DEPARTAMENTO DE ELETRÓNICA, TELECOMUNICAÇÕES E INFORMÁTICA
UNIVERSIDADE DE AVEIRO

EXPLORAÇÃO DE DADOS / DATA MINING

(Part I) Laboratory Assignment 03: Brief introduction on using Pentaho Data Integration/Kettle

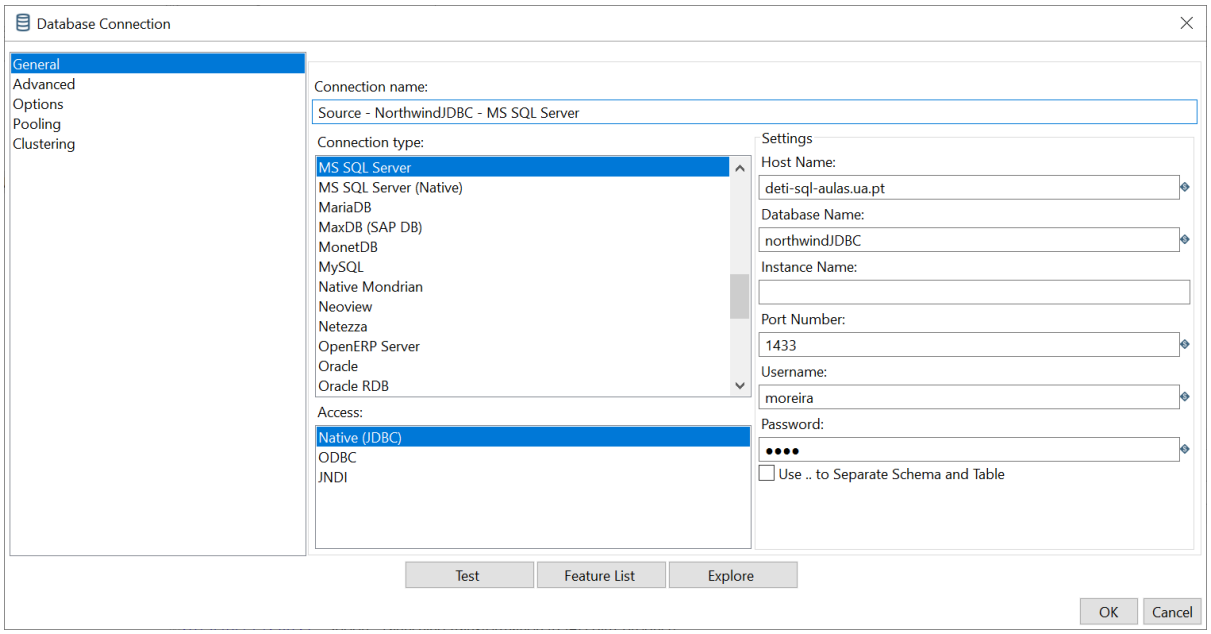
This document presents useful tips for implementing laboratory assignment 3.

