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1)

```sql
DROP DATABASE IF EXISTS northwind_dw;

CREATE DATABASE northwind_dw;

USE northwind_dw;

CREATE TABLE dim_customer (
    CustomerID VARCHAR(5),
    CompanyName VARCHAR(40),
    City VARCHAR(15),
    Country VARCHAR(15),
    CONSTRAINT PK_Customers PRIMARY KEY (CustomerID)
);

CREATE TABLE dim_product (
    ProductNumber INT,
    ProductID INTEGER,
    ProductName VARCHAR(40),
    CategoryName VARCHAR(40),
    Version INT,
    Date_from DATETIME,
    Date_to DATETIME,
    CONSTRAINT PK_Products PRIMARY KEY (ProductNumber)
);

CREATE TABLE dim_shippers (
    ShipperID INTEGER,
    CompanyName VARCHAR(40),
    CONSTRAINT PK_Shippers PRIMARY KEY (ShipperID)
);

CREATE TABLE dim_time (
    Time_id DATETIME,
    Day INT,
    Month_id INT,
    Month_name VARCHAR(3),
    Year INT,
    PRIMARY KEY (Time_id)
);

CREATE TABLE dim_suppliers (
    SupplierID INTEGER,
    CompanyName VARCHAR(40),
    City VARCHAR(15),
    Country VARCHAR(15),
    CONSTRAINT PK_Suppliers PRIMARY KEY (SupplierID)
);

CREATE TABLE fact_order (
    CustomerID VARCHAR(5),
    ProductNumber INTEGER,
    ShipperID INTEGER,
    SupplierID INTEGER,
    Time_id DATETIME,
    OrderID INTEGER,
    Quantity SMALLINT(2) DEFAULT 1,
    UnitPrice DECIMAL(10,4) DEFAULT 0,
    Discount REAL DEFAULT 0,
    OrderTotal DECIMAL(10,4) DEFAULT 0,

    PRIMARY KEY (OrderID,ProductNumber),
    FOREIGN KEY (CustomerID) REFERENCES dim_customer (CustomerID),
    FOREIGN KEY (ProductNumber) REFERENCES dim_product (ProductNumber
    FOREIGN KEY (ShipperID) REFERENCES dim_shippers (ShipperID),
    FOREIGN KEY (SupplierID) REFERENCES dim_suppliers (SupplierID),
    FOREIGN KEY (Time_id) REFERENCES dim_time (Time_id)
);
```
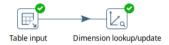
SQL instructions to create the data warehouse tables

2) Everything developed in Pentaho Data Integration.
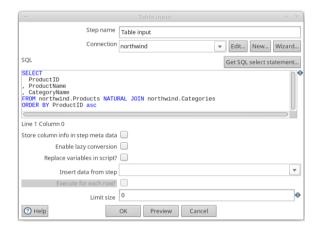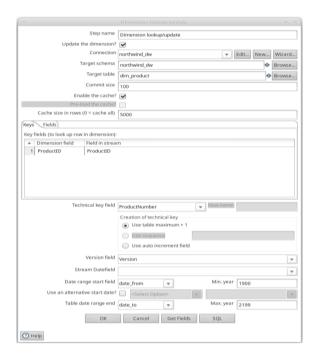
Job

Dim_product

Table input transformation

Table input preview

Dimension lookup/update transformation

ProductID	ProductName	CategoryName	ProductNumber
1	Chai	Beverages	1
2	Chang	Beverages	2
3	Aniseed Syrup	Condiments	3
4	Chef Anton's Cajun Seasoning	Condiments	4
5	Chef Anton's Gumbo Mix	Condiments	5
6	Grandma's Boysenberry Spread	Condiments	6
7	Uncle Bob's Organic Dried Pears	Produce	7
8	Northwoods Cranberry Sauce	Condiments	8
9	Mishi Kobe Niku	Meat/Poultry	9
10	Ikura	Seafood	10
11	Queso Cabrales	Dairy Products	11
12	Queso Manchego La Pastora	Dairy Products	12
13	Konbu	Seafood	13
14	Tofu	Produce	14
15	Genen Shouyu	Condiments	15
16	Pavlova	Confections	16
17	Alice Mutton	Meat/Poultry	17
18	Carnarvon Tigers	Seafood	18
19	Teatime Chocolate Biscuits	Confections	19
20	Sir Rodney's Marmalade	Confections	20
21	Sir Rodney's Scones	Confections	21
22	Gustaf's Knckebrd	Grains/Cereals	22
23	Tunnbrd	Grains/Cereals	23
24	Guaran Fantstica	Beverages	24
25	NuNuCa Nu-Nougat-Creme	Confections	25
26	Gumbr Gummibrchen	Confections	26
27	Schoggi Schokolade	Confections	27
28	Rssle Sauerkraut	Produce	28
29	Thringer Rostbratwurst	Meat/Poultry	29
30	Nord-Ost Matjeshering	Seafood	30
31	Gorgonzola Telino	Dairy Products	31
32	Mascarpone Fabioli	Dairy Products	32
33	Geitost	Dairy Products	33
34	Sasquatch Ale	Beverages	34

