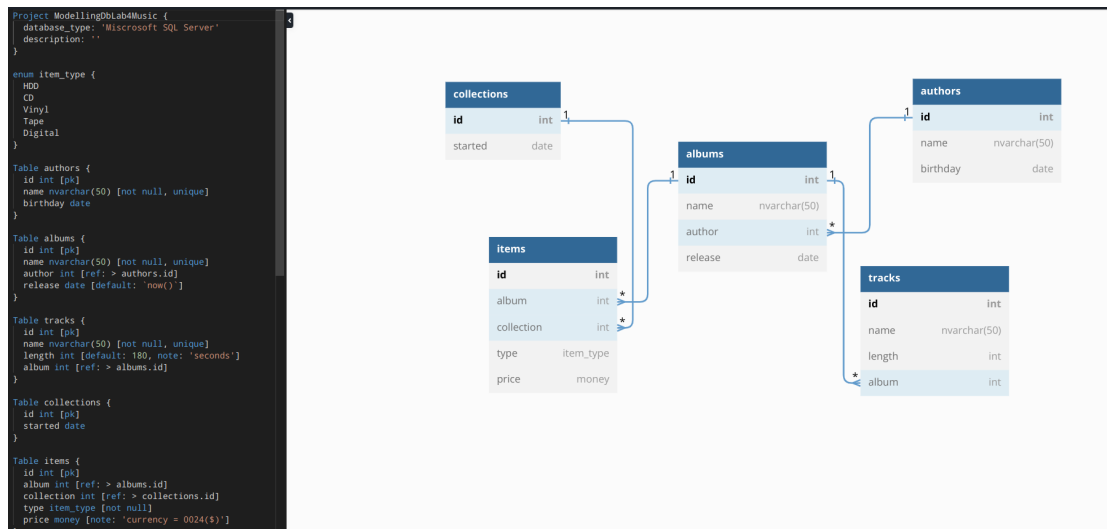# Лабараторная работа №12

Предметная область: 19. Музыкальные альбомы Коллекция состоит из музыкальных альбомов, которые могут быть записаны на Audio CD, или на жестком диске. Каждый альбом создан одним автором (исполнителем). У каждого исполнителя может быть несколько альбомов. Каждый альбом содержит несколько треков (композиций), которые имеют определенную длину и порядок в альбоме. Каждый трек может быть только в одном альбоме.

Структура БД

Данные в БД

Albums

	id	name	author	release
1	1	Scary Monsters	2	1980-09-12
2	2	Heroes	2	1977-10-14
3	3	Transformer	4	1972-11-08
4	4	Lust For Life	3	1977-09-09
5	5	Bone Machine	5	1992-09-08
6	6	Stromae	6	2022-03-04
7	7	2004	7	2019-12-24
8	8	Последний Герой	8	1984-01-01
9	9	45	8	1982-07-22
1...	10	Прости меня моя любовь	9	2000-03-28
1...	11	Земфира	9	1999-05-10
1...	12	Вендетта	9	2005-03-01
1...	13	The Life of Pablo	11	2016-02-14
1...	14	808s & Heartbreak	11	2008-11-24

Authors

	id	name	birthday
1	2	David Bowie	1947-01-08
2	3	Iggy Pop	1947-04-21
3	4	Lou Reed	1942-03-02
4	5	Tom Waits	1949-12-07
5	6	Stromae	1985-03-12
6	7	Скриптонит	1990-06-03
7	8	Виктор Цой	1962-06-21
8	9	Земфира	1976-08-26
9	10	Jim Morrison	1943-12-08
1...	11	Kanye West	1977-06-08

Collections

	id	started
1	1	2004-03-30
2	2	*NULL*
3	3	2023-03-16
4	4	1973-10-10
5	5	2020-04-01
6	6	2003-04-18
7	7	2011-09-11
8	8	1976-06-06
9	9	1968-11-22
1...	10	2000-01-01

Items

	id	album	collection	type	price
1	1	1	3	Vinyl	30.00
2	2	1	3	Tape	20.00
3	3	1	3	Digital	4.00
4	4	2	1	Vinyl	35.00
5	5	5	7	CD	25.00
6	6	9	9	CD	23.00
7	7	7	2	Digital	2.00
8	8	10	2	Digital	1.00
9	9	11	2	Digital	0.33
1...	10	8	5	Tape	15.00
1...	11	9	5	Tape	12.50
1...	12	13	6	Vinyl	100.00
1...	13	14	6	Vinyl	80.00
1...	14	5	6	Vinyl	300.00
1...	15	4	6	Vinyl	30.00

Tracks

	id	name	length	album
1	9	Scary Monsters	232	1
2	10	Ashes to Ashes	133	1
3	11	Heroes	332	2
4	12	Passenger	245	4
5	13	Who are you this time?	305	5
6	14	Бездельник №1	155	9
7	15	Бездельник №2	177	9
8	16	Saint Pablo	344	13
9	17	Welcome to Heartbreak	190	14
1…	18	Ромашки	190	11
1…	19	Сердца из железа	119	7

3. С помощью языка T-SQL выполнить следующие запросы:

- вывести все данные из таблиц
- вывести определенные данные, отсортированные в алфавитном порядке по

определенному полю

- вывести определенные данные, отсортированные в обратном алфавитном

порядке по двум полям

- создать вычисляемое поле, и вывести данные, убрав дубликаты
- вывести 30% строк
- вывести первые 5 строк
- вывести строки начиная с 4 строки по 7 строку, отсортированные в обратном

порядке

- Отсортировать данные, используя в качестве критерия сортировки сложно

выражение на основе столбцов

- Запрос на выборку с добавлением SELECT INTO

In [139…
```sql
-- Select all data from the authors table
SELECT * FROM authors;

-- Select all data from the albums table
SELECT * FROM albums;
```

```sql
-- Select all data from the tracks table
SELECT * FROM tracks;

-- Select all data from the collections table
SELECT * FROM collections;

-- Select all data from the items table
SELECT * FROM items;
```

(10 rows affected)

(14 rows affected)

(11 rows affected)

(10 rows affected)