Setup

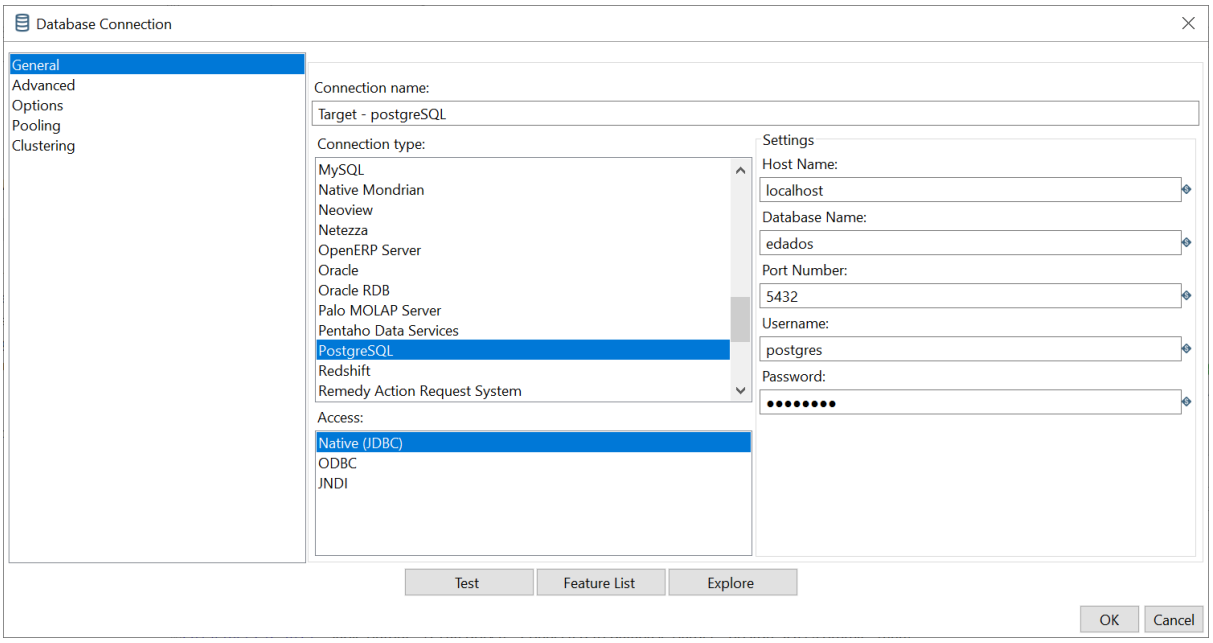
- The accounts created in Microsoft SQL Server require changing the password on first use. This prevents the access to the database using third-party applications. So, the first login must be performed using and application such as Microsoft SQL Server Management Studio. If you do not have any Microsoft SQL Server Client application, you can ask a colleague to perform the first login and change the password or send an email to jose.moreira@ua.pt.

- To connect from PDI to SQL Server you also need a JDBC driver. Go to https://www.microsoft.com/en-us/download/details.aspx?id=11774 and download the archive *sqljdbc_6.0.8112.200_enu.tar.gz*. Unzip archive and copy *sqljdbc_6.0\enu\jre8\sqljdbc42.jar* into *data-integration/lib* in the Pentaho base directory. For more information, please refer to http://bigdatafan.blogspot.com/2016/05/connect-pentaho-pdi-spoon-to-sql-server.html. You may also need to copy *jtds-1.3.1.jar* (https://sourceforge.net/projects/jtds/files/jtds/1.3.1/) into the same folder.

- Use the database *northwindJDBC* instead of *Northwind*. This will be your source database. The username and password are *northwindJDBC*. To create a connection to *northwindJDBC* go to File → New → Database connection and enter the following information:



- Create a connection to PostgreSQL as follows. This will be your target database.



- Validate your transformations step by step, i.e., run a transformation, select the pane *Preview Data* in the *Execution Results* pane and click on each entry (operator) to see the intermediate results.

Quick start

1. Highlights on working with Kettle / PDI and PostgreSQL.

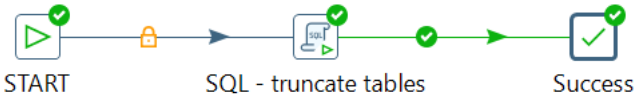
   - Share your database connections (right-click on the connection name) to make them visible to all *Jobs* and *Transformations*.

   - All table names and the attributes names in PostgreSQL must be in capital letters and surrounded by quotation marks (“). This is because PostgreSQL is case sensitive. The same does not hold for Microsoft SQL Server.

   - The basic concepts are *Jobs* (workflow-like models for coordinating resources, execution, and dependencies of ETL activities) and *Transformations* (data flows): https://help.pentaho.com/Documentation/7.0/0L0/0Y0/030/010

   - All steps in a transformation are started and run in parallel so the initialization sequence is not predictable.

