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Факультет инфокоммуникационных технологий

**ОТЧЕТ**  
**ПО ЛАБОРАТОРНОЙ РАБОТЕ №4**

тема: Запросы на выборку и модификацию данных, представления и  
индексы в PostgreSQL.

дисциплина: «ПРОЕКТИРОВАНИЕ И РЕАЛИЗАЦИЯ БАЗ ДАННЫХ»

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**Цель работы:** овладеть практическими навыками создания представлений и запросов на выборку данных к базе данных PostgreSQL, использования подзапросов при модификации данных и индексов.

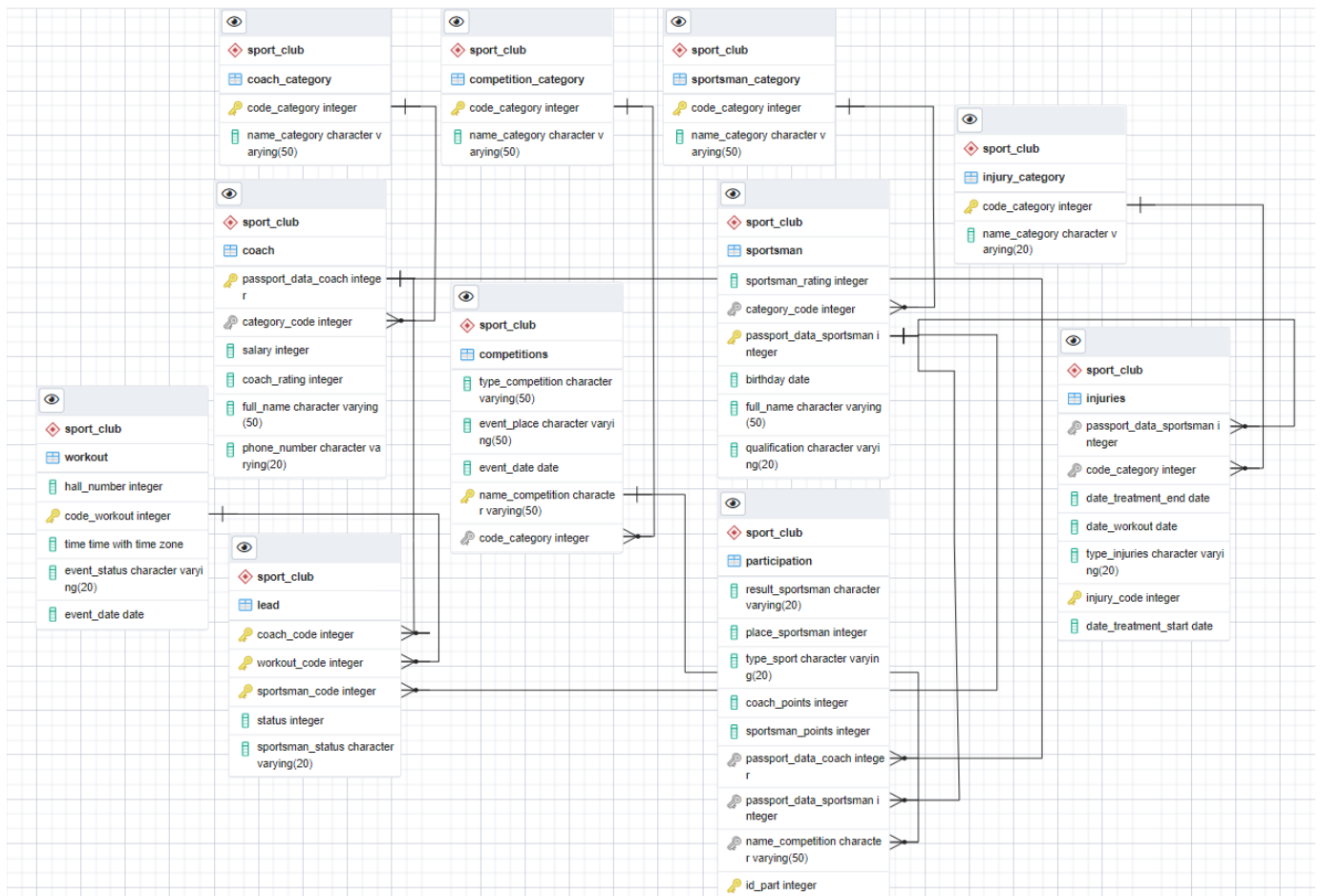
**Оборудование:** компьютерный класс.

**Программное обеспечение:** СУБД PostgreSQL 1X, pgAdmin 4.

**Практическое задание:**

1. Создать запросы и представления на выборку данных к базе данных PostgreSQL (согласно индивидуальному заданию, часть 2 и 3).
2. Составить 3 запроса на модификацию данных (INSERT, UPDATE, DELETE) с использованием подзапросов.
3. Изучить графическое представление запросов и просмотреть историю запросов
4. Создать простой и составной индексы для двух произвольных запросов и сравнить время выполнения запросов без индексов и с индексами. Для получения плана запроса использовать команду EXPLAIN.

