DBMS - Experiment 7

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AIM:

Perform Join operations.

Theory:

1. Cartesian Product

CROSS JOIN is used to combine all possibilities of the two or more tables and returns the result that contains every row from all contributing tables. The CROSS JOIN is also known as CARTESIAN JOIN, which provides the Cartesian product of all associated tables. The Cartesian product can be explained as all rows present in the first table multiplied by all rows present in the second table.

SYNTAX:

```
SELECT column_name(s)
FROM table1, table2;
```

Or

```
SELECT column_name(s)
FROM table1
JOIN table2;
```

Or

```
SELECT column_name(s)
FROM table1
CROSS JOIN table2;
```

Or

```
SELECT column_name(s)
FROM table1, table2
WHERE table1.column_name=table2.column_name;
```

2. Natural Join

A natural join is a type of join operation that creates an implicit join by combining tables based on columns with the same name and data type. It is similar to the INNER or LEFT JOIN, but we cannot use the ON or USING clause with natural join as we used in them

SYNTAX:

```
SELECT column_name(s)
FROM table1 NATURAL
JOIN table2;
```

3. Inner Join

The inner join keyword selects all rows from both tables as long as there is a match between the columns in both tables.

SYNTAX:

```
SELECT column_name(s)
FROM table 1
INNER JOIN table 2
ON table1.column_name = table2.column_name;
```

4. Left Outer Join

The left join keyword returns all rows from the left table, with the matching rows in the right table. The result is NULL in the right side when there is no match.

SYNTAX:

```
SELECT column_name(s)
FROM table1
LEFT JOIN table2
ON table1.column_name=table2.column_name;
```

5. Right Outer Join

The right join keyword returns all rows from the right table, with the matching rows in the left table. The result is NULL in the left side when there is no match.

SYNTAX:

```
SELECT column_name(s)
FROM table1
RIGHT JOIN table2
ON table1.coulmn_name=table2.column_name;
```

6. Full Outer Join

The FULL OUTER JOIN combines the results of both left and right outer joins and returns all (matched or unmatched) rows from the tables on both sides of the join clause. Full Outer Join cannot be performed in Mysql, therefore, we make use of keyword UNION with left join and right join to perform full outer join.

SYNTAX:

```
SELECT column_name(s)
FROM table1
LEFT JOIN table2
ON table1.column_name=table2.column_name
UNION
SELECT column_name(s)
FROM table1
RIGHT JOIN table2
ON table1.coulmn_name=table2.column_name;
```

Join Operations Queries

1. Find all the information of the artists with the songs.

Ans: SELECT * from artist, song;

```
mysql> select * from artist, song;
```

artist_id	artist_name	rating	song_id	song_title	length	album_id	genre	artist_id
3	Justin Bieber	8	21	Industry Baby	00:03:32	NULL	Pop rap	10
3	Justin Bieber	8	19	Perfect	00:04:23	4	Pop	4
3	Justin Bieber	8	18	Galway Girl	00:02:50	4	Pop	4
3	Justin Bieber	8	16	Smile	00:03:16	3	Hip hop	7
3	Justin Bieber	8	7	Hello	00:04:55	2	soul	9
3	Justin Bieber	8	5	Peaches	00:03:18	1	Pop	3
4	Ed Sheeran	9	21	Industry Baby	00:03:32	NULL	Pop rap	10
4	Ed Sheeran	9	19	Perfect	00:04:23	4	Pop	4
4	Ed Sheeran	9	18	Galway Girl	00:02:50	4	Pop	4
4	Ed Sheeran	9	16	Smile	00:03:16	3	Hip hop	7
4	Ed Sheeran	9	7	Hello	00:04:55	2	soul	9
4	Ed Sheeran	9	5	Peaches	00:03:18	1	Pop	3
5	Doja Cat	7	21	Industry Baby	00:03:32	NULL	Pop rap	10
5	Doja Cat	7	19	Perfect	00:04:23	4	Pop	4
5	Doja Cat	7	18	Galway Girl	00:02:50	4	Pop	4
5	Doja Cat	7	16	Smile	00:03:16	3	Hip hop	7
5	Doja Cat	7	7	Hello	00:04:55	2	soul	9
5	Doja Cat	7	5	Peaches	00:03:18	1	Pop	3
7	Juice WRLD	8	21	Industry Baby	00:03:32	NULL	Pop rap	10
7	Juice WRLD	8	19	Perfect	00:04:23	4	Pop	4
7	Juice WRLD	8	18	Galway Girl	00:02:50	4	Pop	4
7	Juice WRLD	8	16	Smile	00:03:16	3	Hip hop	7
7	Juice WRLD	8	7	Hello	00:04:55	2	soul	9
7	Juice WRLD	8	5	Peaches	00:03:18	1	Pop	3
9	Adele	10	21	Industry Baby	00:03:32	NULL	Pop rap	10
9	Adele	10	19	Perfect	00:04:23	4	Pop	4
9	Adele	10	18	Galway Girl	00:02:50	4	Pop	4
9	Adele	10	16	Smile	00:03:16	3	Hip hop	7
9	Adele	10	7	Hello	00:04:55	2	soul	9
9	Adele	10	5	Peaches	00:03:18	1	Pop	3
10	Lil Nas X	9	21	Industry Baby	00:03:32	NULL	Pop rap	10
10	Lil Nas X	9	19	Perfect	00:04:23	4	Pop	4
10	Lil Nas X	9	18	Galway Girl	00:02:50	4	Pop	4
10	Lil Nas X	9	16	Smile	00:03:16	3	Hip hop	7
10	Lil Nas X	9	7	Hello	00:04:55	2	soul	9
10	Lil Nas X	9	5	Peaches	00:03:18	1	Pop	3
11	Mythpat	9	21	Industry Baby	00:03:32	NULL	Pop rap	10
11	Mythpat	9	19	Perfect	00:04:23	4	Pop	4
11	Mythpat	9	18	Galway Girl	00:02:50	4	Pop	4
11	Mythpat	9	16	Smile	00:03:16	3	Hip hop	7
11	Mythpat	9	7	Hello	00:04:55	2	soul	9
11	Mythpat	9	5	Peaches	00:03:18	1	Pop	3
12	Triggered Insaan	8	21	Industry Baby	00:03:32	NULL	Pop rap	10
12	Triggered Insaan	8	19	Perfect	00:04:23	4	Pop	4
12	Triggered Insaan	8	18	Galway Girl	00:02:50	4	Pop	4
12	Triggered Insaan	8	16	Smile	00:03:16	3	Hip hop	7
12	Triggered Insaan	8	7	Hello	00:04:55	2	soul	9
12	Triggered Insaan	8	5	Peaches	00:03:18	1	Pop	3