(15 rows affected)

Total execution time: 00:00:00.009

Out[139]:

id	name	birthday
2	David Bowie	1947-01-08
3	Iggy Pop	1947-04-21
4	Lou Reed	1942-03-02
5	Tom Waits	1949-12-07
6	Stromae	1985-03-12
7	Скриптонит	1990-06-03
8	Виктор Цой	1962-06-21
9	Земфира	1976-08-26
10	Jim Morrison	1943-12-08
11	Kanye West	1977-06-08

Out[139]:

id	name	author	release
1	Scary Monsters	2	1980-09-12
2	Heroes	2	1977-10-14
3	Transformer	4	1972-11-08
4	Lust For Life	3	1977-09-09
5	Bone Machine	5	1992-09-08
6	Stromae	6	2022-03-04
7	2004	7	2019-12-24
8	Последний Герой	8	1984-01-01
9	45	8	1982-07-22
10	Прости меня моя любовь	9	2000-03-28
11	Земфира	9	1999-05-10
12	Вендетта	9	2005-03-01
13	The Life of Pablo	11	2016-02-14
14	808s & Heartbreak	11	2008-11-24

id	name	length	album
9	Scary Monsters	232	1
10	Ashes to Ashes	133	1
11	Heroes	332	2
12	Passenger	245	4
13	Who are you this time?	305	5
14	Бездельник №1	155	9
15	Бездельник №2	177	9
16	Saint Pablo	344	13
17	Welcome to Heartbreak	190	14
18	Ромашки	190	11
19	Сердца из железа	119	7

id	started
1	2004-03-30
2	NULL
3	2023-03-16
4	1973-10-10
5	2020-04-01
6	2003-04-18
7	2011-09-11
8	1976-06-06
9	1968-11-22
10	2000-01-01

Out[139]:

id	album	collection	type	price
1	1	3	Vinyl	30.00
2	1	3	Tape	20.00
3	1	3	Digital	4.00
4	2	1	Vinyl	35.00
5	5	7	CD	25.00
6	9	9	CD	23.00
7	7	2	Digital	2.00
8	10	2	Digital	1.00
9	11	2	Digital	0.33
10	8	5	Tape	15.00
11	9	5	Tape	12.50
12	13	6	Vinyl	100.00
13	14	6	Vinyl	80.00
14	5	6	Vinyl	300.00
15	4	6	Vinyl	30.00

In [140…

```sql
SELECT * FROM albums
ORDER BY name
```

(14 rows affected)

Total execution time: 00:00:00.005

Out[140]:

id	name	author	release
7	2004	7	2019-12-24
9	45	8	1982-07-22
14	808s & Heartbreak	11	2008-11-24
5	Bone Machine	5	1992-09-08
2	Heroes	2	1977-10-14
4	Lust For Life	3	1977-09-09
1	Scary Monsters	2	1980-09-12
6	Stromae	6	2022-03-04
13	The Life of Pablo	11	2016-02-14
3	Transformer	4	1972-11-08
12	Вендетта	9	2005-03-01
11	Земфира	9	1999-05-10
8	Последний Герой	8	1984-01-01
10	Прости меня моя любовь	9	2000-03-28

```sql
SELECT * FROM tracks
ORDER BY name, length
```

(11 rows affected)

Total execution time: 00:00:00.005

Out[141]:

id	name	length	album
10	Ashes to Ashes	133	1
11	Heroes	332	2
12	Passenger	245	4
16	Saint Pablo	344	13
9	Scary Monsters	232	1
17	Welcome to Heartbreak	190	14
13	Who are you this time?	305	5
14	Бездельник №1	155	9
15	Бездельник №2	177	9
18	Ромашки	190	11
19	Сердца из железа	119	7

```sql
SELECT FLOOR(length / 60) AS [Length in minutes]
from tracks
```

(11 rows affected)

Total execution time: 00:00:00.003

Out[142]:

Length in minutes
3
2
5
4
5
2
2
5
3
3
1

```sql
SELECT TOP 30 PERCENT * FROM items
```

(5 rows affected)

Total execution time: 00:00:00.007

Out[143]:

id	album	collection	type	price
1	1	3	Vinyl	30.00
2	1	3	Tape	20.00
3	1	3	Digital	4.00
4	2	1	Vinyl	35.00
5	5	7	CD	25.00

In [144…

```sql
SELECT TOP 5 * from collections
```

(5 rows affected)

Total execution time: 00:00:00.004

Out[144]:

id	started
1	2004-03-30
2	NULL
3	2023-03-16
4	1973-10-10
5	2020-04-01

In [145…

```sql
SELECT *
    FROM tracks
    ORDER BY name DESC
    OFFSET 3 ROWS
    FETCH NEXT 4 ROWS ONLY
```

(4 rows affected)

Total execution time: 00:00:00.005

Out[145]:

id	name	length	album
14	Бездельник №1	155	9
13	Who are you this time?	305	5
17	Welcome to Heartbreak	190	14
9	Scary Monsters	232	1

In [146…

```sql
select * from authors
order by name + REVERSE(name)
```

(10 rows affected)

Total execution time: 00:00:00.004

id	name	birthday
2	David Bowie	1947-01-08
3	Iggy Pop	1947-04-21
10	Jim Morrison	1943-12-08
11	Kanye West	1977-06-08
4	Lou Reed	1942-03-02
6	Stromae	1985-03-12
5	Tom Waits	1949-12-07
8	Виктор Цой	1962-06-21
9	Земфира	1976-08-26
7	Скриптонит	1990-06-03

In [147...

```sql
IF OBJECT_ID('dbo.albums_authors', 'U') IS NOT NULL
    DROP TABLE albums_authors
SELECT
        albums.id,
        albums.name,
        albums.release,
        authors.name as [Author name],
        authors.birthday [Author birthday]
INTO albums_authors
FROM albums, authors
WHERE albums.author = authors.id

SELECT * FROM albums_authors
```

(14 rows affected)

(14 rows affected)

