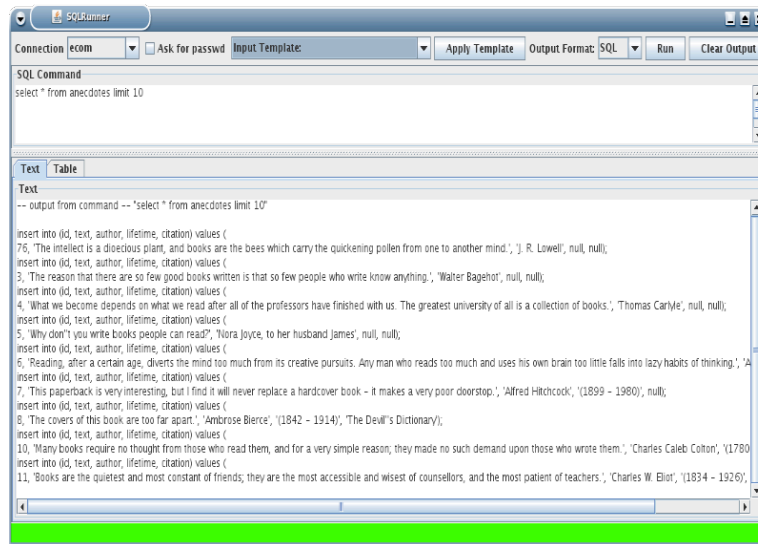
A visual indication of the success or failure of the command is displayed below the output: green for success, red for failure. As well, failures will be accompanied by a pop-up window containing details on the failure.

The Clear Output button clears the contents of the output window.

Output Formats

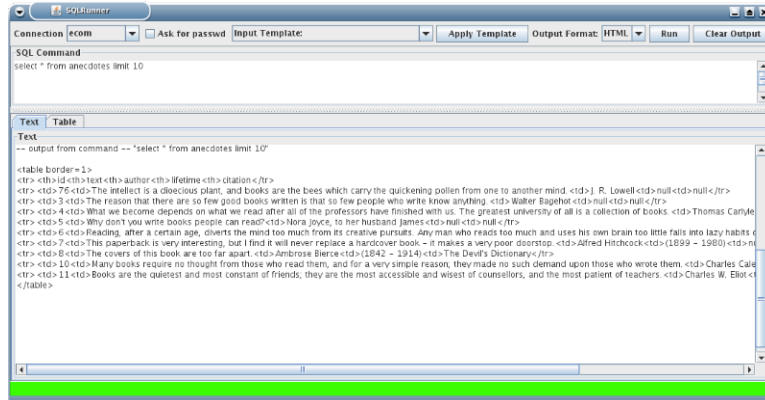
There are several output modes for the display of SQL "select" results: text, SQL, HTML, XML, and Table. Output from the escape commands are always displayed as plain text. Text mode is the default, and is primarily a raw display format. SQL output is most useful with the output of a SELECT statement; it will generate SQL that will attempt to re-create the data in another database. HTML mode generates an HTML table to display the results of a Select. XML format is similar but may be used for exporting data into other applications. Finally, table mode provides a friendlier interface which ensures all of the columns are lined up properly. In this mode, it is even possible to rearrange the columns by dragging them!

For example, with SQL mode selected, a "select * from anecdotes" (a table in a sample bookstore web site's database, used to display a casual quotation about books) looked like this:

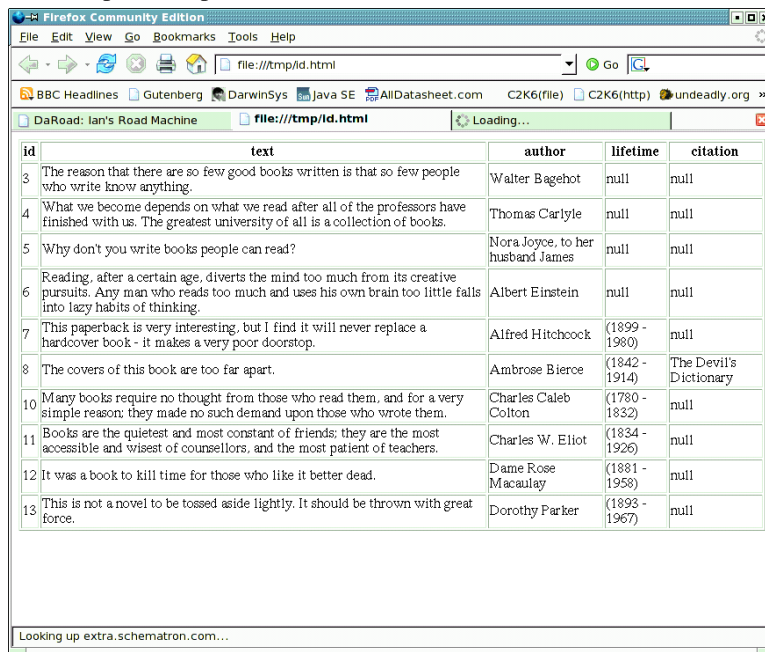


This could, as you can see, be used to create a SQL script to re-create the contents of the database. In fact, some developers use SQLRunner primarily for this purpose: to create stable test databases from "live" data that was created by their application.

You can view this same data in HTML just by changing the Format selection to HTML and clicking the Run button again:



When copied and pasted into an HTML file and viewed in a browser, the output looked like this:



With a bit of formatting, or even a CSS style sheet, this HTML page could be made quite usable.

SQLRunner is not perfect, but it is adequate for many purposes involving direct use of SQL.

Profiling



Profiling displays a summary of the data found in a database. The summary can be used for such tasks as; database optimization and data migration. Select the columns and tables that you wish to profile from the database tree on the left hand side of the screen. Then activate the profile feature by either going to the "Profile" menu and selecting "Profile...", or by right clicking on a selected item and select "Profile..." from the context menu, or by selecting the Profile Icon in the Advanced Tool icon bar. If there is still an existing Profile window, the new profiling results will be added on to the existing window, otherwise, the resulting profile will be displayed in a new window.

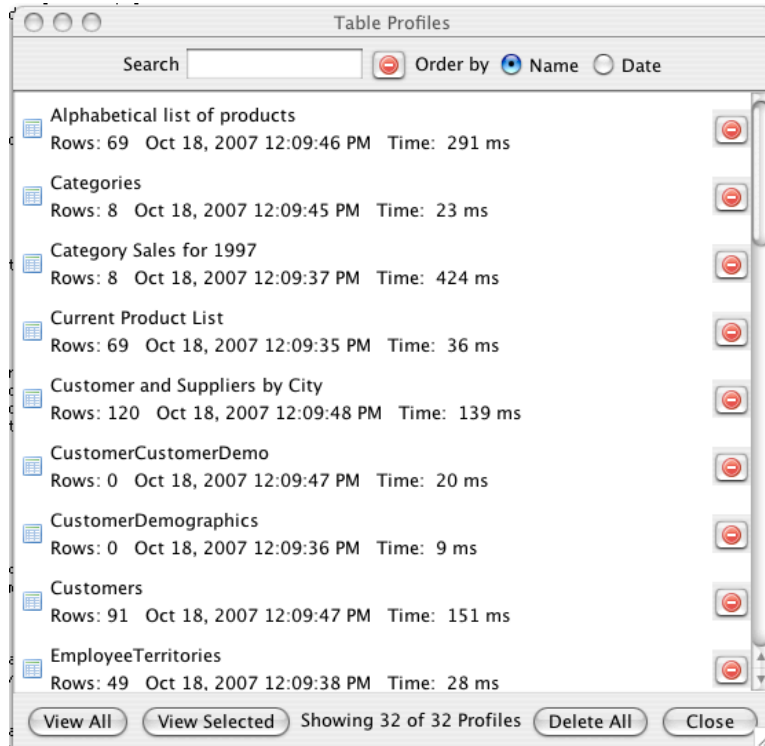


Table View

In the profiling window, the profiling information is sortable. Simply click on the column header and it will sort the data by ascending or descending order. In addition, if you place your mouse pointer over a most frequent cell, it will display the value and frequency of the most recurring items in the column. You can narrow down the results by using the search bar on the top right corner of the profile window. To delete columns from the profile result, simply select the desired columns and press the "Delete" button. As for refreshing the data within the profile table, select any one of the columns within the table and hit "Refresh". This will update the contents of the whole table. If you wish to save the profile results, you can highlight the desired columns to save, and click the "Save" button. If no column is selected, the Architect will save all the displayed results. You have the option to save it in CVS, PDF or HTML format.

