# Project Report

# Data Analysis and Integration – 2022/2023

**Group:** 2

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## Contents

# Data Warehouse SQL

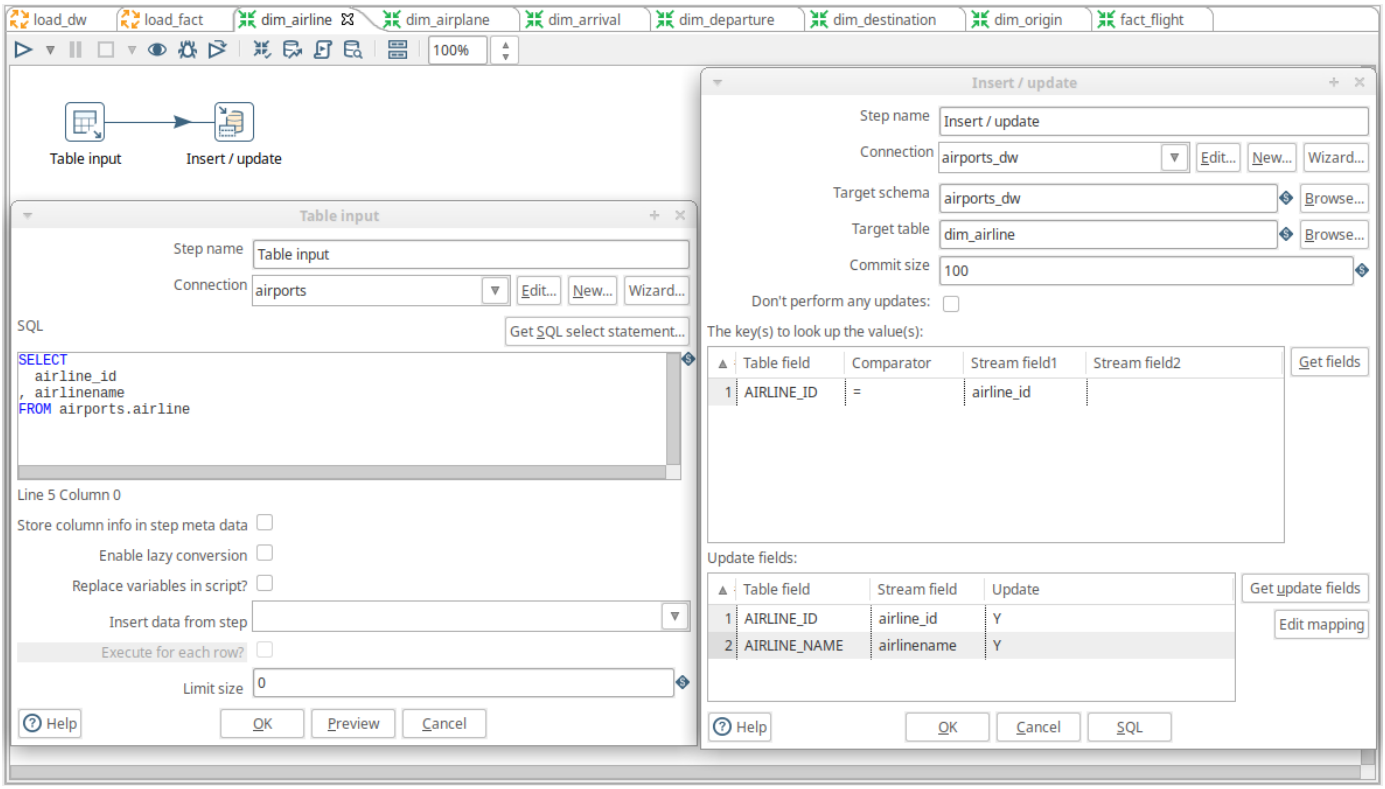
*airports_dw.sql*

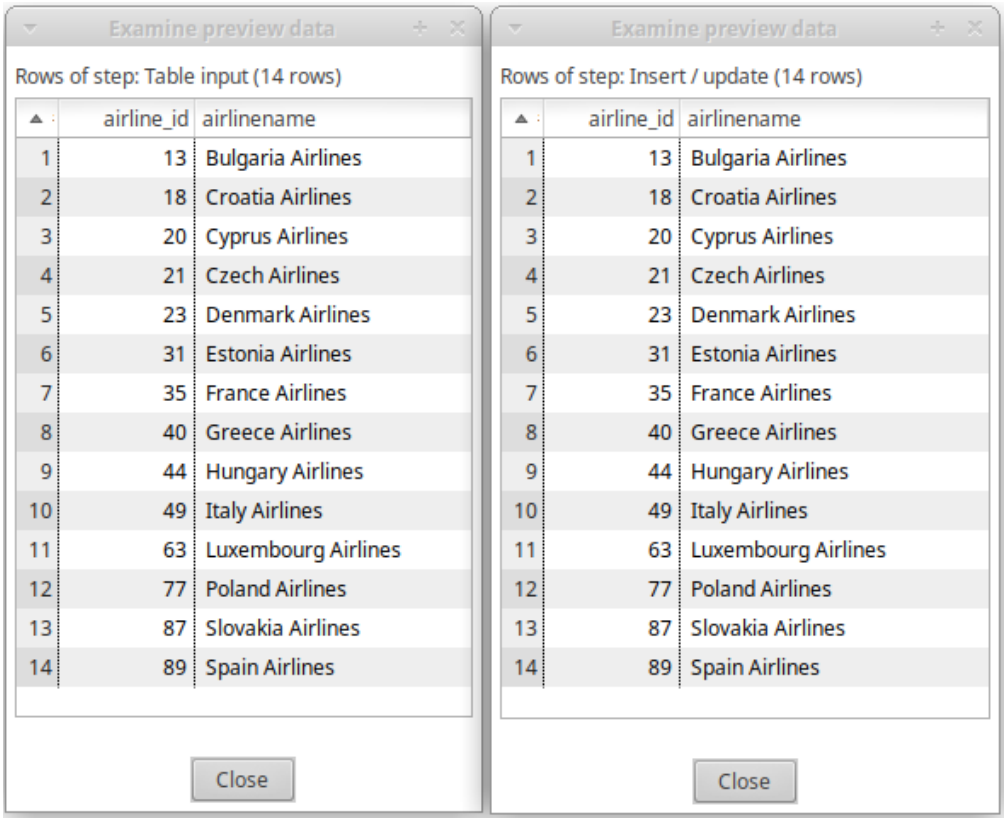
```sql
DROP DATABASE IF EXISTS airports_dw;

CREATE DATABASE airports_dw;

USE airports_dw;


CREATE TABLE dim_airport (
    AIRPORT_ID INT,
    AIRPORT_NAME VARCHAR(255),
    CITY VARCHAR(255),
    COUNTRY VARCHAR(255),
    PRIMARY KEY (AIRPORT_ID)
);

CREATE TABLE dim_departure (
    TIME_ID DATETIME,
    YEAR_ID INT,
    MONTH_ID INT,
    MONTH_NAME VARCHAR(255),
    DAY_ID INT,
    PRIMARY KEY (TIME_ID)
);

CREATE TABLE dim_arrival (
    TIME_ID DATETIME,
    YEAR_ID INT,
    MONTH_ID INT,
    MONTH_NAME VARCHAR(255),
    DAY_ID INT,
    PRIMARY KEY (TIME_ID)
);

CREATE TABLE dim_airplane (
    AIRPLANE_ID INT,
    AIRPLANE_TYPE INT,
    PRIMARY KEY (AIRPLANE_ID)
);


CREATE TABLE dim_airline (
    AIRLINE_ID INT,
    AIRLINE_NAME VARCHAR(255),
    PRIMARY KEY (AIRLINE_ID)
```

```
);

CREATE TABLE fact_flight (
    FLIGHT_ID INT,
    TOTALBOOKINGS INT,
    REVENUE DECIMAL(65,2),
    AIRLINE_ID INT,
    AIRPLANE_ID INT,
    ORIGIN_ID INT,
    DESTINATION_ID INT,
    DEPARTURE DATETIME,
    ARRIVAL DATETIME,
    PRIMARY KEY (FLIGHT_ID),
    FOREIGN KEY (AIRLINE_ID) REFERENCES dim_airline (AIRLINE_ID),
    FOREIGN KEY (AIRPLANE_ID) REFERENCES dim_airplane (AIRPLANE_ID),
    FOREIGN KEY (ORIGIN_ID) REFERENCES dim_airport (AIRPORT_ID),
    FOREIGN KEY (DESTINATION_ID) REFERENCES dim_airport (AIRPORT_ID),
    FOREIGN KEY (DEPARTURE) REFERENCES dim_departure (TIME_ID),
    FOREIGN KEY (ARRIVAL) REFERENCES dim_arrival (TIME_ID)
)
```