Dimension lookup/update preview

Dim_shipper

Table input transformation

▲		ShipperID	CompanyName
1		1	Speedy Express
2		2	United Package
3		3	Federal Shipping

Table input preview

Insert / update transformation

Insert / update preview

Dim_supplier

Table input transformation

Table input preview

Insert / update transformation

Insert / update preview
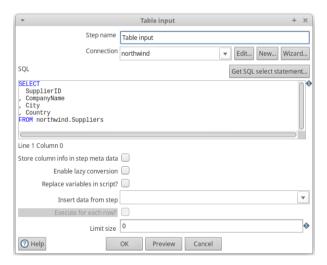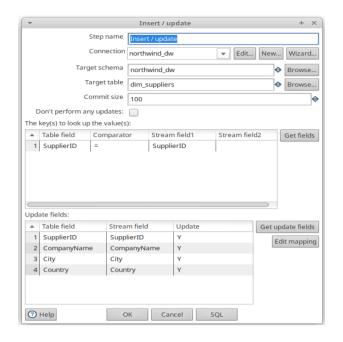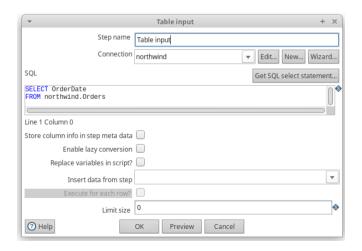
Dim_time

Table input transformation

Table input preview

5

Calculator

Step name
Calculator

☑ Throw an error on non existing files

Fields:

#	New field	Calculation	Field A	Field B	Field C	Value type	Length	Precision	Remove	Conversion mask	Decimal symbol	Grouping symbol	Currency s
1	year_id	Year of date A	OrderDate			None			N				
2	month_id	Month of date A	OrderDate			None			N				
3	day_id	Day of year of date A	OrderDate			None			N				

Help   OK   Cancel

#	OrderDate	year_id	month_id	day_id
1	1996/07/04 00:00:00.000	1996	7	186
2	1996/07/05 00:00:00.000	1996	7	187
3	1996/07/08 00:00:00.000	1996	7	190
4	1996/07/08 00:00:00.000	1996	7	190
5	1996/07/09 00:00:00.000	1996	7	191
6	1996/07/10 00:00:00.000	1996	7	192
7	1996/07/11 00:00:00.000	1996	7	193
8	1996/07/12 00:00:00.000	1996	7	194
9	1996/07/15 00:00:00.000	1996	7	197
10	1996/07/16 00:00:00.000	1996	7	198
11	1996/07/17 00:00:00.000	1996	7	199
12	1996/07/18 00:00:00.000	1996	7	200
13	1996/07/19 00:00:00.000	1996	7	201
14	1996/07/19 00:00:00.000	1996	7	201
15	1996/07/22 00:00:00.000	1996	7	204
16	1996/07/23 00:00:00.000	1996	7	205
17	1996/07/24 00:00:00.000	1996	7	206
18	1996/07/25 00:00:00.000	1996	7	207
19	1996/07/26 00:00:00.000	1996	7	208
20	1996/07/29 00:00:00.000	1996	7	211
21	1996/07/30 00:00:00.000	1996	7	212
22	1996/07/31 00:00:00.000	1996	7	213
23	1996/08/01 00:00:00.000	1996	8	214
24	1996/08/01 00:00:00.000	1996	8	214
25	1996/08/02 00:00:00.000	1996	8	215
26	1996/08/05 00:00:00.000	1996	8	218
27	1996/08/06 00:00:00.000	1996	8	219
28	1996/08/07 00:00:00.000	1996	8	220
29	1996/08/08 00:00:00.000	1996	8	221
30	1996/08/09 00:00:00.000	1996	8	222
31	1996/08/12 00:00:00.000	1996	8	225
32	1996/08/13 00:00:00.000	1996	8	226
33	1996/08/14 00:00:00.000	1996	8	227
34	1996/08/14 00:00:00.000	1996	8	227

Calculator transformation

Calculator preview

Value mapper

Step name : Value mapper
Fieldname to use : month_id
Target field name (empty=overwrite) : month_name
Default upon non-matching :

Field values:

