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ASSIGNMENT - 4

AIM : Use of Joins, ISNULL and DELETE CASCADE in SQL.

TOOL : MariaDB

STEPS TO LOGIN IN MARIADB MONITOR:

1. Navigate to Mysql workbench in command prompt
2. Enter Command: mysql -u root -p
3. Enter password: (root)

INDEX :

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1)	**Joins and types of joins**
2)	**Use of IFNULL(equivalent to ISNULL)**
3)	**Use of DELETE CASCADE**

PROGRAMMING LANGUAGE: Structured Query Language (SQL)

THEORY :
JOIN :
Join statement is used to combine data or rows from two or more tables based on a common field between them.

TYPES OF JOINS :
Inner Join :
The INNER JOIN keyword selects records that have matching values in
both tables.

Syntax :
SELECT column_name(s)
FROM table1
INNER JOIN table2
ON table1.column_name = table2.column_name;

Example :
select * from customers inner join orders on customers.id =
orders.customer_id;

Natural Join :
NATURAL JOIN is an SQL join operation that creates a join on the base
of the common columns in the tables.

Syntax :
SELECT *
FROM table1
NATURAL JOIN table2;

Example :
select * from customers natural join orders where customers.id =
orders.customer_id;

Left Join :
The LEFT JOIN command returns all rows from the left table, and the
matching rows from the right table. The result is NULL from the right
side, if there is no match.

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

Example :
select * from customers left join orders on customers.id =
orders.customer_id;

Right Join :
The RIGHT JOIN keyword returns all records from the right table
(table2), and the matching records from the left table (table1). The result
is 0 records from the left side, if there is no match.

Syntax :
SELECT column_name(s)
FROM table1
RIGHT JOIN table2
ON table1.column_name = table2.column_name;

Example :
select * from customers right join orders on customers.id =
orders.customer_id;

USE OF IFNULL :

The IFNULL() function returns a specified value if the expression is
NULL.

If the expression is NOT NULL, this function returns the expression.

Syntax :

IFNULL(*expression*, *alt_value*)

Example :
select ifnull(first_name,'MISSING') as first,ifnull(last_name,'USER') as last,order_date,amount,sum(amount) from customers right join orders on customers.id=orders.customer_id group by first_name,last_name;

USE OF DELETE CASCADE :
ON DELETE CASCADE option is used to specify whether you want rows deleted in a child table when corresponding rows are deleted in the parent table. If you do not specify cascading deletes, the default behavior of the database server prevents you from deleting data in a table if other tables reference it.

Syntax :
```
CREATE TABLE ChildTable (
    ChildID INT PRIMARY KEY,
    ParentID INT,
    CONSTRAINT FK_ParentChild FOREIGN KEY (ParentID)
        REFERENCES ParentTable(ParentID)
        ON DELETE CASCADE);
```
Example :
```
 CREATE TABLE orders(
     id INT AUTO_INCREMENT PRIMARY KEY,
     order_date DATE,
     amount DECIMAL(8,2),
     customer_id INT,
     FOREIGN KEY(customer_id)
     REFERENCES cust(id)
     ON DELETE CASCADE );
```

