

Database volume & transactions description

1. Database volume

The data for our database has been created by online data generator - <http://www.mockaroo.com/>. It allows to generate up to 1000 rows with many attributes so for tables with a few thousands the generation has been repeated for the same set of attributes.

Description of each table:

- a. COUNTRY – 131 names of existing countries
- b. CARRIER – 200 carriers, names generated as fake companies' names. The rating is a random number between 1 and 100.
- c. AIRPLANE – 2778 airplanes, brands and models are generated as cars' names and models. Airplanes with the same brand and model can be distinguished by different IDs. The number of seats is a random value between 30 and 400.
- d. AIRPORT – 1000 different airports, each airport is assigned to one of 131 countries. Names of airports and the cities in which they are located are generated as random strings.
- e. CLIENT – 10000 clients, first and last names generated as fake people' identities. Each Client is assigned to one of 131 countries. Other personal details are generated as fake geographical locations(city, street) and random numbers(house No, street No, telephone number).
- f. PASSENGER – 10000 passengers, each one assigned to one client. Passenger is randomly associated with one of 200 carriers (as its favorite carrier). Loyalty points are numbers between 0 and 215. Taken flights are also numbers within range of 0 and 200.
- g. FLIGHT – 3000 different flights, each one is assigned to one destination and arrival airport of existing airports (1000). Every flights is also associated with one of 2778 planes and one of 200 carriers. Departure and arrival dates are generated as a dates between 10 – 10 – 2014 and 10 – 10 – 2017.
- h. PAYMENT – 12 000 payments, the amount paid is a number between 20 and 8 000. Payment date is a date between 10 – 10 – 2014 and 10 – 10 – 2017. IsCardPayment is a 0/1 number. If the payment has been done by a card the value is one, otherwise it is 0.
- i. RESERVATION – 12 000 reservations, each one assigned to one of 3 000 flights. The reservation is connected with passenger by storing its ID. Each reservation is assigned to of 12 000 payments. Seat number is a random value from a range of 1 and 400.

2. Transactions

Querying the data

- This query returns first / last name, country name and favorite carrier name of passengers who:
 - have departure from one of German's airports
 - have taken a flight between 01 – 01 – 2014 and 01 – 01 – 2017
 - have at least three reservations for flights in this period of time

Returned values are ordered by country name. They can be seen in the picture below.

FIRSTNAME	LASTNAME	COUNTRY	FAVOURITECARRIER
Dorothee	Fantin	France	Schamberger LLC
Ang?le	MacGettigen	France	Toy, Schuster and Gibson
Françoise	Wibrew	France	Osinski-Goyette
Intéressant	Flowell	France	Aufderhar, Cremin and Spinka
Milèna	McLarnon	France	Reynolds LLC
D?	Mignot	France	Grady, Bailey and Kassulke
Célestine	Brower	France	Schoen-Lueilwitz
MaeIann	Warricker	France	Russel-Block
Géraldine	Tomaszkiewicz	France	Crona-Halvorsen
Mélys	Meach	France	McLaughlin and Sons
Torbjörn	McNair	France	Aufderhar, Cremin and Spinka

Figure 1. Part of returned data

Querying 1	
No	Result[s]
1	0,389
2	0,389
3	0,409
4	0,395
5	0,379
6	0,377
7	0,374
8	0,381
9	0,374
10	0,389
Average	0,386

Table 1. Results of database performance

2. This query prepares a statistic about payment methods. It returns a sum of payments done by card / cash, number of each type of payments and an average amount of each type of payments. This payments concern passengers who:
 - have taken a flight between 01 – 01 – 2015 and 01 – 01 – 2016
 - have traveled by the most convenient airplanes (BMW or Audi)

Returned data can be seen in the picture below.

