

Laboratory work 7

1.

The screenshot shows the pgAdmin 4 interface. In the Object Explorer, under the 'Tables' section, the 'flights' table is selected. In the main query window, the following SQL command is run:

```
CREATE INDEX
ON flights(actual_departure);
```

The 'Messages' tab shows the result: "Query returned successfully in 53 msec." The status bar at the bottom indicates "Query complete 00:00:00.053".

2.

The screenshot shows the pgAdmin 4 interface. In the Object Explorer, under the 'Tables' section, the 'flights' table is selected. In the main query window, the following SQL command is run:

```
CREATE UNIQUE INDEX idx_flights_no_departure
ON flights(flight_no, scheduled_departure);
```

The 'Messages' tab shows the result: "Query returned successfully in 49 msec." The status bar at the bottom indicates "Query complete 00:00:00.049".

3.

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

- boarding_pass
- booking
- booking_flight
- flights
 - Columns (14)
 - flight_id
 - flight_no
 - scheduled_departure
 - scheduled_arrival
 - departure_airport_id
 - arrival_airport_id
 - departing_gate
 - arriving_gate
 - airline_id
 - status
 - actual_departure
 - actual_arrival
 - created_at
 - update_at
 - Constraints (4)
 - flights_airline_id_fkey
 - flights_arrival_airport_id
 - flights_departure_airport
 - flights_pkey
 - Indexes (2)
 - flights_actual_departure
 - idx_flights_no_departure
 - RLS Policies
 - Rules
 - Triggers
 - passengers
 - security_check

Query History

```
CREATE INDEX idx_depAirId_arrAirId
ON flights(departure_airport_id, arrival_airport_id);
```

Data Output Messages Notifications

CREATE INDEX

Query returned successfully in 48 msec.

Total rows: Query complete 00:00:00.048 CRLF Ln 2, Col 41

4.

With indexes:

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

- boarding_pass
- booking
- booking_flight
- flights
 - Columns (14)
 - flight_id
 - flight_no
 - scheduled_departure
 - scheduled_arrival
 - departure_airport_id
 - arrival_airport_id
 - departing_gate
 - arriving_gate
 - airline_id
 - status
 - actual_departure
 - actual_arrival
 - created_at
 - update_at
 - Constraints (4)
 - flights_airline_id_fkey
 - flights_arrival_airport_id
 - flights_departure_airport
 - flights_pkey
 - Indexes (3)
 - flights_actual_departure
 - idx_depairid_arrairid
 - idx_flights_no_departure
 - RLS Policies
 - Rules
 - Triggers
 - passengers

Query History

```
SELECT *
FROM flights
WHERE flight_id = 23;
```

Data Output Messages Notifications

flight_id	flight_no	scheduled_departure	scheduled_arrival	departure_airport_id	arrival_airport_id	departing_gate	arriving_gate	airline_id
23	CN-65	2023-03-21	2024-01-08	2	3	934	3006	

Showing rows: 1 to 1 Page No: 1 of 1 CRLF Ln 3, Col 22

Total rows: 1 Query complete 00:00:00.060

Without indexes:

pgAdmin 4

File Object Tools View Window Help

Object Explorer

- boarding_pass
- booking
- booking_flight
- flights
 - Columns (14)
 - flight_id
 - flight_no
 - scheduled_departure
 - scheduled_arrival
 - departure_airport_id
 - arrival_airport_id
 - departing_gate
 - arriving_gate
 - airline_id
 - status
 - actual_departure
 - actual_arrival
 - created_at
 - update_at
 - Constraints (4)
 - flights_airline_id_fkey
 - flights_arrival_airport_id
 - flights_departure_airport
 - flights_pkey
 - Indexes (3)
 - flights_actual_departure
 - idx_depairid_arrairid
 - idx_flights_no_departure
- RLS Policies
- Rules
- Triggers
- passengers

Query History

```
1 SELECT *
2 FROM flights
3 WHERE flight_id = 23;
```

Data Output

flight_id	flight_no	scheduled_departure	scheduled_arrival	departure_airport_id	arrival_airport_id	departing_gate	arriving_gate	airline_id
23	CN-65	2023-03-21	2024-01-08	2	3	934	3006	

Successfully run. Total query runtime: 73 msec. 1 rows affected.