CODE :
Enter password: ****

```
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 3
Server version: 11.4.0-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CREATE TABLE customers(
    ->    id INT,
    ->    first_name VARCHAR(100),
    ->    last_name VARCHAR(100),
    ->    email VARCHAR(100)
    -> );
ERROR 1046 (3D000): No database selected
MariaDB [(none)]> create database db4;
Query OK, 1 row affected (0.006 sec)

MariaDB [(none)]> use db4;
Database changed
MariaDB [db4]> CREATE TABLE customers(
    ->    id INT,
    ->    first_name VARCHAR(100),
    ->    last_name VARCHAR(100),
    ->    email VARCHAR(100)
    -> );
Query OK, 0 rows affected (0.042 sec)

MariaDB [db4]> CREATE TABLE orders(
    ->    o_id INT,
    ->    order_date DATE,
    ->    amount DECIMAL(8,2),
    ->    customer_id INT
    -> );
Query OK, 0 rows affected (0.015 sec)
```

```
MariaDB [db4]> INSERT INTO customers (id,first_name, last_name,
email)
    -> VALUES (1,'Boy', 'George', 'george@gmail.com'),
    ->      (2,'George', 'Michael', 'gm@gmail.com'),
    ->      (3,'David', 'Bowie', 'david@gmail.com'),
    ->      (4,'Blue', 'Steele', 'blue@gmail.com'),
    ->      (5,'Bette', 'Davis', 'bette@aol.com');
Query OK, 5 rows affected (0.014 sec)
Records: 5  Duplicates: 0  Warnings: 0

MariaDB [db4]> INSERT INTO orders (o_id, order_date, amount,
customer_id)
    -> VALUES (111,'2016/02/10', 99.99, 1),
    ->      (222,'2017/11/11', 35.50, 1),
    ->      (333,'2014/12/12', 800.67, 2),
    ->      (444,'2015/01/03', 12.50, 2),
    ->      (555,'1999/04/11', 450.25, 3);
Query OK, 5 rows affected (0.004 sec)
Records: 5  Duplicates: 0  Warnings: 0

MariaDB [db4]> select * from orders;
+------+------------+--------+-------------+
| o_id | order_date | amount | customer_id |
+------+------------+--------+-------------+
|  111 | 2016-02-10 |  99.99 |           1 |
|  222 | 2017-11-11 |  35.50 |           1 |
|  333 | 2014-12-12 | 800.67 |           2 |
|  444 | 2015-01-03 |  12.50 |           2 |
|  555 | 1999-04-11 | 450.25 |           3 |
+------+------------+--------+-------------+
5 rows in set (0.002 sec)

MariaDB [db4]> --cartesian product
MariaDB [db4]> select * from customers,orders;
```

```
+------+------------+-----------+-----------------+------+------------+--------+------------+
| id   | first_name | last_name | email           | o_id | order_date | amount | customer_id |
+------+------------+-----------+-----------------+------+------------+--------+------------+
|    1 | Boy        | George    | george@gmail.com | 111 | 2016-02-10 |  99.99 | 1 |
|    2 | George     | Michael   | gm@gmail.com     | 111 | 2016-02-10 |  99.99 | 1 |
|    3 | David      | Bowie     | david@gmail.com  | 111 | 2016-02-10 |  99.99 | 1 |
|    4 | Blue       | Steele    | blue@gmail.com   | 111 | 2016-02-10 |  99.99 | 1 |
|    5 | Bette      | Davis     | bette@aol.com    | 111 | 2016-02-10 |  99.99 | 1 |
|    1 | Boy        | George    | george@gmail.com | 222 | 2017-11-11 |  35.50 | 1 |
|    2 | George     | Michael   | gm@gmail.com     | 222 | 2017-11-11 |  35.50 | 1 |
|    3 | David      | Bowie     | david@gmail.com  | 222 | 2017-11-11 |  35.50 | 1 |
|    4 | Blue       | Steele    | blue@gmail.com   | 222 | 2017-11-11 |  35.50 | 1 |
|    5 | Bette      | Davis     | bette@aol.com    | 222 | 2017-11-11 |  35.50 |          1 |
|    1 | Boy        | George    | george@gmail.com | 333 | 2014-12-12 | 800.67 | 2 |
|    2 | George     | Michael   | gm@gmail.com     | 333 | 2014-12-12 | 800.67 | 2 |
|    3 | David      | Bowie     | david@gmail.com  | 333 | 2014-12-12 | 800.67 | 2 |
|    4 | Blue       | Steele    | blue@gmail.com   | 333 | 2014-12-12 | 800.67 | 2 |
```

```
|    5 | Bette     | Davis     | bette@aol.com   |  333 | 2014-12-12 | 800.67 |
2 |
|    1 | Boy       | George    | george@gmail.com |  444 | 2015-01-03 |  12.50 |
2 |
|    2 | George    | Michael   | gm@gmail.com    |  444 | 2015-01-03 |  12.50 |
2 |
|    3 | David     | Bowie     | david@gmail.com |  444 | 2015-01-03 |  12.50 |
2 |
|    4 | Blue      | Steele    | blue@gmail.com  |  444 | 2015-01-03 |  12.50 |
2 |
|    5 | Bette     | Davis     | bette@aol.com   |  444 | 2015-01-03 |  12.50 |
2 |
|    1 | Boy       | George    | george@gmail.com |  555 | 1999-04-11 | 450.25 |
3 |
|    2 | George    | Michael   | gm@gmail.com    |  555 | 1999-04-11 | 450.25 |
3 |
|    3 | David     | Bowie     | david@gmail.com |  555 | 1999-04-11 | 450.25 |
3 |
|    4 | Blue      | Steele    | blue@gmail.com  |  555 | 1999-04-11 | 450.25 |
3 |
|    5 | Bette     | Davis     | bette@aol.com   |  555 | 1999-04-11 | 450.25 |
3 |
+------+------------+-----------+----------------+------+-----------+--------+------------+
25 rows in set (0.001 sec)

MariaDB [db4]> select * from customers inner join orders;
+------+------------+-----------+----------------+------+-----------+--------+------------+
| id   | first_name | last_name | email          | o_id | order_date | amount | customer_id |
+------+------------+-----------+----------------+------+-----------+--------+------------+
|    1 | Boy       | George    | george@gmail.com |  111 | 2016-02-10 |  99.99 |
1 |
```

