SQL JOINS

SQL joins is used to combine 2 or more tables based on the common column present in the tables.

There are different kinds of joins:

- ➢ **Inner Join**
- ➢ **Left Join**
- ➢ **Right Join**
- ➢ **Full Join**

We are going to perform the join operations on the mysql database. Hence, before we begin the discussion about the joins, You should have mysql database installed in your linux machine. If you don't have any idea about the installation and configuration of mysql DB, you can refer to the below mentioned article.

https://www.thegeekstuff.com/2008/07/howto-install-mysql-on-linux/

We will perform some join operations on `retail_db` database which you will need to import to the mysql database. You can download the database dump from the below mentioned link :

https://raw.githubusercontent.com/dgadiraju/code/master/hadoop/edw/database/retail_db.sql

click on this link and do ctrl + S and save it as retail_db.sql

First extract the sql file from the above mentioned package. Then you will have to import the sql dump. If you don't have any idea about how to import the data from sql dump into mysql, follow the below mentioned steps:

- ➢ First login to the mysql DB and create retial_db database using command:
  ```
  CREATE DATABASE retail_db;
  ```

- ➢ restore the data from the sql dump
  ```
  mysql -u root -p<root password> retail_db < retail_db.sql
  ```

Now, Let's start with Joins :

Inner Join : The inner join will join 2 or more tables as long as the condition satisfies. INNER JOIN or JOIN will provide the result set that matches both Table A and Table B.
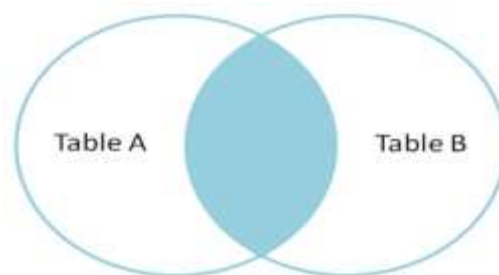
Syntax :

```
SELECT <t1>.<column1>,<t1>.<column2>,<t1>.<column3>,<t2>.<column1>,<t2>.<column2>
FROM Table1 as t1, Table2 as t2
WHERE <t1>.<column2> = <t2>.<column2>;
```

OR

```
SELECT <t1>.<column1>,<t1>.<column2>,<t1>.<column3>,<t2>.<column1>,<t2>.<column2>
FROM Table1 as t1 INNER JOIN Table2 as t2
ON <t1>.<column2> = <t2>.<column2>;
```

Example :

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| retail_db          |
| training_db        |
+--------------------+
4 rows in set (0.00 sec)

mysql> use retail_db;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
+--------------------+
| Tables_in_retail_db |
+--------------------+
| categories         |
| customers          |
| departments        |
| dummy              |
| order_items        |
| order_items_nopk   |
| orders             |
| products           |
+--------------------+
8 rows in set (0.00 sec)

mysql> []
mysql> describe categories;
+------------------------+-------------+------+-----+---------+----------------+
| Field                  | Type        | Null | Key | Default | Extra          |
+------------------------+-------------+------+-----+---------+----------------+
| category_id            | int(11)     | NO   | PRI | NULL    | auto_increment |
| category_department_id | int(11)     | NO   |     | NULL    |                |
| category_name          | varchar(45) | NO   |     | NULL    |                |
+------------------------+-------------+------+-----+---------+----------------+
3 rows in set (0.00 sec)

mysql> describe departments;
+-----------------+-------------+------+-----+---------+----------------+
| Field           | Type        | Null | Key | Default | Extra          |
+-----------------+-------------+------+-----+---------+----------------+
| department_id   | int(11)     | NO   | PRI | NULL    | auto_increment |
| department_name | varchar(45) | NO   |     | NULL    |                |
+-----------------+-------------+------+-----+---------+----------------+
2 rows in set (0.00 sec)
```