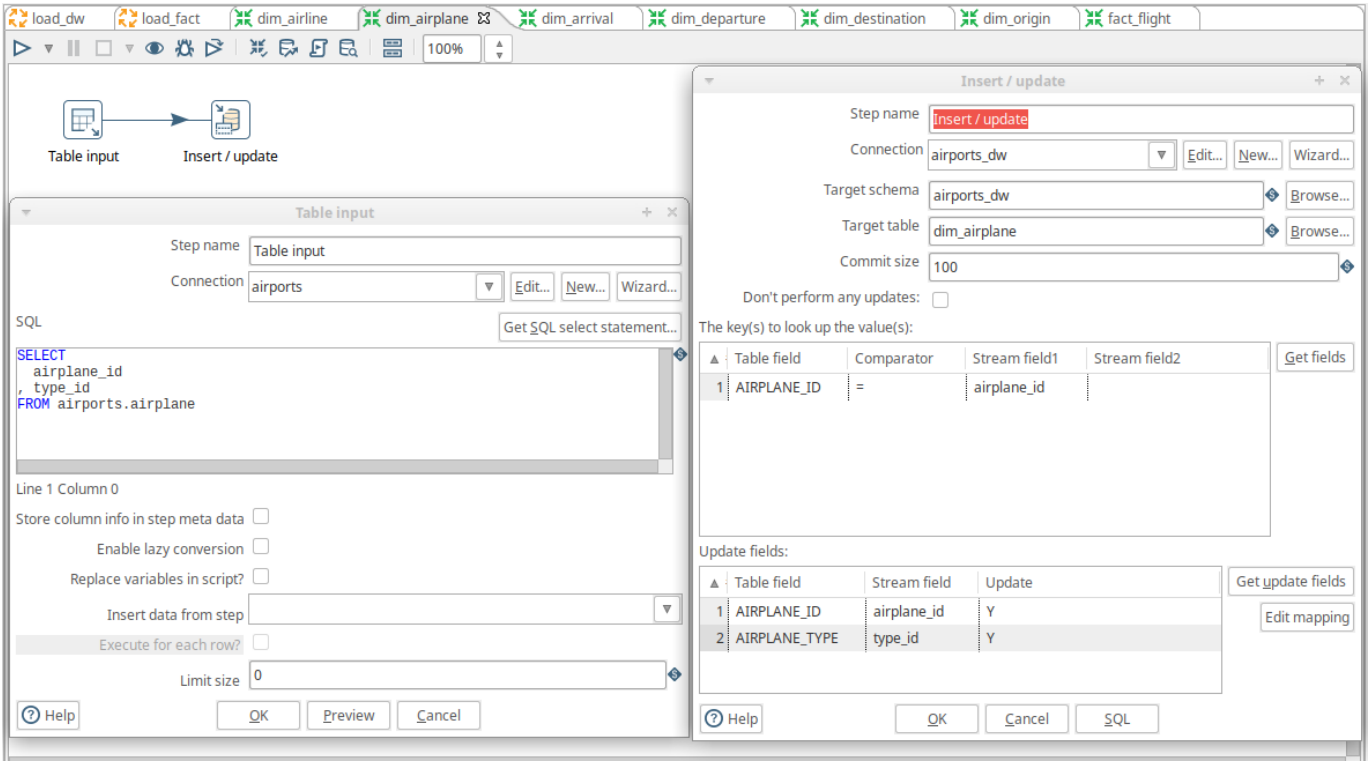
# Transformations

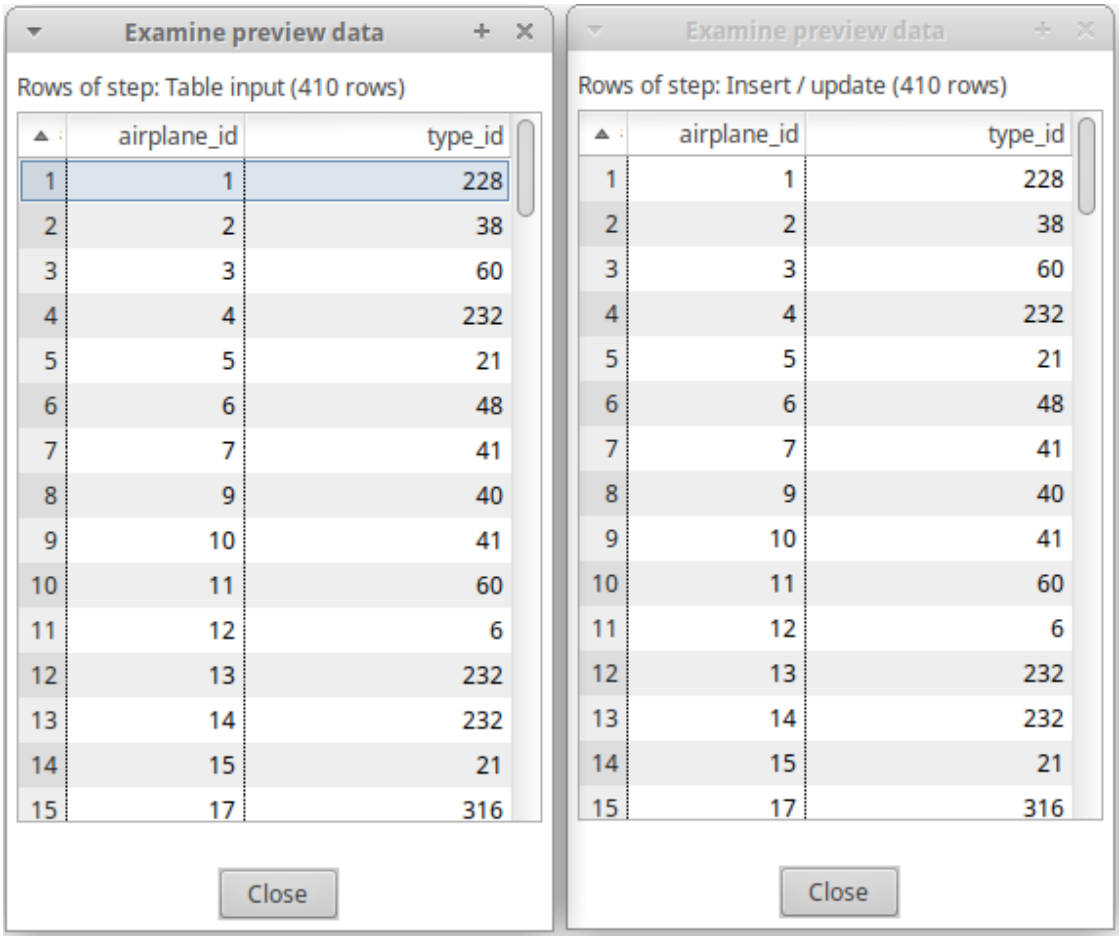
*dim_airline*



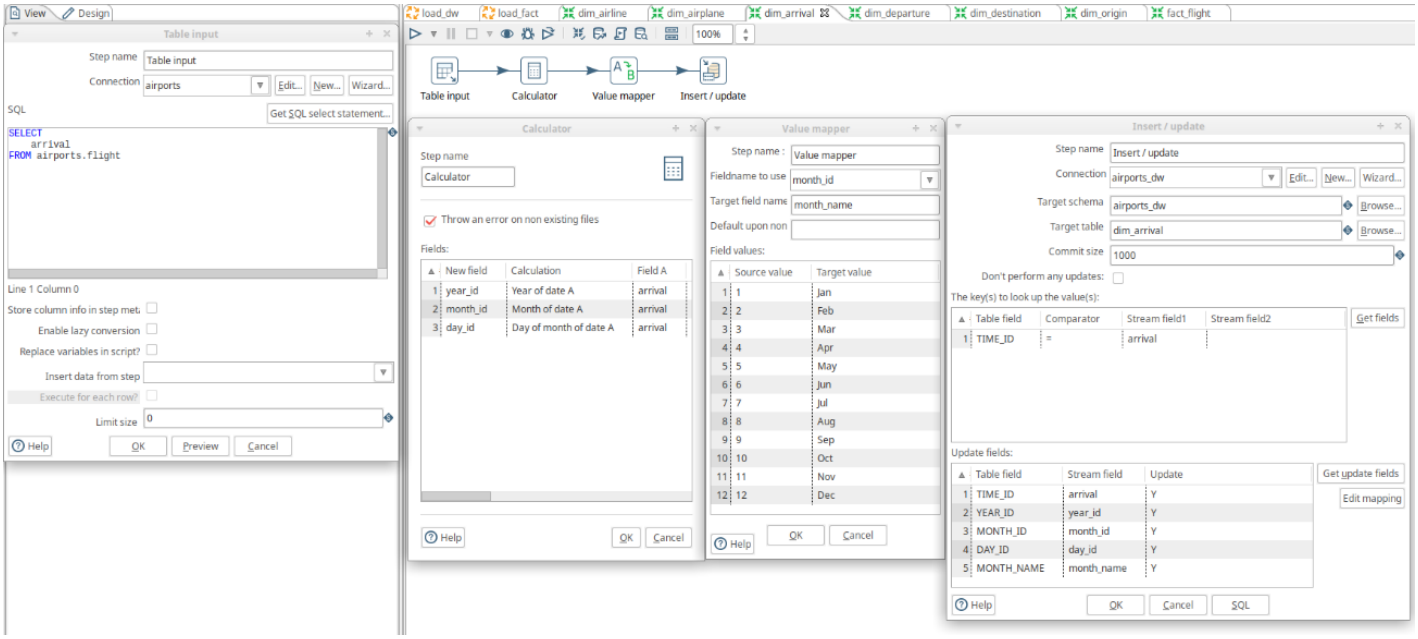



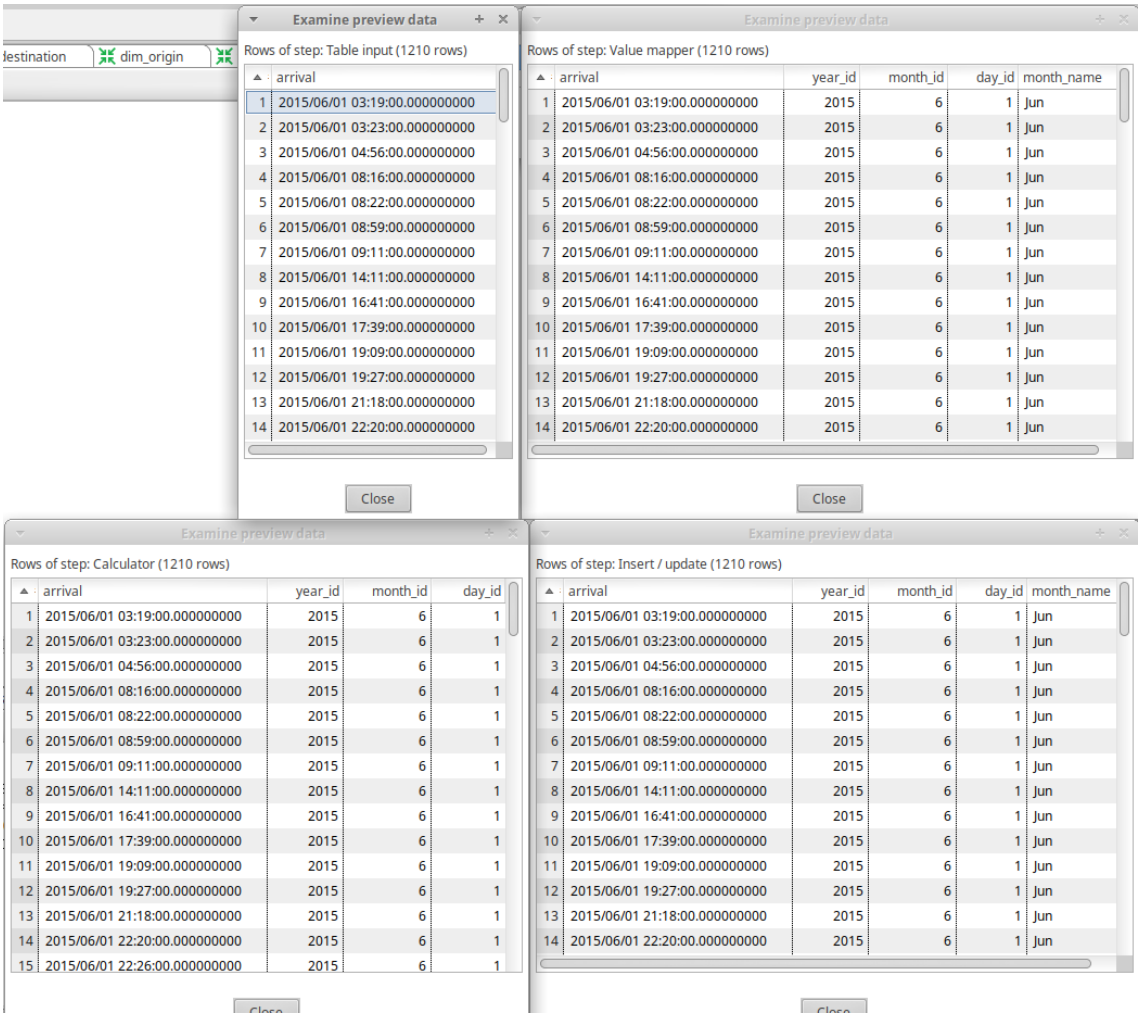
*dim_airplane*



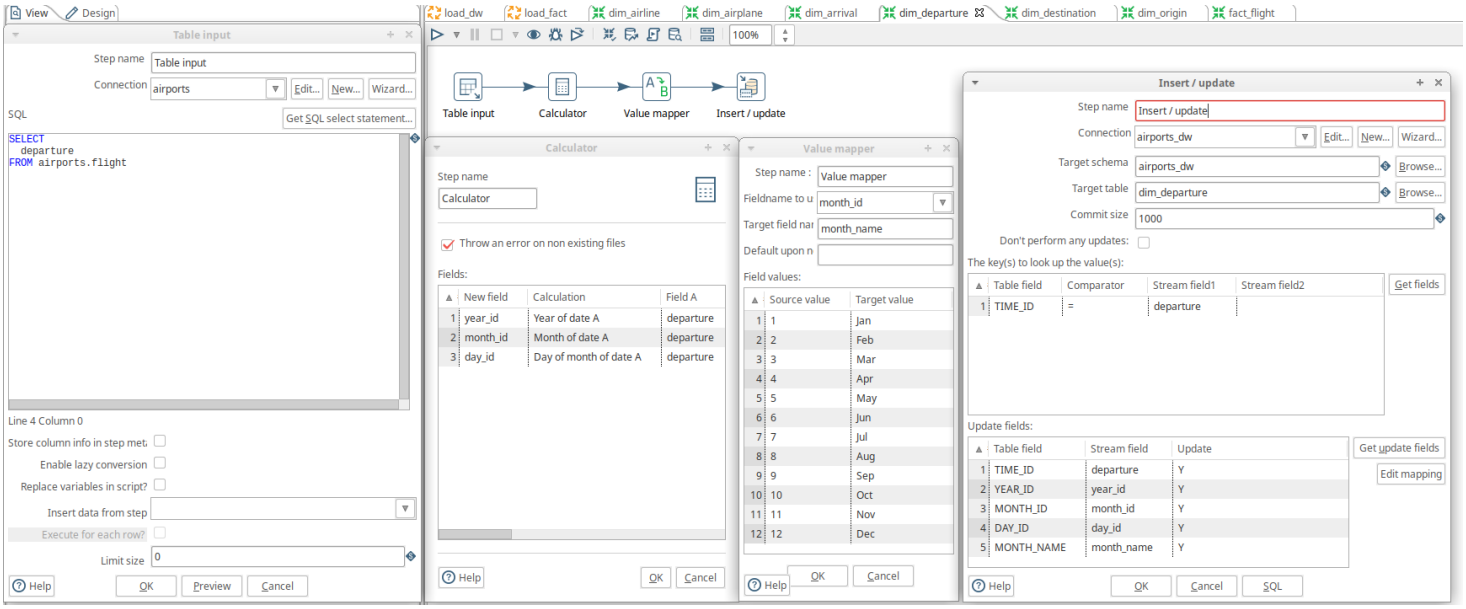



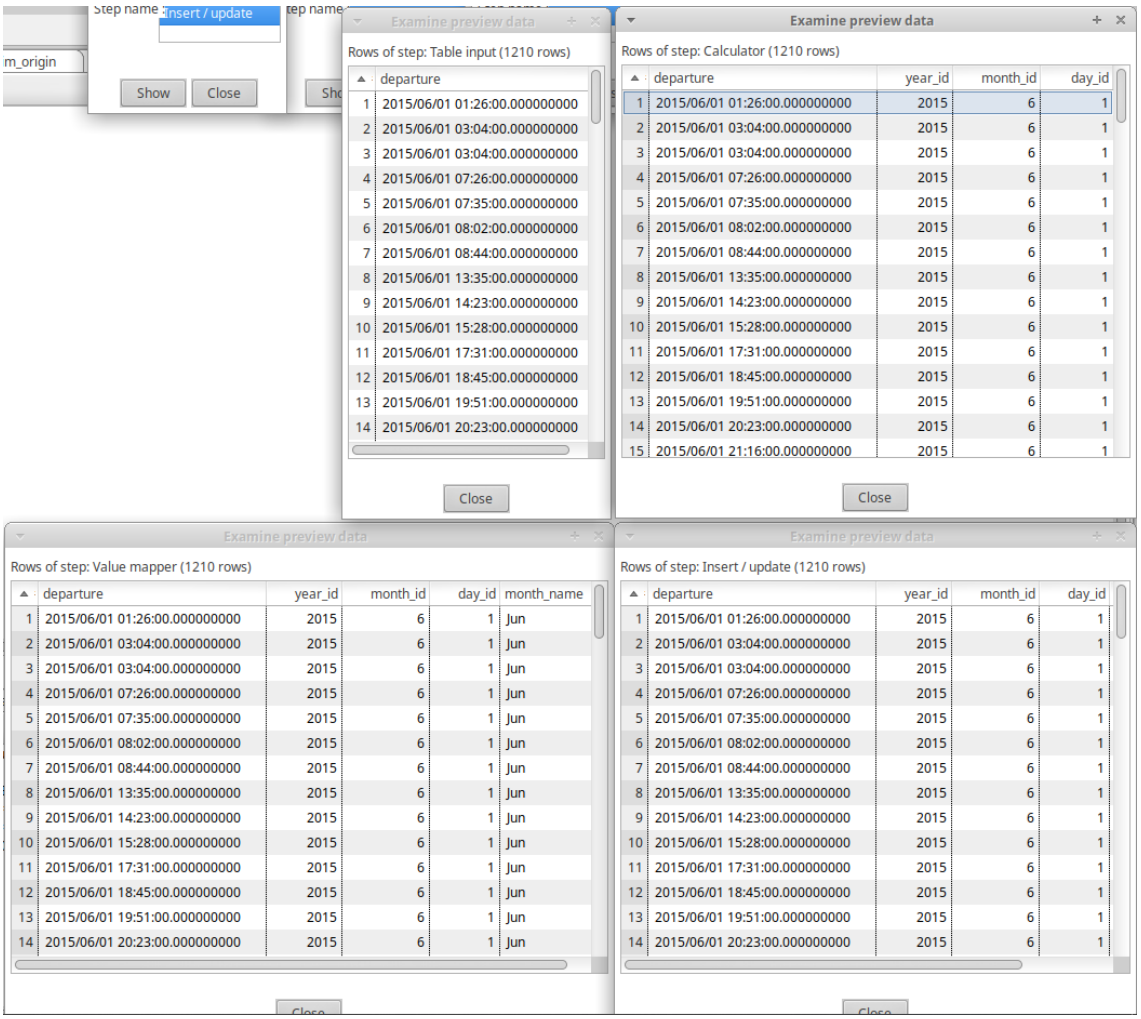
*dim_arrival*


load_dw
load_fact
dim_airline
dim_airplane
dim_arrival
dim_departure
dim_destination
dim_origin
fact_flight
Table input
Calculator
Value mapper
Insert / update
SELECT
arrival
FROM airports.flight
Step name
Connection
airports
Get SQL select statement...
Limit size
Preview
Cancel
Throw an error on non existing files
Fields:
New field
Calculation
Field A
year_id
Year of date A
month_id
Month of date A
day_id
Day of month of date A
Fieldname to use
Target field name
Default upon non
Field values:
Source value
Target value
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Target schema
Target table
dim_arrival
Commit size
1000
Don't perform any updates:
The key(s) to look up the value(s):
Table field
Comparator
Stream field1
Stream field2
TIME_ID
arrival
Get fields
Update fields:
Stream field
Update
YEAR_ID
MONTH_ID
DAY_ID
MONTH_NAME
Get update fields
Edit mapping
SQL


Examine preview data
Rows of step: Table input (1210 rows)
Rows of step: Value mapper (1210 rows)
Rows of step: Calculator (1210 rows)
Rows of step: Insert / update (1210 rows)
arrival
year_id
month_id
day_id
month_name
2015/06/01 03:19:00.000000000
2015/06/01 03:23:00.000000000
2015/06/01 04:56:00.000000000
2015/06/01 08:16:00.000000000
2015/06/01 08:22:00.000000000
2015/06/01 08:59:00.000000000
2015/06/01 09:11:00.000000000
2015/06/01 14:11:00.000000000
2015/06/01 16:41:00.000000000
2015/06/01 17:39:00.000000000
2015/06/01 19:09:00.000000000
2015/06/01 19:27:00.000000000
2015/06/01 21:18:00.000000000
2015/06/01 22:20:00.000000000
2015/06/01 22:26:00.000000000
2015
6
1
Jun
Close