2	George	Michael	gm@gmail.com	111	2016-02-10	99.99	1
3	David	Bowie	david@gmail.com	111	2016-02-10	99.99	1
4	Blue	Steele	blue@gmail.com	111	2016-02-10	99.99	1
5	Bette	Davis	bette@aol.com	111	2016-02-10	99.99	1
1	Boy	George	george@gmail.com	222	2017-11-11	35.50	1
2	George	Michael	gm@gmail.com	222	2017-11-11	35.50	1
3	David	Bowie	david@gmail.com	222	2017-11-11	35.50	1
4	Blue	Steele	blue@gmail.com	222	2017-11-11	35.50	1
5	Bette	Davis	bette@aol.com	222	2017-11-11	35.50	1
1	Boy	George	george@gmail.com	333	2014-12-12	800.67	2
2	George	Michael	gm@gmail.com	333	2014-12-12	800.67	2
3	David	Bowie	david@gmail.com	333	2014-12-12	800.67	2
4	Blue	Steele	blue@gmail.com	333	2014-12-12	800.67	2
5	Bette	Davis	bette@aol.com	333	2014-12-12	800.67	2
1	Boy	George	george@gmail.com	444	2015-01-03	12.50	2
2	George	Michael	gm@gmail.com	444	2015-01-03	12.50	2
3	David	Bowie	david@gmail.com	444	2015-01-03	12.50	2

```
|   4 | Blue     | Steele  | blue@gmail.com   |  444 | 2015-01-03 |  12.50 |
2 |
|   5 | Bette    | Davis    | bette@aol.com    |  444 | 2015-01-03 |  12.50 |
2 |
|   1 | Boy      | George   | george@gmail.com |  555 | 1999-04-11 | 450.25 |
3 |
|   2 | George   | Michael  | gm@gmail.com     |  555 | 1999-04-11 | 450.25 |
3 |
|   3 | David    | Bowie    | david@gmail.com  |  555 | 1999-04-11 | 450.25 |
3 |
|   4 | Blue     | Steele  | blue@gmail.com   |  555 | 1999-04-11 | 450.25 |
3 |
|   5 | Bette    | Davis    | bette@aol.com    |  555 | 1999-04-11 | 450.25 |
3 |
+------+------------+-----------+-----------------+------+------------+--------+--------
----+
25 rows in set (0.002 sec)

MariaDB [db4]> select id,first_name,order_id,amount from
customers,orders;
ERROR 1054 (42S22): Unknown column 'order_id' in 'field list'
MariaDB [db4]> select id,first_name,o_id,amount from
customers,orders;
+------+------------+------+--------+
| id   | first_name | o_id | amount |
+------+------------+------+--------+
|   1 | Boy      | 111 |  99.99 |
|   2 | George    | 111 |  99.99 |
|   3 | David     | 111 |  99.99 |
|   4 | Blue      | 111 |  99.99 |
|   5 | Bette     | 111 |  99.99 |
|   1 | Boy      | 222 |  35.50 |
|   2 | George    | 222 |  35.50 |
|   3 | David     | 222 |  35.50 |
|   4 | Blue      | 222 |  35.50 |
```

```
|    5 | Bette     | 222 | 35.50 |
|    1 | Boy       | 333 | 800.67 |
|    2 | George    | 333 | 800.67 |
|    3 | David     | 333 | 800.67 |
|    4 | Blue      | 333 | 800.67 |
|    5 | Bette     | 333 | 800.67 |
|    1 | Boy       | 444 | 12.50 |
|    2 | George    | 444 | 12.50 |
|    3 | David     | 444 | 12.50 |
|    4 | Blue      | 444 | 12.50 |
|    5 | Bette     | 444 | 12.50 |
|    1 | Boy       | 555 | 450.25 |
|    2 | George    | 555 | 450.25 |
|    3 | David     | 555 | 450.25 |
|    4 | Blue      | 555 | 450.25 |
|    5 | Bette     | 555 | 450.25 |
+------+-----------+------+--------+
25 rows in set (0.001 sec)

MariaDB [db4]> --syntax of 'with' command
MariaDB [db4]> with A1 as (select * from customers,orders) select
count(*) from A1;
+----------+
| count(*) |
+----------+
|       25 |
+----------+
1 row in set (0.008 sec)

MariaDB [db4]> --natural join
MariaDB [db4]> select * from customers,orders on customers.id =
orders.o_id;
ERROR 1064 (42000): You have an error in your SQL syntax; check the
manual that corresponds to your MariaDB server version for the right
syntax to use near 'on customers.id = orders.o_id' at line 1
```