Total rows: 1 Query complete 00:00:00.073 CRLF Ln 3, Col 22

5.

pgAdmin 4

File Object Tools View Window Help

Object Explorer

- boarding_pass
- booking
- booking_flight
- flights
 - Columns (14)
 - flight_id
 - flight_no
 - scheduled_departure
 - scheduled_arrival
 - departure_airport_id
 - arrival_airport_id
 - departing_gate
 - arriving_gate
 - airline_id
 - status
 - actual_departure
 - actual_arrival
 - created_at
 - update_at
 - Constraints (4)
 - flights_airline_id_fkey
 - flights_arrival_airport_id
 - flights_departure_airport
 - flights_pkey
 - Indexes (3)
 - flights_actual_departure
 - idx_depairid_arrairid
 - idx_flights_no_departure
- RLS Policies
- Rules
- Triggers
- passengers

Query History

```
1 EXPLAIN ANALYZE
2 SELECT *
3 FROM flights
4 WHERE flight_id = 23;
```

Data Output

flight_id	flight_no	scheduled_departure	scheduled_arrival	departure_airport_id	arrival_airport_id	departing_gate	arriving_gate	airline_id
23	CN-65	2023-03-21	2024-01-08	2	3	934	3006	

QUERY PLAN

text
1 Index Scan using flights_pkey on flights (cost=0.28..8.29 rows=1 width=61) (actual time=0.033..0.034 rows=1 loops=1)
2 Index Cond: (flight_id = 23)
3 Planning Time: 0.159 ms
4 Execution Time: 0.068 ms

Total rows: 4 Query complete 00:00:00.059 CRLF Ln 4, Col 22

6.

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

lab2/postgres@PostgreSQL 17*

```

1 CREATE UNIQUE INDEX idx_passportNum
2 ON passengers(passport_number);

```

Data Output Messages Notifications

CREATE INDEX

Query returned successfully in 69 msec.

Total rows: Query complete 00:00:00.069 CRLF Ln 2, Col 32

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

lab2/postgres@PostgreSQL 17*

```

1 INSERT INTO passengers (
2     passenger_id,
3     first_name,
4     last_name,
5     date_of_birth,
6     gender,
7     country_of_citizenship,
8     country_of_residence,
9     passport_number,
10    created_at,
11    update_at
12 )
13 VALUES
14     (201, 'Aruzhan', 'Bekova', '1998-04-12', 'F', 'Kazakhstan', 'Kazakhstan', 'N1234567', NOW(), NOW()),
15     (202, 'Daniyar', 'Kairatov', '1995-11-03', 'M', 'Kazakhstan', 'Germany', 'K8901234', NOW(), NOW());
16

```

Data Output Messages Notifications

INSERT 0 2

Query returned successfully in 44 msec.

Total rows: Query complete 00:00:00.044 CRLF Ln 15, Col 7

2 Unique passengers were added to the db

7.

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

flights_arrival_airport_id
flights_departure_airport
flights_pkkey
Indexes (3)
flights_actual_departure
Idx_deparid_arrairid
Idx_flights_no_departure
RLS Policies
Rules
Triggers
passengers
Columns (10)
passenger_id
first_name
last_name
date_of_birth
gender
country_of_citizenship
country_of_residence
passport_number
created_at
update_at
Constraints
Indexes
RLS Policies
Rules
Triggers
security_check
Trigger Functions
Types
Views

Query Query History

```
1 CREATE INDEX idx_passengers_info
2 ON passengers (first_name, last_name, date_of_birth, country_of_citizenship);
3
```

Data Output Messages Notifications

CREATE INDEX

Query returned successfully in 50 msec.

Total rows: 1 Query complete 00:00:00.050 CRLF Ln 3, Col 1

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

flights_arrival_airport_id
flights_departure_airport
flights_pkkey
Indexes (3)
flights_actual_departure
Idx_deparid_arrairid
Idx_flights_no_departure
RLS Policies
Rules
Triggers
passengers
Columns (10)
passenger_id
first_name
last_name
date_of_birth
gender
country_of_citizenship
country_of_residence
passport_number
created_at
update_at
Constraints
Indexes
RLS Policies
Rules
Triggers
security_check
Trigger Functions
Types
Views

Query Query History

```
1 SELECT *
2 FROM passengers
3 WHERE country_of_citizenship = 'Philippines'
4 AND date_of_birth BETWEEN '1984-01-01' AND '1984-12-31';
5
```

Data Output Messages Notifications

Showing rows: 1 to 1 Page No: 1 of 1 | < > << >>

passenger_id	first_name	last_name	date_of_birth	gender	country_of_citizenship	country_of_residence	passport_number	
1	8	Howard	Igo	1984-03-29	Male	Philippines	China	408429911-1