Схема базы данных:



## Выполнение:

### 1. Запросы к базе данных:

#### 1.1. С каким количеством спортсменов работает каждый тренер.

```
SELECT DISTINCT(sport_club.coach.full_name),  
COUNT(sport_club.lead.workout_code)  
FROM sport_club.coach, sport_club.lead  
WHERE sport_club.lead.coach_code IN  
(SELECT sport_club.lead.coach_code FROM sport_club.coach)  
AND sport_club.coach.passport_data_coach = sport_club.lead.coach_code  
GROUP BY sport_club.lead.coach_code, sport_club.coach.full_name
```

Query Editor

Query History

1

2

3

4

5

6

7

8

SELECT DISTINCT(sport\_club.coach.full\_name),

COUNT(sport\_club.lead.workout\_code)

FROM sport\_club.coach, sport\_club.lead

WHERE sport\_club.lead.coach\_code IN

(SELECT sport\_club.lead.coach\_code FROM sport\_club.coach)

AND sport\_club.coach.passport\_data\_coach = sport\_club.lead.coach\_code

GROUP BY sport\_club.lead.coach\_code, sport\_club.coach.full\_name

Data Output

Explain

Messages

Notifications

full\_name

character varying (50)

count

bigint

1

ВОЛОДИН АЛЕКСЕЙ

1

2

ДУРОВ АНТОН

1

3

ЕРМОЛОВА ВАСИЛИСА

2

4

ИВАНОВ ИВАН

1

5

ИВАНОВА НАТАЛЬЯ

2

6

ПЕТРОВ ДМИТРИЙ

2

7

ПОПОВ ДМИТРИЙ

1

#### 1.2. Найти тренеров, чьи спортсмены не имеют травм.

```
SELECT DISTINCT(sport_club.participation.passport_data_coach),  
sport_club.coach.full_name  
FROM sport_club.participation, sport_club.coach  
WHERE sport_club.participation.passport_data_coach NOT IN  
(SELECT DISTINCT(sport_club.participation.passport_data_coach)  
FROM sport_club.participation, sport_club.injuries)
```

WHERE sport\_club.injuries.passport\_data\_sportsman =  
 sport\_club.participation.passport\_data\_sportsman)  
 AND sport\_club.participation.passport\_data\_coach = sport\_club.coach.passport

Query Editor

Query History

```

1 SELECT DISTINCT(sport_club.participation.passport_data_coach),
2 sport_club.coach.full_name
3 FROM sport_club.participation, sport_club.coach
4 WHERE sport_club.participation.passport_data_coach NOT IN
5 (SELECT DISTINCT(sport_club.participation.passport_data_coach)
6 FROM sport_club.participation, sport_club.injuries
7 WHERE sport_club.injuries.passport_data_sportsman = sport_club.participation.passport_data_sportsman)
8 AND sport_club.participation.passport_data_coach = sport_club.coach.passport_data_coach

```

Data Output

Explain

Messages

Notifications

|   | passport_data_coach<br>integer | full_name<br>character varying (50) |
|---|--------------------------------|-------------------------------------|
| 1 | 1510082405                     | ПОПОВ ДМИТРИЙ                       |

1.3. Найти тренера, получающего минимальную зарплату.

SELECT coach.category\_code as "КОД КАТЕГОРИИ",  
 coach.full\_name as "ТРЕНЕР"  
 FROM sport\_club.coach  
 WHERE sport\_club.coach.salary = (SELECT min(salary) FROM sport\_club.coach)

Query Editor

Query History

```
1 SELECT coach.category_code as "КОД КАТЕГОРИИ", coach.full_name as "ТРЕНЕР"
2 FROM sport_club.coach
3 WHERE sport_club.coach.salary = (SELECT min(salary) FROM sport_club.coach)
4
```

Data Output

Explain

Messages

Notifications

|   | КОД КАТЕГОРИИ<br>integer | ТРЕНЕР<br>character varying (50) |  |
|---|--------------------------|----------------------------------|--|
| 1 | 4                        | ИВАНОВ ИВАН                      |  |
| 2 | 5                        | КОЗЛОВ ИВАН                      |  |

1.4. Определить количество соревнований каждой категории.