MariaDB [db4]> select * from customers,orders on customers.id = orders.customer_id;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near 'on customers.id = orders.customer_id' at line 1
MariaDB [db4]> select * from customers inner join orders on customers.id = orders.customer_id;

```
+------+------------+-----------+-----------------+------+------------+--------+------------+
| id   | first_name | last_name | email           | o_id | order_date | amount | customer_id |
+------+------------+-----------+-----------------+------+------------+--------+------------+
|    1 | Boy        | George    | george@gmail.com | 111  | 2016-02-10 |  99.99 | 1          |
|    1 | Boy        | George    | george@gmail.com | 222  | 2017-11-11 |  35.50 | 1          |
|    2 | George     | Michael   | gm@gmail.com     | 333  | 2014-12-12 | 800.67 | 2          |
|    2 | George     | Michael   | gm@gmail.com     | 444  | 2015-01-03 |  12.50 | 2          |
|    3 | David      | Bowie     | david@gmail.com  | 555  | 1999-04-11 | 450.25 | 3          |
+------+------------+-----------+-----------------+------+------------+--------+------------+
5 rows in set (0.005 sec)
```

MariaDB [db4]> select * from customers inner join orders where customers.id = orders.customer_id;

```
+------+------------+-----------+-----------------+------+------------+--------+------------+
| id   | first_name | last_name | email           | o_id | order_date | amount | customer_id |
+------+------------+-----------+-----------------+------+------------+--------+------------+
```

```
|    1 | Boy       | George    | george@gmail.com | 111 | 2016-02-10 |  99.99 |
1 |
|    1 | Boy       | George    | george@gmail.com | 222 | 2017-11-11 |  35.50 |
1 |
|    2 | George    | Michael   | gm@gmail.com     | 333 | 2014-12-12 | 800.67 |
2 |
|    2 | George    | Michael   | gm@gmail.com     | 444 | 2015-01-03 |  12.50 |
2 |
|    3 | David     | Bowie     | david@gmail.com  | 555 | 1999-04-11 | 450.25 |
3 |
+------+-----------+-----------+------------------+------+------------+--------+-------------+
5 rows in set (0.001 sec)

MariaDB [db4]> select * from customers;
+------+------------+-----------+------------------+
| id   | first_name | last_name | email            |
+------+------------+-----------+------------------+
|    1 | Boy        | George    | george@gmail.com |
|    2 | George     | Michael   | gm@gmail.com     |
|    3 | David      | Bowie     | david@gmail.com  |
|    4 | Blue       | Steele    | blue@gmail.com   |
|    5 | Bette      | Davis     | bette@aol.com    |
+------+------------+-----------+------------------+
5 rows in set (0.000 sec)

MariaDB [db4]> select * from orders;
+------+------------+--------+-------------+
| o_id | order_date | amount | customer_id |
+------+------------+--------+-------------+
| 111  | 2016-02-10 |  99.99 |           1 |
| 222  | 2017-11-11 |  35.50 |           1 |
| 333  | 2014-12-12 | 800.67 |           2 |
| 444  | 2015-01-03 |  12.50 |           2 |
| 555  | 1999-04-11 | 450.25 |           3 |
```

```
+------+-----------+--------+-------------+
5 rows in set (0.000 sec)

MariaDB [db4]> select * from customers natural join orders where
customers.id = orders.customer_id;
+------+-----------+-----------+-----------------+------+-----------+--------+------------+
| id   | first_name | last_name | email           | o_id | order_date | amount | customer_id |
+------+-----------+-----------+-----------------+------+-----------+--------+------------+
|    1 | Boy       | George    | george@gmail.com | 111 | 2016-02-10 |  99.99 |          1 |
|    1 | Boy       | George    | george@gmail.com | 222 | 2017-11-11 |  35.50 |          1 |
|    2 | George    | Michael   | gm@gmail.com     | 333 | 2014-12-12 | 800.67 |          2 |
|    2 | George    | Michael   | gm@gmail.com     | 444 | 2015-01-03 |  12.50 |          2 |
|    3 | David     | Bowie     | david@gmail.com  | 555 | 1999-04-11 | 450.25 |          3 |
+------+-----------+-----------+-----------------+------+-----------+--------+------------+
5 rows in set (0.001 sec)

MariaDB [db4]>
MariaDB [db4]>
MariaDB [db4]> select * from customers natural join orders on
customers.id = orders.customer_id;
ERROR 1064 (42000): You have an error in your SQL syntax; check the
manual that corresponds to your MariaDB server version for the right
syntax to use near 'on customers.id = orders.customer_id' at line 1
MariaDB [db4]> select * from customers join orders where customers.id
= orders.customer_id;
```

```
+------+------------+-----------+-----------------+------+------------+--------+-------------+
| id   | first_name | last_name | email           | o_id | order_date | amount | customer_id |
+------+------------+-----------+-----------------+------+------------+--------+-------------+
|    1 | Boy        | George    | george@gmail.com | 111 | 2016-02-10 |  99.99 |           1 |
|    1 | Boy        | George    | george@gmail.com | 222 | 2017-11-11 |  35.50 |           1 |
|    2 | George     | Michael   | gm@gmail.com     | 333 | 2014-12-12 | 800.67 |           2 |
|    2 | George     | Michael   | gm@gmail.com     | 444 | 2015-01-03 |  12.50 |           2 |
|    3 | David      | Bowie     | david@gmail.com  | 555 | 1999-04-11 | 450.25 |           3 |
+------+------------+-----------+-----------------+------+------------+--------+-------------+
5 rows in set (0.001 sec)

MariaDB [db4]> select * from customers join orders;
+------+------------+-----------+-----------------+------+------------+--------+-------------+
| id   | first_name | last_name | email           | o_id | order_date | amount | customer_id |
+------+------------+-----------+-----------------+------+------------+--------+-------------+
|    1 | Boy        | George    | george@gmail.com | 111 | 2016-02-10 |  99.99 |           1 |
|    2 | George     | Michael   | gm@gmail.com     | 111 | 2016-02-10 |  99.99 |           1 |
|    3 | David      | Bowie     | david@gmail.com  | 111 | 2016-02-10 |  99.99 |           1 |
|    4 | Blue       | Steele    | blue@gmail.com   | 111 | 2016-02-10 |  99.99 |           1 |
```