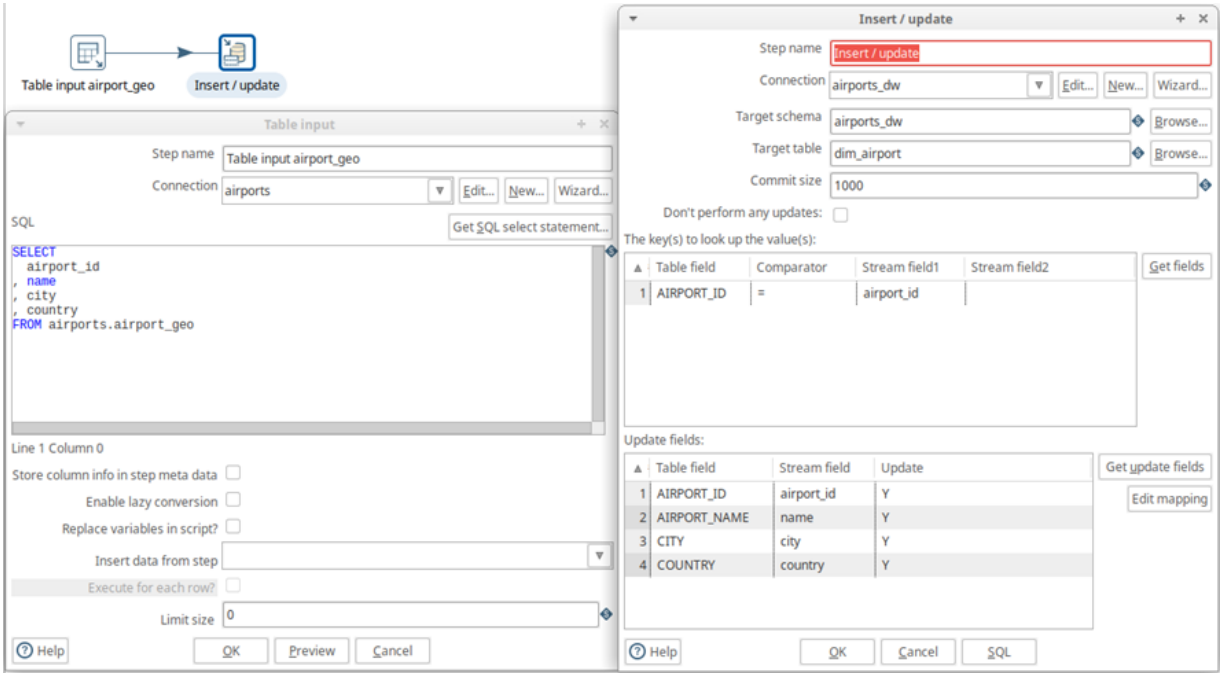
## *dim_departure*

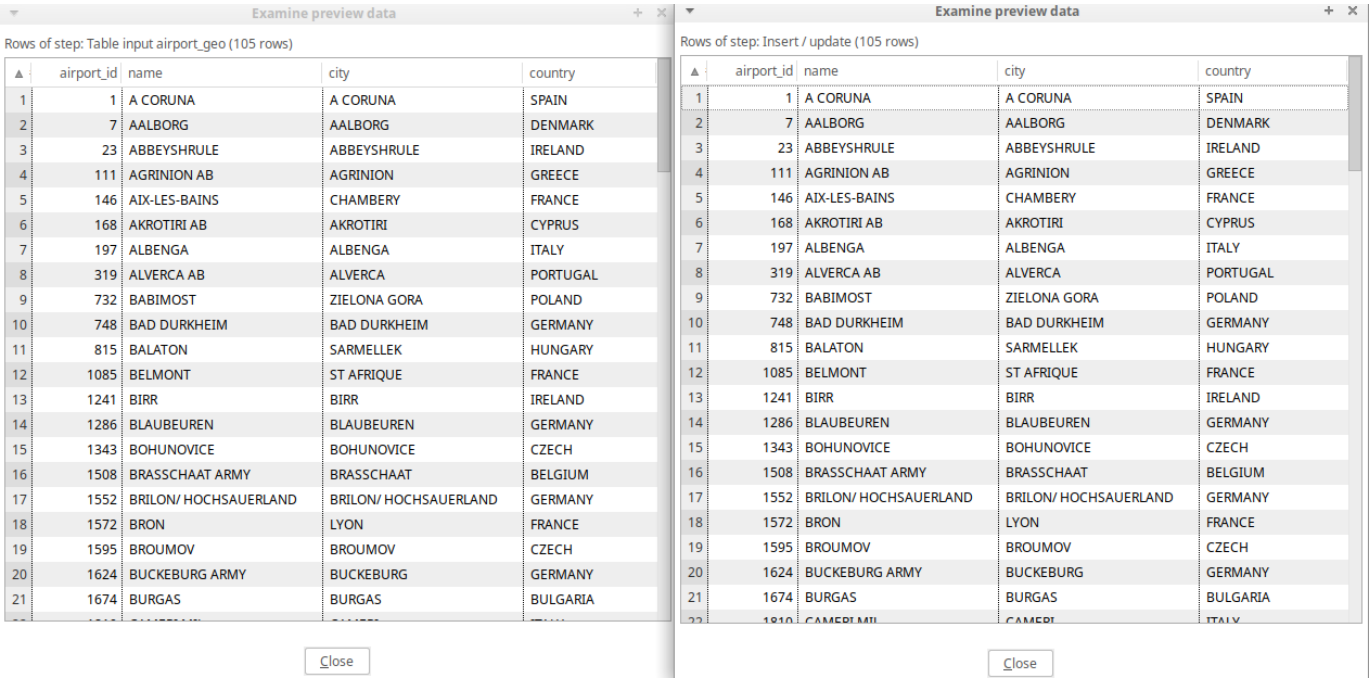


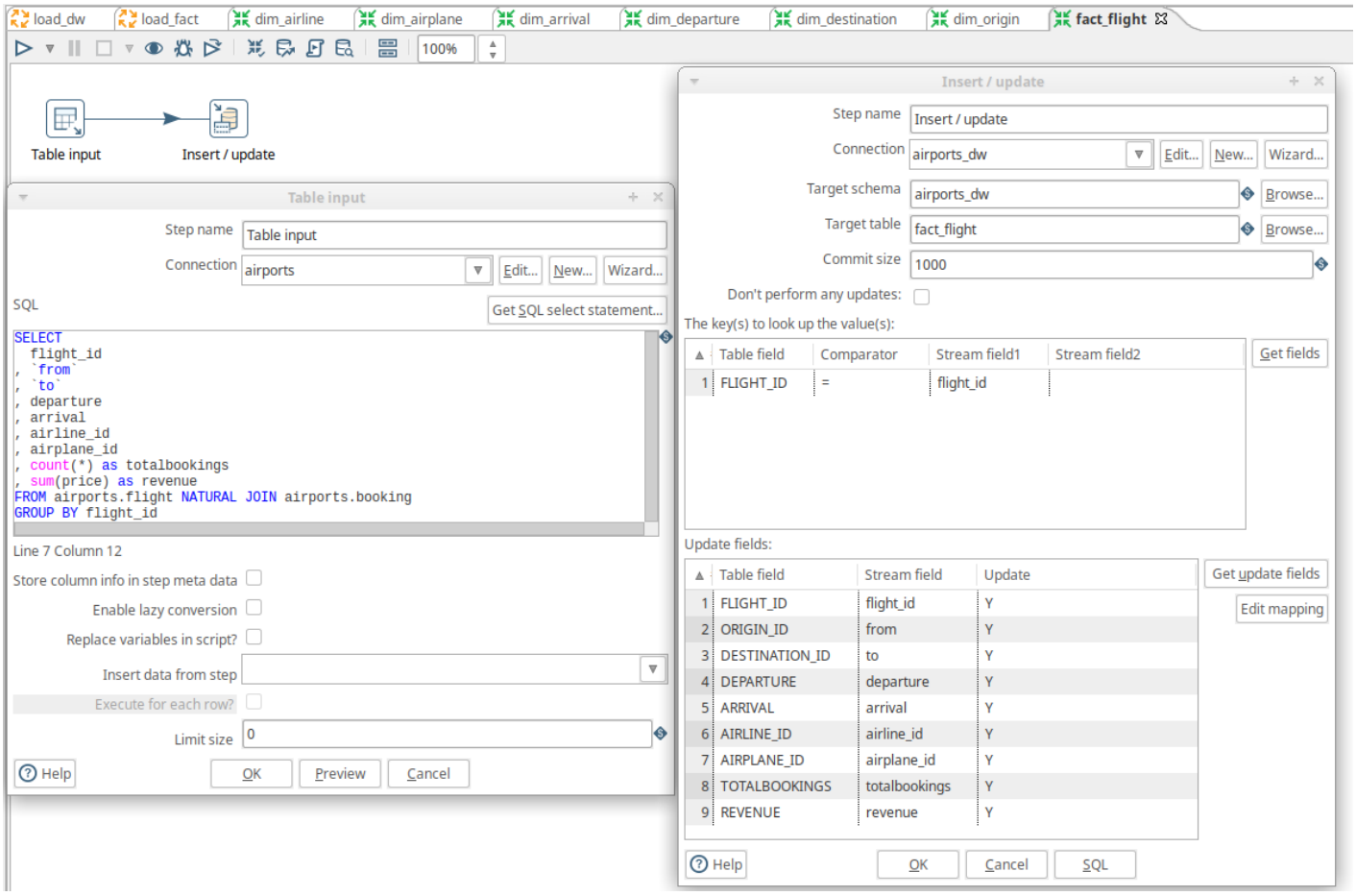
*dim_airport*

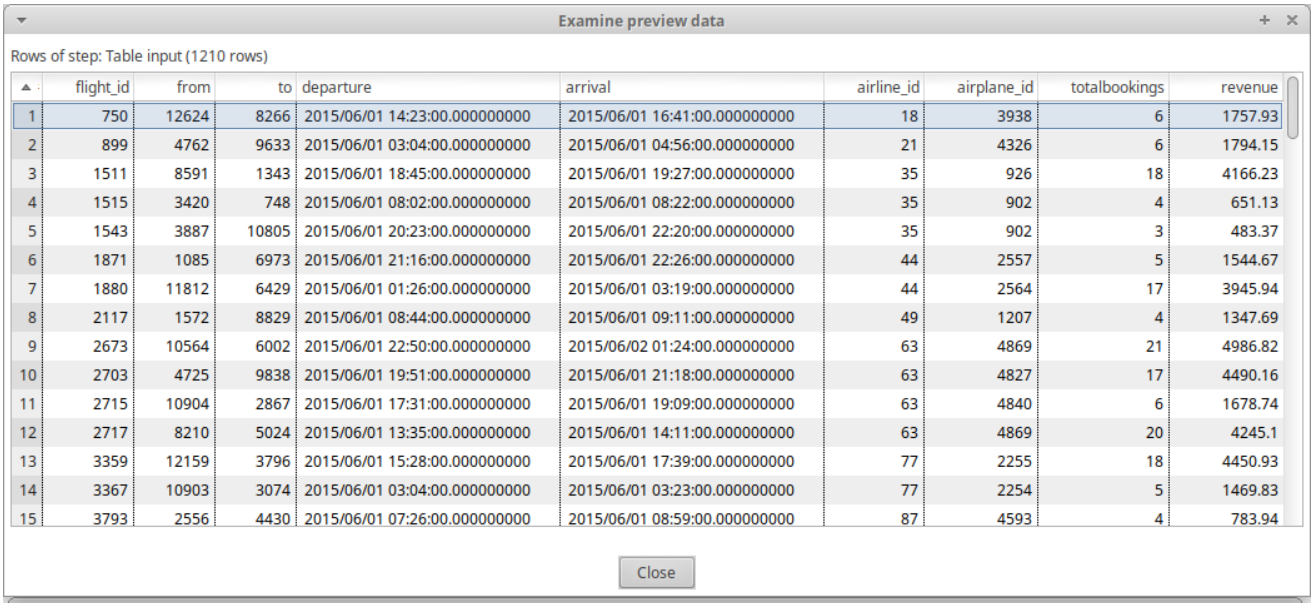
(note: dim_origin and dim_destination were replaced by dim_airport)



*fact_flight*


load_dw
load_fact
dim_airline
dim_airplane
dim_arrival
dim_departure
dim_destination
dim_origin
fact_flight
100%
Table input
Insert / update
Table input
Step name
Table input
Connection
airports
Edit...
New...
Wizard...
SQL
Get SQL select statement...
SELECT
flight_id
, `from`
, `to`
, departure
, arrival
, airline_id
, airplane_id
, count(*) as totalbookings
, sum(price) as revenue
FROM airports.flight NATURAL JOIN airports.booking
GROUP BY flight_id
Line 7 Column 12
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
Help
OK
Preview
Cancel
Insert / update
Step name
Insert / update
Connection
airports_dw
Edit...
New...
Wizard...
Target schema
airports_dw
Browse...
Target table
fact_flight
Browse...
Commit size
1000
Don't perform any updates:
The key(s) to look up the value(s):
Table field
Comparator
Stream field1
Stream field2
Get fields
1 FLIGHT_ID = flight_id
Update fields:
Table field
Stream field
Update
Get update fields
Edit mapping
1 FLIGHT_ID flight_id Y
2 ORIGIN_ID from Y
3 DESTINATION_ID to Y
4 DEPARTURE departure Y
5 ARRIVAL arrival Y
6 AIRLINE_ID airline_id Y
7 AIRPLANE_ID airplane_id Y
8 TOTALBOOKINGS totalbookings Y
9 REVENUE revenue Y
Help
OK
Cancel
SQL




Examine preview data

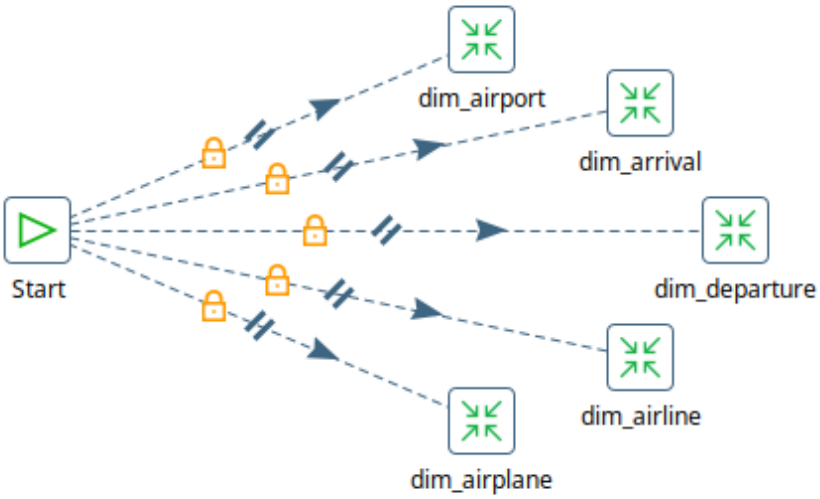
Rows of step: Insert / update (1210 rows)

| | flight_id | from | to | departure | arrival | airline_id | airplane_id | totalbookings | revenue |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 750 | 12624 | 8266 | 2015/06/01 14:23:00.000000000 | 2015/06/01 16:41:00.000000000 | 18 | 3938 | 6 | 1757.93 |
| 2 | 899 | 4762 | 9633 | 2015/06/01 03:04:00.000000000 | 2015/06/01 04:56:00.000000000 | 21 | 4326 | 6 | 1794.15 |
| 3 | 1511 | 8591 | 1343 | 2015/06/01 18:45:00.000000000 | 2015/06/01 19:27:00.000000000 | 35 | 926 | 18 | 4166.23 |
| 4 | 1515 | 3420 | 748 | 2015/06/01 08:02:00.000000000 | 2015/06/01 08:22:00.000000000 | 35 | 902 | 4 | 651.13 |
| 5 | 1543 | 3887 | 10805 | 2015/06/01 20:23:00.000000000 | 2015/06/01 22:20:00.000000000 | 35 | 902 | 3 | 483.37 |
| 6 | 1871 | 1085 | 6973 | 2015/06/01 21:16:00.000000000 | 2015/06/01 22:26:00.000000000 | 44 | 2557 | 5 | 1544.67 |
| 7 | 1880 | 11812 | 6429 | 2015/06/01 01:26:00.000000000 | 2015/06/01 03:19:00.000000000 | 44 | 2564 | 17 | 3945.94 |
| 8 | 2117 | 1572 | 8829 | 2015/06/01 08:44:00.000000000 | 2015/06/01 09:11:00.000000000 | 49 | 1207 | 4 | 1347.69 |
| 9 | 2673 | 10564 | 6002 | 2015/06/01 22:50:00.000000000 | 2015/06/02 01:24:00.000000000 | 63 | 4869 | 21 | 4986.82 |
| 10 | 2703 | 4725 | 9838 | 2015/06/01 19:51:00.000000000 | 2015/06/01 21:18:00.000000000 | 63 | 4827 | 17 | 4490.16 |
| 11 | 2715 | 10904 | 2867 | 2015/06/01 17:31:00.000000000 | 2015/06/01 19:09:00.000000000 | 63 | 4840 | 6 | 1678.74 |
| 12 | 2717 | 8210 | 5024 | 2015/06/01 13:35:00.000000000 | 2015/06/01 14:11:00.000000000 | 63 | 4869 | 20 | 4245.1 |
| 13 | 3359 | 12159 | 3796 | 2015/06/01 15:28:00.000000000 | 2015/06/01 17:39:00.000000000 | 77 | 2255 | 18 | 4450.93 |
| 14 | 3367 | 10903 | 3074 | 2015/06/01 03:04:00.000000000 | 2015/06/01 03:23:00.000000000 | 77 | 2254 | 5 | 1469.83 |
| 15 | 3793 | 2556 | 4430 | 2015/06/01 07:26:00.000000000 | 2015/06/01 08:59:00.000000000 | 87 | 4593 | 4 | 783.94 |