SELECT competition\_category.code\_category,  
 competition\_category.name\_category,  
 COUNT(competitions.name\_competition)  
 FROM sport\_club.competitions INNER JOIN sport\_club.competition\_category

ON competitions.code\_category = competition\_category.code\_category  
GROUP BY competition\_category.code\_category

|   |          |  |
|---|----------|--|
| 1 | SELECT   | competition_category.code_category,                                |
| 2 |          | competition_category.name_category,                                |
| 3 | COUNT    | (competitions.name_competition)                                    |
| 4 | FROM     | sport_club.competitions INNER JOIN sport_club.competition_category |
| 5 | ON       | competitions.code_category = competition_category.code_category    |
| 6 | GROUP BY | competition_category.code_category                                 |
| 7 |          |  |

| Data Output                   | Explain                                 | Messages        | Notifications |
|-------------------------------|---|-----------------|---------------|
| code_category<br>[PK] integer | name_category<br>character varying (50) | count<br>bigint |               |
| 1                             | СПОРТИВНОЕ ПЛАВАНИЕ                     | 2               |               |
| 2                             | ФИГУРНОЕ КАТАНИЕ                        | 1               |               |
| 3                             | БАСКЕТБОЛ                               | 1               |               |
| 4                             | ВОЛЕЙБОЛ                                | 1               |               |
| 5                             | ХОККЕЙ                                  | 1               |               |
|                               |   |                 |               |

1.5. Найти тренера, работающего с самыми молодыми спортсменами (средний возраст спортсменов минимален).

```
FROM sport_club.coach, sport_club.lead, sport_club.sportsman
WHERE sport_club.coach.passport_data_coach = sport_club.lead.coach_code
AND
sport_club.sportsman.passport_data_sportsman = sport_club.lead.sportsman_code
AND
(SELECT EXTRACT(YEAR FROM CURRENT_DATE)-EXTRACT(YEAR
FROM sport_club.sportsman.birthday))
=(SELECT MIN(yo) FROM (SELECT sport_club.lead.coach_code,
AVG(EXTRACT(YEAR FROM
CURRENT_DATE)-EXTRACT(YEAR FROM sport_club.sportsman.birthday)) as
yo
FROM sport_club.sportsman, sport_club.lead
WHERE
sport_club.sportsman.passport_data_sportsman = sport_club.lead.sportsman_code
```

Query Editor

Query History

```
2 FROM sport_club.coach, sport_club.lead, sport_club.sportsman
3 WHERE sport_club.coach.passport_data_coach = sport_club.lead.coach_code
4 AND sport_club.sportsman.passport_data_sportsman = sport_club.lead.sportsman_code
5 AND
6 (SELECT EXTRACT(YEAR FROM CURRENT_DATE)-EXTRACT(YEAR FROM sport_club.sportsman.birthday))
7 =(SELECT MIN(yo) FROM (SELECT sport_club.lead.coach_code,
8                         AVG(EXTRACT(YEAR FROM CURRENT_DATE)-EXTRACT(YEAR FROM sport_club.sportsman.birthday)) as yo
9                         FROM sport_club.sportsman, sport_club.lead
10                        WHERE sport_club.sportsman.passport_data_sportsman = sport_club.lead.sportsman_code
11
```

Data Output

Explain

Messages

Notifications

|   | full_name              |  |
|---|------------------------|--|
|   | character varying (50) |  |
| 1 | ПОПОВ ДМИТРИЙ          |  |

1.6. Сколько спортсменов участвует в соревнованиях каждой категории в заданный период.

```

SELECT competitions.code_category,
COUNT(participation.passport_data_sportsman)
FROM sport_club.competitions
INNER JOIN sport_club.participation
ON sport_club.competitions.name_competition =
sport_club.participation.name_competition
WHERE sport_club.competitions.event_date
BETWEEN '01.02.2022' AND '20.08.2022'
GROUP BY competitions.code_category

```

Query Editor

Query History



```
1 SELECT competitions.code_category,
2 COUNT(participation.passport_data_sportsman)
3 FROM sport_club.competitions
4 INNER JOIN sport_club.participation
5 ON sport_club.competitions.name_competition = sport_club.participation.name_competition
6 WHERE sport_club.competitions.event_date
7 BETWEEN '01.02.2022' AND '20.08.2022'
8 GROUP BY competitions.code_category
9
```

Data Output

Explain

Messages

Notifications

|   | <div>code_category</div> <div>integer</div> | <div></div> <div>count</div> <div>bigint</div> | <div></div> |
|---|---|---|--|
| 1 |   | 1   | 2  |
| 2 |   | 3   | 1  |
| 3 |   | 2   | 1  |

1.7 Для всех спортсменов определить количество соревнований, в которых они участвовали.

```

SELECT sportsman.full_name,

```

```

COUNT(participation.name_competition)
FROM sport_club.sportsman, sport_club.participation
WHERE sport_club.sportsman.passport_data_sportsman
IN (SELECT sport_club.sportsman.passport_data_sportsman
FROM sport_club.sportsman)
AND
sport_club.sportsman.passport_data_sportsman=sport_club.participation.passport_data_sportsman
GROUP BY sportsman.full_name, sportsman.passport_data_sportsman

```

Query Editor

Query History

```

1 SELECT sportsman.full_name,
2 COUNT(participation.name_competition)
3 FROM sport_club.sportsman, sport_club.participation
4 WHERE sport_club.sportsman.passport_data_sportsman
5 IN (SELECT sport_club.sportsman.passport_data_sportsman
6 FROM sport_club.sportsman)
7 AND sport_club.sportsman.passport_data_sportsman=sport_club.participation.passport_data_sportsman
8 GROUP BY sportsman.full_name, sportsman.passport_data_sportsman