5	Bette	Davis	bette@aol.com	111	2016-02-10	99.99	1
1	Boy	George	george@gmail.com	222	2017-11-11	35.50	1
2	George	Michael	gm@gmail.com	222	2017-11-11	35.50	1
3	David	Bowie	david@gmail.com	222	2017-11-11	35.50	1
4	Blue	Steele	blue@gmail.com	222	2017-11-11	35.50	1
5	Bette	Davis	bette@aol.com	222	2017-11-11	35.50	1
1	Boy	George	george@gmail.com	333	2014-12-12	800.67	2
2	George	Michael	gm@gmail.com	333	2014-12-12	800.67	2
3	David	Bowie	david@gmail.com	333	2014-12-12	800.67	2
4	Blue	Steele	blue@gmail.com	333	2014-12-12	800.67	2
5	Bette	Davis	bette@aol.com	333	2014-12-12	800.67	2
1	Boy	George	george@gmail.com	444	2015-01-03	12.50	2
2	George	Michael	gm@gmail.com	444	2015-01-03	12.50	2
3	David	Bowie	david@gmail.com	444	2015-01-03	12.50	2
4	Blue	Steele	blue@gmail.com	444	2015-01-03	12.50	2
5	Bette	Davis	bette@aol.com	444	2015-01-03	12.50	2
1	Boy	George	george@gmail.com	555	1999-04-11	450.25	3

```
|    2 | George    | Michael   | gm@gmail.com    |  555 | 1999-04-11 | 450.25 |
3 |
|    3 | David     | Bowie     | david@gmail.com |  555 | 1999-04-11 | 450.25 |
3 |
|    4 | Blue      | Steele    | blue@gmail.com  |  555 | 1999-04-11 | 450.25 |
3 |
|    5 | Bette     | Davis     | bette@aol.com   |  555 | 1999-04-11 | 450.25 |
3 |
+------+------------+-----------+-----------------+------+------------+--------+--------
----+
25 rows in set (0.001 sec)

MariaDB [db4]> --left join
MariaDB [db4]> select * from customers left join orders on customers.id
= orders.customer_id;
+------+------------+-----------+-----------------+------+------------+--------+--------
----+
| id   | first_name | last_name | email           | o_id | order_date | amount |
customer_id |
+------+------------+-----------+-----------------+------+------------+--------+--------
----+
|    1 | Boy       | George    | george@gmail.com |  111 | 2016-02-10 |  99.99 |
1 |
|    1 | Boy       | George    | george@gmail.com |  222 | 2017-11-11 |  35.50 |
1 |
|    2 | George    | Michael   | gm@gmail.com    |  333 | 2014-12-12 | 800.67 |
2 |
|    2 | George    | Michael   | gm@gmail.com    |  444 | 2015-01-03 |  12.50 |
2 |
|    3 | David     | Bowie     | david@gmail.com |  555 | 1999-04-11 | 450.25 |
3 |
|    4 | Blue      | Steele    | blue@gmail.com  | NULL | NULL       |   NULL |
NULL |
|    5 | Bette     | Davis     | bette@aol.com   | NULL | NULL       |   NULL |
NULL |
```

```
+------+------------+-----------+-----------------+------+------------+--------+------------+
7 rows in set (0.002 sec)

MariaDB [db4]> select * from customers left join orders;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '' at line 1
MariaDB [db4]> select * from customers left join orders where customers.id = orders.customer_id;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near 'where customers.id = orders.customer_id' at line 1
MariaDB [db4]> select * from customers right join orders on customers.id = orders.customer_id;
+------+------------+-----------+-----------------+------+------------+--------+------------+
| id   | first_name | last_name | email           | o_id | order_date | amount | customer_id |
+------+------------+-----------+-----------------+------+------------+--------+------------+
|    1 | Boy        | George    | george@gmail.com | 111 | 2016-02-10 |  99.99 | 1 |
|    1 | Boy        | George    | george@gmail.com | 222 | 2017-11-11 |  35.50 | 1 |
|    2 | George     | Michael   | gm@gmail.com    | 333 | 2014-12-12 | 800.67 | 2 |
|    2 | George     | Michael   | gm@gmail.com    | 444 | 2015-01-03 |  12.50 | 2 |
|    3 | David      | Bowie     | david@gmail.com | 555 | 1999-04-11 | 450.25 | 3 |
+------+------------+-----------+-----------------+------+------------+--------+------------+
5 rows in set (0.001 sec)
```

```
MariaDB [db4]> delete from customers where id=1;
Query OK, 1 row affected (0.004 sec)

MariaDB [db4]> select * from customers;
+------+------------+-----------+-----------------+
| id   | first_name | last_name | email           |
+------+------------+-----------+-----------------+
|    2 | George     | Michael   | gm@gmail.com    |
|    3 | David      | Bowie     | david@gmail.com |
|    4 | Blue       | Steele    | blue@gmail.com  |
|    5 | Bette      | Davis     | bette@aol.com   |
+------+------------+-----------+-----------------+
4 rows in set (0.000 sec)

MariaDB [db4]> select * from orders;
+------+------------+--------+-------------+
| o_id | order_date | amount | customer_id |
+------+------------+--------+-------------+
| 111  | 2016-02-10 | 99.99  |           1 |