Table Profiles

Table View Graph View

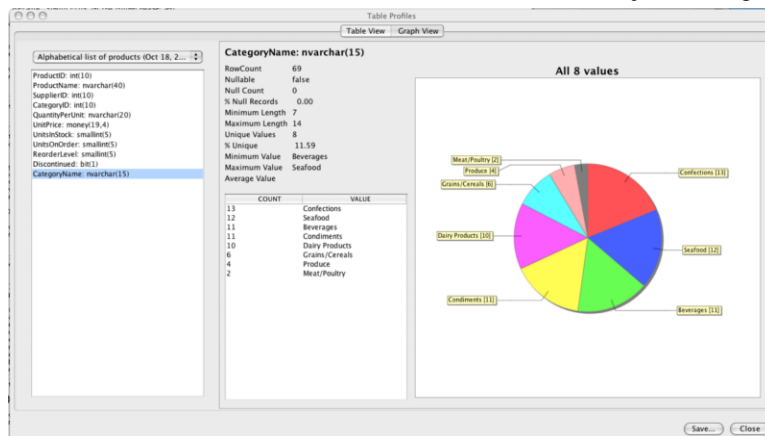
Search:

Database	Catalog	Schema	Table	Column	Run Date	Record Co	Data Type	# Null	% Null	# Unique	% Unique	Min Leng	Max Leng	Avg Leng	Min Value	Max Value	Avg Value	Most Freq
test.com...	Northwind	dbo	Alphabet...	CategoryID	2007-1...	69	NT	0.0%	0.0%	8.12%	1	1	1	1	8	4	3	
test.com...	Northwind	dbo	Alphabet...	Category...	2007-1...	69	VARCHA...	0.0%	0.0%	8.12%	7	14	10		Beverages	Seafood		Confecti...
test.com...	Northwind	dbo	Alphabet...	Discontin...	2007-1...	69	BIT	0.0%	0.0%	1.1%	0	0	0					false
test.com...	Northwind	dbo	Alphabet...	ProductID	2007-1...	69	NT	0.0%	0.0%	69.100%	1	2	1	77	40.5	1		
test.com...	Northwind	dbo	Alphabet...	ProductN...	2007-1...	69	VARCHA...	0.0%	0.0%	69.100%	4	32	16		Aniseed ...	Zaanse k...		Aniseed ...
test.com...	Northwind	dbo	Alphabet...	Quantity...	2007-1...	69	VARCHA...	0.0%	0.0%	62.90%	5	20	14		1 kg pkg	750 cc p...		24 - 12 ...
test.com...	Northwind	dbo	Alphabet...	ReorderL...	2007-1...	69	SMALLINT	0.0%	0.0%	7.0%	1	2	1	0	30	13.9	0	
test.com...	Northwind	dbo	Alphabet...	SupplierID	2007-1...	69	NT	0.0%	0.0%	28.41%	1	2	1	29	13.9	7		
test.com...	Northwind	dbo	Alphabet...	UnitPrice	2007-1...	69	DECIMAL	0.0%	0.0%	55.80%	0	0	0	2.5	263.5	26.8	18.0000	
test.com...	Northwind	dbo	Alphabet...	UnitsInSt...	2007-1...	69	SMALLINT	0.0%	0.0%	51.74%	1	3	2	0	125	43.7	15	
test.com...	Northwind	dbo	Alphabet...	UnitsOnO...	2007-1...	69	SMALLINT	0.0%	0.0%	10.14%	1	3	1	0	100	11.3	0	
test.com...	Northwind	dbo	Categories	CategoryID	2007-1...	8	NT	0.0%	0.0%	8.100%	1	1	1	8	4.5	1		
test.com...	Northwind	dbo	Categories	Category...	2007-1...	8	VARCHA...	0.0%	0.0%	8.100%	7	14	10		Beverages	Seafood		Beverages
test.com...	Northwind	dbo	Categories	Description	2007-1...	8	TEXT	0.0%	0.0%	0.0%	0	0	0					
test.com...	Northwind	dbo	Categories	Picture	2007-1...	8	MAGE	0.0%	0.0%	0.0%	0	0	0					
test.com...	Northwind	dbo	Categories	Category...	2007-1...	8	VARCHA...	0.0%	0.0%	8.100%	7	14	10		Beverages	Seafood		Confecti...
test.com...	Northwind	dbo	Categories	Category...	2007-1...	8	DECIMAL	0.0%	0.0%	8.100%	0	0	0	53.020	114,749.8	76,105.9	53019.9...	
test.com...	Northwind	dbo	Current...	ProductID	2007-1...	69	NT	0.0%	0.0%	69.100%	1	2	1	77	40.5	1		
test.com...	Northwind	dbo	Current...	ProductN...	2007-1...	69	VARCHA...	0.0%	0.0%	69.100%	4	32	16		Aniseed ...	Zaanse k...		Aniseed ...
test.com...	Northwind	dbo	Current...	City	2007-1...	120	VARCHA...	0.0%	0.0%	93.78%	4	15	7		Aachen	Zaandam		London
test.com...	Northwind	dbo	Customer...	Compan...	2007-1...	120	VARCHA...	0.0%	0.0%	120.100%	8	38	18		Alfreds F...	Zaanse S...		Alfreds F...