```
mysql> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c, departments as d \
    -> WHERE c.category_department_id = d.department_id;
```

OR the same query can also be written using join statement as :
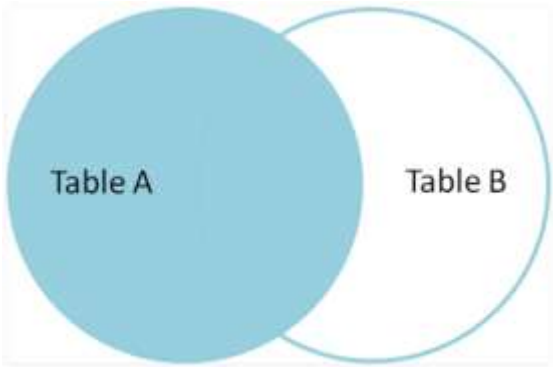
```
mysql>  SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c JOIN departments as d \
    -> ON c.category_department_id = d.department_id;
```

```
mysql> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c,departments as d \
    -> WHERE c.category_department_id = d.department_id;
+-------------+------------------------+---------------+-----------------+---------------------+
| category_id | category_department_id | department_id | department_name | category_name       |
+-------------+------------------------+---------------+-----------------+---------------------+
|           1 |                      2 |             2 | Fitness         | Football            |
|           2 |                      2 |             2 | Fitness         | Soccer              |
|           3 |                      2 |             2 | Fitness         | Baseball & Softball |
|           4 |                      2 |             2 | Fitness         | Basketball          |
|           5 |                      2 |             2 | Fitness         | Lacrosse            |
|           6 |                      2 |             2 | Fitness         | Tennis & Racquet    |
|           7 |                      2 |             2 | Fitness         | Hockey              |
|           8 |                      2 |             2 | Fitness         | More Sports         |
|           9 |                      3 |             3 | Footwear        | Cardio Equipment    |
|          10 |                      3 |             3 | Footwear        | Strength Training   |
|          11 |                      3 |             3 | Footwear        | Fitness Accessories |
|          12 |                      3 |             3 | Footwear        | Boxing & MMA        |
|          13 |                      3 |             3 | Footwear        | Electronics         |
|          14 |                      3 |             3 | Footwear        | Yoga & Pilates      |
|          15 |                      3 |             3 | Footwear        | Training by Sport   |
|          16 |                      3 |             3 | Footwear        | As Seen on  TV!     |
|          17 |                      4 |             4 | Apparel         | Cleats              |
|          18 |                      4 |             4 | Apparel         | Men's Footwear      |
|          19 |                      4 |             4 | Apparel         | Women's Footwear    |
|          20 |                      4 |             4 | Apparel         | Kids' Footwear      |
|          21 |                      4 |             4 | Apparel         | Featured Shops      |
|          22 |                      4 |             4 | Apparel         | Accessories         |
|          23 |                      5 |             5 | Golf            | Men's Apparel       |
|          24 |                      5 |             5 | Golf            | Women's Apparel     |
|          25 |                      5 |             5 | Golf            | Boys' Apparel       |
|          26 |                      5 |             5 | Golf            | Girls' Apparel      |
|          27 |                      5 |             5 | Golf            | Accessories         |
|          28 |                      5 |             5 | Golf            | Top Brands          |
|          29 |                      5 |             5 | Golf            | Shop By Sport       |
|          30 |                      6 |             6 | Outdoors        | Men's Golf Clubs    |
|          31 |                      6 |             6 | Outdoors        | Women's Golf Clubs  |
|          32 |                      6 |             6 | Outdoors        | Golf Apparel        |
|          33 |                      6 |             6 | Outdoors        | Golf Shoes          |
|          34 |                      6 |             6 | Outdoors        | Golf Bags & Carts   |
|          35 |                      6 |             6 | Outdoors        | Golf Gloves         |
|          36 |                      6 |             6 | Outdoors        | Golf Balls          |
|          37 |                      6 |             6 | Outdoors        | Electronics         |
|          38 |                      6 |             6 | Outdoors        | Kids' Golf Clubs    |
|          39 |                      6 |             6 | Outdoors        | Team Shop           |
|          40 |                      6 |             6 | Outdoors        | Accessories         |
|          41 |                      6 |             6 | Outdoors        | Trade-In            |
|          42 |                      7 |             7 | Fan Shop        | Bike & Skate Shop   |
|          43 |                      7 |             7 | Fan Shop        | Camping & Hiking    |
|          44 |                      7 |             7 | Fan Shop        | Hunting & Shooting  |
|          45 |                      7 |             7 | Fan Shop        | Fishing             |
|          46 |                      7 |             7 | Fan Shop        | Indoor/Outdoor Games|
|          47 |                      7 |             7 | Fan Shop        | Boating             |
|          48 |                      7 |             7 | Fan Shop        | Water Sports        |
+-------------+------------------------+---------------+-----------------+---------------------+
48 rows in set (0.00 sec)
```

Left Join : This join will return all the rows from the table on the left side of the join and matching rows from the table on the right side of the join. The rows for which there are no matching rows on the right side, the result will contain NULL. LEFT JOIN is also called as LEFT OUTER JOIN

Syntax :

