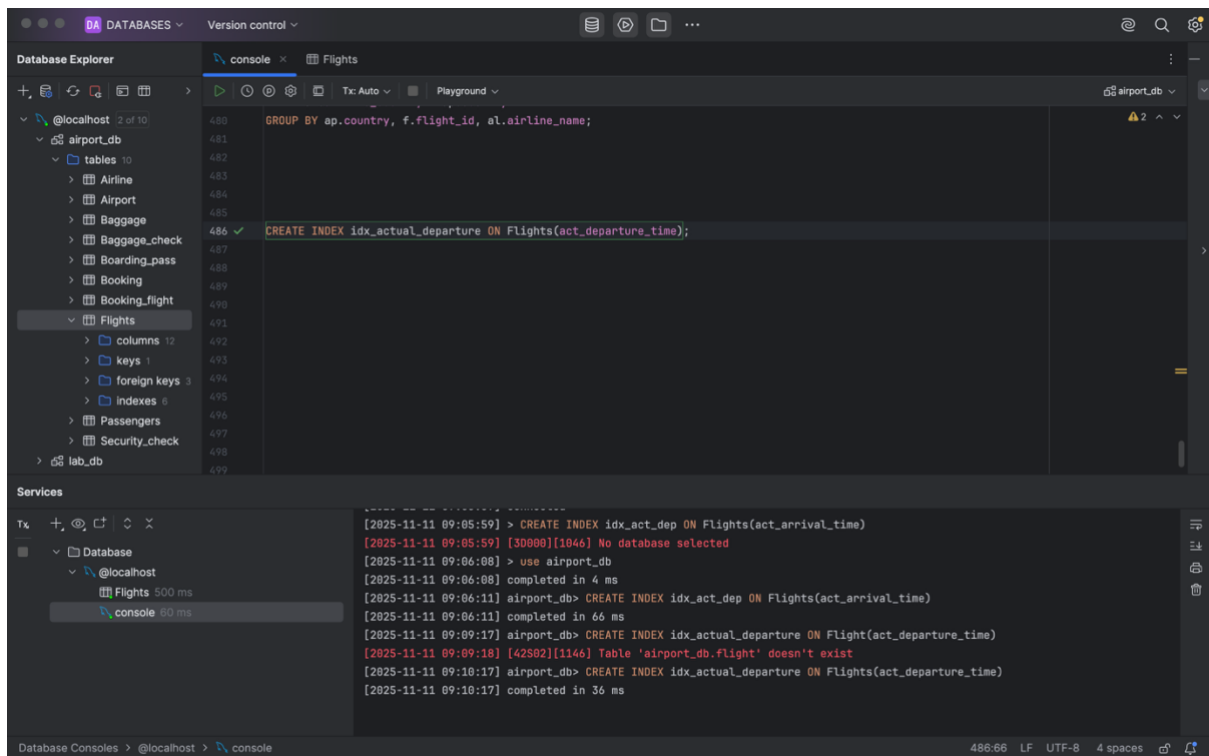


# Kazakh-British Technical University

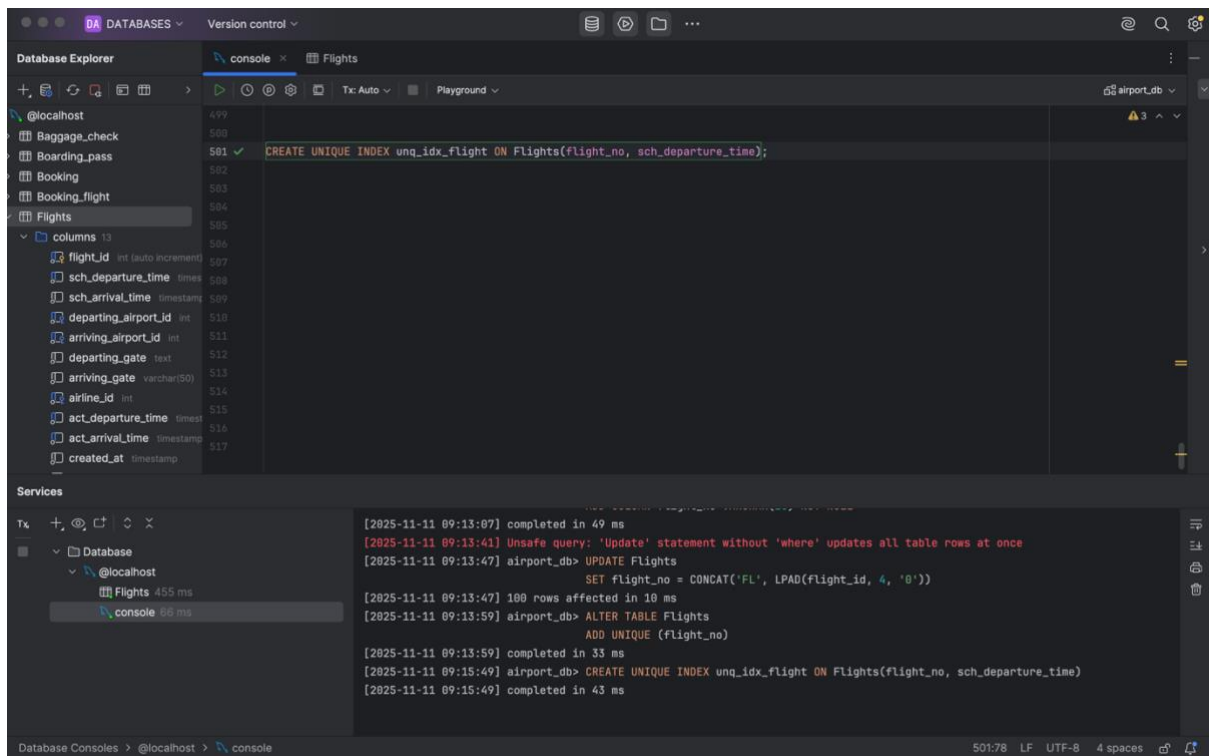
DATABASES  
Laboratory work №7

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## 1. Create an index on the actual\_departure column in the flights table.



## 2. Create a unique index to ensure flight\_no and scheduled\_departure combinations are unique.



### 3. Create a composite index on the departure\_airport\_id and arrival\_airport\_id columns.

The screenshot shows a database console interface with a sidebar on the left displaying a database explorer for 'airport\_db'. The main console area contains the following SQL commands:

```
CREATE UNIQUE INDEX unq_idx_flight ON Flights(flight_no, sch_departure_time);

CREATE INDEX idx_dep_arr_flight ON Flights(departing_airport_id, arriving_airport_id);

SELECT * FROM Flights
WHERE departing_airport_id = 3 AND arriving_airport_id = 10;

EXPLAIN ANALYZE
SELECT * FROM Flights
WHERE departing_airport_id = 5 AND arriving_airport_id = 12;
```

The bottom panel shows the output of the queries. The first query returns 0 rows. The second query shows the execution plan for the composite index, indicating that it was used to filter the results.

### 5. Use EXPLAIN ANALYZE to check index usage in a query filtering by departure\_airport and arrival\_airport.

The screenshot shows a database console interface with a sidebar on the left displaying a database explorer for 'airport\_db'. The main console area contains the following SQL commands:

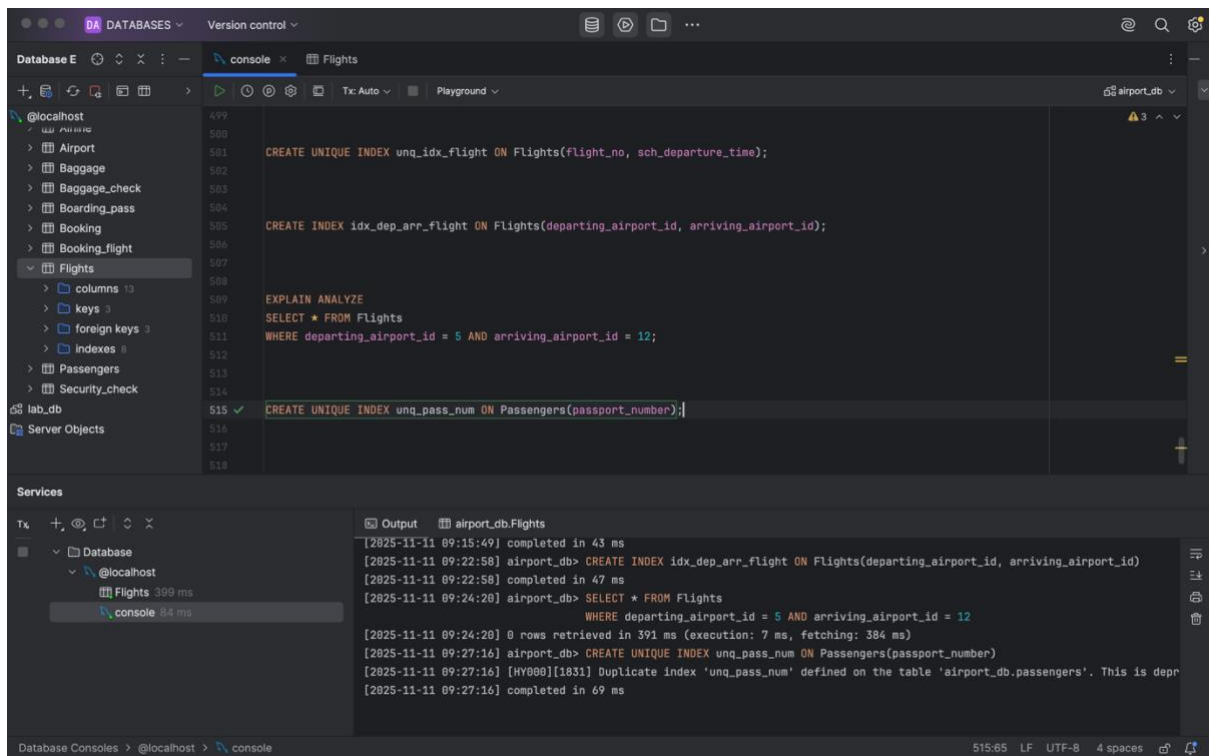
```
CREATE UNIQUE INDEX unq_pass_num ON Passengers(passport_number);

CREATE INDEX idx_passengers_multi ON Passengers(first_name, last_name, gender, date_of_birth);

SHOW INDEXES FROM Passengers;
SHOW INDEXES FROM Flights;
```

The bottom panel shows the output of the queries. The first query returns 0 rows. The second query shows the execution plan for the composite index, indicating that it was used to filter the results. The third query shows the execution plan for the composite index, indicating that it was used to filter the results. The fourth query shows the execution plan for the composite index, indicating that it was used to filter the results.

6. Create a unique index for the `passport_number` of the `Passengers` table. Check if the index was created or not. Insert into the table two new passengers. Explain in your own words what is going on in the output?



```
CREATE UNIQUE INDEX unq_idx_flight ON Flights(flight_no, sch_departure_time);

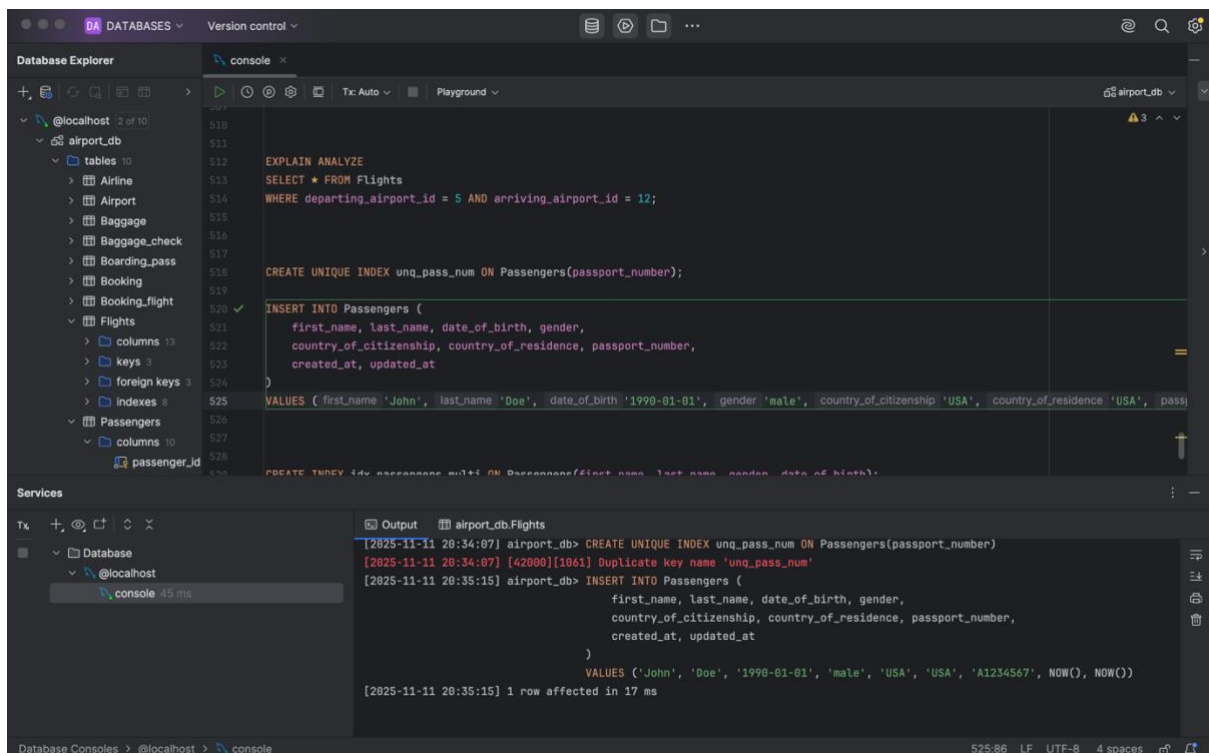
CREATE INDEX idx_dep_arr_flight ON Flights(departing_airport_id, arriving_airport_id);

EXPLAIN ANALYZE
SELECT * FROM Flights
WHERE departing_airport_id = 5 AND arriving_airport_id = 12;

CREATE UNIQUE INDEX unq_pass_num ON Passengers(passport_number);
```