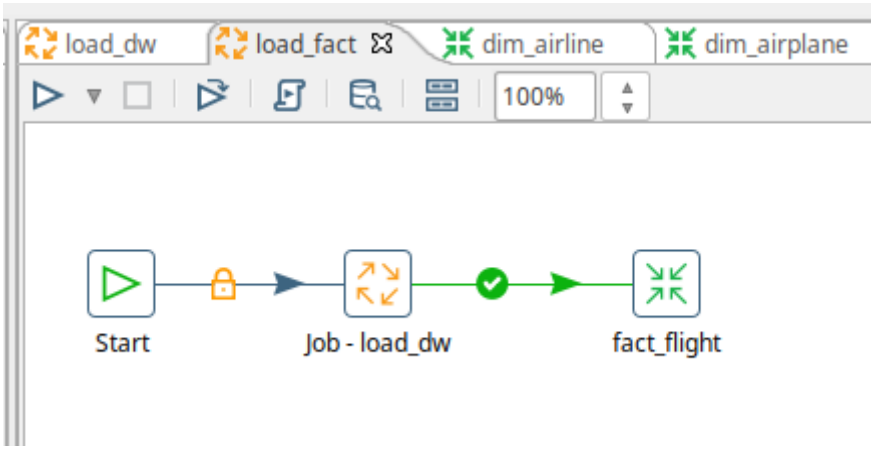
Close

## Jobs

*load_dw* – loads dimension in parallel




*load_fact* – loads fact_flight table after all dimensions loaded



## Cube Definition

```
<Schema name="airports_dw">
  <Cube name="Flights" visible="true" cache="true" enabled="true">
    <Table name="fact_flight">
    </Table>
    <Dimension type="StandardDimension" visible="true" foreignKey="ORIGIN_ID"
highCardinality="false" name="Origin">
      <Hierarchy name="Origin Hierarchy" visible="true" hasAll="true"
allMemberName="AllOrigins" primaryKey="AIRPORT_ID">
        <Table name="dim_airport">
        </Table>
        <Level name="Country" visible="true" column="COUNTRY" type="String"
uniqueMembers="false" levelType="Regular" hideMemberIf="Never">
        </Level>
        <Level name="City" visible="true" column="CITY" type="String"
uniqueMembers="false" levelType="Regular" hideMemberIf="Never">
        </Level>
        <Level name="Airport Name" visible="true" column="AIRPORT_NAME" type="String"
uniqueMembers="false" levelType="Regular" hideMemberIf="Never">
        </Level>
      </Hierarchy>
    </Dimension>
    <Dimension type="StandardDimension" visible="true" foreignKey="DESTINATION_ID"
highCardinality="false" name="Destination">
      <Hierarchy name="Destination Hierarchy" visible="true" hasAll="true"
allMemberName="All Destinations" primaryKey="AIRPORT_ID">
        <Table name="dim_airport">
        </Table>
        <Level name="Country" visible="true" column="COUNTRY" type="String"
uniqueMembers="false" levelType="Regular" hideMemberIf="Never">
        </Level>
        <Level name="City" visible="true" column="CITY" type="String"
uniqueMembers="false" levelType="Regular" hideMemberIf="Never">
        </Level>
        <Level name="Airport Name" visible="true" column="AIRPORT_NAME" type="String"
uniqueMembers="false" levelType="Regular" hideMemberIf="Never">
        </Level>
      </Hierarchy>
    </Dimension>
    <Dimension type="TimeDimension" visible="true" foreignKey="DEPARTURE"
highCardinality="false" name="Departure">
      <Hierarchy name="Departure Hierarchy" visible="true" hasAll="true"
allMemberName="All Departures" primaryKey="TIME_ID">
        <Table name="dim_departure">
        </Table>
        <Level name="Year" visible="true" column="YEAR_ID" type="Integer"
uniqueMembers="false" levelType="TimeYears" hideMemberIf="Never">
        </Level>
```

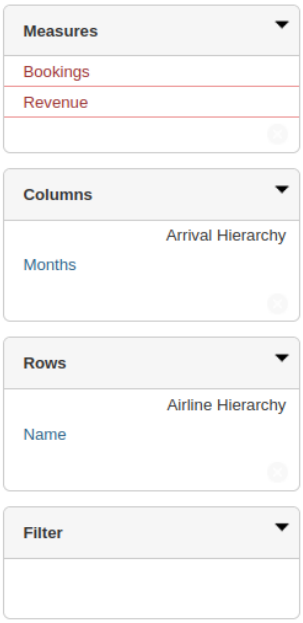
```
        <Level name="Months" visible="true" column="MONTH_NAME"
ordinalColumn="MONTH_ID" type="String" uniqueMembers="false" levelType="TimeMonths"
hideMemberIf="Never">
        </Level>
        <Level name="Days" visible="true" column="DAY_ID" type="Integer"
uniqueMembers="false" levelType="TimeDays" hideMemberIf="Never">
        </Level>
      </Hierarchy>
    </Dimension>
    <Dimension type="TimeDimension" visible="true" foreignKey="ARRIVAL"
highCardinality="false" name="Arrival">
      <Hierarchy name="Arrival Hierarchy" visible="true" hasAll="true"
allMemberName="All Arrivals" primaryKey="TIME_ID">
        <Table name="dim_arrival">
        </Table>
        <Level name="Year" visible="true" column="YEAR_ID" type="Integer"
uniqueMembers="false" levelType="TimeYears" hideMemberIf="Never">
        </Level>
        <Level name="Months" visible="true" column="MONTH_NAME"
ordinalColumn="MONTH_ID" type="String" uniqueMembers="false" levelType="TimeMonths"
hideMemberIf="Never">
        </Level>
        <Level name="Days" visible="true" column="DAY_ID" type="Integer"
uniqueMembers="false" levelType="TimeDays" hideMemberIf="Never">
        </Level>
      </Hierarchy>
    </Dimension>
    <Dimension type="StandardDimension" visible="true" foreignKey="AIRPLANE_ID"
highCardinality="false" name="Airplane">
      <Hierarchy name="Airplane Hierarchy" visible="true" hasAll="true"
allMemberName="All Airplanes" primaryKey="AIRPLANE_ID">
        <Table name="dim_airplane">
        </Table>
        <Level name="Type" visible="true" column="AIRPLANE_TYPE" type="Integer"
uniqueMembers="false" levelType="Regular" hideMemberIf="Never">
        </Level>
      </Hierarchy>
    </Dimension>
    <Dimension type="StandardDimension" visible="true" foreignKey="AIRLINE_ID"
highCardinality="false" name="Airlines">
      <Hierarchy name="Airline Hierarchy" visible="true" hasAll="true"
allMemberName="All Airlines" primaryKey="AIRLINE_ID">
        <Table name="dim_airline">
        </Table>
        <Level name="Name" visible="true" column="AIRLINE_NAME" type="String"
uniqueMembers="false" levelType="Regular" hideMemberIf="Never">
        </Level>
      </Hierarchy>
    </Dimension>
```

```
    <Measure name="Bookings" column="TOTALBOOKINGS" datatype="Integer"
formatString="#,###" aggregator="sum" visible="true">
    </Measure>
    <Measure name="Revenue" column="REVENUE" datatype="Integer" formatString="$
#,###.00" aggregator="sum" visible="true">
    </Measure>
  </Cube>
</Schema>
```

# Saiku Analysis

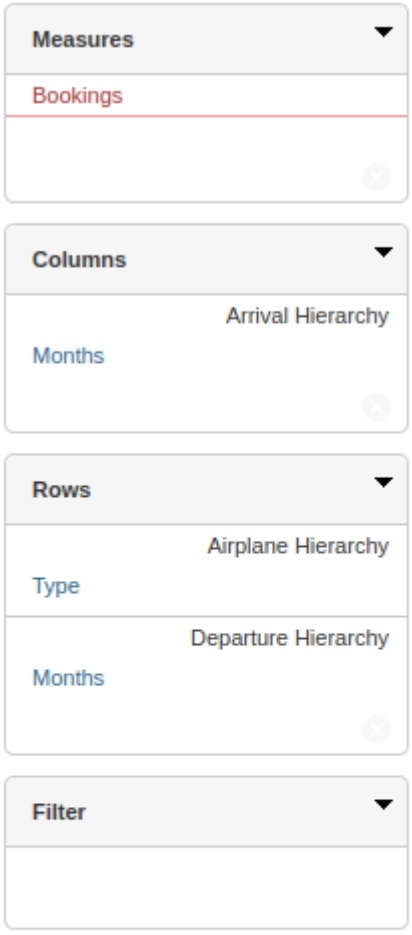
*airports.sql*

passengers and revenue by airline and month



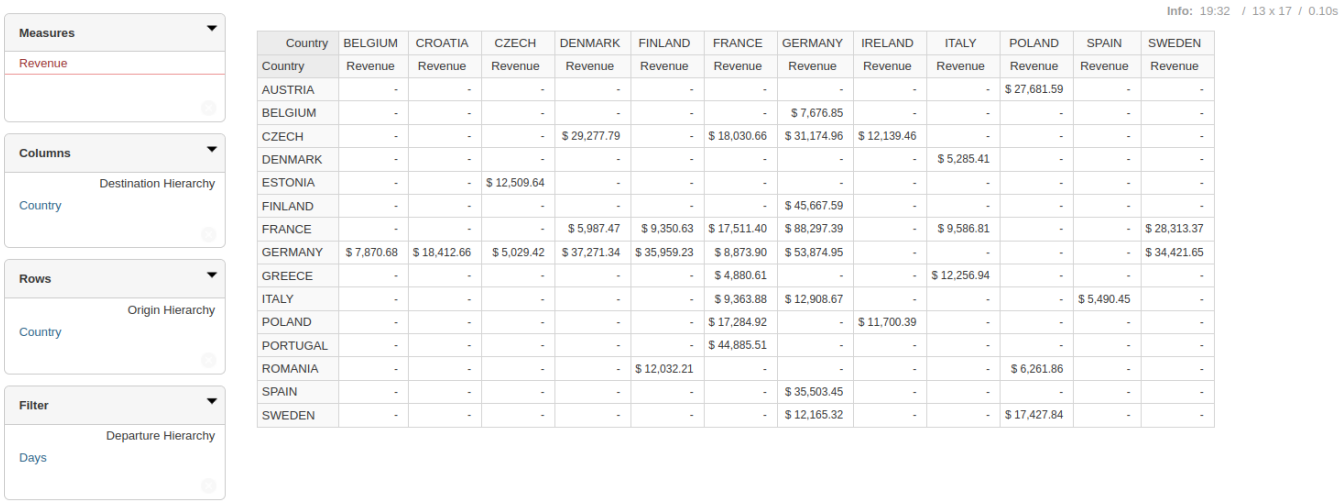

| Months | Jun | | Jul | | Aug | |
|---|---|---|---|---|---|---|
| Name | Bookings | Revenue | Bookings | Revenue | Bookings | Revenue |
| Bulgaria Airlines | 449 | $ 110,113.24 | 587 | $ 154,437.99 | - | - |
| Croatia Airlines | 436 | $ 109,007.19 | 489 | $ 122,529.28 | - | - |
| Cyprus Airlines | 291 | $ 76,905.68 | 379 | $ 98,558.57 | 10 | $ 2,127.63 |
| Czech Airlines | 372 | $ 98,762.85 | 426 | $ 103,871.69 | - | - |
| Denmark Airlines | 187 | $ 46,222.46 | 236 | $ 55,558.29 | - | - |
| Estonia Airlines | 405 | $ 107,981.78 | 530 | $ 133,757.98 | - | - |
| France Airlines | 772 | $ 191,586.52 | 752 | $ 191,868.27 | - | - |
| Greece Airlines | 204 | $ 50,663.94 | 179 | $ 47,767.02 | - | - |
| Hungary Airlines | 1,089 | $ 274,893.57 | 1,143 | $ 286,874.33 | - | - |
| Italy Airlines | 165 | $ 42,343.58 | 210 | $ 56,486.71 | - | - |
| Luxembourg Airlines | 1,262 | $ 314,355.07 | 1,204 | $ 308,794.45 | 18 | $ 4,498.30 |
| Poland Airlines | 552 | $ 138,618.84 | 598 | $ 146,253.93 | - | - |
| Slovakia Airlines | 341 | $ 82,589.22 | 369 | $ 91,144.70 | - | - |
| Spain Airlines | 181 | $ 44,725.48 | 149 | $ 37,702.61 | - | - |

airplane type and month of departure by month of arrival
(2 airplane types departed in July and arrived in August)




| | Months | Jun | Jul | Aug |
|---|---|---|---|---|
| Type | Months | Bookings | Bookings | Bookings |
| 6 | Jun | 1,354 | - | - |
| | Jul | - | 1,597 | - |
| 18 | Jun | 867 | - | - |
| | Jul | - | 931 | - |
| 21 | Jun | 885 | - | - |
| | Jul | - | 1,148 | - |
| 38 | Jun | 272 | - | - |
| | Jul | - | 219 | 10 |
| 40 | Jun | 129 | - | - |
| | Jul | - | 129 | - |
| 41 | Jun | 358 | - | - |
| | Jul | - | 343 | - |
| 48 | Jun | 328 | - | - |
| | Jul | - | 338 | - |
| 60 | Jun | 566 | - | - |
| | Jul | - | 731 | 18 |
| 75 | Jun | 135 | - | - |
| | Jul | - | 184 | - |
| 228 | Jun | 360 | - | - |
| | Jul | - | 361 | - |
| 232 | Jun | 129 | - | - |
| | Jul | - | 137 | - |
| 301 | Jun | 1,108 | - | - |
| | Jul | - | 976 | - |
| 316 | Jun | 215 | - | - |
| | Jul | - | 157 | - |

how much money spent/gained on flights between countries
(on the 10 days with highest revenue)