```
SELECT <t1>.<column1>,<t1>.<column2>,<t1>.<column3>,<t2>.<column1>,<t2>.<column2>
FROM Table1 as t1 LEFT JOIN Table2 as t2
ON <t1>.<column2> = <t2>.<column2>;
```

Example:

```
mysql> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c LEFT JOIN departments as d \
    -> ON c.category_department_id = d.department_id;
```
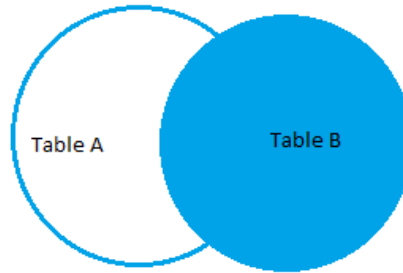
```
mysql> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c LEFT JOIN departments as d \
    -> ON c.category_department_id = d.department_id;
+-------------+------------------------+---------------+-----------------+----------------------+
| category_id | category_department_id | department_id | department_name | category_name        |
+-------------+------------------------+---------------+-----------------+----------------------+
|           1 |                      2 |             2 | Fitness         | Football             |
|           2 |                      2 |             2 | Fitness         | Soccer               |
|           3 |                      2 |             2 | Fitness         | Baseball & Softball  |
|           4 |                      2 |             2 | Fitness         | Basketball           |
|           5 |                      2 |             2 | Fitness         | Lacrosse             |
|           6 |                      2 |             2 | Fitness         | Tennis & Racquet     |
|           7 |                      2 |             2 | Fitness         | Hockey               |
|           8 |                      2 |             2 | Fitness         | More Sports          |
|           9 |                      3 |             3 | Footwear        | Cardio Equipment     |
|          10 |                      3 |             3 | Footwear        | Strength Training    |
|          11 |                      3 |             3 | Footwear        | Fitness Accessories  |
|          12 |                      3 |             3 | Footwear        | Boxing & MMA         |
|          13 |                      3 |             3 | Footwear        | Electronics          |
|          14 |                      3 |             3 | Footwear        | Yoga & Pilates       |
|          15 |                      3 |             3 | Footwear        | Training by Sport    |
|          16 |                      3 |             3 | Footwear        | As Seen on  TV!      |
|          17 |                      4 |             4 | Apparel         | Cleats               |
|          18 |                      4 |             4 | Apparel         | Men's Footwear       |
|          19 |                      4 |             4 | Apparel         | Women's Footwear     |
|          20 |                      4 |             4 | Apparel         | Kids' Footwear       |
|          21 |                      4 |             4 | Apparel         | Featured Shops       |
|          22 |                      4 |             4 | Apparel         | Accessories          |
|          23 |                      5 |             5 | Golf            | Men's Apparel        |
|          24 |                      5 |             5 | Golf            | Women's Apparel      |
|          25 |                      5 |             5 | Golf            | Boys' Apparel        |
|          26 |                      5 |             5 | Golf            | Girls' Apparel       |
|          27 |                      5 |             5 | Golf            | Accessories          |
|          28 |                      5 |             5 | Golf            | Top Brands           |
|          29 |                      5 |             5 | Golf            | Shop By Sport        |
|          30 |                      6 |             6 | Outdoors        | Men's Golf Clubs     |
|          31 |                      6 |             6 | Outdoors        | Women's Golf Clubs   |
|          32 |                      6 |             6 | Outdoors        | Golf Apparel         |
|          33 |                      6 |             6 | Outdoors        | Golf Shoes           |
|          34 |                      6 |             6 | Outdoors        | Golf Bags & Carts    |
|          35 |                      6 |             6 | Outdoors        | Golf Gloves          |
|          36 |                      6 |             6 | Outdoors        | Golf Balls           |
|          37 |                      6 |             6 | Outdoors        | Electronics          |
|          38 |                      6 |             6 | Outdoors        | Kids' Golf Clubs     |
|          39 |                      6 |             6 | Outdoors        | Team Shop            |
|          40 |                      6 |             6 | Outdoors        | Accessories          |
|          41 |                      6 |             6 | Outdoors        | Trade-In             |
|          42 |                      7 |             7 | Fan Shop        | Bike & Skate Shop    |
|          43 |                      7 |             7 | Fan Shop        | Camping & Hiking     |
|          44 |                      7 |             7 | Fan Shop        | Hunting & Shooting   |
|          45 |                      7 |             7 | Fan Shop        | Fishing              |
|          46 |                      7 |             7 | Fan Shop        | Indoor/Outdoor Games |
|          47 |                      7 |             7 | Fan Shop        | Boating              |
|          48 |                      7 |             7 | Fan Shop        | Water Sports         |
|          49 |                      8 |          NULL | NULL            | MLB                  |
|          50 |                      8 |          NULL | NULL            | NFL                  |
|          51 |                      8 |          NULL | NULL            | NHL                  |
|          52 |                      8 |          NULL | NULL            | NBA                  |
|          53 |                      8 |          NULL | NULL            | NCAA                 |
|          54 |                      8 |          NULL | NULL            | MLS                  |
|          55 |                      8 |          NULL | NULL            | International Soccer |
|          56 |                      8 |          NULL | NULL            | World Cup Shop       |
|          57 |                      8 |          NULL | NULL            | MLB Players          |
|          58 |                      8 |          NULL | NULL            | NFL Players          |
+-------------+------------------------+---------------+-----------------+----------------------+
58 rows in set (0.00 sec)