test.com...	Northwind	dbo	Customer...	ContactN...	2007-1...	120	VARCHA...	0.0%	0.0%	120.100%	8	26	13		Alejandro...	Zbyszek ...		Alejandro...
test.com...	Northwind	dbo	Customer...	Relations...	2007-1...	120	VARCHA...	0.0%	0.0%	2.2%	9	9	9		Customers	Suppliers		Customers
test.com...	Northwind	dbo	Customer...	Customer...	2007-1...	0	CHAR(5)	0.0%	0.0%	0.0%	0	0	0					
test.com...	Northwind	dbo	Customer...	Customer...	2007-1...	0	CHAR(10)	0.0%	0.0%	0.0%	0	0	0					
test.com...	Northwind	dbo	Customer...	Customer...	2007-1...	0	TEXT	0.0%	0.0%	0.0%	0	0	0					
test.com...	Northwind	dbo	Customer...	Customer...	2007-1...	0	CHAR(10)	0.0%	0.0%	0.0%	0	0	0					
test.com...	Northwind	dbo	Customers	Address	2007-1...	91	VARCHA...	0.0%	0.0%	91.100%	11	46	18		1 rue Als...	Walsenw...		1 rue Als...
test.com...	Northwind	dbo	Customers	City	2007-1...	91	VARCHA...	0.0%	0.0%	69.78%	4	15	8		Aachen	Warszawa		London
test.com...	Northwind	dbo	Customers	Compan...	2007-1...	91	VARCHA...	0.0%	0.0%	91.100%	8	36	18		Alfreds F...	Wolski Z...		Alfreds F...
test.com...	Northwind	dbo	Customers	Contact...	2007-1...	91	VARCHA...	0.0%	0.0%	91.100%	8	23	13		Alejandro...	Zbyszek ...		Alejandro...
test.com...	Northwind	dbo	Customers	Contact...	2007-1...	91	VARCHA...	0.0%	0.0%	12.11%	5	30	14		Account...	Sales Re...		Owner
test.com...	Northwind	dbo	Customers	Country	2007-1...	91	VARCHA...	0.0%	0.0%	21.23%	2	11	5		Argentina	Venezuela		USA
test.com...	Northwind	dbo	Customers	Customer...	2007-1...	91	CHAR(5)	0.0%	0.0%	91.100%	5	5	5		ALFRI	WOLZA		ALFRI
test.com...	Northwind	dbo	Customers	Fax	2007-1...	91	VARCHA...	22.24%	22.24%	69.78%	9	17	12		(02) 201...	981-44...		null
test.com...	Northwind	dbo	Customers	Phone	2007-1...	91	VARCHA...	0.0%	0.0%	91.100%	8	17	12		(02) 201...	981-44...		(02) 201...
test.com...	Northwind	dbo	Customers	PostalCode	2007-1...	61	VARCHA...	1.1%	1.1%	86.94%	4	9	5		01-013	WY3 6RM		1A10

Save... Close

Graph View

Besides the tabular view, there is also the graphical view. Simply click on "Graph View" tab on the top to switch. On the left side of this window, you can select which column you want to profile. In the middle, it will show statistics about that particular column. It will also display the most frequent 'n' values and its frequency within the table. The pie chart on the right displays the portionality of the most frequent 'n' values in the column (the value of 'n' can be set in the "Project Settings" under the "File" menu).



How to Create a Kettle Job

What it Does

This feature allows a user to create a Kettle job and multiple transformations based on the information in the play pen. The Kettle job is used to take the data from the sources of the tables in the play pen and place them in the new tables of the target database.