| 222  | 2017-11-11 | 35.50  |           1 |
| 333  | 2014-12-12 | 800.67 |           2 |
| 444  | 2015-01-03 | 12.50  |           2 |
| 555  | 1999-04-11 | 450.25 |           3 |
+------+------------+--------+-------------+
5 rows in set (0.000 sec)

MariaDB [db4]> select * from customers right join orders on
customers.id = orders.customer_id;
+------+------------+-----------+-----------------+------+------------+--------+------------+
| id   | first_name | last_name | email           | o_id | order_date | amount | customer_id |
+------+------------+-----------+-----------------+------+------------+--------+------------+
```

```
|    2 | George    | Michael  | gm@gmail.com   |  333 | 2014-12-12 | 800.67 |
2 |
|    2 | George    | Michael  | gm@gmail.com   |  444 | 2015-01-03 |  12.50 |
2 |
|    3 | David     | Bowie    | david@gmail.com |  555 | 1999-04-11 | 450.25 |
3 |
| NULL | NULL      | NULL     | NULL           |  111 | 2016-02-10 |  99.99 |      1
|
| NULL | NULL      | NULL     | NULL           |  222 | 2017-11-11 |  35.50 |      1 |
+------+-----------+----------+----------------+------+-----------+--------+---------
---+
5 rows in set (0.001 sec)

MariaDB [db4]> --SELF JOIN
MariaDB [db4]> --Fetch the order ids with the highest amounts (i.e.
amounts greater than the lowest amount)
MariaDB [db4]> select distinct T.o_id from orders as T,orders as S where
T.amount > S.amount;
+------+
| o_id |
+------+
|  333 |
|  555 |
|  111 |
|  222 |
+------+
4 rows in set (0.004 sec)

MariaDB [db4]> select ifnull(first_name,'MISSING') as
first,ifnull(last_name,'USER') as last,order_date,amount from customers
right join orders on customers.id=orders.customer_id;
+---------+---------+------------+--------+
| first   | last    | order_date | amount |
+---------+---------+------------+--------+
| George  | Michael | 2014-12-12 | 800.67 |
```

```
| George  | Michael | 2015-01-03 |  12.50 |
| David   | Bowie   | 1999-04-11 | 450.25 |
| MISSING | USER    | 2016-02-10 |  99.99 |
| MISSING | USER    | 2017-11-11 |  35.50 |
+---------+---------+------------+--------+
5 rows in set (0.004 sec)

MariaDB [db4]> --above is QUERY1
MariaDB [db4]>
MariaDB [db4]>
MariaDB [db4]> --QUERY2
MariaDB [db4]> select ifnull(first_name,'MISSING') as
first,ifnull(last_name,'USER) as last,order_date,amount,sum(amount)
from customers right join orders on customers.id=orders.customer_id
group by first_name,last_name;
    '> select ifnull(first_name,'MISSING') as first,ifnull(last_name,'USER) as
last,order_date,amount,sum(amount) from customers right join orders
on customers.id=orders.customer_id group by first_name,last_name;
ERROR 1064 (42000): You have an error in your SQL syntax; check the
manual that corresponds to your MariaDB server version for the right
syntax to use near '') as first,ifnull(last_name,'USER) as
last,order_date,amount,sum(amount) fro...' at line 1
MariaDB [db4]> select ifnull(first_name,'MISSING') as
first,ifnull(last_name,'USER) as last,order_date,amount,sum(amount)
from customers right join orders on customers.id=orders.customer_id
group by first_name,last_name;
    '> select ifnull(first_name,'MISSING') as first,ifnull(last_name,'USER') as
last,order_date
    '> amount
    '> sum(amount)
    '>
    '>
    '>
    '> Bye
Ctrl-C -- exit!
```

```
C:\Program Files\MariaDB 11.4\bin>mysql -u root -p
Enter password: ****
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 4
Server version: 11.4.0-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> use db4;
Database changed
MariaDB [db4]> select ifnull(first_name,'MISSING') as
first,ifnull(last_name,'USER') as last,order_date,amount,sum(amount)
from customers right join orders on customers.id=orders.customer_id
group by first_name,last_name;
+---------+---------+------------+--------+-------------+
| first   | last    | order_date | amount | sum(amount) |
+---------+---------+------------+--------+-------------+
| MISSING | USER    | 2016-02-10 |  99.99 |      135.49 |
| David   | Bowie   | 1999-04-11 | 450.25 |      450.25 |
| George  | Michael | 2014-12-12 | 800.67 |      813.17 |
+---------+---------+------------+--------+-------------+
3 rows in set (0.004 sec)

MariaDB [db4]> select * from customers right join orders on
customers.id=orders.customer_id;
+------+------------+-----------+----------------+------+------------+--------+------------+
| id   | first_name | last_name | email          | o_id | order_date | amount | customer_id |
+------+------------+-----------+----------------+------+------------+--------+------------+
```

