# Data And Applications

# Homework - 3

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`Note:` All the queries are single line (no nested queries) commands written in multiple lines just for readability purposes.

## Query 1:

- Which Track Has Longest Length?

```
SELECT T1.*
FROM Track AS T1
LEFT JOIN Track AS T2
        ON T1.Milliseconds < T2.Milliseconds
WHERE T2.Milliseconds IS NULL;
```

(or)

```
SELECT *
FROM Track
WHERE Milliseconds = (
    SELECT MAX(Milliseconds)
    FROM Track
);
```

- `Approach 1`:
  - Select all columns from `Track`
  - Arrange them in descending order of `Milliseconds`
  - Limit the output to 1 row, i.e., the row having the highest value of `Milliseconds`

- Approach 2:
    - Select maximum `Milliseconds` from `Track`
    - Print all rows of the table `Track` where `Milliseconds` is the maximum

```
mysql> SELECT * FROM Track ORDER BY Milliseconds DESC LIMIT 1;
+---------+---------------+---------+-------------+----------+---------+----------+
| TrackID | Name          | AlbumID | Milliseconds | Bytes    | GenreID | ArtistID |
+---------+---------------+---------+-------------+----------+---------+----------+
|      15 | Under Pressure |       6 |       559000 | 55900000 |       4 |        2 |
+---------+---------------+---------+-------------+----------+---------+----------+
1 row in set (0.01 sec)

mysql> SELECT * FROM Track WHERE Milliseconds = ( SELECT MAX(Milliseconds) FROM Track);
+---------+---------------+---------+-------------+----------+---------+----------+
| TrackID | Name          | AlbumID | Milliseconds | Bytes    | GenreID | ArtistID |
+---------+---------------+---------+-------------+----------+---------+----------+
|      15 | Under Pressure |       6 |       559000 | 55900000 |       4 |        2 |
+---------+---------------+---------+-------------+----------+---------+----------+
1 row in set (0.00 sec)
```

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## Query 2:

- How many audio tracks were listened to by the people of "Indian" nationality?

```
SELECT COUNT(DISTINCT TrackID) AS Count
FROM Listener AS A,
        ListeningTo AS B
WHERE A.Nationality='Indian'
        AND A.ListenerID=B.ListenerID;
```

- Approach:
    - Select only `Nationality` = "Indian" From `Listener` table
    - Select all the appropriate rows in the `ListeningTo` table with `ListenerID` as a foreign key
    - Count the number of distinct tracks

```
mysql> SELECT COUNT(DISTINCT TrackID) AS Count FROM Listener AS A, ListeningTo AS B WHERE Nationality='Indian' AND A.ListenerID=B.ListenerID;
+-------+
| Count |
+-------+
|    12 |
+-------+
1 row in set (0.01 sec)
```

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## Query 3:

- Which album takes up the maximum space?

```
SELECT A.*,
        SUM(Bytes) AS Size
FROM Album AS A,
```

```
          Track AS T
WHERE A.AlbumID=T.AlbumID
GROUP BY A.AlbumID
ORDER BY Size DESC
LIMIT 1;
```

- Approach:
    - Select tables `Album` and `Track` with AlbumID as foreign key.
    - Group by `AlbumID` and calculate the sum of `Bytes` of a given album
    - Order the selected rows in the descending order of sum of bytes.
    - Limit the selected rows to be displayed to 1 to get the album of highest bytes, i.e., maximum space

```
mysql> SELECT A.*, SUM(Bytes) AS Size FROM Album AS A,Track AS T WHERE A.AlbumID=T.AlbumID GROUP BY A.AlbumID ORDER BY Size DESC LIMIT 1;
+---------+---------------+----------+
| AlbumID | Name          | Size     |
+---------+---------------+----------+
|       6 | Under Pressure | 80300000 |
+---------+---------------+----------+
1 row in set (0.00 sec)
```

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## Query 4:

- Which nationality listens to music the least?

```
SELECT L.Nationality
FROM Listener AS L,
        ListeningTo AS LT
WHERE L.ListenerID=LT.ListenerID
GROUP BY L.Nationality
ORDER BY SUM(LT.Milliseconds) ASC
LIMIT 1;
```