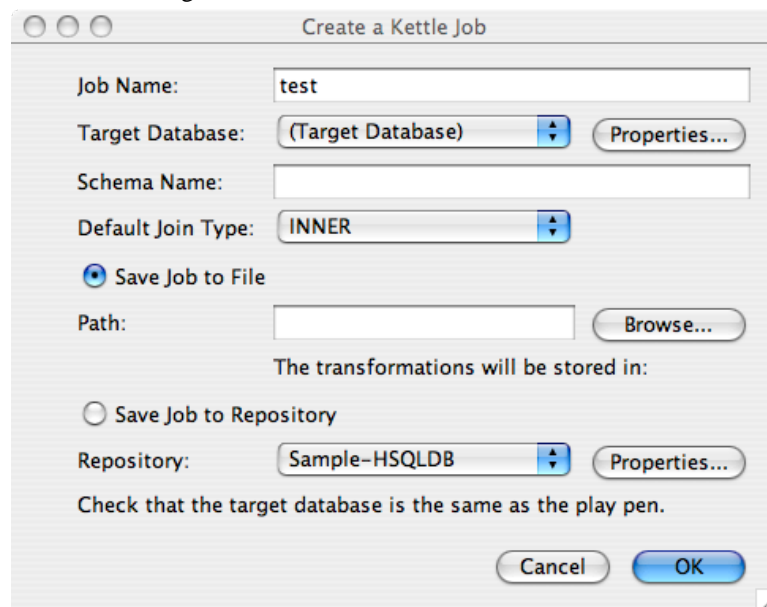
Setup for Kettle

Before you start creating jobs, some settings need to be configured. Go to the User Preferences and select the JDBC Drivers tab. For each driver that you use in a database connection, set the Kettle Connection Type on the Kettle sub-tab.

Creating a Kettle Job

Before creating a Kettle job we need to create the new database schema in the play pen. This includes creating new source connections, dragging tables into the play pen and modifying the play pen to have the desired layout. Once the play pen has the correct layout use the forward engineering tool to create the tables and relationships in the target database.

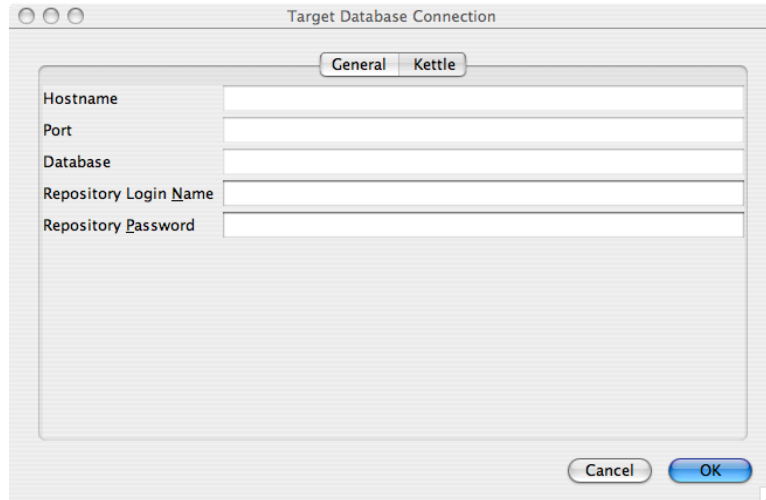
To start creating a Kettle job go to the ETL menu and select the "Create Kettle Job" menu item. You should see the following window.



Each Kettle job requires a name, a target database and either a file path or a repository to save to. To set the target database, click the "Properties" button. The default join type is used to define what join type will be used in all merge-joins. Merge-joins are used to create tables with multiple sources.