```

Data Output

Explain

Messages

Notifications

|   | <div>full_name</div> <div>character varying (50)</div> | <div>count</div> <div>bigint</div> |  |
|---|--|------------------------------------|--|
| 1 | СТЕПАНОВ АНДРЕЙ  | 2                                  |  |
| 2 | КИРИЛЕНКО ДАНИИЛ                                       | 1                                  |  |
| 3 | ДОБРЮЛЮБОВА АННА                                       | 1                                  |  |

## 2. Представление

2.1. Содержащее сведения обо всех тренерах, соревнованиях, в которых участвовали их спортсмены и местах, которые они заняли.

```

SELECT sport_club.coach.full_name, sport_club.participation.name_competition,
sport_club.participation.place_sportsman
FROM sport_club.coach INNER JOIN sport_club.participation
ON
sport_club.coach.passport_data_coach=sport_club.participation.passport_data_coach

```

Query Editor   Query History

```

1 CREATE VIEW sport_club.info_sport_club AS
2 SELECT sport_club.coach.full_name, sport_club.participation.name_competition,
3 sport_club.participation.place_sportsman
4 FROM sport_club.coach INNER JOIN sport_club.participation
5 ON sport_club.coach.passport_data_coach=sport_club.participation.passport_data_coach
6

```

Data Output   Explain   Messages   Notifications

CREATE VIEW

Query returned successfully in 73 msec.

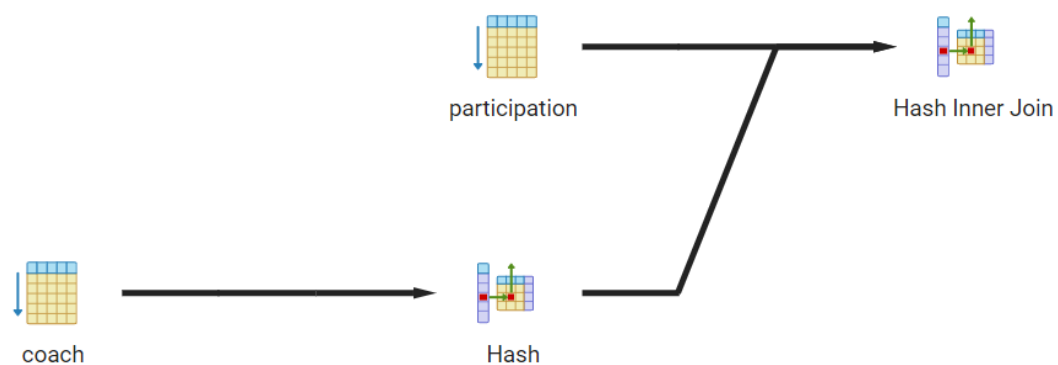
Data Output   Explain   Messages   Notifications

|   | full_name<br>character varying (50) | name_competition<br>character varying (50) | place_sportsman<br>integer |
|---|-------------------------------------|--|----------------------------|
| 1 | ЕРМОЛОВА ВАСИЛИСА                   | ФИГУРНОЕ КАТАНИЕ ПО СТРАНАМ                | 1                          |
| 2 | ДУРОВ АНТОН                         | МЕЖДУНАРОДНЫЕ СОРЕВНОВАНИЯ ПО ВОЛЕЙБОЛУ    | 2                          |
| 3 | ПОПОВ ДМИТРИЙ                       | ЧЕМПИОНАТ МИРА ПО ПЛАВАНИЮ                 | 3                          |
| 4 | ПОПОВ ДМИТРИЙ                       | МЕЖКЛУБНОЕ СОРЕВНОВАНИЕ ПО ПЛАВАНИЮ        | 2                          |

Data Output   Explain   Messages   Notifications

Graphical   Analysis   Statistics

🔍 🔄 🔍 📄



2.2. Найти самую распространенную травму.

```

SELECT injury_category.name_category, count(sport_club.injuries.code_category)
FROM sport_club.injury_category INNER JOIN sport_club.injuries
ON sport_club.injury_category.code_category=sport_club.injuries.code_category
GROUP BY sport_club.injuries.code_category, injury_category.name_category
HAVING COUNT(sport_club.injuries.code_category) = (SELECT MAX(inj)
FROM (SELECT injury_category.name_category,

```



```

count(sport_club.injuries.code_category) as inj FROM sport_club.injury_category
GROUP BY
sport_club.injuries.code_category,
injury_category.name_category)
inj)
LIMIT 1