Total execution time: 00:00:00.020

id	name	release	Author name	Author birthday
1	Scary Monsters	1980-09-12	David Bowie	1947-01-08
2	Heroes	1977-10-14	David Bowie	1947-01-08
3	Transformer	1972-11-08	Lou Reed	1942-03-02
4	Lust For Life	1977-09-09	Iggy Pop	1947-04-21
5	Bone Machine	1992-09-08	Tom Waits	1949-12-07
6	Stromae	2022-03-04	Stromae	1985-03-12
7	2004	2019-12-24	Скриптонит	1990-06-03
8	Последний Герой	1984-01-01	Виктор Цой	1962-06-21
9	45	1982-07-22	Виктор Цой	1962-06-21
10	Прости меня моя любовь	2000-03-28	Земфира	1976-08-26
11	Земфира	1999-05-10	Земфира	1976-08-26
12	Вендетта	2005-03-01	Земфира	1976-08-26
13	The Life of Pablo	2016-02-14	Kanye West	1977-06-08
14	808s & Heartbreak	2008-11-24	Kanye West	1977-06-08

4. С помощью языка T-SQL написать и выполнить 7 запросов на фильтрацию данных с использованием в запросах операторов сравнения, логических операторов

In [148...
```sql
SELECT * FROM authors
WHERE id = 3
```

(1 row affected)

Total execution time: 00:00:00.003

Out[148]:

id	name	birthday
3	Iggy Pop	1947-04-21

In [149...
```sql
SELECT * FROM authors
WHERE name LIKE 'K%'
```

(1 row affected)

Total execution time: 00:00:00.004

Out[149]:

id	name	birthday
11	Kanye West	1977-06-08

In [150...
```sql
SELECT * from albums
WHERE release < '2000-01-01'
```

(8 rows affected)

Total execution time: 00:00:00.006

Out[150]:

id	name	author	release
1	Scary Monsters	2	1980-09-12
2	Heroes	2	1977-10-14
3	Transformer	4	1972-11-08
4	Lust For Life	3	1977-09-09
5	Bone Machine	5	1992-09-08
8	Последний Герой	8	1984-01-01
9	45	8	1982-07-22
11	Земфира	9	1999-05-10

In [151…

```sql
SELECT * from tracks
WHERE length > 180
```

(7 rows affected)

Total execution time: 00:00:00.004

Out[151]:

id	name	length	album
9	Scary Monsters	232	1
11	Heroes	332	2
12	Passenger	245	4
13	Who are you this time?	305	5
16	Saint Pablo	344	13
17	Welcome to Heartbreak	190	14
18	Ромашки	190	11

In [152…

```sql
SELECT * FROM albums
WHERE id not in(3,6,9,12)
```

(10 rows affected)

Total execution time: 00:00:00.006

Out[152]:

id	name	author	release
1	Scary Monsters	2	1980-09-12
2	Heroes	2	1977-10-14
4	Lust For Life	3	1977-09-09
5	Bone Machine	5	1992-09-08
7	2004	7	2019-12-24
8	Последний Герой	8	1984-01-01
10	Прости меня моя любовь	9	2000-03-28
11	Земфира	9	1999-05-10
13	The Life of Pablo	11	2016-02-14
14	808s & Heartbreak	11	2008-11-24

```
In [153…   SELECT * from albums
           WHERE release BETWEEN '1990-01-01' AND '2000-01-01'
```

(2 rows affected)

Total execution time: 00:00:00.007

Out[153]:

id	name	author	release
5	Bone Machine	5	1992-09-08
11	Земфира	9	1999-05-10

```
In [154…   SELECT COUNT(*) as [Vinyls number] from items
           where [type] = 'Vinyl'
```

(1 row affected)

Total execution time: 00:00:00.005

Out[154]:

Vinyls number
6

5. Переименуйте одну из таблиц вашей БД

```
In [155…   exec sp_rename 'albums', 'records'
           GO
```

Caution: Changing any part of an object name could break scripts and stored procedures.

Total execution time: 00:00:00.009

```
In [156…   exec sp_rename 'records', 'albums'
           GO
```

Caution: Changing any part of an object name could break scripts and stored procedures.

Total execution time: 00:00:00.016

6. Добавьте по две записи в каждую из таблиц вашей БД

```
In [157…   -- -- Insert authors
           -- INSERT INTO authors (name, birthday)
           -- VALUES
           --     ('Freddie Mercury', '1946-09-05'),
           --     ('Jimmy Page', '1944-01-09');

           -- -- Insert albums
           -- INSERT INTO albums (name, author, release)
           -- VALUES
           --     ('A Night at the Opera', 12, '1975-11-21'),
           --     ('Led Zeppelin IV', 13, '1971-11-08');

           -- -- Insert tracks
           -- INSERT INTO tracks (name, length, album)
           -- VALUES
           --     ('Bohemian Rhapsody', 354, 15),
           --     ('Stairway to Heaven', 482, 16);
```

```
-- -- Insert collections
-- INSERT INTO collections (started)
-- VALUES ('2023-05-01'), ('2005-04-18');

-- -- Insert items
-- INSERT INTO items (album, collection, type, price)
-- VALUES
--     (9, 1, 'CD', 15.99),
--     (7, 1, 'Vinyl', 24.99);
```

Commands completed successfully.

Total execution time: 00:00:00.003

7. Измените одну из таблиц вашей БД:

- добавьте по смыслу один столбец
- добавьте ограничение с именем на новый введенный вами столбец

In [158…
```
ALTER TABLE albums
ADD rating INT
```

Commands completed successfully.

Total execution time: 00:00:00.016

In [159…
```
ALTER TABLE albums
ADD CONSTRAINT CK_albums_rating CHECK (rating >= 1 AND rating <= 10);
```

Commands completed successfully.

Total execution time: 00:00:00.018

In [160…
```
-- Remove the constraint
ALTER TABLE albums
DROP CONSTRAINT CK_albums_rating;

-- Remove the column
ALTER TABLE albums
DROP COLUMN rating;
```

Commands completed successfully.