mysql> []
```

Right Join : This join will return all the rows from the table on the right side of the join and matching rows from the table on the left side of the join. The rows for which there are no matching rows on the left side, the result will contain NULL. RIGHT JOIN is also called as RIGHT OUTER JOIN

Syntax :

```
SELECT <t1>.<column1>,<t1>.<column2>,<t1>.<column3>,<t2>.<column1>,<t2>.<column2>
FROM Table1 as t1 RIGHT JOIN Table2 as t2
ON <t1>.<column2> = <t2>.<column2>;
```

Example:

```
mysql> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c RIGHT JOIN departments as d \
    -> ON c.category_department_id = d.department_id;
```
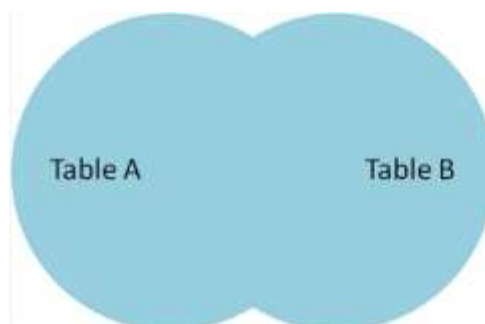
```
mysql> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c RIGHT JOIN departments as d \
    -> ON c.category_department_id = d.department_id;
+-------------+------------------------+---------------+-----------------+----------------------+
| category_id | category_department_id | department_id | department_name | category_name        |
+-------------+------------------------+---------------+-----------------+----------------------+
|           1 |                      2 |             2 | Fitness         | Football             |
|           2 |                      2 |             2 | Fitness         | Soccer               |
|           3 |                      2 |             2 | Fitness         | Baseball & Softball  |
|           4 |                      2 |             2 | Fitness         | Basketball           |
|           5 |                      2 |             2 | Fitness         | Lacrosse             |
|           6 |                      2 |             2 | Fitness         | Tennis & Racquet     |
|           7 |                      2 |             2 | Fitness         | Hockey               |
|           8 |                      2 |             2 | Fitness         | More Sports          |
|           9 |                      3 |             3 | Footwear        | Cardio Equipment     |
|          10 |                      3 |             3 | Footwear        | Strength Training    |
|          11 |                      3 |             3 | Footwear        | Fitness Accessories  |
|          12 |                      3 |             3 | Footwear        | Boxing & MMA         |
|          13 |                      3 |             3 | Footwear        | Electronics          |
|          14 |                      3 |             3 | Footwear        | Yoga & Pilates       |
|          15 |                      3 |             3 | Footwear        | Training by Sport    |
|          16 |                      3 |             3 | Footwear        | As Seen on  TV!      |
|          17 |                      4 |             4 | Apparel         | Cleats               |
|          18 |                      4 |             4 | Apparel         | Men's Footwear       |
|          19 |                      4 |             4 | Apparel         | Women's Footwear     |
|          20 |                      4 |             4 | Apparel         | Kids' Footwear       |
|          21 |                      4 |             4 | Apparel         | Featured Shops       |
|          22 |                      4 |             4 | Apparel         | Accessories          |
|          23 |                      5 |             5 | Golf            | Men's Apparel        |