Output:

```
[2025-11-11 09:15:49] completed in 43 ms
[2025-11-11 09:22:58] airport_db> CREATE INDEX idx_dep_arr_flight ON Flights(departing_airport_id, arriving_airport_id)
[2025-11-11 09:22:58] completed in 47 ms
[2025-11-11 09:24:20] airport_db> SELECT * FROM Flights
WHERE departing_airport_id = 5 AND arriving_airport_id = 12
[2025-11-11 09:24:20] 0 rows retrieved in 391 ms (execution: 7 ms, fetching: 384 ms)
[2025-11-11 09:27:16] airport_db> CREATE UNIQUE INDEX unq_pass_num ON Passengers(passport_number)
[2025-11-11 09:27:16] [HY000][1831] Duplicate index 'unq_pass_num' defined on the table 'airport_db.passengers'. This is depr
[2025-11-11 09:27:16] completed in 69 ms
```



```
EXPLAIN ANALYZE
SELECT * FROM Flights
WHERE departing_airport_id = 5 AND arriving_airport_id = 12;

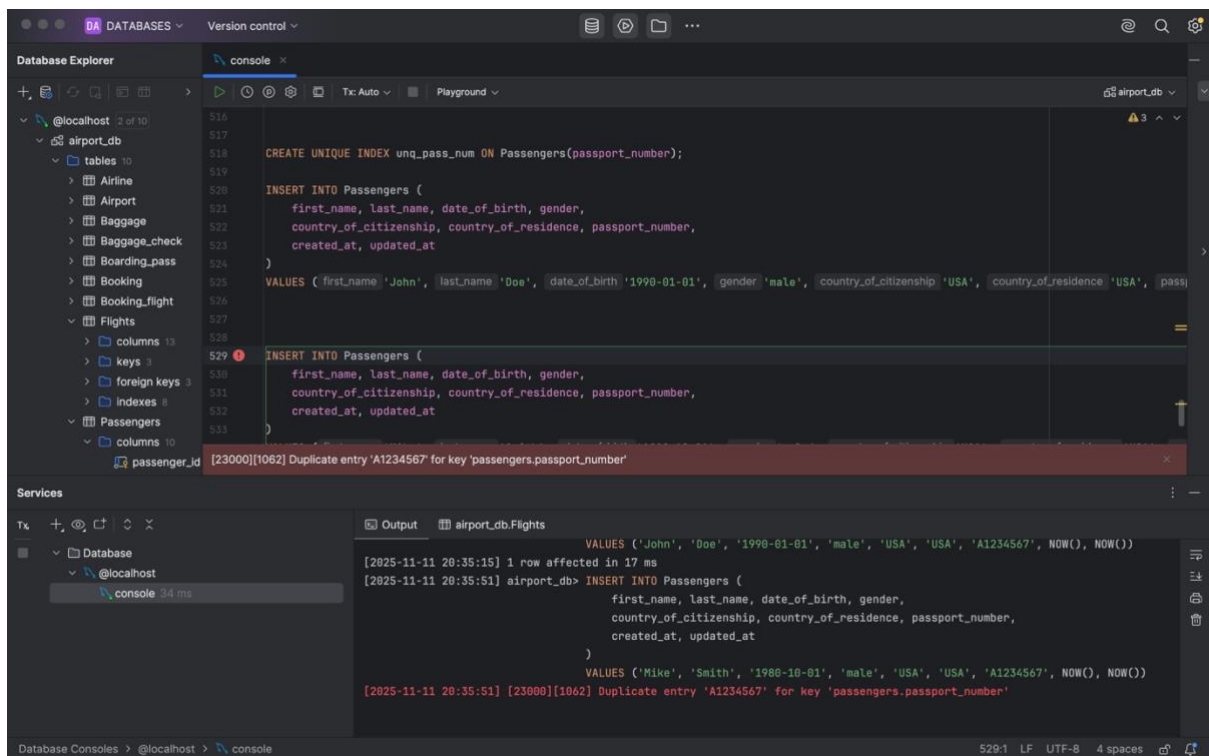
CREATE UNIQUE INDEX unq_pass_num ON Passengers(passport_number);

INSERT INTO Passengers (
    first_name, last_name, date_of_birth, gender,
    country_of_citizenship, country_of_residence, passport_number,
    created_at, updated_at
)
VALUES ('John', 'Doe', '1990-01-01', 'male', 'USA', 'USA', 'A1234567', NOW(), NOW());

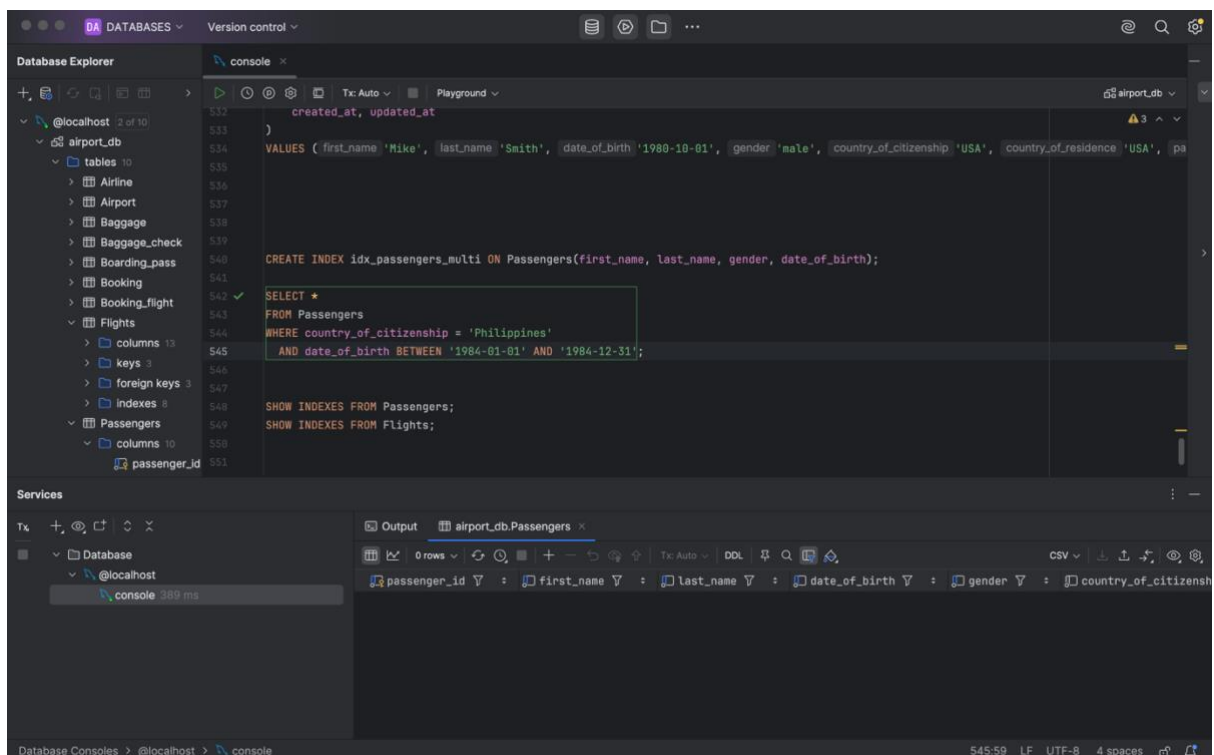
CREATE INDEX idx_passport_multi ON Passengers(first_name, last_name, gender, date_of_birth);
```