Total execution time: 00:00:00.023

8. Напишите 5 запросов, используя агрегатные функции (SUM, MAX, MIN, AVG, COUNT)

In [161…
```
SELECT SUM(length) as [Total length] from tracks
```

(1 row affected)

Total execution time: 00:00:00.003

Out[161]:
Total length
2422

In [162…
```
SELECT MAX(length) as [Longest track] from tracks
```

(1 row affected)

Total execution time: 00:00:00.004

Out[162]: **Longest track**

344

In [163… `SELECT MIN(length) as [Shortest track] from tracks`

(1 row affected)

Total execution time: 00:00:00.004

Out[163]: **Shortest track**

119

In [164… `SELECT AVG(length) as [Average length] from tracks`

(1 row affected)

Total execution time: 00:00:00.005

Out[164]: **Average length**

220

In [165… `SELECT COUNT(name) as [Number of tracks] from tracks`

(1 row affected)

Total execution time: 00:00:00.005

Out[165]: **Number of tracks**

11

9. Написать 2 запроса на группировку данных, используя оператор GROUP BY

In [166…
```
SELECT albums.name, SUM(items.price) as [Total albums selling], COUNT(ite
FROM albums
INNER JOIN items on items.album = albums.id
GROUP BY albums.name
```

(11 rows affected)

Total execution time: 00:00:00.007

name	Total albums selling	Copies sold
2004	2.00	1
45	35.50	2
808s & Heartbreak	80.00	1
Bone Machine	325.00	2
Heroes	35.00	1
Lust For Life	30.00	1
Scary Monsters	54.00	3
The Life of Pablo	100.00	1
Земфира	0.33	1
Последний Герой	15.00	1
Прости меня моя любовь	1.00	1

In [167…

```sql
SELECT authors.name, COUNT(albums.name) as [Albums released]
FROM authors
INNER JOIN albums on albums.author = authors.id
GROUP BY authors.name
```

(9 rows affected)

Total execution time: 00:00:00.008

Out[167]:

name	Albums released
David Bowie	2
Iggy Pop	1
Kanye West	2
Lou Reed	1
Stromae	1
Tom Waits	1
Виктор Цой	2
Земфира	3
Скриптонит	1

10. Написать 2 запроса на фильтрацию групп, используя HAVING

In [168…

```sql
SELECT authors.name, COUNT(albums.name) as [Albums released]
FROM authors
INNER JOIN albums on albums.author = authors.id
GROUP BY authors.name
HAVING COUNT(albums.name) > 2
```

(1 row affected)

Total execution time: 00:00:00.009

name	Albums released
Земфира	3

```sql
SELECT albums.name, SUM(items.price) as [Total albums selling], COUNT(ite
FROM albums
INNER JOIN items on items.album = albums.id
GROUP BY albums.name
HAVING SUM(items.price) >= 100
```

(2 rows affected)

Total execution time: 00:00:00.011

name	Total albums selling	Copies sold
Bone Machine	325.00	2
The Life of Pablo	100.00	1

11. Написать запросы на расширения SQL Server для группировки (ROLLUP, CUBE, GROUPING SETS, OVER)

```sql
SELECT YEAR(release) as [Year], MONTH(release) as [Month], COUNT(release)
from albums
GROUP BY ROLLUP (YEAR(release), MONTH(release))
```

(28 rows affected)

Total execution time: 00:00:00.008

Out[170]:

Year	Month	Number of albums
1972	11	1
1972	NULL	1
1977	9	1
1977	10	1
1977	NULL	2
1980	9	1
1980	NULL	1
1982	7	1
1982	NULL	1
1984	1	1
1984	NULL	1
1992	9	1
1992	NULL	1
1999	5	1
1999	NULL	1
2000	3	1
2000	NULL	1
2005	3	1
2005	NULL	1
2008	11	1
2008	NULL	1
2016	2	1
2016	NULL	1
2019	12	1
2019	NULL	1
2022	3	1
2022	NULL	1
NULL	NULL	14

In [171…
```sql
SELECT YEAR(release) as [Year], MONTH(release) as [Month], COUNT(release)
from albums
GROUP BY CUBE (YEAR(release), MONTH(release))
```

(37 rows affected)

Total execution time: 00:00:00.012

Out[171]:

Year	Month	Number of albums
1984	1	1
NULL	1	1
2016	2	1
NULL	2	1
2000	3	1
2005	3	1
2022	3	1
NULL	3	3
1999	5	1
NULL	5	1
1982	7	1
NULL	7	1
1977	9	1
1980	9	1
1992	9	1
NULL	9	3
1977	10	1
NULL	10	1
1972	11	1
2008	11	1
NULL	11	2
2019	12	1
NULL	12	1
NULL	NULL	14
1972	NULL	1
1977	NULL	2
1980	NULL	1
1982	NULL	1
1984	NULL	1
1992	NULL	1
1999	NULL	1
2000	NULL	1
2005	NULL	1
2008	NULL	1
2016	NULL	1

| 2019 | NULL | 1 |
| 2022 | NULL | 1 |

In [172…
```sql
SELECT YEAR(release) as [Year], MONTH(release) as [Month], COUNT(release)
from albums
GROUP BY GROUPING SETS (YEAR(release), MONTH(release))
```

(22 rows affected)

Total execution time: 00:00:00.008

Out[172]:

Year	Month	Number of albums
NULL	1	1
NULL	2	1
NULL	3	3
NULL	5	1
NULL	7	1
NULL	9	3
NULL	10	1
NULL	11	2
NULL	12	1
1972	NULL	1
1977	NULL	2
1980	NULL	1
1982	NULL	1
1984	NULL	1
1992	NULL	1
1999	NULL	1
2000	NULL	1
2005	NULL	1
2008	NULL	1
2016	NULL	1
2019	NULL	1
2022	NULL	1

In [173…
```sql
SELECT name, SUM(length) OVER(PARTITION BY LEN(name)) AS [Total length]
FROM tracks
ORDER BY name
```

(11 rows affected)

Total execution time: 00:00:00.004

name	Total length
Ashes to Ashes	365
Heroes	332
Passenger	245
Saint Pablo	344
Scary Monsters	365
Welcome to Heartbreak	190
Who are you this time?	305
Бездельник №1	332
Бездельник №2	332
Ромашки	190
Сердца из железа	119