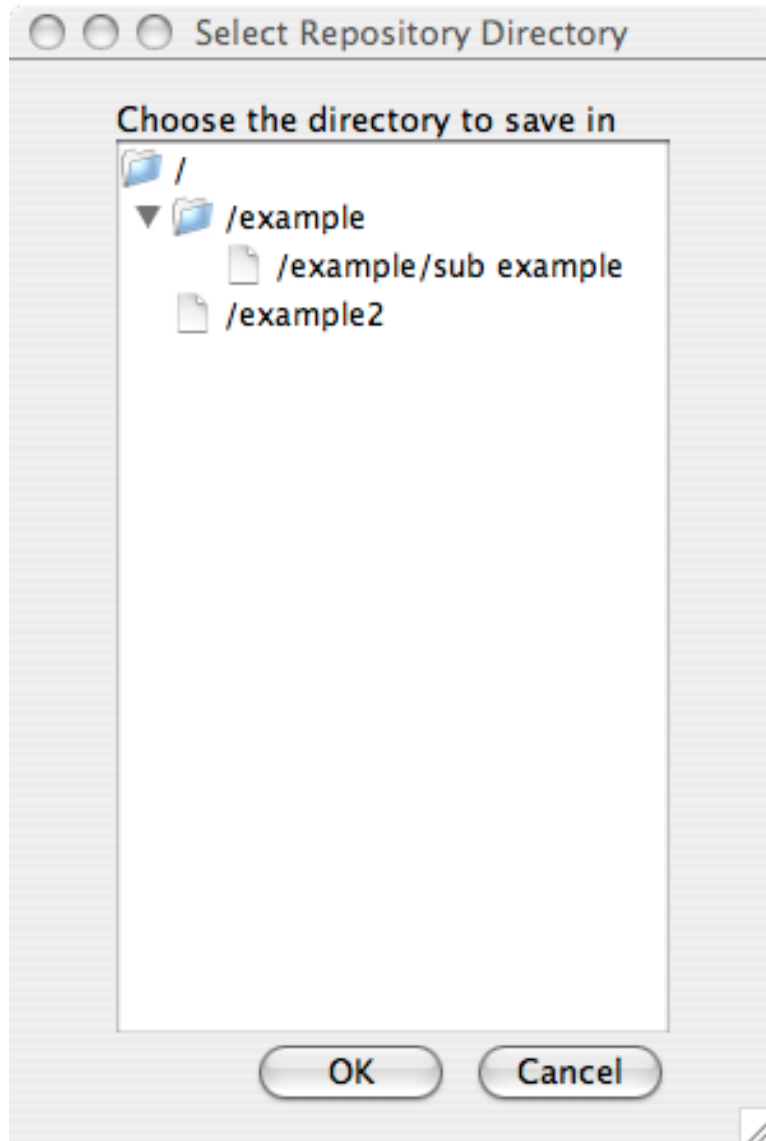
Note: Merge-joins that are created in transformations from Power*Architect will usually have to be updated manually. A manual update is required as Power*Architect cannot tell which fields to compare during the join.

When setting the target database, a hostname, port number and database name need to be specified. The URL template may contain properties for the database, host and/or port. If the template contains properties for Kettle, the values given in the URL will be used for the target connection in Kettle. If the template does not contain Kettle properties then they can be set on the Kettle tab.



To save the Kettle job and transformations to a repository you must first choose the repository option. Then, any of the source connections can be used as a repository provided they have a repository set up. If the desired repository is not one of the source databases the properties can be set manually. When setting up a database connection for use as a repository the login name and password can be set on the Kettle tab.

To start creating the Kettle job and transformation files, click the "OK" button. If a repository is being used a window will appear to choose the directory location in the repository to save to.



Once the job has been created, a window will display additional steps that need to be completed before running the job.

Note: The transformation files will be stored in the same location as the Kettle job. You must use Kettle to run the job.

Chapter 4. Database Product Notes

Database	Notes
Oracle	Is fully supported.
SQL Server	Is fully supported.
PostgreSQL	Is fully supported.
IBM DB2	Partial support; needs more testing.
HSQLDB	Works; used in samples.
Derby	Does not work; the current version (10.1.2) has what we consider some unwarranted chumminess with the JDBC Driver Manager that breaks because we use our own Java "ClassLoader"
MySQL	Is fully supported.

Chapter 5. Troubleshooting

We have worked hard to ensure that Power*Architect works correctly. However there are probably always going to be some combinations of different database products and database configurations, user actions, computer setups, and so on, that just don't work. We apologize in advance for any inconvenience this may cause...

If you are having trouble with Power*Architect, we may ask that, in order to help us to diagnose the problem, you take some or all of the following actions:

- Prepare a description of what you were doing
- Prepare a copy of any errors you encountered
- Post your problem to the Power*Architect help forum [<http://www.sqlpower.ca/forum/forums/show/2.page>]

Chapter 6. Glossary

This section lists some database-related terms and their meanings.