|          24 |                      5 |             5 | Golf            | Women's Apparel      |
|          25 |                      5 |             5 | Golf            | Boys' Apparel        |
|          26 |                      5 |             5 | Golf            | Girls' Apparel       |
|          27 |                      5 |             5 | Golf            | Accessories          |
|          28 |                      5 |             5 | Golf            | Top Brands           |
|          29 |                      5 |             5 | Golf            | Shop By Sport        |
|          30 |                      6 |             6 | Outdoors        | Men's Golf Clubs     |
|          31 |                      6 |             6 | Outdoors        | Women's Golf Clubs   |
|          32 |                      6 |             6 | Outdoors        | Golf Apparel         |
|          33 |                      6 |             6 | Outdoors        | Golf Shoes           |
|          34 |                      6 |             6 | Outdoors        | Golf Bags & Carts    |
|          35 |                      6 |             6 | Outdoors        | Golf Gloves          |
|          36 |                      6 |             6 | Outdoors        | Golf Balls           |
|          37 |                      6 |             6 | Outdoors        | Electronics          |
|          38 |                      6 |             6 | Outdoors        | Kids' Golf Clubs     |
|          39 |                      6 |             6 | Outdoors        | Team Shop            |
|          40 |                      6 |             6 | Outdoors        | Accessories          |
|          41 |                      6 |             6 | Outdoors        | Trade-In             |
|          42 |                      7 |             7 | Fan Shop        | Bike & Skate Shop    |
|          43 |                      7 |             7 | Fan Shop        | Camping & Hiking     |
|          44 |                      7 |             7 | Fan Shop        | Hunting & Shooting   |
|          45 |                      7 |             7 | Fan Shop        | Fishing              |
|          46 |                      7 |             7 | Fan Shop        | Indoor/Outdoor Games |
|          47 |                      7 |             7 | Fan Shop        | Boating              |
|          48 |                      7 |             7 | Fan Shop        | Water Sports         |
+-------------+------------------------+---------------+-----------------+----------------------+
48 rows in set (0.00 sec)
```

Full Join : This join will return the result set by combining both the LEFT JOIN and RIGHT JOIN. The result set will contain all the rows from both the tables. The rows for which there are no matching, the result set will contain NULL values

Syntax :

```
SELECT <t1>.<column1>,<t1>.<column2>,<t1>.<column3>,<t2>.<column1>,<t2>.<column2>
FROM Table1 as t1 FULL JOIN Table2 as t2
ON <t1>.<column2> = <t2>.<column2>;
```

The above syntax can be used for other SQL databases. MySQL does not support FULL JOIN. Hence can implement the same by using **UNION** on **LEFT JOIN** and **RIGHT JOIN**.

Example:

```
mysql> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c LEFT JOIN departments as d ON c.category_department_id = d.department_id \
    -> UNION
    -> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c RIGHT JOIN departments as d ON c.category_department_id = d.department_id ;
```