#	Source value	Target value
1	1	Jan
2	2	Feb
3	3	Mar
4	4	Apr
5	5	May
6	6	Jun
7	7	Jul
8	8	Aug
9	9	Sep
10	10	Oct
11	11	Nov
12	12	Dec

Help   OK   Cancel

#	OrderDate	year_id	month_id	day_id	month_name
1	1996/07/04 00:00:00.000	1996	7	186	Jul
2	1996/07/05 00:00:00.000	1996	7	187	Jul
3	1996/07/08 00:00:00.000	1996	7	190	Jul
4	1996/07/08 00:00:00.000	1996	7	190	Jul
5	1996/07/09 00:00:00.000	1996	7	191	Jul
6	1996/07/10 00:00:00.000	1996	7	192	Jul
7	1996/07/11 00:00:00.000	1996	7	193	Jul
8	1996/07/12 00:00:00.000	1996	7	194	Jul
9	1996/07/15 00:00:00.000	1996	7	197	Jul
10	1996/07/16 00:00:00.000	1996	7	198	Jul
11	1996/07/17 00:00:00.000	1996	7	199	Jul
12	1996/07/18 00:00:00.000	1996	7	200	Jul
13	1996/07/19 00:00:00.000	1996	7	201	Jul
14	1996/07/19 00:00:00.000	1996	7	201	Jul
15	1996/07/22 00:00:00.000	1996	7	204	Jul
16	1996/07/23 00:00:00.000	1996	7	205	Jul
17	1996/07/24 00:00:00.000	1996	7	206	Jul
18	1996/07/25 00:00:00.000	1996	7	207	Jul
19	1996/07/26 00:00:00.000	1996	7	208	Jul
20	1996/07/29 00:00:00.000	1996	7	211	Jul
21	1996/07/30 00:00:00.000	1996	7	212	Jul
22	1996/07/31 00:00:00.000	1996	7	213	Jul
23	1996/08/01 00:00:00.000	1996	8	214	Aug
24	1996/08/01 00:00:00.000	1996	8	214	Aug
25	1996/08/02 00:00:00.000	1996	8	215	Aug
26	1996/08/05 00:00:00.000	1996	8	218	Aug
27	1996/08/06 00:00:00.000	1996	8	219	Aug
28	1996/08/07 00:00:00.000	1996	8	220	Aug
29	1996/08/08 00:00:00.000	1996	8	221	Aug
30	1996/08/09 00:00:00.000	1996	8	222	Aug
31	1996/08/12 00:00:00.000	1996	8	225	Aug
32	1996/08/13 00:00:00.000	1996	8	226	Aug
33	1996/08/14 00:00:00.000	1996	8	227	Aug
34	1996/08/14 00:00:00.000	1996	8	227	Aug

Value mapper transformation

Value mapper preview

Insert / update

- Step name: Insert / update
- Connection: northwind_dw
- Target schema: northwind_dw
- Target table: dim_time
- Commit size: 100
- Don't perform any updates: ☐

The key(s) to look up the value(s):

#	Table field	Comparator	Stream field1	Stream field2
1	Time_id	=	OrderDate	

Update fields:

#	Table field	Stream field	Update
1	Time_id	OrderDate	Y
2	Year	year_id	Y
3	Month_name	month_name	Y
4	Day	day_id	Y
5	Month_id	month_id	Y

Insert / Update transformation

#	OrderDate	year_id	month_id	day_id	month_name
1	1996/07/04 00:00:00.000	1996	7	186	Jul
2	1996/07/05 00:00:00.000	1996	7	187	Jul
3	1996/07/08 00:00:00.000	1996	7	190	Jul
4	1996/07/08 00:00:00.000	1996	7	190	Jul
5	1996/07/09 00:00:00.000	1996	7	191	Jul
6	1996/07/10 00:00:00.000	1996	7	192	Jul
7	1996/07/11 00:00:00.000	1996	7	193	Jul
8	1996/07/12 00:00:00.000	1996	7	194	Jul
9	1996/07/15 00:00:00.000	1996	7	197	Jul
10	1996/07/16 00:00:00.000	1996	7	198	Jul
11	1996/07/17 00:00:00.000	1996	7	199	Jul
12	1996/07/18 00:00:00.000	1996	7	200	Jul
13	1996/07/19 00:00:00.000	1996	7	201	Jul
14	1996/07/19 00:00:00.000	1996	7	201	Jul
15	1996/07/22 00:00:00.000	1996	7	204	Jul
16	1996/07/23 00:00:00.000	1996	7	205	Jul
17	1996/07/24 00:00:00.000	1996	7	206	Jul
18	1996/07/25 00:00:00.000	1996	7	207	Jul
19	1996/07/26 00:00:00.000	1996	7	208	Jul
20	1996/07/29 00:00:00.000	1996	7	211	Jul
21	1996/07/30 00:00:00.000	1996	7	212	Jul
22	1996/07/31 00:00:00.000	1996	7	213	Jul
23	1996/08/01 00:00:00.000	1996	8	214	Aug
24	1996/08/01 00:00:00.000	1996	8	214	Aug
25	1996/08/02 00:00:00.000	1996	8	215	Aug
26	1996/08/05 00:00:00.000	1996	8	218	Aug
27	1996/08/06 00:00:00.000	1996	8	219	Aug
28	1996/08/07 00:00:00.000	1996	8	220	Aug
29	1996/08/08 00:00:00.000	1996	8	221	Aug
30	1996/08/09 00:00:00.000	1996	8	222	Aug
31	1996/08/12 00:00:00.000	1996	8	225	Aug
32	1996/08/13 00:00:00.000	1996	8	226	Aug
33	1996/08/14 00:00:00.000	1996	8	227	Aug
34	1996/08/14 00:00:00.000	1996	8	227	Aug