2. Create a new Job to clear all tables in your *Data Mart* (the target database in PostgreSQL)

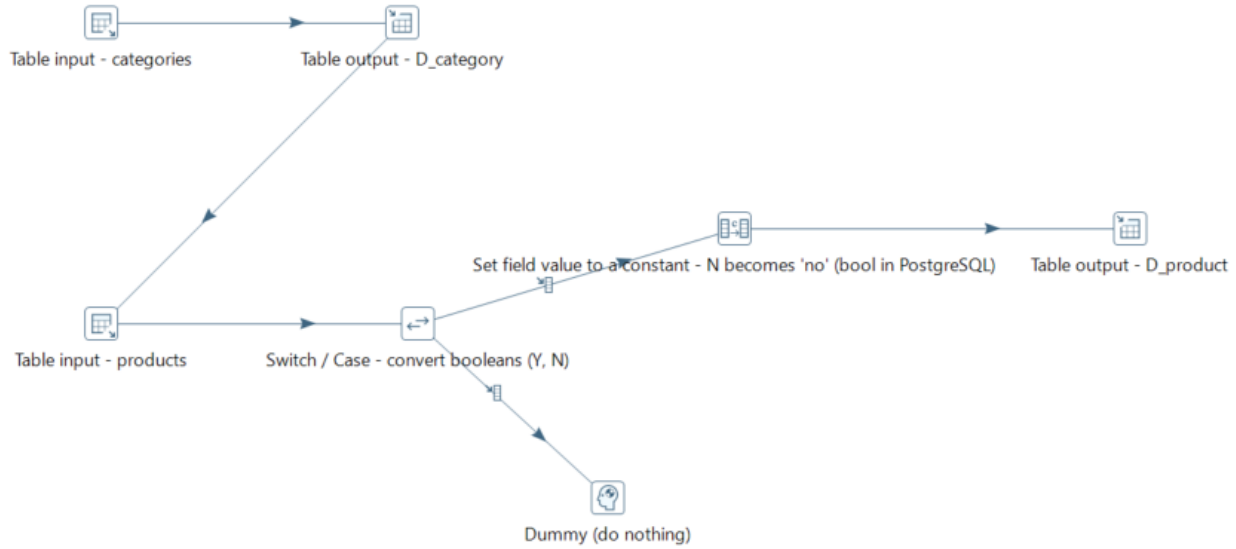


2.1. Go to *Design View* and add a *Start* entry (no need to select any automatic scheduling option).

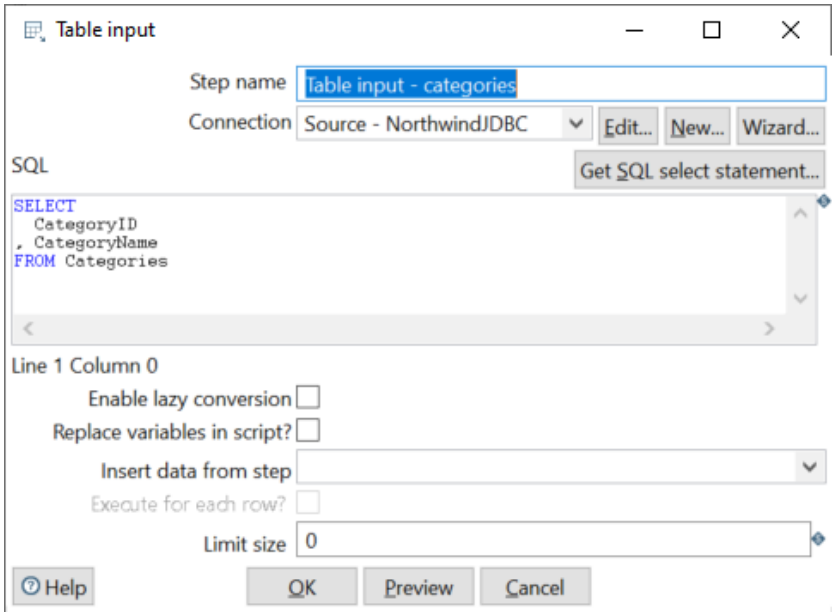
2.2. Add an *SQL* entry and write the SQL statements to delete all data from your tables (TRUNCATE TABLE xyz CASCADE).