Total rows: 1 Query complete 00:00:00.062 CRLF Ln 5, Col 1

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

- flights_arrival_airport_id
- flights_departure_airport
- flights_pkey
- Indexes (3)
 - flights_actual_departure
 - idx_depairid_arrairid
 - idx_flights_no_departure
- RLS Policies
- Rules
- Triggers
- passengers
- Columns (10)
 - passenger_id
 - first_name
 - last_name
 - date_of_birth
 - gender
 - country_of_citizenship
 - country_of_residence
 - passport_number
 - created_at
 - update_at
- Constraints
- Indexes
- RLS Policies
- Rules
- Triggers
- security_check
- Trigger Functions
- Types
- Views

Subscriptions

Query History

```

1 EXPLAIN ANALYZE
2 SELECT *
3 FROM passengers
4 WHERE country_of_citizenship = 'Philippines'
5   AND date_of_birth BETWEEN '1984-01-01' AND '1984-12-31';
6

```

Data Output Messages Notifications

Showing rows: 1 to 5 Page No: 1 of 1

QUERY PLAN

text

- Seq Scan on passengers (cost=0.00..6.54 rows=1 width=64) (actual time=0.027..0.057 rows=1 loops=1)
- Filter: ((date_of_birth >= '1984-01-01'::date) AND (date_of_birth <= '1984-12-31'::date) AND ((country_of_citizenship)::text = 'Philippines'::text))
- Rows Removed by Filter: 201
- Planning Time: 0.185 ms
- Execution Time: 0.074 ms

Total rows: 5 Query complete 00:00:00.061 CRLF Ln 6, Col 1

Seq scan means that the index is not used

8.

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

- Operators
- Procedures
- Sequences
- Tables (10)
 - airline
 - airport
 - baggage
 - baggage_check
 - boarding_pass
 - booking
 - booking_flight
 - flights
 - Columns (10)
 - passenger_id
 - first_name
 - last_name
 - date_of_birth
 - gender
 - Constraints (4)
 - flights_airline_id_fkey
 - flights_arrival_airport_id
 - flights_departure_airport
 - flights_pkey
 - Indexes (3)
 - flights_actual_departure
 - idx_depairid_arrairid
 - idx_flights_no_departure
 - RLS Policies
 - Rules
 - Triggers
 - passengers
 - Columns (10)
 - passenger_id
 - first_name
 - last_name
 - date_of_birth
 - gender

Subscriptions

Query History

```

1 SELECT *
2 FROM pg_indexes
3 WHERE tablename = 'flights' OR tablename = 'passengers';

```

Data Output Messages Notifications

Showing rows: 1 to 7 Page No: 1 of 1

schema	name	table	index	tablespace	indexdef
public	passengers	passengers_pkey	[null]		CREATE UNIQUE INDEX passengers_pkey ON public.passengers USING btree (passenger_id)
public	flights	flights_pkey	[null]		CREATE UNIQUE INDEX flights_pkey ON public.flights USING btree (flight_id)
public	flights	flights_actual_departure_idx	[null]		CREATE INDEX flights_actual_departure_idx ON public.flights USING btree (actual_departure)
public	flights	idx_flights_no_departure	[null]		CREATE UNIQUE INDEX idx_flights_no_departure ON public.flights USING btree (flight_no, scheduled_departure)
public	flights	idx_depairid_arrairid	[null]		CREATE INDEX idx_depairid_arrairid ON public.flights USING btree (departure_airport_id, arrival_airport_id)
public	passengers	idx_passportnum	[null]		CREATE UNIQUE INDEX idx_passportnum ON public.passengers USING btree (passport_number)
public	passengers	idx_passengers_info	[null]		CREATE INDEX idx_passengers_info ON public.passengers USING btree (first_name, last_name, date_of_birth, country)

Total rows: 7 Query complete 00:00:00.096 CRLF Ln 3, Col 57

pgAdmin 4

File Object Tools Edit View Window Help

Object Explorer

lab2/postgres@PostgreSQL 17*

Query History

```
1 DROP INDEX flights_actual_departure_idx;
2 DROP INDEX idx_depAirlid_arrAirlid;
3 DROP INDEX idx_flights_no_departure;
4 DROP INDEX idx_passengers_info;
5 DROP INDEX idx_passportnum;
```

Data Output Messages Notifications

DROP INDEX

Query returned successfully in 67 msec.

Total rows: Query complete 00:00:00.067 CRLF Ln 3, Col 22