2. Find the artist's id, name and the song's title, length and genre which the artist has.

Ans:
SELECT artist.artist_id, artist.artist_name, song.song_title, song.length, song.genre

FROM artist, song
WHERE artist.artist_id=song.artist_id;

```
mysql> SELECT artist.artist_id,
    -> artist.artist_name,
    -> song.song_title,
    -> song.length,
    -> song.genre
    -> FROM artist, song
    -> WHERE artist.artist_id=song.artist_id;
+-----------+---------------+---------------+----------+---------+
| artist_id | artist_name   | song_title    | length   | genre   |
+-----------+---------------+---------------+----------+---------+
|         3 | Justin Bieber | Peaches       | 00:03:18 | Pop     |
|         9 | Adele         | Hello         | 00:04:55 | soul    |
|         7 | Juice WRLD    | Smile         | 00:03:16 | Hip hop |
|         4 | Ed Sheeran    | Galway Girl   | 00:02:50 | Pop     |
|         4 | Ed Sheeran    | Perfect       | 00:04:23 | Pop     |
|        10 | Lil Nas X     | Industry Baby | 00:03:32 | Pop rap |
+-----------+---------------+---------------+----------+---------+
```

3. Find the artist's id, name and the song's title which the artist has composed

Ans:
SELECT artist.artist_id, artist.artist_name, song.song_title
FROM artist
NATURAL JOIN song;

```
mysql> SELECT artist.artist_id, artist.artist_name, song.song_title
    -> FROM artist
    -> NATURAL JOIN song;
+-----------+---------------+---------------+
| artist_id | artist_name   | song_title    |
+-----------+---------------+---------------+
|         3 | Justin Bieber | Peaches       |
|         9 | Adele         | Hello         |
|         7 | Juice WRLD    | Smile         |
|         4 | Ed Sheeran    | Galway Girl   |
|         4 | Ed Sheeran    | Perfect       |
|        10 | Lil Nas X     | Industry Baby |
+-----------+---------------+---------------+
```

4. Find all the information related to artist and the songs created by them.

Ans:

```
SELECT * FROM artist
INNER JOIN song
ON artist.artist_id=song.artist_id;
```

```
mysql> SELECT * FROM artist
    -> INNER JOIN song
    -> ON artist.artist_id=song.artist_id;
+-----------+--------------+--------+---------+--------------+----------+----------+---------+-----------+
| artist_id | artist_name  | rating | song_id | song_title   | length   | album_id | genre   | artist_id |
+-----------+--------------+--------+---------+--------------+----------+----------+---------+-----------+
|         3 | Justin Bieber|      8 |       5 | Peaches      | 00:03:18 |        1 | Pop     |         3 |
|         9 | Adele        |     10 |       7 | Hello        | 00:04:55 |        2 | soul    |         9 |
|         7 | Juice WRLD   |      8 |      16 | Smile        | 00:03:16 |        3 | Hip hop |         7 |
|         4 | Ed Sheeran   |      9 |      18 | Galway Girl  | 00:02:50 |        4 | Pop     |         4 |
|         4 | Ed Sheeran   |      9 |      19 | Perfect      | 00:04:23 |        4 | Pop     |         4 |
|        10 | Lil Nas X    |      9 |      21 | Industry Baby| 00:03:32 |     NULL | Pop rap |        10 |
+-----------+--------------+--------+---------+--------------+----------+----------+---------+-----------+
```