2	George	Michael	gm@gmail.com	333	2014-12-12	800.67	2
2	George	Michael	gm@gmail.com	444	2015-01-03	12.50	2
3	David	Bowie	david@gmail.com	555	1999-04-11	450.25	3
NULL	NULL	NULL	NULL	111	2016-02-10	99.99	1
NULL	NULL	NULL	NULL	222	2017-11-11	35.50	1
+------+-----------+----------+----------------+------+-----------+--------+------------+
5 rows in set (0.001 sec)

MariaDB [db4]> Create table students(id int,first_name char(150));
Query OK, 0 rows affected (0.015 sec)

MariaDB [db4]> Create table papers(student_id int, title varchar(150), grade int);
Query OK, 0 rows affected (0.012 sec)

MariaDB [db4]> INSERT INTO students (id,first_name) VALUES
    -> (1,'Caleb'), (2,'Samantha'), (3,'Raj'), (4,'Carlos'), (5,'Lisa');
Query OK, 5 rows affected (0.003 sec)
Records: 5 Duplicates: 0 Warnings: 0

MariaDB [db4]> INSERT INTO papers (student_id, title, grade) VALUES
    -> (1, 'My First Book Report', 60),
    -> (1, 'My Second Book Report', 75),
    -> (2, 'Russian Lit Through The Ages', 94),
    -> (2, 'De Montaigne and The Art of The Essay', 98),
    -> (4, 'Borges and Magical Realism', 89);
Query OK, 5 rows affected (0.003 sec)
Records: 5 Duplicates: 0 Warnings: 0

MariaDB [db4]> select * from students;

```
+------+------------+
| id   | first_name |
+------+------------+
|    1 | Caleb      |
|    2 | Samantha   |
|    3 | Raj        |
|    4 | Carlos     |
|    5 | Lisa       |
+------+------------+
5 rows in set (0.000 sec)

MariaDB [db4]> select * from papers;
+------------+------------------------------------+-------+
| student_id | title                              | grade |
+------------+------------------------------------+-------+
|          1 | My First Book Report               |    60 |
|          1 | My Second Book Report              |    75 |
|          2 | Russian Lit Through The Ages        |    94 |
|          2 | De Montaigne and The Art of The Essay |  98 |
|          4 | Borges and Magical Realism          |    89 |
+------------+------------------------------------+-------+
5 rows in set (0.001 sec)

MariaDB [db4]> select * from students right join papers where
students.id=papers.student_id;
ERROR 1064 (42000): You have an error in your SQL syntax; check the
manual that corresponds to your MariaDB server version for the right
syntax to use near 'where students.id=papers.student_id' at line 1
MariaDB [db4]> select * from students right join papers on
students.id=papers.student_id;
+------+------------+------------+------------------------------------+-------+
| id   | first_name | student_id | title                              | grade |
+------+------------+------------+------------------------------------+-------+
|    1 | Caleb      |          1 | My First Book Report               |    60 |
|    1 | Caleb      |          1 | My Second Book Report              |    75 |
```

```
| 2 | Samantha  |      2 | Russian Lit Through The Ages      |  94 |
| 2 | Samantha  |      2 | De Montaigne and The Art of The Essay |  98 |
| 4 | Carlos    |      4 | Borges and Magical Realism        |  89 |
+------+-----------+------------+------------------------------------+-------+
5 rows in set (0.001 sec)
```