12. Написать запрос на разворачивание данных (PIVOT), отмена разворачивания (UNPIVOT)

In [174…

```sql
SELECT *
FROM (
    SELECT a.name AS author_name, b.name AS album_name
    FROM authors a
    JOIN albums b ON a.id = b.author
) AS src
PIVOT (
    COUNT(album_name)
    FOR author_name IN ([David Bowie], [Kanye West])
) AS pivoted_data;
```

(1 row affected)

Total execution time: 00:00:00.009

Out[174]:

David Bowie	Kanye West
2	2

In [175…

```sql
SELECT *
FROM (
    SELECT *
    FROM (
        SELECT a.name AS author_name, b.name AS album_name
        FROM authors a
        JOIN albums b ON a.id = b.author
    ) AS src
    PIVOT (
        COUNT(album_name)
        FOR author_name IN ([David Bowie], [Kanye West])
    ) AS pivoted_data
) AS unpivoted_data
UNPIVOT (
    album_count FOR metric IN ([David Bowie], [Kanye West])
) AS final_data;
```

(2 rows affected)

Total execution time: 00:00:00.007

Out[175]:

album_count	metric
2	David Bowie
2	Kanye West

13. Написать по два запроса на каждое соединение таблиц: внутреннее, внешнее левое, внешнее правое, полное внешнее соединение.

In [176…

```sql
-- Query 1: Inner Join
SELECT a.name AS author_name, b.name AS album_name
FROM authors a
INNER JOIN albums b ON a.id = b.author;
```

(14 rows affected)

Total execution time: 00:00:00.006

Out[176]:

author_name	album_name
David Bowie	Scary Monsters
David Bowie	Heroes
Lou Reed	Transformer
Iggy Pop	Lust For Life
Tom Waits	Bone Machine
Stromae	Stromae
Скриптонит	2004
Виктор Цой	Последний Герой
Виктор Цой	45
Земфира	Прости меня моя любовь
Земфира	Земфира
Земфира	Вендетта
Kanye West	The Life of Pablo
Kanye West	808s & Heartbreak

In [177…

```sql
SELECT a.id, a.name as [album name], a.release, t.id, t.name as [track na
FROM albums a
INNER JOIN tracks t ON a.id = t.album;
```

(11 rows affected)

Total execution time: 00:00:00.008

id	album name	release	id	track name	length	album
1	Scary Monsters	1980-09-12	9	Scary Monsters	232	1
1	Scary Monsters	1980-09-12	10	Ashes to Ashes	133	1
2	Heroes	1977-10-14	11	Heroes	332	2
4	Lust For Life	1977-09-09	12	Passenger	245	4
5	Bone Machine	1992-09-08	13	Who are you this time?	305	5
9	45	1982-07-22	14	Бездельник №1	155	9
9	45	1982-07-22	15	Бездельник №2	177	9
13	The Life of Pablo	2016-02-14	16	Saint Pablo	344	13
14	808s & Heartbreak	2008-11-24	17	Welcome to Heartbreak	190	14
11	Земфира	1999-05-10	18	Ромашки	190	11
7	2004	2019-12-24	19	Сердца из железа	119	7

In [178…

```sql
-- Query 2: Left Outer Join
SELECT a.name AS author_name, b.name AS album_name
FROM authors a
LEFT JOIN albums b ON a.id = b.author;
```

(15 rows affected)

Total execution time: 00:00:00.007

author_name	album_name
David Bowie	Scary Monsters
David Bowie	Heroes
Iggy Pop	Lust For Life
Lou Reed	Transformer
Tom Waits	Bone Machine
Stromae	Stromae
Скриптонит	2004
Виктор Цой	Последний Герой
Виктор Цой	45
Земфира	Прости меня моя любовь
Земфира	Земфира
Земфира	Вендетта
Jim Morrison	NULL
Kanye West	The Life of Pablo
Kanye West	808s & Heartbreak

In [179…

```sql
SELECT a.id, a.name as [author name], b.id, b.name as [album name], b.aut
FROM authors a
LEFT JOIN albums b ON a.id = b.author;
```

(15 rows affected)

Total execution time: 00:00:00.007

Out[179]:

id	author name	id	album name	author
2	David Bowie	1	Scary Monsters	2
2	David Bowie	2	Heroes	2
3	Iggy Pop	4	Lust For Life	3
4	Lou Reed	3	Transformer	4
5	Tom Waits	5	Bone Machine	5
6	Stromae	6	Stromae	6
7	Скриптонит	7	2004	7
8	Виктор Цой	8	Последний Герой	8
8	Виктор Цой	9	45	8
9	Земфира	10	Прости меня моя любовь	9
9	Земфира	11	Земфира	9
9	Земфира	12	Вендетта	9
10	Jim Morrison	NULL	NULL	NULL
11	Kanye West	13	The Life of Pablo	11
11	Kanye West	14	808s & Heartbreak	11

In [180…

```sql
-- Query 3: Right Outer Join
SELECT a.name AS author_name, b.name AS album_name
FROM authors a
RIGHT JOIN albums b ON a.id = b.author;
```

(14 rows affected)

Total execution time: 00:00:00.006

Out[180]:

author_name	album_name
David Bowie	Scary Monsters
David Bowie	Heroes
Lou Reed	Transformer
Iggy Pop	Lust For Life
Tom Waits	Bone Machine
Stromae	Stromae
Скриптонит	2004
Виктор Цой	Последний Герой
Виктор Цой	45
Земфира	Прости меня моя любовь
Земфира	Земфира
Земфира	Вендетта
Kanye West	The Life of Pablo
Kanye West	808s & Heartbreak

In [181…
```sql
SELECT a.id, a.name as [album name], a.release, t.id, t.name as [track na
FROM albums a
RIGHT JOIN tracks t ON a.id = t.album;
```

(11 rows affected)