5. Find the artist id, name and the song id to show whether the given artist has a song or not.

Ans:

```
SELECT artist.artist_id, artist.artist_name, song.song_id
FROM artist
LEFT JOIN song
ON artist.artist_id=song.artist_id;
```

```
mysql> SELECT artist.artist_id, artist.artist_name, song.song_id
    -> FROM artist
    -> LEFT JOIN song
    -> ON artist.artist_id=song.artist_id;
+-----------+--------------+---------+
| artist_id | artist_name  | song_id |
+-----------+--------------+---------+
|         9 | Adele        |       7 |
|         5 | Doja Cat     |    NULL |
|         4 | Ed Sheeran   |      18 |
|         4 | Ed Sheeran   |      19 |
|         7 | Juice WRLD   |      16 |
|         3 | Justin Bieber|       5 |
|        10 | Lil Nas X    |      21 |
|        11 | Mythpat      |    NULL |
|        12 | Triggered Insaan |  NULL |
+-----------+--------------+---------+
```

6. Find the artist's id, name and the song's title and whether all songs have an artist or not.

Ans:

```
SELECT artist.artist_id, artist.artist_name, song.song_title
FROM artist
RIGHT JOIN song
ON artist.artist_id=song.artist_id;
```

```
mysql> SELECT artist.artist_id, artist.artist_name, song.song_title
    -> FROM artist
    -> RIGHT JOIN song
    -> ON artist.artist_id=song.artist_id;
+-----------+---------------+---------------+
| artist_id | artist_name   | song_title    |
+-----------+---------------+---------------+
|         3 | Justin Bieber | Peaches       |
|      NULL | NULL          | Love nwantiti |
|         9 | Adele         | Hello         |
|         7 | Juice WRLD    | Smile         |
|         4 | Ed Sheeran    | Galway Girl   |
|         4 | Ed Sheeran    | Perfect       |
|        10 | Lil Nas X     | Industry Baby |
+-----------+---------------+---------------+
```

7. Find the artist's id, name and the song's id, title, length and whether all songs have an artist or not or whether all artists have a song or not.

Ans:

```
SELECT artist.artist_id, artist.artist_name, song.song_id, song.song_title,
song.song_title, song.length
FROM artist
LEFT JOIN song
ON artist.artist_id=song.artist_id
UNION
SELECT artist.artist_id, artist.artist_name, song.song_id, song.song_title,
song.song_title, song.length
FROM artist
RIGHT JOIN song
ON artist.artist_id=song.artist_id;
```

```
mysql> SELECT artist.artist_id, artist.artist_name, song.song_id, song.song_title, song.song_title, song.length
    -> FROM artist
    -> LEFT JOIN song
    -> ON artist.artist_id=song.artist_id
    -> UNION
    -> SELECT artist.artist_id, artist.artist_name, song.song_id, song.song_title, song.song_title, song.length
    -> FROM artist
    -> RIGHT JOIN song
    -> ON artist.artist_id=song.artist_id;
+-----------+------------------+---------+---------------+---------------+----------+
| artist_id | artist_name      | song_id | song_title    | song_title    | length   |
+-----------+------------------+---------+---------------+---------------+----------+
|         9 | Adele            |       7 | Hello         | Hello         | 00:04:55 |
|         5 | Doja Cat         |    NULL | NULL          | NULL          | NULL     |
|         4 | Ed Sheeran       |      18 | Galway Girl   | Galway Girl   | 00:02:50 |
|         4 | Ed Sheeran       |      19 | Perfect       | Perfect       | 00:04:23 |
|         7 | Juice WRLD       |      16 | Smile         | Smile         | 00:03:16 |
|         3 | Justin Bieber    |       5 | Peaches       | Peaches       | 00:03:18 |
|        10 | Lil Nas X        |      21 | Industry Baby | Industry Baby | 00:03:32 |
|        11 | Mythpat          |    NULL | NULL          | NULL          | NULL     |
|        12 | Triggered Insaan |    NULL | NULL          | NULL          | NULL     |
|      NULL | NULL             |       6 | Love nwantiti | Love nwantiti | 00:03:08 |
+-----------+------------------+---------+---------------+---------------+----------+
```

Conclusion:

Various queries are executed with set operations and all types of joins.