```

| Query Editor |          | Query History   |  |
|--------------|----------|---|--|
| 1            | SELECT   | injury_category.name_category,  | count(sport_club.injuries.code_category) |
| 2            | FROM     | sport_club.injury_category  | INNER JOIN sport_club.injuries           |
| 3            | ON       | sport_club.injury_category.code_category=sport_club.injuries.code_category      |  |
| 4            | GROUP BY | sport_club.injuries.code_category,  | injury_category.name_category            |
| 5            | HAVING   | COUNT(sport_club.injuries.code_category) = (SELECT MAX(inj)                     |  |
| 6            |          | FROM (SELECT injury_category.name_category,                                     |  |
| 7            |          | count(sport_club.injuries.code_category) as inj FROM sport_club.injury_category |  |
| 8            |          | GROUP BY sport_club.injuries.code_category,                                     |  |
| 9            |          | injury_category.name_category)  |  |
| 10           |          | inj)  |  |
| 11           | LIMIT    | 1   |  |

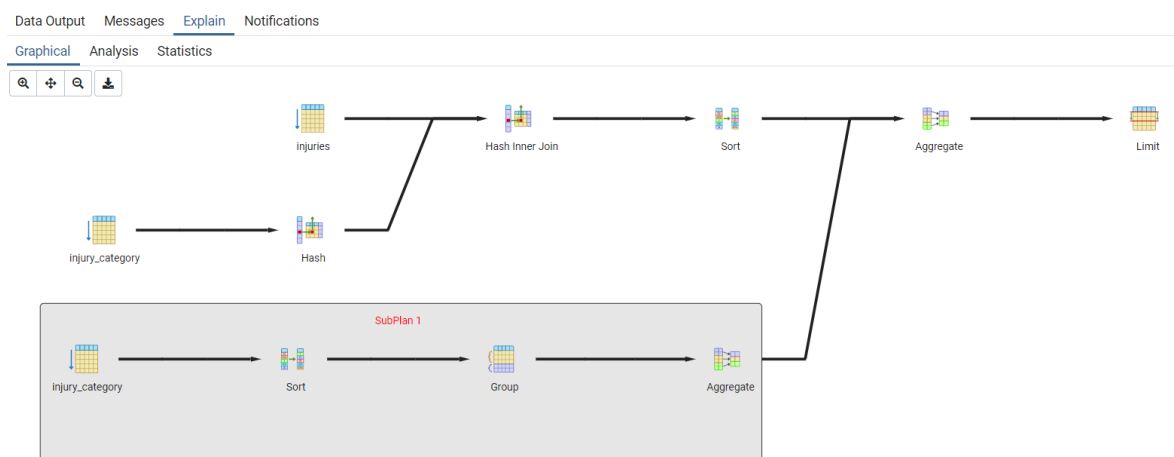
  

| Data Output            |        | Messages | Explain | Notifications |
|------------------------|--------|----------|---------|---------------|
| name_category          | count  |          |         |               |
| character varying (20) | bigint |          |         |               |
| 1 УШИБ                 | 2      |          |         |               |

Data Output Explain Notifications Messages

CREATE VIEW

Query returned successfully in 70 msec.



### 3. Модификация

#### 3.1. Добавить новую тренировку - INSERT

до:

| Data Output |   | Messages   | Explain                               | Notifications  |   |
|-------------|---|--|---------------------------------------|--|---|
|             | <div>type_competition</div> <div>character varying (50)</div> | <div>event_place</div> <div>character varying (50)</div> | <div>event_date</div> <div>date</div> | <div>name_competition</div> <div>[PK] character varying (50)</div> | <div>code_category</div> <div>integer</div> |
| 1           | КОМАНДНАЯ   | СК ДИНАМО  | 2022-12-01                            | КУБОК МИРА ПО ХОККЕЮ   | 8   |
| 2           | КОМАНДНОЕ   | СК ВЯЗЕМСКИЙ   | 2022-03-25                            | МЕЖДУНАРОДНЫЕ СОРЕВНОВАНИЯ ПО ВОЛЕЙБОЛУ                            | 2   |
| 3           | ОДИНОЧНОЕ   | БАСЕЙН СКА   | 2022-07-26                            | МЕЖКЛУБНОЕ СОРЕВНОВАНИЕ ПО ПЛАВАНИЮ                                | 1   |
| 4           | КОМАНДНОЕ   | СК ВЯЗЕМСКИЙ   | 2022-05-20                            | МЕЖУНИВЕРСИТЕТСКАЯ ИГРА  | 4   |
| 5           | ОДИНОЧНОЕ   | СК ГОРЬКОВСКАЯ   | 2022-03-24                            | ФИГУРНОЕ КАТАНИЕ ПО СТРАНАМ  | 3   |
| 6           | ОДИНОЧНОЕ   | БАСЕЙН СКА   | 2022-07-26                            | ЧЕМПИОНАТ МИРА ПО ПЛАВАНИЮ   | 1   |
|             |   |  |                                       |  |   |