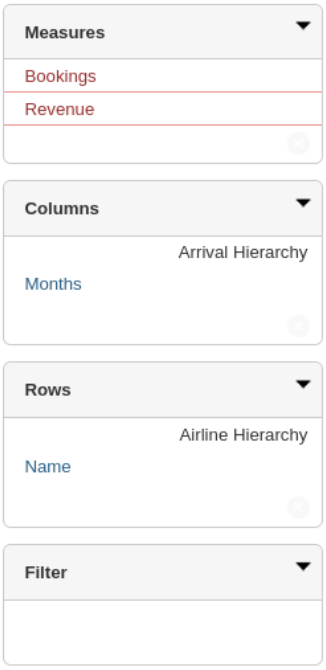



Info: 19:32 / 13 x 17 / 0.10s

| Country | BELGIUM | CROATIA | CZECH | DENMARK | FINLAND | FRANCE | GERMANY | IRELAND | ITALY | POLAND | SPAIN | SWEDEN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue |
| AUSTRIA | - | - | - | - | - | - | - | - | - | $ 27,681.59 | - | - |
| BELGIUM | - | - | - | - | - | - | $ 7,676.85 | - | - | - | - | - |
| CZECH | - | - | - | $ 29,277.79 | - | $ 18,030.66 | $ 31,174.96 | $ 12,139.46 | - | - | - | - |
| DENMARK | - | - | - | - | - | - | - | - | $ 5,285.41 | - | - | - |
| ESTONIA | - | - | $ 12,509.64 | - | - | - | - | - | - | - | - | - |
| FINLAND | - | - | - | - | - | - | $ 45,667.59 | - | - | - | - | - |
| FRANCE | - | - | - | $ 5,987.47 | $ 9,350.63 | $ 17,511.40 | $ 88,297.39 | - | $ 9,586.81 | - | - | $ 28,313.37 |
| GERMANY | $ 7,870.68 | $ 18,412.66 | $ 5,029.42 | $ 37,271.34 | $ 35,959.23 | $ 8,873.90 | $ 53,874.95 | - | - | - | - | $ 34,421.65 |
| GREECE | - | - | - | - | - | $ 4,880.61 | - | - | $ 12,256.94 | - | - | - |
| ITALY | - | - | - | - | - | $ 9,363.88 | $ 12,908.67 | - | - | - | $ 5,490.45 | - |
| POLAND | - | - | - | - | - | $ 17,284.92 | - | $ 11,700.39 | - | - | - | - |
| PORTUGAL | - | - | - | - | - | $ 44,885.51 | - | - | - | - | - | - |
| ROMANIA | - | - | - | - | $ 12,032.21 | - | - | - | - | $ 6,261.86 | - | - |
| SPAIN | - | - | - | - | - | - | $ 35,503.45 | - | - | - | - | - |
| SWEDEN | - | - | - | - | - | - | $ 12,165.32 | - | - | $ 17,427.84 | - | - |

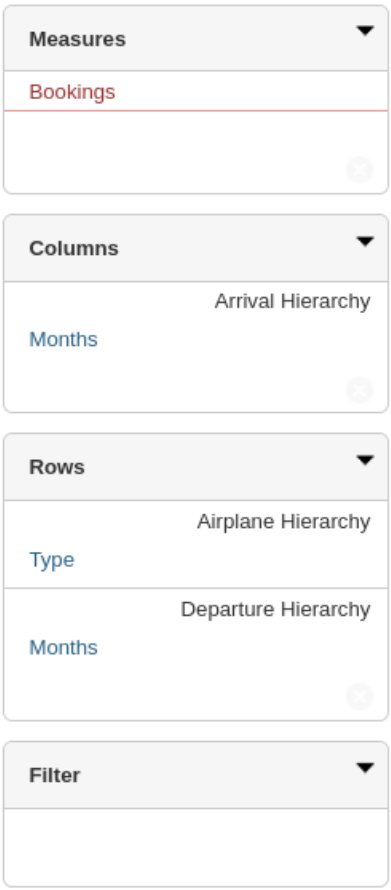
*airports-large.sql*

passengers and revenue by airline and month



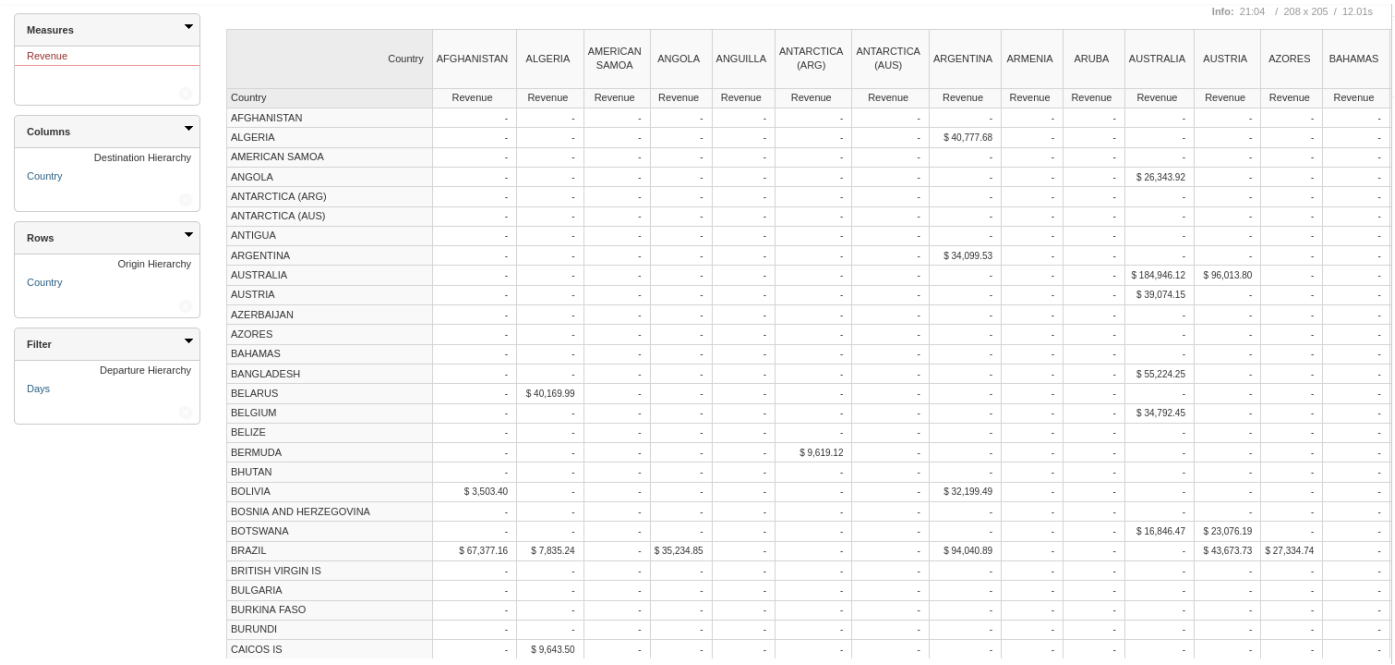

| Months | Jun | | Jul | | Aug | |
|---|---|---|---|---|---|---|
| Name | Bookings | Revenue | Bookings | Revenue | Bookings | Revenue |
| Afghanistan Airlines | 15,352 | $ 3,864,611.80 | 16,118 | $ 4,062,950.72 | 318 | $ 81,725.14 |
| Albania Airlines | 15,951 | $ 3,991,510.15 | 17,053 | $ 4,308,360.83 | 229 | $ 57,998.03 |
| American Samoa Airli | 11,252 | $ 2,824,533.49 | 12,546 | $ 3,134,302.87 | 102 | $ 23,804.54 |
| Angola Airlines | 13,650 | $ 3,425,851.18 | 14,893 | $ 3,740,791.82 | 126 | $ 31,979.18 |
| Argentina Airlines | 15,661 | $ 3,947,144.14 | 17,098 | $ 4,309,724.79 | 274 | $ 67,685.16 |
| Australia Airlines | 14,726 | $ 3,686,163.92 | 15,853 | $ 3,987,009.91 | 271 | $ 65,439.72 |
| Azerbaijan Airlines | 11,636 | $ 2,892,437.23 | 12,449 | $ 3,138,111.32 | 206 | $ 49,668.41 |
| Bahamas Airlines | 16,613 | $ 4,171,537.98 | 17,918 | $ 4,513,922.77 | 135 | $ 35,741.87 |
| Belarus Airlines | 13,546 | $ 3,412,206.46 | 14,084 | $ 3,524,337.33 | 199 | $ 52,043.62 |
| Bhutan Airlines | 16,876 | $ 4,217,204.21 | 18,143 | $ 4,561,337.77 | 337 | $ 88,020.20 |
| Bolivia Airlines | 10,035 | $ 2,514,974.14 | 10,310 | $ 2,578,467.28 | 141 | $ 31,541.84 |
| Brazil Airlines | 18,264 | $ 4,590,913.75 | 18,679 | $ 4,698,229.33 | 268 | $ 65,752.29 |
| Bulgaria Airlines | 14,355 | $ 3,615,409.70 | 15,065 | $ 3,805,913.52 | 204 | $ 51,009.91 |
| Caicos Is Airlines | 13,899 | $ 3,504,475.25 | 13,677 | $ 3,391,208.05 | 176 | $ 43,858.96 |
| Central African Rep | 15,935 | $ 4,004,911.42 | 16,829 | $ 4,224,236.25 | 191 | $ 50,894.75 |
| Chad Airlines | 13,582 | $ 3,411,597.28 | 14,500 | $ 3,635,622.05 | 345 | $ 83,324.37 |
| Colombia Airlines | 13,396 | $ 3,362,594.33 | 14,495 | $ 3,665,361.21 | 157 | $ 40,559.92 |
| Croatia Airlines | 17,832 | $ 4,461,904.52 | 18,804 | $ 4,689,909.55 | 216 | $ 52,837.11 |
| Cuba Airlines | 14,201 | $ 3,553,389.12 | 14,849 | $ 3,716,627.79 | 89 | $ 24,691.91 |
| Cyprus Airlines | 18,091 | $ 4,534,422.14 | 19,375 | $ 4,875,355.50 | 306 | $ 78,392.56 |
| Czech Airlines | 14,426 | $ 3,613,421.07 | 15,658 | $ 3,951,107.66 | 173 | $ 44,100.96 |
| Dakhla And Laayoune | 14,152 | $ 3,560,507.07 | 14,659 | $ 3,676,618.99 | 278 | $ 68,369.97 |
| Denmark Airlines | 12,515 | $ 3,159,702.20 | 13,695 | $ 3,420,967.75 | 222 | $ 57,921.59 |
| Djibouti Airlines | 14,562 | $ 3,627,921.07 | 15,373 | $ 3,861,495.67 | 229 | $ 53,245.86 |
| Dominica Airlines | 11,570 | $ 2,900,001.11 | 11,594 | $ 2,909,360.74 | 114 | $ 28,687.23 |
| Ecuador Airlines | 15,418 | $ 3,886,397.82 | 16,016 | $ 4,029,561.24 | 240 | $ 59,310.63 |

airplane type and month of departure by month of arrival
(2 airplane types departed in July and arrived in August)




| | Months | Jun | Jul | Aug |
|---|---|---|---|---|
| Type | Months | Bookings | Bookings | Bookings |
| 6 | Jun | 400,251 | 5,637 | - |
| | Jul | - | 403,462 | 5,273 |
| 18 | Jun | 235,757 | 3,324 | - |
| | Jul | - | 246,377 | 3,551 |
| 21 | Jun | 183,671 | 2,589 | - |
| | Jul | - | 189,362 | 2,534 |
| | Aug | - | - | 18 |
| 38 | Jun | 101,738 | 1,418 | - |
| | Jul | - | 106,392 | 1,701 |
| | Aug | - | - | 9 |
| 40 | Jun | 40,540 | 556 | - |
| | Jul | - | 41,693 | 512 |
| 41 | Jun | 58,249 | 770 | - |
| | Jul | - | 60,229 | 859 |
| 48 | Jun | 70,907 | 1,137 | - |
| | Jul | - | 73,456 | 968 |
| 60 | Jun | 220,202 | 3,451 | - |
| | Jul | - | 230,522 | 3,297 |
| | Aug | - | - | 18 |
| 75 | Jun | 50,143 | 700 | - |
| | Jul | - | 51,798 | 615 |
| | Aug | - | - | 11 |
| 228 | Jun | 78,211 | 963 | - |
| | Jul | - | 79,969 | 1,154 |
| 232 | Jun | 27,997 | 420 | - |
| | Jul | - | 28,914 | 427 |

how much money spent/gained on flights between countries
(on the 10 days with highest revenue)