Total execution time: 00:00:00.007

Out[181]:

id	album name	release	id	track name	length	album
1	Scary Monsters	1980-09-12	9	Scary Monsters	232	1
1	Scary Monsters	1980-09-12	10	Ashes to Ashes	133	1
2	Heroes	1977-10-14	11	Heroes	332	2
4	Lust For Life	1977-09-09	12	Passenger	245	4
5	Bone Machine	1992-09-08	13	Who are you this time?	305	5
9	45	1982-07-22	14	Бездельник №1	155	9
9	45	1982-07-22	15	Бездельник №2	177	9
13	The Life of Pablo	2016-02-14	16	Saint Pablo	344	13
14	808s & Heartbreak	2008-11-24	17	Welcome to Heartbreak	190	14
11	Земфира	1999-05-10	18	Ромашки	190	11
7	2004	2019-12-24	19	Сердца из железа	119	7

In [182…
```sql
-- Query 4: Full Outer Join
SELECT a.name AS author_name, b.name AS album_name
FROM authors a
FULL JOIN albums b ON a.id = b.author;
```

(15 rows affected)

Total execution time: 00:00:00.009

Out[182]:

author_name	album_name
David Bowie	Scary Monsters
David Bowie	Heroes
Iggy Pop	Lust For Life
Lou Reed	Transformer
Tom Waits	Bone Machine
Stromae	Stromae
Скриптонит	2004
Виктор Цой	Последний Герой
Виктор Цой	45
Земфира	Прости меня моя любовь
Земфира	Земфира
Земфира	Вендетта
Jim Morrison	NULL
Kanye West	The Life of Pablo
Kanye West	808s & Heartbreak

In [183…

```sql
SELECT *
FROM albums a
FULL JOIN tracks t ON a.id = t.album;
```

(16 rows affected)

Total execution time: 00:00:00.009

Out[183]:

id	name	author	release	id	name	length	album
1	Scary Monsters	2	1980-09-12	9	Scary Monsters	232	1
1	Scary Monsters	2	1980-09-12	10	Ashes to Ashes	133	1
2	Heroes	2	1977-10-14	11	Heroes	332	2
3	Transformer	4	1972-11-08	NULL	NULL	NULL	NULL
4	Lust For Life	3	1977-09-09	12	Passenger	245	4
5	Bone Machine	5	1992-09-08	13	Who are you this time?	305	5
6	Stromae	6	2022-03-04	NULL	NULL	NULL	NULL
7	2004	7	2019-12-24	19	Сердца из железа	119	7
8	Последний Герой	8	1984-01-01	NULL	NULL	NULL	NULL
9	45	8	1982-07-22	14	Бездельник №1	155	9
9	45	8	1982-07-22	15	Бездельник №2	177	9
10	Прости меня моя любовь	9	2000-03-28	NULL	NULL	NULL	NULL
11	Земфира	9	1999-05-10	18	Ромашки	190	11
12	Вендетта	9	2005-03-01	NULL	NULL	NULL	NULL
13	The Life of Pablo	11	2016-02-14	16	Saint Pablo	344	13
14	808s & Heartbreak	11	2008-11-24	17	Welcome to Heartbreak	190	14

14. Написать по два запроса на пересечение, разность, объединение таблиц

```
-- Query 1: Intersection
SELECT name
FROM albums
INTERSECT
SELECT name
FROM tracks;

-- Query 2: Intersection
SELECT collections.id
FROM collections
INTERSECT
```

```sql
SELECT id
FROM items;
```

(2 rows affected)

(10 rows affected)

Total execution time: 00:00:00.008

Out[184]:

name
Heroes
Scary Monsters

Out[184]:

id
1
2
3
4
5
6
7
8
9
10

In [185…

```sql
-- Query 3: Difference
SELECT name
FROM albums
EXCEPT
SELECT name
FROM tracks;

-- Query 4: Difference
SELECT id
FROM collections
EXCEPT
SELECT id
FROM authors;
```

(12 rows affected)

(1 row affected)

Total execution time: 00:00:00.008

Out[185]:

name
2004
45
808s & Heartbreak
Bone Machine
Lust For Life
Stromae
The Life of Pablo
Transformer
Вендетта
Земфира
Последний Герой
Прости меня моя любовь

Out[185]:

id
1

```sql
-- Query 5: Union
SELECT name
FROM albums
UNION
SELECT name
FROM tracks;

-- Query 6: Union
SELECT name
FROM albums
UNION ALL
SELECT name
FROM tracks;
```

(23 rows affected)

(25 rows affected)

Total execution time: 00:00:00.007

Out[186]:

name
2004
45
808s & Heartbreak
Ashes to Ashes
Bone Machine
Heroes
Lust For Life
Passenger
Saint Pablo
Scary Monsters
Stromae
The Life of Pablo
Transformer
Welcome to Heartbreak
Who are you this time?
Бездельник №1
Бездельник №2
Вендетта
Земфира
Последний Герой
Прости меня моя любовь
Ромашки
Сердца из железа

name
2004
45
808s & Heartbreak
Bone Machine
Heroes
Lust For Life
Scary Monsters
Stromae
The Life of Pablo
Transformer
Вендетта
Земфира
Последний Герой
Прости меня моя любовь
Scary Monsters
Ashes to Ashes
Heroes
Passenger
Who are you this time?
Бездельник №1
Бездельник №2
Saint Pablo
Welcome to Heartbreak
Ромашки
Сердца из железа

Out[186]:

15. Написать 4 запроса с использованием подзапросов, используя операторы сравнения, операторы IN, ANY|SOME и ALL, предикат EXISTS

In [187…

```sql
-- Query 1: Using IN operator
SELECT *
FROM albums
WHERE author IN (SELECT id FROM authors WHERE birthday < '1990-01-01');
```

(13 rows affected)

Total execution time: 00:00:00.006

Out[187]:

id	name	author	release
1	Scary Monsters	2	1980-09-12
2	Heroes	2	1977-10-14
3	Transformer	4	1972-11-08
4	Lust For Life	3	1977-09-09
5	Bone Machine	5	1992-09-08
6	Stromae	6	2022-03-04
8	Последний Герой	8	1984-01-01
9	45	8	1982-07-22
10	Прости меня моя любовь	9	2000-03-28
11	Земфира	9	1999-05-10
12	Вендетта	9	2005-03-01
13	The Life of Pablo	11	2016-02-14
14	808s & Heartbreak	11	2008-11-24