после:

```
INSERT INTO sport_club.competitions(type_competition, event_place, event_date,
name_competition, code_category)
VALUES('КОМАНДНАЯ', 'СК ВЯЗЕМСКИЙ',
      '2022-05-01', 'МЕЖКЛУБНОЕ СОРЕВНОВАНИЕ ПО БАСКЕТБОЛУ',
      (SELECT code_category FROM sport_club.competition_category
      WHERE competition_category.name_category = 'БАСКЕТБОЛ')
      )
```

| Data Output |  | Messages                              | Explain            | Notifications                                   |                          |
|-------------|--|---------------------------------------|--------------------|---|--------------------------|
|             | type_competition<br>character varying (50) | event_place<br>character varying (50) | event_date<br>date | name_competition<br>[PK] character varying (50) | code_category<br>integer |
| 1           | КОМАНДНАЯ                                  | СК ДИНАМО                             | 2022-12-01         | КУБОК МИРА ПО ХОККЕЮ                            | 8                        |
| 2           | КОМАНДНОЕ                                  | СК ВЯЗЕМСКИЙ                          | 2022-03-25         | МЕЖДУНАРОДНЫЕ СОРЕВНОВАНИЯ ПО ВОЛЕЙБОЛУ         | 2                        |
| 3           | КОМАНДНАЯ                                  | СК ВЯЗЕМСКИЙ                          | 2022-05-01         | МЕЖКЛУБНОЕ СОРЕВНОВАНИЕ ПО БАСКЕТБОЛУ           | 4                        |
| 4           | ОДИНОЧНОЕ                                  | БАСЕЙН СКА                            | 2022-07-26         | МЕЖКЛУБНОЕ СОРЕВНОВАНИЕ ПО ПЛАВАНИЮ             | 1                        |
| 5           | КОМАНДНОЕ                                  | СК ВЯЗЕМСКИЙ                          | 2022-05-20         | МЕЖУНИВЕРСИТЕТСКАЯ ИГРА                         | 4                        |
| 6           | ОДИНОЧНОЕ                                  | СК ГОРЬКОВСКАЯ                        | 2022-03-24         | ФИГУРНОЕ КАТАНИЕ ПО СТРАНАМ                     | 3                        |
| 7           | ОДИНОЧНОЕ                                  | БАСЕЙН СКА                            | 2022-07-26         | ЧЕМПИОНАТ МИРА ПО ПЛАВАНИЮ                      | 1                        |
|             |  |                                       |                    |   |                          |








3.2. UPDATE - Повысить зарплату на 5000 всем тренерам, у которых она меньше 90000.

до:

| Data Output   |   | Messages   | Explain   | Notifications   |   |  |
|---|---|--|---|---|---|--|
|  | passport_data_coach<br>[PK] integer  | category_code<br>integer  | salary<br>integer  | coach_rating<br>integer  | full_name<br>character varying (50)  | phone_number<br>character varying (20)  |
| 1   | 1101574677  | 3  | 75000   | 1   | ЕРМОЛОВА ВАСИЛИСА   | 936581855  |
| 2   | 1510082405  | 1  | 75000   | 1   | ПОПОВ ДМИТРИЙ   | 936789595  |
| 3   | 1610082400  | 4  | 60000   | 3   | ИВАНОВ ИВАН   | 936787410  |
| 4   | 1610082401  | 5  | 80000   | 5   | ИВАНОВА НАТАЛЬЯ   | 936787411  |
| 5   | 1610082402  | 6  | 80000   | 4   | ВОЛОДИН АЛЕКСЕЙ   | 936787412  |
| 6   | 1610082403  | 7  | 90000   | 2   | КОЖАНОВА АЛЕКСАНДРА   | 936787413  |
| 7   | 1610082404  | 8  | 84000   | 9   | ПЕТРОВ ДМИТРИЙ  | 936787414  |
| 8   | 1610082405  | 2  | 75000   | 1   | ДУРОВ АНТОН   | 936787412  |
| 9   | 1610082408  | 3  | 75000   | 2   | ПЛЮЩЕНКО АЛЕКСЕЙ  | 936787417  |
| 10  | 1610082409  | 8  | 84000   | 3   | ВАСИЛЕНКО АНТОН   | 936787413  |
| 11  | 1610082410  | 5  | 60000   | 3   | КОЗЛОВ ИВАН   | 936787414  |
|   |   |  |   |   |   |  |

после:

```
UPDATE sport_club.coach
SET salary = salary + 5000
WHERE salary IN (
SELECT salary FROM sport_club.coach
WHERE salary < 90000)
```