2.3. Add a *Success* entry to complete your job.

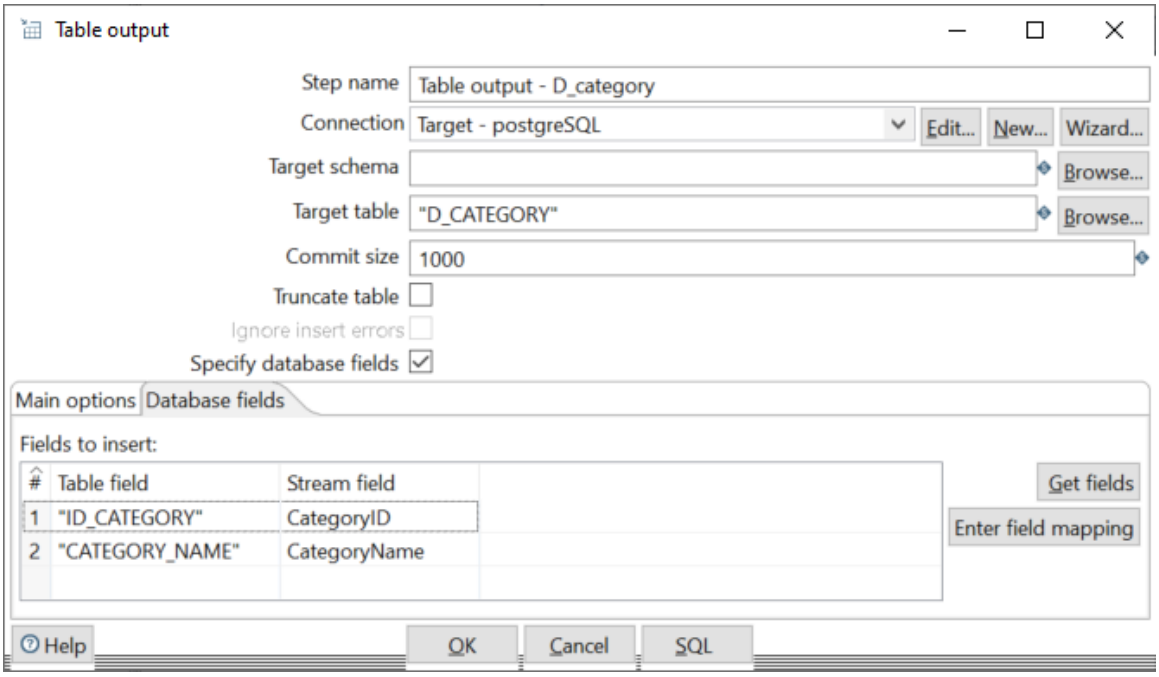
3. Create a new transformation to load the data into the dimension *Product* (tables *D_category* and *D_product*) using the data from the table *Categories* and *Products* in the Northwind database.



3.1. Go to *Design View* and add a *Table Input* entry to select the columns you need data from the table *Categories* in the Northwind database.