Measures
Revenue

Columns
Destination Hierarchy
Country

Rows
Origin Hierarchy
Country

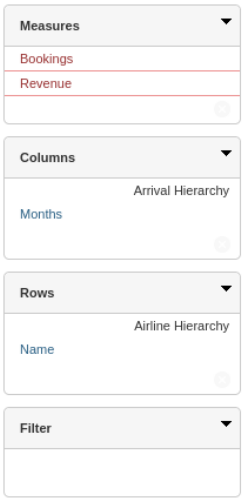
Filter
Departure Hierarchy
Days

Info: 21:04 / 208 x 205 / 12.01s

| Country | AFGHANISTAN | ALGERIA | AMERICAN SAMOA | ANGOLA | ANGUILLA | ANTARCTICA (ARG) | ANTARCTICA (AUS) | ARGENTINA | ARMENIA | ARUBA | AUSTRALIA | AUSTRIA | AZORES | BAHAMAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue |
| AFGHANISTAN | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ALGERIA | - | - | - | - | - | - | - | $ 40,777.68 | - | - | - | - | - | - |
| AMERICAN SAMOA | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ANGOLA | - | - | - | - | - | - | - | - | - | - | $ 26,343.92 | - | - | - |
| ANTARCTICA (ARG) | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ANTARCTICA (AUS) | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ANTIGUA | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ARGENTINA | - | - | - | - | - | - | - | $ 34,099.53 | - | - | - | - | - | - |
| AUSTRALIA | - | - | - | - | - | - | - | - | - | - | $ 184,946.12 | $ 96,013.80 | - | - |
| AUSTRIA | - | - | - | - | - | - | - | - | - | - | $ 39,074.15 | - | - | - |
| AZERBAIJAN | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| AZORES | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BAHAMAS | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BANGLADESH | - | - | - | - | - | - | - | - | - | - | $ 55,224.25 | - | - | - |
| BELARUS | - | $ 40,169.99 | - | - | - | - | - | - | - | - | - | - | - | - |
| BELGIUM | - | - | - | - | - | - | - | - | - | - | $ 34,792.45 | - | - | - |
| BELIZE | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BERMUDA | - | - | - | - | - | $ 9,619.12 | - | - | - | - | - | - | - | - |
| BHUTAN | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BOLIVIA | $ 3,503.40 | - | - | - | - | - | - | $ 32,199.49 | - | - | - | - | - | - |
| BOSNIA AND HERZEGOVINA | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BOTSWANA | - | - | - | - | - | - | - | - | - | - | $ 16,846.47 | $ 23,076.19 | - | - |
| BRAZIL | $ 67,377.16 | $ 7,835.24 | - | $ 35,234.85 | - | - | - | $ 94,040.89 | - | - | - | $ 43,673.73 | $ 27,334.74 | - |
| BRITISH VIRGIN IS | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BULGARIA | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BURKINA FASO | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BURUNDI | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CAICOS IS | - | $ 9,643.50 | - | - | - | - | - | - | - | - | - | - | - | - |

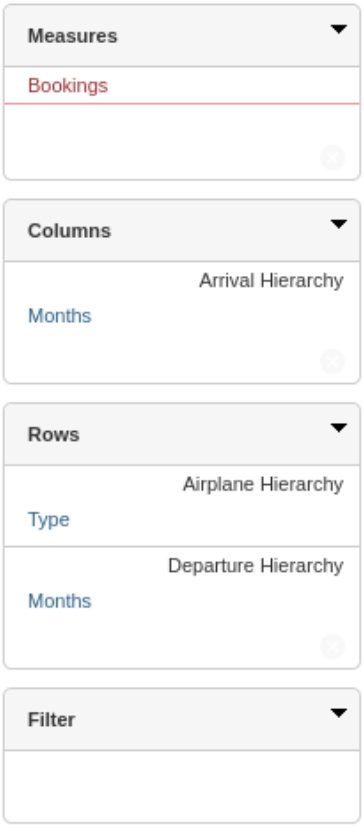
*airports-large-extra.sql*

passengers and revenue by airline and month



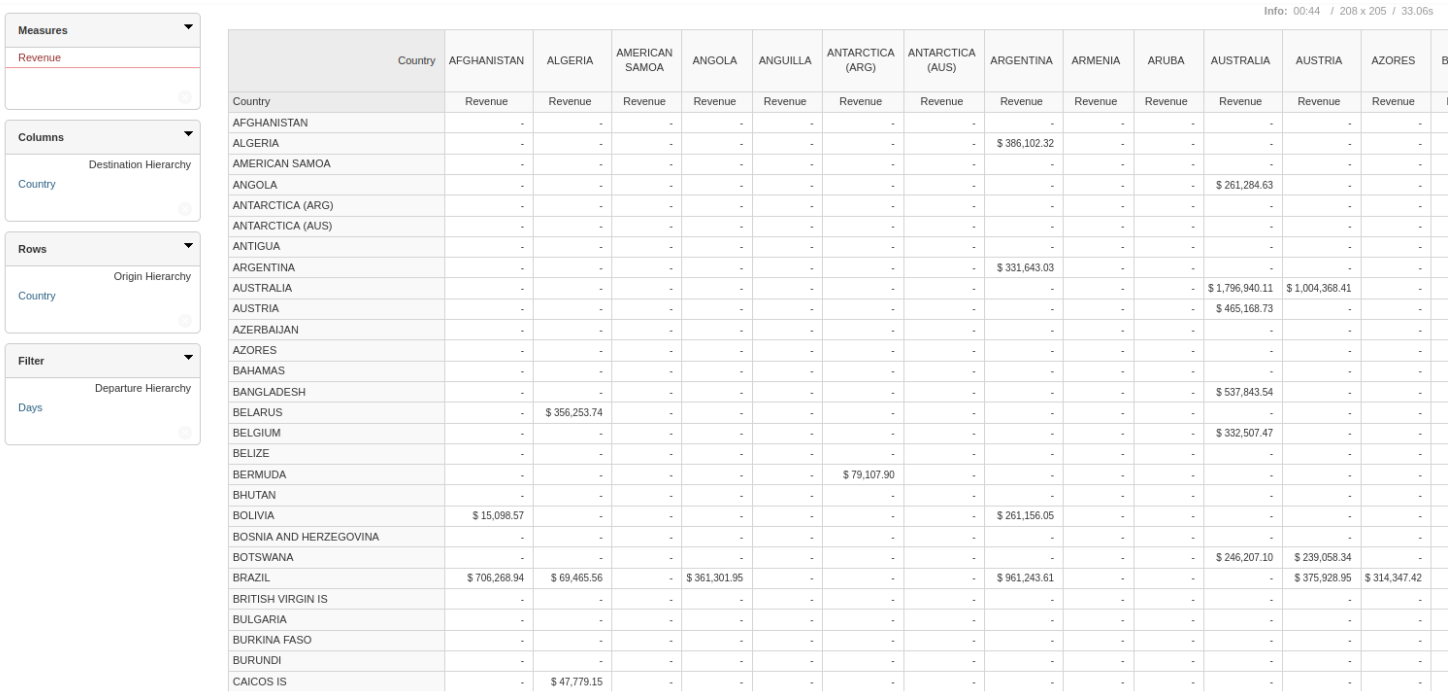

| Months | Jun | | Jul | | Aug | | Sep | |
|---|---|---|---|---|---|---|---|---|
| Name | Bookings | Revenue | Bookings | Revenue | Bookings | Revenue | Bookings | Revenue |
| Afghanistan Airlines | 153,531 | $ 38,484,790.79 | 161,293 | $ 40,472,054.67 | 162,391 | $ 40,865,554.24 | 8,124 | $ 2,039,445.54 |
| Albania Airlines | 159,262 | $ 39,897,663.61 | 170,623 | $ 42,827,184.84 | 169,506 | $ 42,678,075.18 | 9,508 | $ 2,408,284.91 |
| American Samoa Airli | 112,472 | $ 28,308,790.69 | 125,591 | $ 31,504,222.81 | 117,037 | $ 29,368,785.09 | 4,395 | $ 1,090,446.04 |
| Angola Airlines | 136,425 | $ 34,347,453.81 | 148,966 | $ 37,385,955.74 | 139,364 | $ 35,013,009.79 | 6,126 | $ 1,524,536.54 |
| Argentina Airlines | 156,706 | $ 39,433,100.48 | 171,009 | $ 42,933,031.41 | 158,448 | $ 39,820,229.90 | 7,249 | $ 1,792,335.79 |
| Australia Airlines | 147,264 | $ 36,895,382.74 | 158,391 | $ 39,717,352.17 | 154,653 | $ 38,775,426.65 | 7,486 | $ 1,881,800.70 |
| Azerbaijan Airlines | 116,404 | $ 29,158,202.24 | 124,498 | $ 31,339,897.35 | 124,711 | $ 31,326,210.56 | 6,458 | $ 1,613,125.74 |
| Bahamas Airlines | 166,189 | $ 41,667,568.68 | 179,311 | $ 45,011,524.23 | 170,440 | $ 42,797,620.62 | 8,441 | $ 2,124,317.51 |
| Belarus Airlines | 135,549 | $ 34,147,753.07 | 140,954 | $ 35,328,487.03 | 142,070 | $ 35,654,752.12 | 6,232 | $ 1,563,137.63 |
| Bhutan Airlines | 168,839 | $ 42,317,956.17 | 181,527 | $ 45,582,515.26 | 175,595 | $ 44,040,959.30 | 10,125 | $ 2,546,693.14 |
| Bolivia Airlines | 100,221 | $ 25,079,321.56 | 103,110 | $ 25,822,166.50 | 103,653 | $ 26,018,204.52 | 5,146 | $ 1,296,724.35 |
| Brazil Airlines | 182,562 | $ 45,811,242.30 | 186,589 | $ 46,786,121.53 | 186,863 | $ 46,921,737.45 | 9,054 | $ 2,254,099.02 |
| Bulgaria Airlines | 143,482 | $ 36,061,920.02 | 150,467 | $ 37,736,376.11 | 145,333 | $ 36,439,479.41 | 6,509 | $ 1,654,183.65 |
| Caicos Is Airlines | 139,123 | $ 34,931,721.84 | 136,801 | $ 34,289,397.05 | 136,614 | $ 34,262,735.45 | 6,519 | $ 1,629,706.29 |
| Central African Rep | 159,303 | $ 40,021,712.99 | 168,365 | $ 42,125,765.54 | 171,976 | $ 43,124,600.90 | 9,089 | $ 2,271,431.95 |
| Chad Airlines | 135,782 | $ 34,072,100.08 | 144,879 | $ 36,371,560.39 | 145,014 | $ 36,362,031.39 | 6,079 | $ 1,536,691.94 |
| Colombia Airlines | 133,934 | $ 33,595,180.27 | 144,968 | $ 36,335,348.56 | 144,710 | $ 36,238,243.43 | 7,400 | $ 1,878,148.08 |
| Croatia Airlines | 178,186 | $ 44,646,913.61 | 188,029 | $ 47,132,982.06 | 187,251 | $ 46,927,131.22 | 9,023 | $ 2,296,912.56 |
| Cuba Airlines | 142,058 | $ 35,617,149.64 | 148,646 | $ 37,354,343.65 | 148,108 | $ 37,196,850.77 | 6,600 | $ 1,651,337.72 |
| Cyprus Airlines | 180,906 | $ 45,455,559.53 | 193,990 | $ 48,758,424.97 | 199,919 | $ 50,205,078.87 | 8,339 | $ 2,089,902.55 |
| Czech Airlines | 144,527 | $ 36,249,272.89 | 156,292 | $ 39,263,017.41 | 150,664 | $ 37,883,903.19 | 7,735 | $ 1,936,701.94 |
| Dakhla And Laayoune | 141,785 | $ 35,557,711.65 | 146,538 | $ 36,769,620.16 | 152,244 | $ 38,203,020.00 | 9,035 | $ 2,266,459.92 |
| Denmark Airlines | 125,033 | $ 31,357,361.07 | 136,844 | $ 34,271,543.51 | 130,576 | $ 32,805,019.70 | 5,613 | $ 1,412,421.64 |
| Djibouti Airlines | 145,687 | $ 36,506,386.56 | 153,697 | $ 38,629,889.57 | 153,866 | $ 38,656,025.07 | 5,937 | $ 1,491,655.31 |
| Dominica Airlines | 115,913 | $ 29,190,379.84 | 115,808 | $ 29,054,151.34 | 120,969 | $ 30,433,939.52 | 5,332 | $ 1,332,572.25 |
| Ecuador Airlines | 154,307 | $ 38,672,659.24 | 160,267 | $ 40,123,529.57 | 165,385 | $ 41,497,231.40 | 8,789 | $ 2,194,314.47 |
| Egypt Airlines | 152,584 | $ 38,312,427.95 | 157,085 | $ 39,469,676.85 | 155,740 | $ 39,032,374.87 | 7,361 | $ 1,844,706.61 |
| El Salvador Airlines | 152,013 | $ 38,186,942.96 | 157,311 | $ 39,541,539.00 | 162,757 | $ 40,862,191.03 | 6,817 | $ 1,713,911.04 |
| Equatorial Guinea Ai | 175,440 | $ 44,094,510.06 | 178,659 | $ 44,785,869.08 | 185,993 | $ 46,608,700.52 | 9,920 | $ 2,472,782.74 |
| Eritrea Airlines | 162,910 | $ 40,821,913.60 | 163,044 | $ 41,013,770.62 | 166,612 | $ 41,826,120.76 | 8,730 | $ 2,170,624.26 |