| Data Output   |   | Messages   | Explain   | Notifications   |   |  |
|---|---|--|---|---|---|--|
|  | passport_data_coach<br>[PK] integer  | category_code<br>integer  | salary<br>integer  | coach_rating<br>integer  | full_name<br>character varying (50)  | phone_number<br>character varying (20)  |
| 1   | 1610082403  | 7  | 90000   | 2   | КОЖАНОВА АЛЕКСАНДРА   | 936787413  |
| 2   | 1510082405  | 1  | 80000   | 1   | ПОПОВ ДМИТРИЙ   | 936789595  |
| 3   | 1610082405  | 2  | 80000   | 1   | ДУРОВ АНТОН   | 936787412  |
| 4   | 1101574677  | 3  | 80000   | 1   | ЕРМОЛОВА ВАСИЛИСА   | 936581855  |
| 5   | 1610082400  | 4  | 65000   | 3   | ИВАНОВ ИВАН   | 936787410  |
| 6   | 1610082401  | 5  | 85000   | 5   | ИВАНОВА НАТАЛЬЯ   | 936787411  |
| 7   | 1610082402  | 6  | 85000   | 4   | ВОЛОДИН АЛЕКСЕЙ   | 936787412  |
| 8   | 1610082404  | 8  | 89000   | 9   | ПЕТРОВ ДМИТРИЙ  | 936787414  |
| 9   | 1610082408  | 3  | 80000   | 2   | ПЛЮЩЕНКО АЛЕКСЕЙ  | 936787417  |
| 10  | 1610082409  | 8  | 89000   | 3   | ВАСИЛЕНКО АНТОН   | 936787413  |
| 11  | 1610082410  | 5  | 65000   | 3   | КОЗЛОВ ИВАН   | 936787414  |
|   |   |  |   |   |   |  |

3.3. Удалить тренера, зарабатывающего больше 90000 (включительно).

до:

| Data Output |                                     | Messages                 | Explain           | Notifications           |                                     |  |
|-------------|-------------------------------------|--------------------------|-------------------|-------------------------|-------------------------------------|--|
|             | passport_data_coach<br>[PK] integer | category_code<br>integer | salary<br>integer | coach_rating<br>integer | full_name<br>character varying (50) | phone_number<br>character varying (20) |
| 1           | 1610082403                          | 7                        | 90000             | 2                       | КОЖАНОВА АЛЕКСАНДРА                 | 936787413                              |
| 2           | 1510082405                          | 1                        | 80000             | 1                       | ПОПОВ ДМИТРИЙ                       | 936789595                              |
| 3           | 1610082405                          | 2                        | 80000             | 1                       | ДУРОВ АНТОН                         | 936787412                              |
| 4           | 1101574677                          | 3                        | 80000             | 1                       | ЕРМОЛОВА ВАСИЛИСА                   | 936581855                              |
| 5           | 1610082400                          | 4                        | 65000             | 3                       | ИВАНОВ ИВАН                         | 936787410                              |
| 6           | 1610082401                          | 5                        | 85000             | 5                       | ИВАНОВА НАТАЛЬЯ                     | 936787411                              |
| 7           | 1610082402                          | 6                        | 85000             | 4                       | ВОЛОДИН АЛЕКСЕЙ                     | 936787412                              |
| 8           | 1610082404                          | 8                        | 89000             | 9                       | ПЕТРОВ ДМИТРИЙ                      | 936787414                              |
| 9           | 1610082408                          | 3                        | 80000             | 2                       | ПЛЮЩЕНКО АЛЕКСЕЙ                    | 936787417                              |
| 10          | 1610082409                          | 8                        | 89000             | 3                       | ВАСИЛЕНКО АНТОН                     | 936787413                              |
| 11          | 1610082410                          | 5                        | 65000             | 3                       | КОЗЛОВ ИВАН                         | 936787414                              |
|             |                                     |                          |                   |                         |                                     |  |

после:

```
DELETE FROM sport_club.coach
WHERE salary IN (
SELECT salary FROM sport_club.coach
WHERE salary >= 90000)
```

| Data Output |                                     | Messages                 | Explain           | Notifications           |                                     |  |
|-------------|-------------------------------------|--------------------------|-------------------|-------------------------|-------------------------------------|--|
|             | passport_data_coach<br>[PK] integer | category_code<br>integer | salary<br>integer | coach_rating<br>integer | full_name<br>character varying (50) | phone_number<br>character varying (20) |
| 1           | 1510082405                          | 1                        | 80000             | 1                       | ПОПОВ ДМИТРИЙ                       | 936789595                              |
| 2           | 1610082405                          | 2                        | 80000             | 1                       | ДУРОВ АНТОН                         | 936787412                              |
| 3           | 1101574677                          | 3                        | 80000             | 1                       | ЕРМОЛОВА ВАСИЛИСА                   | 936581855                              |
| 4           | 1610082400                          | 4                        | 65000             | 3                       | ИВАНОВ ИВАН                         | 936787410                              |
| 5           | 1610082401                          | 5                        | 85000             | 5                       | ИВАНОВА НАТАЛЬЯ                     | 936787411                              |
| 6           | 1610082402                          | 6                        | 85000             | 4                       | ВОЛОДИН АЛЕКСЕЙ                     | 936787412                              |
| 7           | 1610082404                          | 8                        | 89000             | 9                       | ПЕТРОВ ДМИТРИЙ                      | 936787414                              |
| 8           | 1610082408                          | 3                        | 80000             | 2                       | ПЛЮЩЕНКО АЛЕКСЕЙ                    | 936787417                              |
| 9           | 1610082409                          | 8                        | 89000             | 3                       | ВАСИЛЕНКО АНТОН                     | 936787413                              |
| 10          | 1610082410                          | 5                        | 65000             | 3                       | КОЗЛОВ ИВАН                         | 936787414                              |
|             |                                     |                          |                   |                         |                                     |  |