Insert / Update preview

Dim_customer

Table input → Insert / update

Table input

- Step name: Table input
- Connection: northwind

SQL

```
SELECT
  CustomerID
, CompanyName
, City
, Country
FROM northwind.Customers
```

Line 1 Column 0

- Store column info in step meta data ☐
- Enable lazy conversion ☐
- Replace variables in script? ☐
- Insert data from step
- Execute for each row? ☐
- Limit size: 0

Table input transformation

#	CustomerID	CompanyName	City	Country
1	ALFKI	Alfreds Futterkiste	Berlin	Germany
2	ANATR	Ana Trujillo Emparedados y helados	Mxico D.F.	Mexico
3	ANTON	Antonio Moreno Taquera	Mxico D.F.	Mexico
4	AROUT	Around the Horn	London	UK
5	BERGS	Berglunds snabbkp	Lule	Sweden
6	BLAUS	Blauer See Delikatessen	Mannheim	Germany
7	BLONP	Blondesddsl pre et fils	Strasbourg	France
8	BOLID	Blido Comidas preparadas	Madrid	Spain
9	BONAP	Bon app'	Marseille	France
10	BOTTM	Bottom-Dollar Markets	Tsawassen	Canada
11	BSBEV	B's Beverages	London	UK
12	CACTU	Cactus Comidas para llevar	Buenos Aires	Argentina
13	CENTC	Centro comercial Moctezuma	Mxico D.F.	Mexico
14	CHOPS	Chop-suey Chinese	Bern	Switzerland
15	COMMI	Comrcio Mineiro	Sao Paulo	Brazil
16	CONSH	Consolidated Holdings	London	UK
17	DRACD	Drachenblut Delikatessen	Aachen	Germany
18	DUMON	Du monde entier	Nantes	France
19	EASTC	Eastern Connection	London	UK
20	ERNSH	Ernst Handel	Graz	Austria
21	FAMIA	Familia Arquibaldo	Sao Paulo	Brazil
22	FISSA	FISSA Fabrica Inter. Salchichas S.A.	Madrid	Spain
23	FOLIG	Folies gourmandes	Lille	France
24	FOLKO	Folk och f HB	Brcke	Sweden
25	FRANK	Frankenversand	Mnchen	Germany
26	FRANR	France restauration	Nantes	France
27	FRANS	Franchi S.p.A.	Torino	Italy
28	FURIB	Furia Bacalhau e Frutos do Mar	Lisboa	Portugal
29	GALED	Galera del gastrnomo	Barcelona	Spain
30	GODOS	Godos Cocina Tpica	Sevilla	Spain
31	GOURL	Gourmet Lanchonetes	Campinas	Brazil
32	GREAL	Great Lakes Food Market	Eugene	USA
33	GROSR	GROSELLA-Restaurante	Caracas	Venezuela
34	HANAR	Hanari Carnes	Rio de Janeiro	Brazil

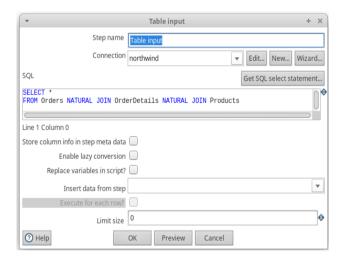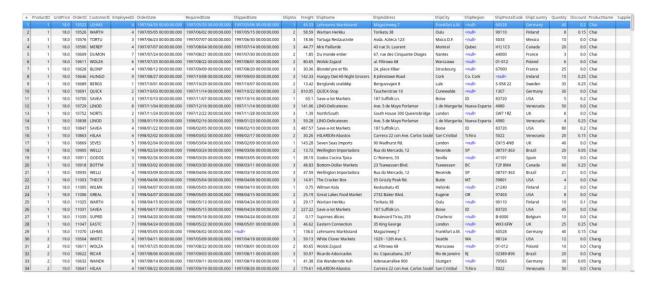Table input preview