```
mysql> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c LEFT JOIN departments as d ON c.category_department_id = d.department_id \
    -> UNION
    -> SELECT c.category_id, c.category_department_id, d.department_id,d.department_name, c.category_name \
    -> FROM categories as c RIGHT JOIN departments as d ON c.category_department_id = d.department_id ;
+-------------+------------------------+---------------+-----------------+---------------------+
| category_id | category_department_id | department_id | department_name | category_name       |
+-------------+------------------------+---------------+-----------------+---------------------+
|           1 |                      2 |             2 | Fitness         | Football            |
|           2 |                      2 |             2 | Fitness         | Soccer              |
|           3 |                      2 |             2 | Fitness         | Baseball & Softball |
|           4 |                      2 |             2 | Fitness         | Basketball          |
|           5 |                      2 |             2 | Fitness         | Lacrosse            |
|           6 |                      2 |             2 | Fitness         | Tennis & Racquet    |
|           7 |                      2 |             2 | Fitness         | Hockey              |
|           8 |                      2 |             2 | Fitness         | More Sports         |
|           9 |                      3 |             3 | Footwear        | Cardio Equipment    |
|          10 |                      3 |             3 | Footwear        | Strength Training   |
|          11 |                      3 |             3 | Footwear        | Fitness Accessories |
|          12 |                      3 |             3 | Footwear        | Boxing & MMA        |
|          13 |                      3 |             3 | Footwear        | Electronics         |
|          14 |                      3 |             3 | Footwear        | Yoga & Pilates      |
|          15 |                      3 |             3 | Footwear        | Training by Sport   |
|          16 |                      3 |             3 | Footwear        | As Seen on  TV!     |
|          17 |                      4 |             4 | Apparel         | Cleats              |
|          18 |                      4 |             4 | Apparel         | Men's Footwear      |
|          19 |                      4 |             4 | Apparel         | Women's Footwear    |
|          20 |                      4 |             4 | Apparel         | Kids' Footwear      |
|          21 |                      4 |             4 | Apparel         | Featured Shops      |
|          22 |                      4 |             4 | Apparel         | Accessories         |
|          23 |                      5 |             5 | Golf            | Men's Apparel       |
|          24 |                      5 |             5 | Golf            | Women's Apparel     |
|          25 |                      5 |             5 | Golf            | Boys' Apparel       |
|          26 |                      5 |             5 | Golf            | Girls' Apparel      |
|          27 |                      5 |             5 | Golf            | Accessories         |
|          28 |                      5 |             5 | Golf            | Top Brands          |
|          29 |                      5 |             5 | Golf            | Shop By Sport       |
|          30 |                      6 |             6 | Outdoors        | Men's Golf Clubs    |
|          31 |                      6 |             6 | Outdoors        | Women's Golf Clubs  |
|          32 |                      6 |             6 | Outdoors        | Golf Apparel        |
|          33 |                      6 |             6 | Outdoors        | Golf Shoes          |
|          34 |                      6 |             6 | Outdoors        | Golf Bags & Carts   |
|          35 |                      6 |             6 | Outdoors        | Golf Gloves         |
|          36 |                      6 |             6 | Outdoors        | Golf Balls          |
|          37 |                      6 |             6 | Outdoors        | Electronics         |
|          38 |                      6 |             6 | Outdoors        | Kids' Golf Clubs    |
|          39 |                      6 |             6 | Outdoors        | Team Shop           |
|          40 |                      6 |             6 | Outdoors        | Accessories         |
|          41 |                      6 |             6 | Outdoors        | Trade-In            |
|          42 |                      7 |             7 | Fan Shop        | Bike & Skate Shop   |
|          43 |                      7 |             7 | Fan Shop        | Camping & Hiking    |
|          44 |                      7 |             7 | Fan Shop        | Hunting & Shooting  |
|          45 |                      7 |             7 | Fan Shop        | Fishing             |
|          46 |                      7 |             7 | Fan Shop        | Indoor/Outdoor Games|
|          47 |                      7 |             7 | Fan Shop        | Boating             |
|          48 |                      7 |             7 | Fan Shop        | Water Sports        |
|          49 |                      8 |          NULL | NULL            | MLB                 |
|          50 |                      8 |          NULL | NULL            | NFL                 |
|          51 |                      8 |          NULL | NULL            | NHL                 |
|          52 |                      8 |          NULL | NULL            | NBA                 |
|          53 |                      8 |          NULL | NULL            | NCAA                |
|          54 |                      8 |          NULL | NULL            | MLS                 |
|          55 |                      8 |          NULL | NULL            | International Soccer |
|          56 |                      8 |          NULL | NULL            | World Cup Shop       |
|          57 |                      8 |          NULL | NULL            | MLB Players         |
|          58 |                      8 |          NULL | NULL            | NFL Players         |
+-------------+------------------------+---------------+-----------------+---------------------+
58 rows in set (0.01 sec)
```

Author - Shivshankar Chandankhede
References : Thegeekstuff.com , geeksforgeeks.org, https://dev.mysql.com/doc/refman/8.0/en/join.html