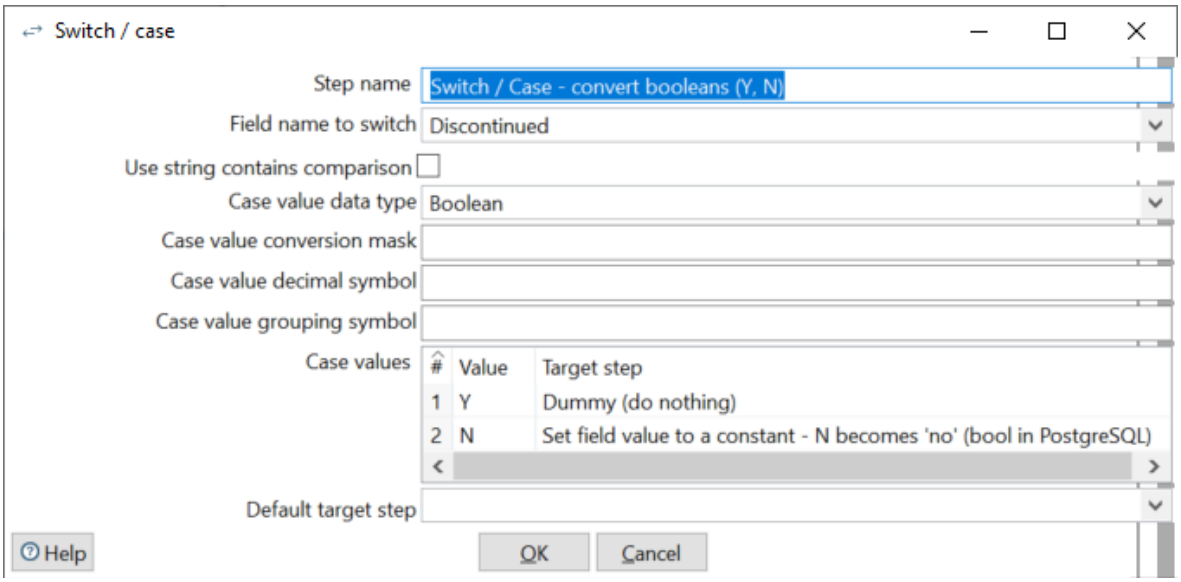


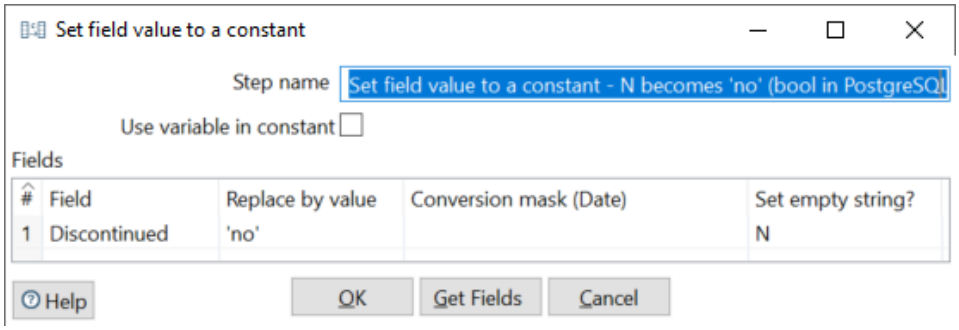
3.2. Add a *Table output* entry to create a mapping between the fields of the source table (*Categories*) and the target table (*D_category*). Do not forget to add quotation marks to "D_category" as well as to the names of attributes in the *Table Field* column (PostgreSQL database).