- Approach:
    - Select `Listener` and `ListeningTo` using `ListenerID` as Foreign key
    - Group by `Nationality`
    - Order by the sum of `Time` for a given nationality
    - Limit the selected rows to be displayed to 1 to get the nationality having lowest listening time.

```
mysql> SELECT L.Nationality FROM Listener AS L, ListeningTo AS LT WHERE L.ListenerID=LT.ListenerID GROUP BY L.Nationality ORDER BY SUM(LT.Milliseconds) ASC LIMIT 1;
+-------------+
| Nationality |
+-------------+
| Indian      |
+-------------+
1 row in set (0.00 sec)
```

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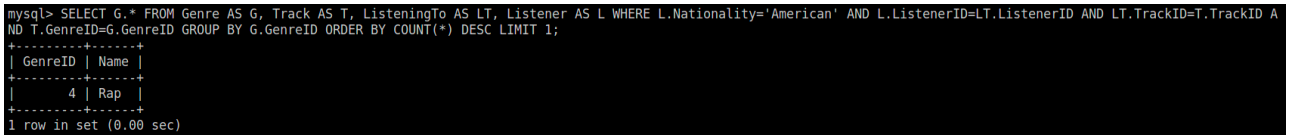
## Query 5:

- Which genre is listened to by the most people among "Americans"?

```
SELECT G.*
FROM Genre AS G,
        Track AS T,
        ListeningTo AS LT,
        Listener AS L
WHERE L.Nationality='American'
        AND L.ListenerID=LT.ListenerID
        AND LT.TrackID=T.TrackID
        AND T.GenreID=G.GenreID
GROUP BY G.GenreID
ORDER BY COUNT(*) DESC
LIMIT 1;
```

- Approach:
    - Select all columns in `Genre` from `Genre`, `Track`, `ListeningTo` and `Listener` tables using `Nationality`, `ListenerID`, `TrackID`, `GenreID` as foreign keys.
    - Group them using `GenreID`
    - Order them by the number of times each genre is appearing in the table from highest to lowest, i.e., descending order
    - Limit the selected rows to be displayed to 1 to get the genre that appeared the most number of times

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## Query 6:

- Which artist did not make any albums at all?

```
SELECT A.*
FROM Artist AS A
LEFT JOIN Track AS T
        ON A.ArtistID=T.ArtistID
GROUP BY A.ArtistID
        HAVING COUNT(T.ArtistID) = 0;
```

- Approach:
    - Select all columns in `Artist` from `Artist` and `Track` using `ArtistID` as foreign key (mandating every artist to appear using left join).
    - Group by `ArtistID`
    - Print all artists who have `0` rows in the `Track` table, which can be obtained by using the condition `COUNT(T.ArtistID) = 0`

```
mysql> SELECT A.Name FROM Artist AS A LEFT JOIN Track AS T ON A.ArtistID=T.ArtistID GROUP BY A.Name HAVING COUNT(T.ArtistID) = 0;
+---------------+
| Name          |
+---------------+
| Vennu Mallesh |
+---------------+
1 row in set (0.00 sec)
```

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## Query 7:

- Which artists did not record any tracks of the "Pop" Genre type?

```
SELECT A.Name
FROM Artist AS A
LEFT JOIN Genre AS G LEFT JOIN Track AS T
        ON T.GenreID=G.GenreID AND G.Name='Pop' ON
A.ArtistID=T.ArtistID
GROUP BY A.ArtistID
        HAVING COUNT(T.ArtistID) = 0;
```

- `Approach`:
    - Left Join the table `Genre` to `Track` where `GenreID` in `Genre` and `Track` tables are same and the `Genre` is `Pop` after which left join the `Artist` table to this table where `ArtistID` in both the tables are same
    - Group by `ArtistID` and select the artists which did not appear in the first table

```
mysql> SELECT A.Name FROM Artist AS A LEFT JOIN Genre AS G LEFT JOIN Track AS T ON T.GenreID=G.GenreID AND G.Name='Pop' ON A.ArtistID=T.ArtistID GROUP BY A.Name HAVING COUNT(T
.ArtistID) = 0;
+---------------+
| Name          |
+---------------+
| Logic         |
| Vennu Mallesh |
+---------------+
2 rows in set (0.00 sec)
```

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