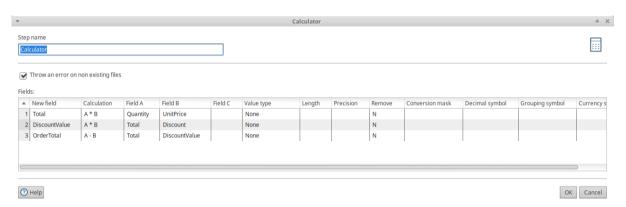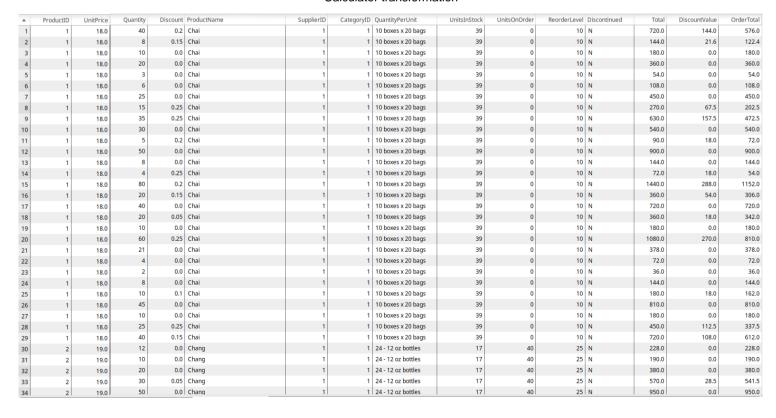Insert / update transformation

Insert / update preview

Fact_order

Table input transformation

Table input preview

Calculator transformation

Calculator preview (the most
relevant columns)

Database lookup transformation

Database lookup preview

Insert / update

Step name: Insert / update
Connection: northwind_dw
Target schema: northwind_dw
Target table: fact_order
Commit size: 100
Don't perform any updates: ☐

The key(s) to look up the value(s):

	Table field	Comparator	Stream field1	Stream field2
1	OrderID	=	OrderID	
2	ProductNumber	=	ProductNumber	

Get fields

Update fields:

	Table field	Stream field	Update
1	OrderID	OrderID	Y
2	CustomerID	CustomerID	Y
3	Time_id	OrderDate	Y
4	UnitPrice	UnitPrice	Y
5	Quantity	Quantity	Y
6	Discount	Discount	Y
7	OrderTotal	OrderTotal	Y
8	ProductNumber	ProductNumber	Y
9	SupplierID	SupplierID	Y
10	ShipperID	ShipVia	Y