Column	The set of all instances of a given field from all records in a table [http://foldoc.org/foldoc/foldoc.cgi?table] .
Database	One or more large structured sets of persistent data, usually associated with software to update and query [http://foldoc.org/foldoc/foldoc.cgi?query] the data. A simple database might be a single file containing many records [http://foldoc.org/foldoc/foldoc.cgi?records] , each of which contains the same set of fields [http://foldoc.org/foldoc/foldoc.cgi?fields] where each field is a certain fixed width.
Data Modelling	The product of the database design process which aims to identify and organize the required data logically and physically.
Data Warehousing	A database, often remote, containing recent snapshots of corporate data. Planners and researchers can use this database freely without worrying about slowing down day-to-day operations of the production database.
ETL	Extraction, Transforming and Loading - the process of maintaining and transforming data into and out of a relational database.
Foreign key	<p>A column [http://foldoc.org/foldoc/foldoc.cgi?column] in a database table [http://foldoc.org/foldoc/foldoc.cgi?table] containing values that are also found in some primary key [http://foldoc.org/foldoc/foldoc.cgi?primary+key] column (of a different table). By extension, any reference to entities of a different type.</p> <p>Some RDBMSs [http://foldoc.org/foldoc/foldoc.cgi?RDBMSs] allow a column to be explicitly labelled as a foreign key and only allow values to be inserted if they already exist in the relevant primary key column.</p>
Identifying Relationship	Where the key of the parent table is a subset of the key of the child table.
JDBC	Java DataBase Connectivity, an unofficial acronym for the "java.sql" package of functionality used to access relational databases from programs written in the Java programming language.
Key	A value used to identify a record [http://foldoc.org/foldoc/foldoc.cgi?record] in a database, derived by

	applying some fixed function to the record. The key is often simply one of the fields [http://foldoc.org/foldoc/foldoc.cgi?fields] (a column [http://foldoc.org/foldoc/foldoc.cgi?column] if the database is considered as a table with records being rows, see " key field [http://foldoc.org/foldoc/foldoc.cgi?key+field] "). Alternatively the key may be obtained by applying some function, e.g. a hash function [http://foldoc.org/foldoc/foldoc.cgi?hash+function] , to one or more of the fields. The set of keys for all records forms an index [http://foldoc.org/foldoc/foldoc.cgi?index] . Multiple indexes may be built for one database depending on how it is to be searched.
Primary key	The candidate key [http://foldoc.org/foldoc/foldoc.cgi?candidate+key] selected as being most important for identifying a body of information (an entity, object or record [http://foldoc.org/foldoc/foldoc.cgi?record]).
Record (row)	One or more structured sets of persistent data, usually associated with software to update and query [http://foldoc.org/foldoc/foldoc.cgi?query] the data. A simple database might be a single file containing many records [http://foldoc.org/foldoc/foldoc.cgi?records] , each of which contains the same set of fields [http://foldoc.org/foldoc/foldoc.cgi?fields] where each field is a certain fixed width.
SQL	Originally SEQUEL [http://en.wikipedia.org/wiki/SQL#History] and still pronounced that way by many practitioners, SQL is the Standard Query Language; a unified language for creating queries that is accepted (with some variations) by all modern relational databases.
Table	A collection of records [http://foldoc.org/foldoc/foldoc.cgi?records] in a relational database [http://foldoc.org/foldoc/foldoc.cgi?relational+database] .

Some of these terms are from FolDoc, "The Free On-line Dictionary of Computing", <http://www.foldoc.org/>, Editor Denis Howe.

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The Power*Architect team is also grateful to the JFree team for their top-notch charting library, which has a nice API as well as nice-looking output.

The following license applies to these library jar files, which are distributed as part of the Architect download:

- jcommon-1.0.0.jar
- jfreechart-1.0.1.jar

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Version 3, 29 June 2007

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Thanks to Ian Darwin of Darwin Systems for his many contributions to the Power*Architect. SQLRunner is part of his darwinsys Java library, which we redistribute with the Architect.

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We gratefully acknowledge the work of Matt Casters and the Pentaho corporation for their support and hard work on this product.

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The Power*Architect was primarily developed and tested using the Eclipse [<http://www.sqlpower.ca/>] Java Development Tools, one of the more productive Java environments around.

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Last but not least, many thanks to Sun Microsystems [<http://java.sun.com/>] and their various Java development teams for creating, extending, bugfixing, documenting, and supporting the Java platform over the past *N* years!

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