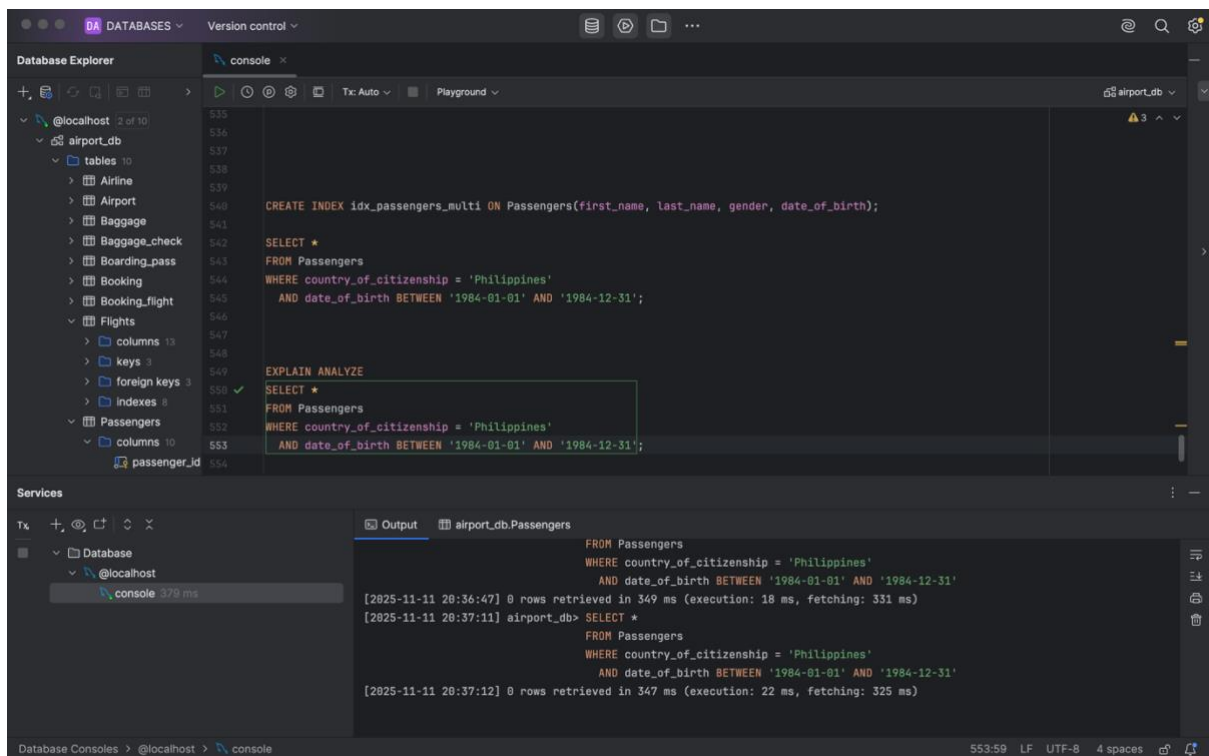
Output:

```
[2025-11-11 20:34:07] airport_db> CREATE UNIQUE INDEX unq_pass_num ON Passengers(passport_number)
[2025-11-11 20:34:07] [42000][1061] Duplicate key name 'unq_pass_num'
[2025-11-11 20:35:15] airport_db> INSERT INTO Passengers (
    first_name, last_name, date_of_birth, gender,
    country_of_citizenship, country_of_residence, passport_number,
    created_at, updated_at
)
VALUES ('John', 'Doe', '1990-01-01', 'male', 'USA', 'USA', 'A1234567', NOW(), NOW())
[2025-11-11 20:35:15] 1 row affected in 17 ms
```



7. Create an index for the Passengers table. Use for that first name, last name, date of birth and country of citizenship. Then, write a SQL query to find a passenger who was born in Philippines and was born in 1984 and check if the query uses indexes or not. Give the explanation of the results.





8. Write a SQL query to list indexes for table Passengers. After delete the created indexes.