3.3. Add a *Table Input* entry to select the columns you need data from the table *Products* in the Northwind database.

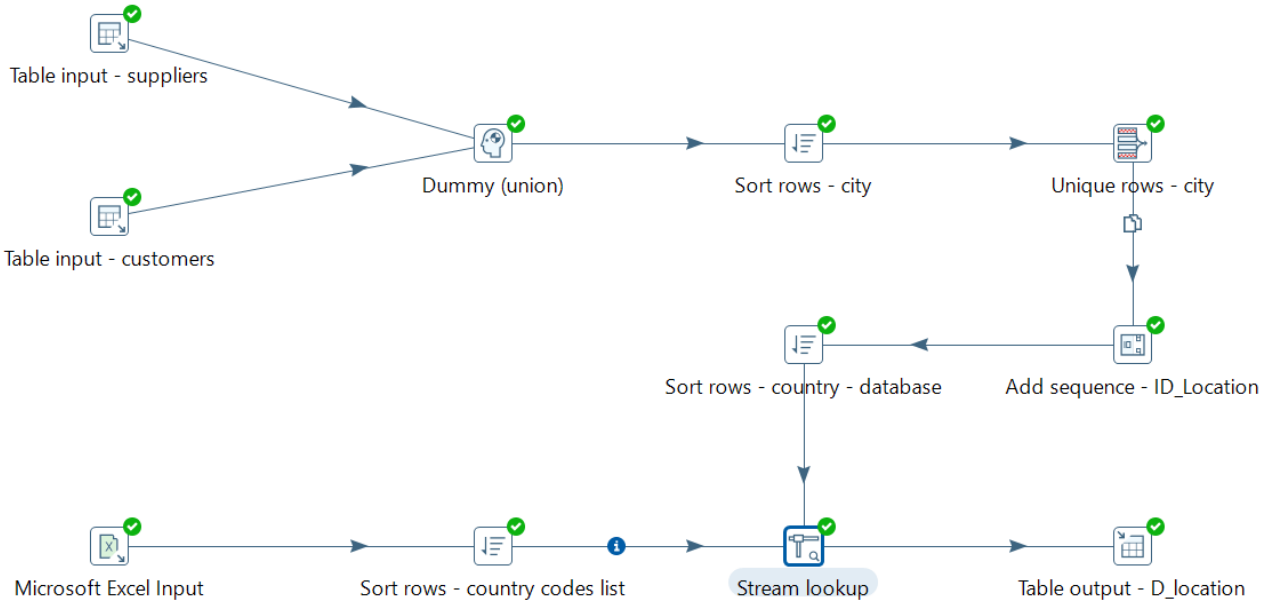
3.4. PostgreSQL does not accept Boolean values specified as 'Y' and 'No', but it accepts 'yes' and 'no', among other options. So, it is necessary to convert the values of *Discontinued* from the table *Products* into something recognized by PostgreSQL. Several alternatives exist. This example uses a *switch* entry and a *Set field to a constant* entry and migrates the products that are not discontinued.



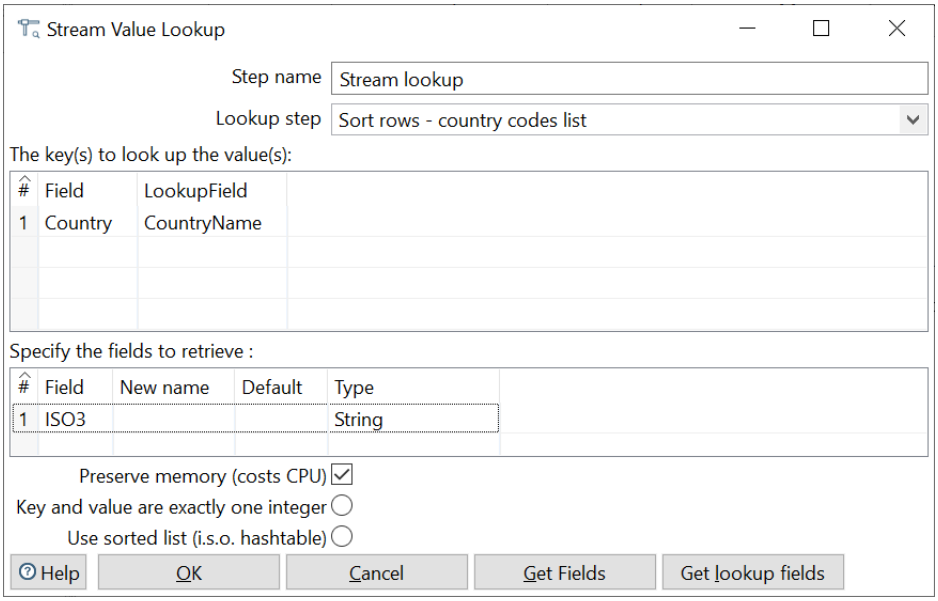


3.5. Add a *Table output* entry to create a mapping between the fields of the data stream and the target table (*D_category*).