Get update fields
Edit mapping

Help   OK   Cancel   SQL

Insert / update transformation

	ProductID	UnitPrice	Quantity	Discount	ProductName	SupplierID	CategoryID	QuantityPerUnit	UnitsInStock	UnitsOnOrder	ReorderLevel	Discontinued	Total	DiscountValue	OrderTotal	ProductNumber
1	1	18.0	40	0.2	Chai	1	1	10 boxes x 20 bags	39	0	10	N	720.0	144.0	576.0	1
2	1	18.0	8	0.15	Chai	1	1	10 boxes x 20 bags	39	0	10	N	144.0	21.6	122.4	1
3	1	18.0	10	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	180.0	0.0	180.0	1
4	1	18.0	20	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	360.0	0.0	360.0	1
5	1	18.0	3	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	54.0	0.0	54.0	1
6	1	18.0	6	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	108.0	0.0	108.0	1
7	1	18.0	25	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	450.0	0.0	450.0	1
8	1	18.0	15	0.25	Chai	1	1	10 boxes x 20 bags	39	0	10	N	270.0	67.5	202.5	1
9	1	18.0	35	0.25	Chai	1	1	10 boxes x 20 bags	39	0	10	N	630.0	157.5	472.5	1
10	1	18.0	30	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	540.0	0.0	540.0	1
11	1	18.0	5	0.2	Chai	1	1	10 boxes x 20 bags	39	0	10	N	90.0	18.0	72.0	1
12	1	18.0	50	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	900.0	0.0	900.0	1
13	1	18.0	8	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	144.0	0.0	144.0	1
14	1	18.0	4	0.25	Chai	1	1	10 boxes x 20 bags	39	0	10	N	72.0	18.0	54.0	1
15	1	18.0	80	0.2	Chai	1	1	10 boxes x 20 bags	39	0	10	N	1440.0	288.0	1152.0	1
16	1	18.0	20	0.15	Chai	1	1	10 boxes x 20 bags	39	0	10	N	360.0	54.0	306.0	1
17	1	18.0	40	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	720.0	0.0	720.0	1
18	1	18.0	20	0.05	Chai	1	1	10 boxes x 20 bags	39	0	10	N	360.0	18.0	342.0	1
19	1	18.0	10	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	180.0	0.0	180.0	1
20	1	18.0	60	0.25	Chai	1	1	10 boxes x 20 bags	39	0	10	N	1080.0	270.0	810.0	1
21	1	18.0	21	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	378.0	0.0	378.0	1
22	1	18.0	4	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	72.0	0.0	72.0	1
23	1	18.0	2	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	36.0	0.0	36.0	1
24	1	18.0	8	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	144.0	0.0	144.0	1
25	1	18.0	10	0.1	Chai	1	1	10 boxes x 20 bags	39	0	10	N	180.0	18.0	162.0	1
26	1	18.0	45	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	810.0	0.0	810.0	1
27	1	18.0	10	0.0	Chai	1	1	10 boxes x 20 bags	39	0	10	N	180.0	0.0	180.0	1
28	1	18.0	25	0.25	Chai	1	1	10 boxes x 20 bags	39	0	10	N	450.0	112.5	337.5	1
29	1	18.0	40	0.15	Chai	1	1	10 boxes x 20 bags	39	0	10	N	720.0	108.0	612.0	1
30	2	19.0	12	0.0	Chang	1	1	24 - 12 oz bottles	17	40	25	N	228.0	0.0	228.0	2
31	2	19.0	10	0.0	Chang	1	1	24 - 12 oz bottles	17	40	25	N	190.0	0.0	190.0	2
32	2	19.0	20	0.0	Chang	1	1	24 - 12 oz bottles	17	40	25	N	380.0	0.0	380.0	2
33	2	19.0	30	0.05	Chang	1	1	24 - 12 oz bottles	17	40	25	N	570.0	28.5	541.5	2
34	2	19.0	50	0.0	Chang	1	1	24 - 12 oz bottles	17	40	25	N	950.0	0.0	950.0	2

Insert / update preview (the most relevant columns)

3)

```xml
▼<Schema name="northwind_dw">
  ▼<Cube name="Orders" visible="true" cache="true" enabled="true">
      <Table name="fact_order"> </Table>
    ▼<Dimension type="StandardDimension" visible="true" foreignKey="CustomerID" name="Customer">
      ▼<Hierarchy name="Customer Hierarchy" visible="true" hasAll="true" allMemberName="All Customers" primaryKey="CustomerID">
          <Table name="dim_customer"> </Table>
          <Level name="Country" visible="true" column="Country" type="String" uniqueMembers="false" levelType="Regular"> </Level>
          <Level name="City" visible="true" column="City" type="String" uniqueMembers="false" levelType="Regular"> </Level>
          <Level name="Company Name" visible="true" column="CompanyName" type="String" uniqueMembers="false" levelType="Regular"> </Level>
        </Hierarchy>
      </Dimension>
    ▼<Dimension type="StandardDimension" visible="true" foreignKey="ProductNumber" name="Product">
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        </Hierarchy>
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        </Hierarchy>
      </Dimension>
    ▼<Dimension type="TimeDimension" visible="true" foreignKey="Time_id" name="Time">
      ▼<Hierarchy name="Time hierarchy" visible="true" hasAll="true" allMemberName="All Years" primaryKey="Time_id">
          <Table name="dim_time"> </Table>
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          <Level name="Month" visible="true" column="Month_name" ordinalColumn="Month_id" type="String" uniqueMembers="false" levelType="TimeMonths"> </Level>
          <Level name="Day" visible="true" column="Day" type="Integer" uniqueMembers="false" levelType="TimeDays"> </Level>
        </Hierarchy>
      </Dimension>
      <Measure name="Sales" column="OrderTotal" datatype="Numeric" formatString="$ #,###.00" aggregator="sum" visible="true"> </Measure>
      <Measure name="Quantity" column="Quantity" datatype="Integer" formatString="#,###" aggregator="sum" visible="true"> </Measure>
    </Cube>
  </Schema>
```

XML code for the cube definition

4)

a)

```
1  SELECT {Time.Year.Members} ON COLUMNS,
2      ORDER(DESCENDANTS(Customer.AllMembers, Customer.Country, SELF_AND_BEFORE), Measures.Sales,
   DESC) ON ROWS
3  FROM [Orders]
4  WHERE Measures.Sales
```