PAYM	TOTALAMOUNTPAID	NUMBEROFFPAYMENTS	AVERAGE
Card	407678,44	115	3.5E+03
Cash	465817,09	130	3.6E+03

Figure 2. Returned data

Querying 2	
No	Result[s]
1	0,425
2	0,433
3	0,436
4	0,437
5	0,438
6	0,424
7	0,460
8	0,424
9	0,441
10	0,427
Average	0,435

Table 2. Results of database performance

3. This query returns first / last names, telephone numbers and the country of origin of passengers from one country with the highest number of passengers who:
 - have paid for the reservation by a card
 - the amount of payment was higher than 6000
 - have a total number of taken flights greater than 4

All passengers who meet the criteria are grouped by country name and ordered by descending number of passengers in each country. Only the first country is selected and only passengers from this country are returned.

Returned data can be seen in the picture below.

FIRSTNAME	LASTNAME	TELNUMBER	COUNTRYNAME
Faites	Castilljo	5347512903	Micronesia
Ad?le	Tettley	2458498995	Micronesia
Adéla?de	Desorts	2739345971	Micronesia
Pélagie	Froom	7223559372	Micronesia
Ma?	Bellon	1395572667	Micronesia
Séverine	Kegg	2778873648	Micronesia
Lông	Egre	6192991451	Micronesia
Kui	Holsall	3008542554	Micronesia
Océanne	Marquand	9517414103	Micronesia
Cécile	Huygen	3567877225	Micronesia

Figure 3. Returned data

Querying 3	
No	Result[s]
1	0,573
2	0,552
3	0,497
4	0,467
5	0,520
6	0,482
7	0,477
8	0,482
9	0,483
10	0,600
Average	0,513

Table 3. Performance of database

Changing the data

4. This transaction inserts two new flights. Because of the deletion of all flights between 01 – 01 – 2016 and 01 – 02 – 2016 all passengers of cancelled flights get 10 additional loyalty points(update) and their favorite carrier changes to the carrier with the highest rating (update). The reservations for all flights between 01 – 01 – 2016 and 01 – 02 – 2016 need to be updated – the flight ID changes to one of new created flights. For all reservations between 01 – 01 – 2016 and 15 – 01 – 2016 the flight's ID changes to the ID of first newly created flights and for all reservations between 16 – 01 – 2016 and 01 – 02 – 2016 it changes to the ID of the second flight. All flights between 01 – 01 – 2016 and 01 – 02 – 2016 are deleted from the table of available flights.

All operations executed on the database can be seen in the picture below.

```
1 row inserted.  
  
1 row inserted.  
  
346 rows updated.  
177 rows updated.  
  
179 rows updated.  
  
83 rows deleted.
```

Figure 4. Operations in the order of execution

Modifying 1	
No	Result[s]
1	0,422
2	0,427
3	0,568
4	0,681
5	0,480
6	0,605
7	0,604
8	0,620
9	0,555
10	0,568
Average	0,553

Table 4. Performance of database

5. All airplanes assigned to flights of brands such as Fiat, Opel, Ford, Citroen, Renault are replaced by airplanes of brand Mercedes(update). It is caused by a high risk of failure.

Additionally, airplanes of two Japanese brands – Nissan and Toyota are also dangerous in use. Because of that all airplanes of this two brands which are not assigned to any flight are deleted from a table of available planes. For those carriers who had at least one airplane of brand Mercedes there is a reward – the rating is increased by 10 points(update). For those carriers who still use possibly dangerous planes of brand Toyota and Nissan the rating is decreased by 10 points(update). The passengers who have to fly with one of unsafe planes (Toyota / Nissan) get additional 10 loyalty points (update).

All operations executed on the database can be seen in the picture below.

261 rows updated.

222 rows deleted.

126 rows updated.

150 rows updated.

1 084 rows updated.

Figure 5. Operations in order of execution

Modifying 2	
No	Result[s]
1	0,681
2	0,718
3	0,546
4	0,506
5	0,465
6	0,471
7	0,475
8	0,471
9	0,472
10	0,455
Average	0,526

Table 5. Performance of database

Performance of database for the execution of all transactions

All scripts	
No	Result[s]
1	2,007
2	2,035
3	2,017
4	2,025
5	2,020
6	2,030
7	2,066
8	2,027
9	2,027
10	2,057
Average	2,031

Table 6. Performance during executing all scripts