airplane type and month of departure by month of arrival
(2 airplane types departed in July and arrived in August)




| | Months | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|
| Type | Months | Bookings | Bookings | Bookings | Bookings |
| 6 | Jun | 4,002,690 | 56,319 | - | - |
| | Jul | - | 4,035,047 | 52,740 | - |
| | Aug | - | - | 4,103,815 | 59,872 |
| | Sep | - | - | - | 149,922 |
| 18 | Jun | 2,358,157 | 33,193 | - | - |
| | Jul | - | 2,463,421 | 35,468 | - |
| | Aug | - | - | 2,393,324 | 38,065 |
| | Sep | - | - | - | 81,851 |
| 21 | Jun | 1,837,798 | 25,875 | - | - |
| | Jul | - | 1,893,661 | 25,333 | - |
| | Aug | - | - | 1,917,024 | 27,036 |
| | Sep | - | - | - | 59,000 |
| 38 | Jun | 1,017,201 | 14,128 | - | - |
| | Jul | - | 1,064,500 | 16,928 | - |
| | Aug | - | - | 1,065,543 | 11,980 |
| | Sep | - | - | - | 36,378 |
| 40 | Jun | 405,278 | 5,555 | - | - |
| | Jul | - | 417,154 | 5,138 | - |
| | Aug | - | - | 420,771 | 6,087 |
| | Sep | - | - | - | 14,106 |
| 41 | Jun | 582,638 | 7,710 | - | - |
| | Jul | - | 602,124 | 8,583 | - |
| | Aug | - | - | 601,477 | 7,684 |
| | Sep | - | - | - | 19,412 |
| 48 | Jun | 709,642 | 11,393 | - | - |
| | Jul | - | 734,217 | 9,694 | - |
| | Aug | - | - | 728,225 | 9,743 |
| | Sep | - | - | - | 26,203 |
| 60 | Jun | 2,201,963 | 34,508 | - | - |
| | Jul | - | 2,304,932 | 32,936 | - |

how much money spent/gained on flights between countries
(on the 10 days with highest revenue)



Measures
Revenue

Columns
Destination Hierarchy
Country

Rows
Origin Hierarchy
Country

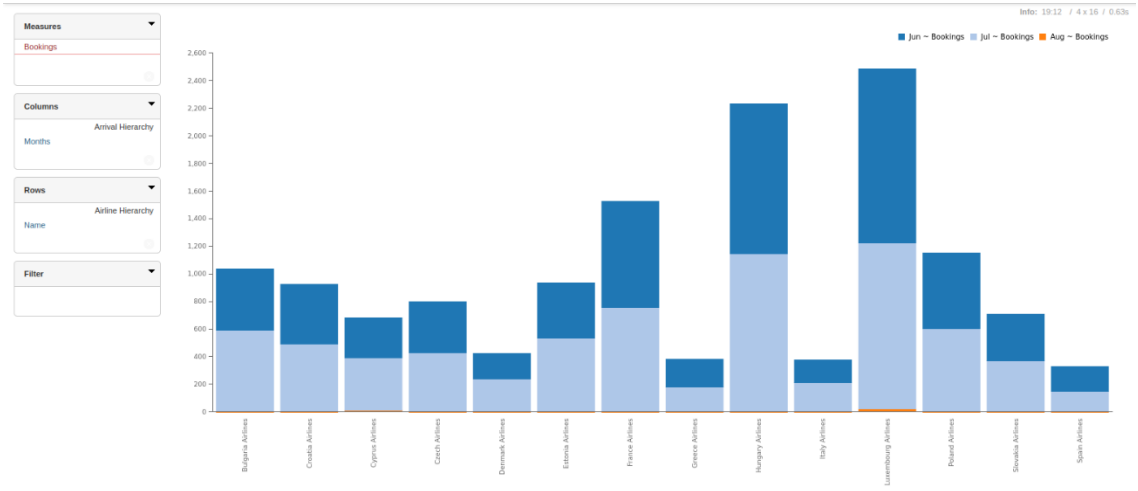
Filter
Departure Hierarchy
Days

Info: 00:44 / 208 x 205 / 33.06s

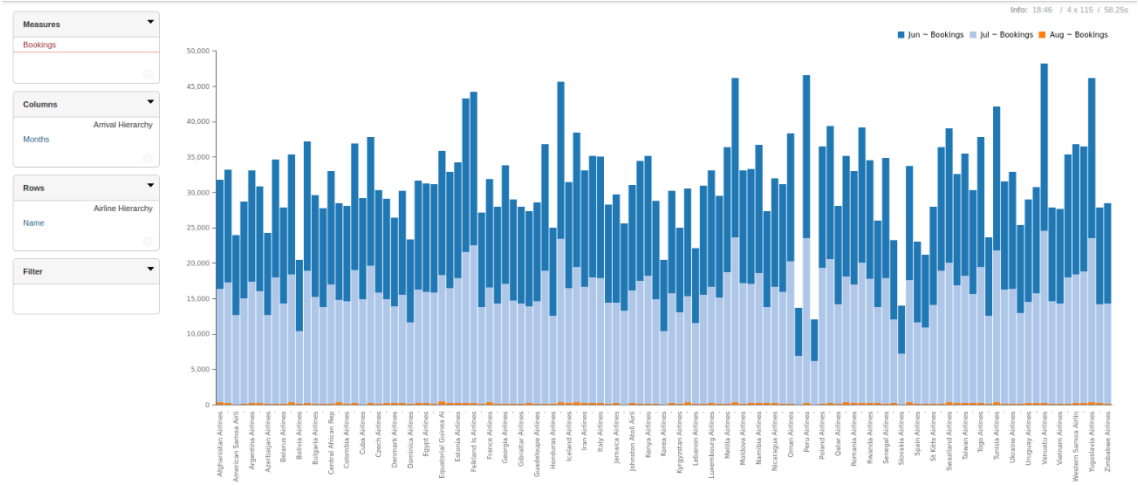
| Country | AFGHANISTAN | ALGERIA | AMERICAN SAMOA | ANGOLA | ANGUILLA | ANTARCTICA (ARG) | ANTARCTICA (AUS) | ARGENTINA | ARMENIA | ARUBA | AUSTRALIA | AUSTRIA | AZORES | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | Revenue | |
| AFGHANISTAN | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| ALGERIA | - | - | - | - | - | - | - | $ 386,102.32 | - | - | - | - | - | |
| AMERICAN SAMOA | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| ANGOLA | - | - | - | - | - | - | - | - | - | - | $ 261,284.63 | - | - | |
| ANTARCTICA (ARG) | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| ANTARCTICA (AUS) | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| ANTIGUA | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| ARGENTINA | - | - | - | - | - | - | - | $ 331,643.03 | - | - | - | - | - | |
| AUSTRALIA | - | - | - | - | - | - | - | - | - | - | $ 1,796,940.11 | $ 1,004,368.41 | - | |
| AUSTRIA | - | - | - | - | - | - | - | - | - | - | $ 465,168.73 | - | - | |
| AZERBAIJAN | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| AZORES | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| BAHAMAS | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| BANGLADESH | - | - | - | - | - | - | - | - | - | - | $ 537,843.54 | - | - | |
| BELARUS | - | $ 356,253.74 | - | - | - | - | - | - | - | - | - | - | - | |
| BELGIUM | - | - | - | - | - | - | - | - | - | - | $ 332,507.47 | - | - | |
| BELIZE | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| BERMUDA | - | - | - | - | - | $ 79,107.90 | - | - | - | - | - | - | - | |
| BHUTAN | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| BOLIVIA | $ 15,098.57 | - | - | - | - | - | - | $ 261,156.05 | - | - | - | - | - | |
| BOSNIA AND HERZEGOVINA | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| BOTSWANA | - | - | - | - | - | - | - | - | - | - | $ 246,207.10 | $ 239,058.34 | - | |
| BRAZIL | $ 706,268.94 | $ 69,465.56 | - | $ 361,301.95 | - | - | - | $ 961,243.61 | - | - | - | $ 375,928.95 | $ 314,347.42 | |
| BRITISH VIRGIN IS | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| BULGARIA | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| BURKINA FASO | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| BURUNDI | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| CAICOS IS | - | $ 47,779.15 | - | - | - | - | - | - | - | - | - | - | - | |

# Comparisons

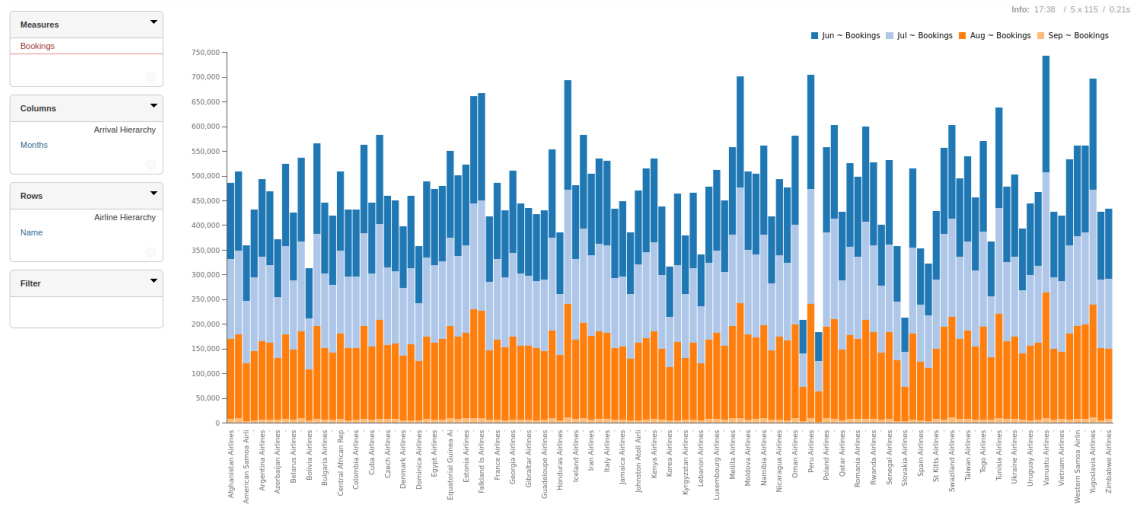
airports.sql




airports-large.sql




airports-large-extra.sql



We decided to compare the 3 datasets using the first query from exercise 5, just using the bookings measure.

From the graphs, we can see that scale increases 20-fold between the first and second graphs, and 15-fold between the second and third graphs.

From the first to the second graphs, we see more airlines. From the second to the third graphs, there is around the same number of airlines, but a new month is added, September.

Thus, we can conclude that we are dealing with increasingly denser datasets.