In [188…

```sql
-- Query 2: Using ANY|SOME operator
SELECT *
FROM albums
WHERE release < ANY (SELECT birthday FROM authors);
```

(6 rows affected)

Total execution time: 00:00:00.008

Out[188]:

id	name	author	release
1	Scary Monsters	2	1980-09-12
2	Heroes	2	1977-10-14
3	Transformer	4	1972-11-08
4	Lust For Life	3	1977-09-09
8	Последний Герой	8	1984-01-01
9	45	8	1982-07-22

In [189…

```sql
-- Query 3: Using ALL operator
SELECT *
FROM items
WHERE price > ALL (SELECT price from items WHERE price % 2 = 1);
```

(3 rows affected)

Total execution time: 00:00:00.005

Out[189]:

id	album	collection	type	price
12	13	6	Vinyl	100.00
13	14	6	Vinyl	80.00
14	5	6	Vinyl	300.00

```
In [190… -- Query 4: Using EXISTS predicate
         SELECT *
         FROM albums a
         WHERE EXISTS (SELECT 1 FROM items i WHERE i.album = a.id AND i.[type] = '
```

(6 rows affected)

Total execution time: 00:00:00.010

Out[190]:

id	name	author	release
1	Scary Monsters	2	1980-09-12
2	Heroes	2	1977-10-14
4	Lust For Life	3	1977-09-09
5	Bone Machine	5	1992-09-08
13	The Life of Pablo	11	2016-02-14
14	808s & Heartbreak	11	2008-11-24

16. Написать 4 запроса по строковым функциям

```
In [191… -- Query 1: Using CONCAT function
         SELECT CONCAT(name, ' - ', author) AS [Album info]
         FROM albums;
```

(14 rows affected)

Total execution time: 00:00:00.005

Out[191]:

Album info
Scary Monsters - 2
Heroes - 2
Transformer - 4
Lust For Life - 3
Bone Machine - 5
Stromae - 6
2004 - 7
Последний Герой - 8
45 - 8
Прости меня моя любовь - 9
Земфира - 9
Вендетта - 9
The Life of Pablo - 11
808s & Heartbreak - 11

```
In [192… -- Query 2: Using LEFT function
         SELECT name, LEFT(name, 3) AS [First three characters]
         FROM authors;
```

(10 rows affected)

Total execution time: 00:00:00.005

Out[192]:

name	First three characters
David Bowie	Dav
Iggy Pop	Igg
Jim Morrison	Jim
Kanye West	Kan
Lou Reed	Lou
Stromae	Str
Tom Waits	Tom
Виктор Цой	Вик
Земфира	Зем
Скриптонит	Скр

In [193…

```
-- Query 3: Using LEN function
SELECT name, LEN(name) AS [Name length]
FROM albums;
```

(14 rows affected)

Total execution time: 00:00:00.006

Out[193]:

name	Name length
2004	4
45	2
808s & Heartbreak	17
Bone Machine	12
Heroes	6
Lust For Life	13
Scary Monsters	14
Stromae	7
The Life of Pablo	17
Transformer	11
Вендетта	8
Земфира	7
Последний Герой	15
Прости меня моя любовь	22

In [194…

```
-- Query 4: Using REPLACE function
SELECT name, REPLACE(name, ' ', '-') AS [Name without spaces]
FROM albums;
```

(14 rows affected)

Total execution time: 00:00:00.007

Out[194]:

name	Name without spaces
2004	2004
45	45
808s & Heartbreak	808s-&-Heartbreak
Bone Machine	Bone-Machine
Heroes	Heroes
Lust For Life	Lust-For-Life
Scary Monsters	Scary-Monsters
Stromae	Stromae
The Life of Pablo	The-Life-of-Pablo
Transformer	Transformer
Вендетта	Вендетта
Земфира	Земфира
Последний Герой	Последний-Герой
Прости меня моя любовь	Прости-меня-моя-любовь

17. Написать 4 запроса по числовым функциям

In [195…

```
-- Query 1: Using NEWID function
SELECT *
FROM albums
ORDER BY NEWID()
```

(14 rows affected)

Total execution time: 00:00:00.008

id	name	author	release
8	Последний Герой	8	1984-01-01
7	2004	7	2019-12-24
13	The Life of Pablo	11	2016-02-14
1	Scary Monsters	2	1980-09-12
10	Прости меня моя любовь	9	2000-03-28
12	Вендетта	9	2005-03-01
5	Bone Machine	5	1992-09-08
4	Lust For Life	3	1977-09-09
11	Земфира	9	1999-05-10
6	Stromae	6	2022-03-04
9	45	8	1982-07-22
3	Transformer	4	1972-11-08
14	808s & Heartbreak	11	2008-11-24
2	Heroes	2	1977-10-14

In [196…

```sql
-- Query 2: Using CEILING function
SELECT price, CEILING(price) AS [Ceiled price], FLOOR(price) as [Floored
FROM items;
```

(15 rows affected)

Total execution time: 00:00:00.005

Out[196]:

price	Ceiled price	Floored price
30.00	30.00	30.00
20.00	20.00	20.00
4.00	4.00	4.00
35.00	35.00	35.00
25.00	25.00	25.00
23.00	23.00	23.00
2.00	2.00	2.00
1.00	1.00	1.00
0.33	1.00	0.00
15.00	15.00	15.00
12.50	13.00	12.00
100.00	100.00	100.00
80.00	80.00	80.00
300.00	300.00	300.00
30.00	30.00	30.00

```
In [197… SELECT ROUND(AVG(length) / 60, 1) as [Average track length in minutes] fr
```

(1 row affected)

Total execution time: 00:00:00.002

Out[197]: **Average track length in minutes**

3

```
In [198… SELECT SQUARE(SUM(length)) as [Squared total tracks length (Why not?)] fr
```

(1 row affected)

Total execution time: 00:00:00.005

Out[198]: **Squared total tracks length (Why not?)**

5866084

18. Создайте 5 представлений по своей БД

```
In [199… CREATE OR ALTER VIEW vw_album_details AS
SELECT a.id AS album_id, a.name AS album_name, a.release, au.name AS auth
FROM albums a
INNER JOIN authors au ON a.author = au.id;
```

Commands completed successfully.