3, 13

Info: 17:23 / 5 x 24 / 0.01s

(All)	Country	1996	1997	1998
All Customers		$ 175.00	$ 475,588.00	$ 441,601.97
	USA	-	$ 89,727.20	$ 92,786.42
	Germany	-	$ 104,062.10	$ 77,624.25
	Austria	-	$ 46,172.60	$ 45,146.40
	Brazil	-	$ 31,467.40	$ 44,949.75
	France	$ 175.00	$ 31,357.45	$ 18,769.00
	Sweden	-	$ 25,479.00	$ 20,480.20
	UK	-	$ 19,932.30	$ 22,696.00
	Ireland	-	$ 19,070.60	$ 20,416.40
	Venezuela	-	$ 18,274.45	$ 20,751.90
	Canada	-	$ 16,255.35	$ 11,539.00
	Switzerland	-	$ 16,293.50	$ 9,196.85
	Belgium	-	$ 5,350.00	$ 16,094.90
	Mexico	-	$ 13,133.65	$ 4,576.00
	Denmark	-	$ 11,498.45	$ 4,526.60
	Spain	-	$ 6,647.80	$ 8,044.70
	Italy	-	$ 5,374.90	$ 6,875.80
	Finland	-	$ 9,338.30	$ 2,253.00
	Argentina	-	$ 1,066.00	$ 6,318.00
	Portugal	-	$ 3,163.95	$ 2,693.80
	Norway	-	$ 709.00	$ 3,977.00
	Poland	-	$ 1,214.00	$ 1,886.00

Country with most sales: USA

Year with most sales: 1997

Pair country-year with most sales: Germany 1997

b)

```
1  SELECT {Time.Year.Members} ON COLUMNS,
2      ORDER(DESCENDANTS(Product.AllMembers, Product.Category, SELF_AND_BEFORE), Measures.Sales,
   DESC) ON ROWS
3  FROM [Orders]
4  WHERE Measures.Sales
```

3, 13

Info: 17:30 / 5 x 11 / 0.03s

(All)	Category	1996	1997	1998
All products		$ 175.00	$ 475,588.00	$ 441,601.97
	Beverages	-	$ 68,836.00	$ 116,505.40
	Dairy Products	$ 175.00	$ 90,410.90	$ 78,570.27
	Confections	-	$ 62,580.05	$ 54,863.19
	Meat/Poultry	-	$ 63,534.60	$ 53,280.25
	Seafood	-	$ 59,748.15	$ 44,990.68
	Produce	-	$ 45,914.15	$ 31,215.36
	Condiments	-	$ 41,720.00	$ 32,804.15
	Grains/Cereals	-	$ 42,844.15	$ 29,372.67

Category with most sales: Beverages

Year with most sales: 1997

Pair category-year with most sales: Beverages 1998

c)

```
1  SELECT {Time.Year.Members} ON COLUMNS,
2      ORDER(DESCENDANTS(Shipper.AllMembers, Shipper.[Company Name], SELF_AND_BEFORE), Measures.Quantity, DESC) ON ROWS
3  FROM Orders
4  WHERE Measures.Quantity
```

4, 23

(All)	Company Name	1996	1997	1998
All shippers		5	18,922	16,247
	United Package	-	6,354	7,345
	Speedy Express	-	6,601	5,003
	Federal Shipping	5	5,967	3,899

Company with most quantity: United Package

Year with most quantity: 1997

Pair company-year with most quantity: United Package 1998

d)

Country	Beverages Quantity	Condiments Quantity	Confections Quantity	Dairy Products Quantity	Grains/Cereals Quantity	Meat/Poultry Quantity	Produce Quantity	Seafood Quantity
Argentina	82	45	39	54	20		21	28
Austria	794	411	351	700	430	223	254	406
Belgium	198	87	179	145	80	49	40	76
Brazil	727	406	369	395	285	134	54	544
Canada	164	201	218	250	161	6	44	53
Denmark	49	139	64	42	15	110	100	178
Finland	62	50	59	118	80	18	43	88
France	386	242	296	242	160	89	193	364
Germany	1,187	643	1,260	1,190	487	326	391	1,041
Ireland	103	95	36	267	50	203	73	292
Italy	74	60	48	140	68	30	55	86
Mexico	222	55	79	214	30	69	23	43
Norway	33	18	17			5	12	28
Poland	71	22	27	15		3	22	
Portugal	30	85	46	2	26	10		24
Spain	66	31	75	19	78	114	40	54
Sweden	411	202	214	123	140	129	214	294
Switzerland	132	52	113	152	190	106	36	182
UK	247	180	188	460	195	111	158	244
USA	1,232	382	1,203	1,098	578	793	224	1,368
Venezuela	399	61	295	380	244	20	95	506

Export Provided By Saiku Analytics Community Edition(http://meteorite.bi)