#### 4. Индекс

**3-ий запрос без индекса:**

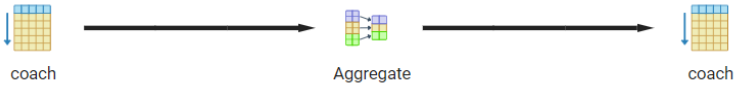
```
SELECT coach.category_code as "КОД КАТЕГОРИИ",
coach.full_name as "ПРЕИМЯ"
FROM sport_club.coach
WHERE sport_club.coach.salary = (SELECT min(salary) FROM sport_club.coach)
```

Data Output Messages Explain Notifications

Successfully run. Total query runtime: 56 msec.  
2 rows affected.

Data Output Messages Explain Notifications

Graphical Analysis Statistics



## С индексом:

создание индекса:

Query Editor Query History

```
1 CREATE INDEX sal ON sport_club.coach(category_code)
```

Data Output Messages Explain Notifications

CREATE INDEX

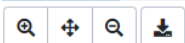
Query returned successfully in 50 msec.

запрос:

Successfully run. Total query runtime: 44 msec.  
2 rows affected.

Data Output Messages Explain Notifications

Graphical Analysis Statistics



7-ой запрос без индекса:

Query Editor   Query History

```

1 SELECT sportsman.full_name,
2 COUNT(participation.name_competition)
3 FROM sport_club.sportsman, sport_club.participation
4 WHERE sport_club.sportsman.passport_data_sportsman
5 IN (SELECT sport_club.sportsman.passport_data_sportsman
6 FROM sport_club.sportsman)
7 AND sport_club.sportsman.passport_data_sportsman=sport_club.participation.passport_data_sportsman
8 GROUP BY sportsman.full_name, sportsman.passport_data_sportsman

```

Data Output   Messages   Explain   Notifications

Successfully run. Total query runtime: 75 msec.  
3 rows affected.

Graphical   Analysis   Statistics

```

graph LR
    sportsman1[sportsman] --> Hash1[Hash]
    participation1[participation] --> Hash2[Hash]
    Hash1 --> HJ1[Hash Inner Join]
    Hash2 --> HJ1
    HJ1 --> Hash3[Hash]
    Hash3 --> Aggregate[Aggregate]

```

## С индексом:

создание индекса:

Query Editor   Query History

```

1 CREATE UNIQUE INDEX ccomp ON
2 sport_club.sportsman(full_name, passport_data_sportsman)

```

Data Output   Messages   Explain   Notifications

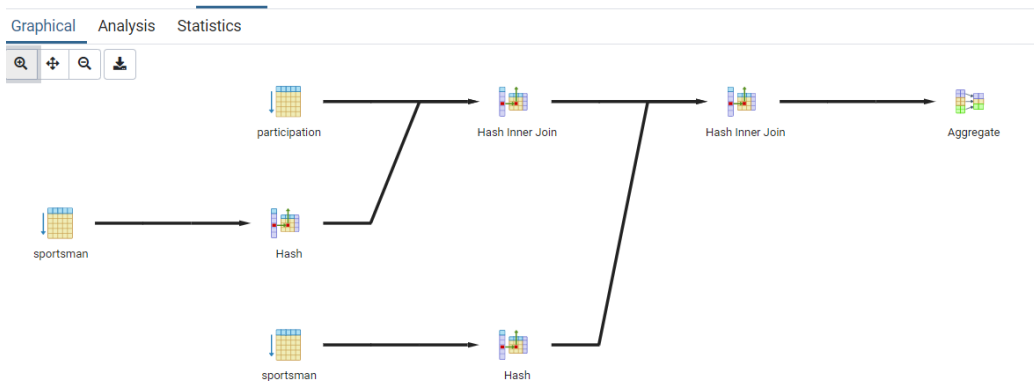
CREATE INDEX

Query returned successfully in 64 msec.

создание запроса:

Data Output   Messages   Explain   Notifications

Successfully run. Total query runtime: 55 msec.  
3 rows affected.



### Удаление индексов:

Query Editor Query History

```
1 DROP INDEX sport_club.sal
```

Data Output Messages Explain Notifications

DROP INDEX

Query returned successfully in 35 msec.

Query Editor Query History

```
1 DROP INDEX sport_club.ccomp
```

Data Output Messages Explain Notifications

DROP INDEX

Query returned successfully in 31 msec.

### Вывод:

В ходе выполнения лабораторной работы были приобретены практические навыки создания запросов и представления на выборку данных, запросов на модификацию данных (INSERT, UPDATE, DELETE) с использованием подзапросов; графическое представление запросов. Также созданы простые и составные индексы для двух запросов.

Время выполнения как маленьких так и больших запросов с индексами обрабатывается медленнее, чем запросы без индексов.