4. Create a new transformation to load the data into the dimension *Location*.



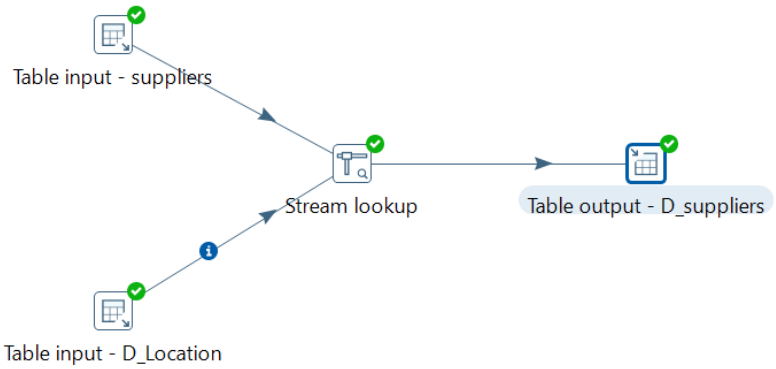
- This dimension must have one record for each distinct *City* in the tables *Suppliers* and *Customers*.
- The union of the values in both tables is performed by the *Dummy* entry and the tuples must be ordered before removing the duplicates using the *Unique rows* operator.
- As there is no attribute key for this dimension, it is necessary to use the entry *Add sequence* to create an auto number that will be assigned to the *ID_location*.
- The Microsoft Excel Input refers to the file *countryCodesList.xls*, which holds a table with the ISO country codes. These are the codes needed to fill the attribute *Country_code* in *D_location*.
- The rows of both data streams must be in the same order to perform a *Stream lookup* to create a data stream with the attributes *City*, *Region*, *PostalCode* and *Country*, plus the corresponding ISO-3 country codes.



- The attributes *state_name*, *region_name* e *continent_name* are not null, but they are empty in the source databases. You may change the definition of the corresponding attributes in the target database to allow null values, or you may use a *switch / case* entry and a *Set field value to a constant* to substitute null values by default values at your choice.

5. The table *D_suppliers* (dimension Suppliers) has a foreign key to *D_location*. As the values of *ID_location* are generated automatically, it is not possible to create a simple mapping of a column in the source database to the foreign key column in the target database. So, it is necessary to add a *Lookup* entry to compare the values of the attribute *City* (table *Suppliers*) from the source database with the values of the attribute *City_name* in the target database (table *D_location*) and retrieve the corresponding keys (*ID_location*).

   However, using a *Database Lookup* entry with a table from a PostgreSQL is not error free. An alternative is to use a *Table input* entry to retrieve the data from the table *D_location* (create an alias for the column names, if necessary) followed by a *Stream lookup* entry.



   The same holds for the foreign key in the table *D_customers* (dimension Customers).

6. The source to load the data into the fact table (*F_sales*) is the table *Orders* (source database). This is the table that holds the measures *Quantity*, *Unit price*, *Discount* and *Freight*, but this is only a part of the data that must be loaded into *F_sales*. So, the transformation that loads the data into the fact table must use several *Lookup* or *Join* entries to retrieve, step by step, all required data.

Documentation

Pentaho Data Integration (Kettle): https://wiki.pentaho.com/display/EAI/Latest+Pentaho+Data+Integration+%28aka+Kettle%29+Documentation

Quick start: https://intellipaat.com/blog/tutorial/pentaho-tutorial/getting-started-with-transformations/