Measures ▼
Quantity

Columns ▼
Product hierarchy
Category

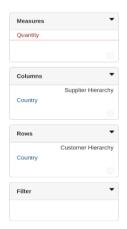**Rows** ▼
Customer Hierarchy
Country

Filter ▼

Pairs of country category with no sales at all: (Argentina, Meat/Poultry); (Norway – Dairy Products); (Norway – Grains/Cereals); (Poland – Grains/Cereals); (Poland – Seafood); (Portugal – Produce);

e)

Saiku Export - 03/11/2021 19:57

Country	Australia Quantity	Brazil Quantity	Canada Quantity	Denmark Quantity	Finland Quantity	France Quantity	Germany Quantity	Italy Quantity	Japan Quantity	Netherlands Quantity	Norway Quantity	Singapore Quantity	Spain Quantity	UK Quantity	USA Quantity
Argentina	13		10	3	12	4	43	32	5		10	7	30	31	79
Austria	448	255	351	27	72	445	443	252	189		191	65	101	157	486
Belgium	62	12	49	15	6	120	143	61	36		40	68		126	116
Brazil	318	130	98	74	147	321	394	190	175	60	112	141	44	239	383
Canada	70	60	89			165	93	133	53		30	27	20	199	118
Denmark	99	25	170			18	130	24	43					44	114
Finland	17	20	13	40	20	65	13	80	70		10	12	19	52	63
France	349	30	112	21	70	38	164	168	120	38	76	86	45	142	450
Germany	561	73	322	162	252	897	907	291	285	66	255	336	145	886	805
Ireland	75				35	134	241	125	138		50	20	40	15	240
Italy	78	10	10	4	28	16	30	116	5	5	20			15	154
Mexico	91	25	10	21		64	60	45	15	15	68	96	77	64	84
Norway	28	8				8	33					9		2	25
Poland	2	12	37			15	30		20					41	3
Portugal	40				10	2	10	12	24	6		54			65
Spain	144	12	44	20	14	19	70		15	5		4		66	36
Sweden	216	6	93	25	86	136	268	96	44	121	32	70		116	304
Switzerland	248		21	30	22	30	148	153	64		91	28		80	16
UK	183		105	43	44	100	51	231	72	25	125	36	65	203	313
USA	842	97	524	276	233	497	682	522	447	66	372	163	175	858	703
Venezuela	182	39	20	70	125	159	313	222	88		72	40	50	176	306

Export Provided By Saiku Analytics Community Edition(http://meteorite.bi)

Measures ▼
Quantity

Columns ▼
Supplier Hierarchy
Country

Rows ▼
Customer Hierarchy
Country

Filter ▼

Pairs of countries with no quantities being shipped between them:

(Brazil – Argentina); (Brazil – Ireland); (Brazil – Portugal); (Brazil – Switzerland); (Brazil – UK);
(Canada – Ireland); (Canada – Norway); (Canada – Portugal);
(Denmark – Canada); (Denmark – Denmark); (Denmark – Ireland); (Denmark – Norway); (Denmark – Portugal);
(Finland – Canada); (Finland – Denmark); (Finland – Mexico); (Finland – Norway); (Finland – Poland);
(Italy – Norway); (Italy – Poland); (Italy – Spain);
(Japan -Norway);
(Netherlands - Argentina); (Netherlands - Austria); (Netherlands - Belgium); (Netherlands - Canada);
(Netherlands - Denmark); (Netherlands - Finland); (Netherlands - Ireland); (Netherlands - Norway);
(Netherlands - Poland); (Netherlands - Switzerland); (Netherlands - Venezuela);
(Norway – Denmark); (Norway – Norway); (Norway – Poland); (Norway – Portugal); (Norway – Spain);
(Singapore – Denmark); (Singapore – Italy); (Singapore – Poland);
(Spain – Belgium); (Spain – Denmark); (Spain – Italy); (Spain – Norway); (Spain – Poland); (Spain – Portugal); (Spain – Spain); (Spain – Sweden); (Spain – Switzerland);
(UK – Portugal);

f)

Measures ▼

Quantity

Columns ▼

Product hierarchy

Category

Rows ▼

Shipper Hierarchy

Company Name

Filter ▼

Category	Beverages	Condiments	Confections	Dairy Products	Grains/Cereals	Meat/Poultry	Produce	Seafood
Company Name	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity
Federal Shipping	1,860	1,117	1,592	1,429	854	775	722	1,522
Speedy Express	2,213	1,282	1,714	2,339	1,038	591	457	1,970
United Package	2,596	1,068	1,870	2,238	1,425	1,182	913	2,407

Pairs of category shipper with no quantity at all: None