Total execution time: 00:00:00.016

```
In [200… SELECT * from vw_album_details;
```

(14 rows affected)

Total execution time: 00:00:00.007

Out[200]:

album_id	album_name	release	author_name
1	Scary Monsters	1980-09-12	David Bowie
2	Heroes	1977-10-14	David Bowie
3	Transformer	1972-11-08	Lou Reed
4	Lust For Life	1977-09-09	Iggy Pop
5	Bone Machine	1992-09-08	Tom Waits
6	Stromae	2022-03-04	Stromae
7	2004	2019-12-24	Скриптонит
8	Последний Герой	1984-01-01	Виктор Цой
9	45	1982-07-22	Виктор Цой
10	Прости меня моя любовь	2000-03-28	Земфира
11	Земфира	1999-05-10	Земфира
12	Вендетта	2005-03-01	Земфира
13	The Life of Pablo	2016-02-14	Kanye West
14	808s & Heartbreak	2008-11-24	Kanye West

```
In [201...  CREATE OR ALTER VIEW vw_collection_prices AS
            SELECT c.id AS collection_id, SUM(i.price) AS total_price
            FROM collections c
            LEFT JOIN items i ON c.id = i.collection
            GROUP BY c.id;
```

Commands completed successfully.

Total execution time: 00:00:00.008

```
In [202...  SELECT * from vw_collection_prices
```

(10 rows affected)

Total execution time: 00:00:00.007

Out[202]:

collection_id	total_price
1	35.00
2	3.33
3	54.00
4	NULL
5	27.50
6	510.00
7	25.00
8	NULL
9	23.00
10	NULL

```
In [203...  CREATE OR ALTER VIEW vw_album_tracks AS
            SELECT al.name AS album_name, t.name AS track_name, t.length
            FROM albums al
            INNER JOIN tracks t ON al.id = t.album;
```

Commands completed successfully.

Total execution time: 00:00:00.014

```
In [204...  select * from vw_album_tracks
```

(11 rows affected)

Total execution time: 00:00:00.008

Out[204]:

album_name	track_name	length
Scary Monsters	Scary Monsters	232
Scary Monsters	Ashes to Ashes	133
Heroes	Heroes	332
Lust For Life	Passenger	245
Bone Machine	Who are you this time?	305
45	Бездельник №1	155
45	Бездельник №2	177
The Life of Pablo	Saint Pablo	344
808s & Heartbreak	Welcome to Heartbreak	190
Земфира	Ромашки	190
2004	Сердца из железа	119

In [205…

```sql
CREATE OR ALTER VIEW vw_avg_track_length AS
SELECT al.name AS album_name, AVG(t.length) AS avg_length
FROM albums al
INNER JOIN tracks t ON al.id = t.album
GROUP BY al.name;
```

Commands completed successfully.

Total execution time: 00:00:00.009

In [206…

```sql
select * from vw_avg_track_length
```

(9 rows affected)

Total execution time: 00:00:00.009

Out[206]:

album_name	avg_length
2004	119
45	166
808s & Heartbreak	190
Bone Machine	305
Heroes	332
Lust For Life	245
Scary Monsters	182
The Life of Pablo	344
Земфира	190

In [207…

```sql
CREATE OR ALTER VIEW vw_album_items AS
SELECT al.name AS album_name, i.type, i.price
FROM albums al
LEFT JOIN items i ON al.id = i.album;
```

Commands completed successfully.

Total execution time: 00:00:00.017

```
select * from vw_album_items
```

(18 rows affected)

Total execution time: 00:00:00.011

Out[208]:

album_name	type	price
Scary Monsters	Vinyl	30.00
Scary Monsters	Tape	20.00
Scary Monsters	Digital	4.00
Heroes	Vinyl	35.00
Transformer	NULL	NULL
Lust For Life	Vinyl	30.00
Bone Machine	CD	25.00
Bone Machine	Vinyl	300.00
Stromae	NULL	NULL
2004	Digital	2.00
Последний Герой	Tape	15.00
45	CD	23.00
45	Tape	12.50
Прости меня моя любовь	Digital	1.00
Земфира	Digital	0.33
Вендетта	NULL	NULL
The Life of Pablo	Vinyl	100.00
808s & Heartbreak	Vinyl	80.00

19. Покажите применение табличных переменных, временные локальных и глобальных таблиц, а так же обобщенных табличных выражений.

```
DECLARE @myTableVariable TABLE (
    id int,
    name nvarchar(50)
);

INSERT INTO @myTableVariable (id, name)
VALUES (1, 'John'), (2, 'Jane');

SELECT * FROM @myTableVariable;
```

(2 rows affected)

(2 rows affected)

Total execution time: 00:00:00.015

Out[209]:

id	name
1	John
2	Jane

In [210…]:
```sql
CREATE TABLE #tempTable (
    id int,
    name nvarchar(50)
);

INSERT INTO #tempTable (id, name)
VALUES (1, 'John'), (2, 'Jane');

SELECT * FROM #tempTable;
DROP TABLE #tempTable;
```

Total execution time: 00:00:00.005

In [83]:
```sql
CREATE TABLE ##globalTempTable (
    id int,
    name nvarchar(50)
);

INSERT INTO ##globalTempTable (id, name)
VALUES (1, 'John'), (2, 'Jane');

SELECT * FROM ##globalTempTable;
DROP TABLE ##globalTempTable;
```

Total execution time: 00:00:00.003

In [84]:
```sql
WITH cte_tracks AS (
    SELECT id, name, length
    FROM tracks
    WHERE length > 240
)
SELECT *
FROM cte_tracks;
```

(4 rows affected)

Total execution time: 00:00:00.005

Out[84]:

id	name	length
11	Heroes	332
12	Passenger	245
13	Who are you this time?	305
16	Saint Pablo	344