MariaDB [db4]> select first_name from students right join papers on students.id=papers.student_id;

```
+------------+
| first_name |
+------------+
| Caleb      |
| Caleb      |
| Samantha   |
| Samantha   |
| Carlos     |
+------------+
5 rows in set (0.001 sec)
```

MariaDB [db4]> select * from students right join papers on students.id=papers.student_id;

```
+------+-----------+------------+------------------------------------+-------+
| id   | first_name | student_id | title                             | grade |
+------+-----------+------------+------------------------------------+-------+
| 1 | Caleb     |      1 | My First Book Report             |  60 |
| 1 | Caleb     |      1 | My Second Book Report            |  75 |
| 2 | Samantha  |      2 | Russian Lit Through The Ages      |  94 |
| 2 | Samantha  |      2 | De Montaigne and The Art of The Essay |  98 |
| 4 | Carlos    |      4 | Borges and Magical Realism        |  89 |
+------+-----------+------------+------------------------------------+-------+
5 rows in set (0.001 sec)
```

```
MariaDB [db4]> select first_name,ifnull(title,'MISSING')
First,ifnull(grade,0) from students left join papers on
students.id=papers.student_id;
+------------+-------------------------------------+----------------+
| first_name | First                               | ifnull(grade,0) |
+------------+-------------------------------------+----------------+
| Caleb      | My First Book Report                |             60 |
| Caleb      | My Second Book Report               |             75 |
| Samantha   | Russian Lit Through The Ages         |             94 |
| Samantha   | De Montaigne and The Art of The Essay |           98 |
| Carlos     | Borges and Magical Realism           |             89 |
| Raj        | MISSING                             |              0 |
| Lisa       | MISSING                             |              0 |
+------------+-------------------------------------+----------------+
7 rows in set (0.001 sec)

MariaDB [db4]> select first_name, ifnull(avg(grade),0) as average from
students left join papers on students.id=papers.student_id group by
students.first_name order by average desc;
+------------+---------+
| first_name | average |
+------------+---------+
| Samantha   | 96.0000 |
| Carlos     | 89.0000 |
| Caleb      | 67.5000 |
| Lisa       |  0.0000 |
| Raj        |  0.0000 |
+------------+---------+
5 rows in set (0.003 sec)

MariaDB [db4]> --CASE EXPRESSION WITH CLAUSE
MariaDB [db4]> select first_name ,
    -> ifnull(avg(grade),0) as average,
    -> case
    -> when avg(grade) is null then 'FAILING'
```

```
    -> when avg(grade)>=75 then 'PASSING'
    -> else 'FAILING'
    -> end as passing_status
    -> from students
    -> left join papers
    -> on students.id=papers.student_id
    -> group by students.id
    -> order by average desc;
+------------+---------+----------------+
| first_name | average | passing_status |
+------------+---------+----------------+
| Samantha   | 96.0000 | PASSING        |
| Carlos     | 89.0000 | PASSING        |
| Caleb      | 67.5000 | FAILING        |
| Lisa       |  0.0000 | FAILING        |
| Raj        |  0.0000 | FAILING        |
+------------+---------+----------------+
5 rows in set (0.003 sec)

MariaDB [db4]> --Use of Delete Cascade
MariaDB [db4]> --if PK row is deleted then referencing row from FK
table is also deleted
MariaDB [db4]> create table customers(id int auto_increment primary
key,first_name varchar(100),last_name varchar(100),email varchar(100));
ERROR 1050 (42S01): Table 'customers' already exists
MariaDB [db4]> create table cust(id int auto_increment primary
key,first_name varchar(100),last_name varchar(100),email varchar(100));
Query OK, 0 rows affected (0.014 sec)

MariaDB [db4]> create table order(id int auto_increment primary
key,order_date date,amount decimal(8,2),customer_id int,foreign
key(customer_id) references cust(id) on delete cascade);
ERROR 1064 (42000): You have an error in your SQL syntax; check the
manual that corresponds to your MariaDB server version for the right
```

```
syntax to use near 'order(id int auto_increment primary key,order_date
date,amount decimal(8,2),c...' at line 1
MariaDB [db4]> CREATE TABLE orders(
    ->
    ->    id INT AUTO_INCREMENT PRIMARY KEY,
    ->
    ->    order_date DATE,
    ->
    ->    amount DECIMAL(8,2),
    ->
    ->    customer_id INT,
    ->
    ->    FOREIGN KEY(customer_id)
    ->
    ->      REFERENCES cust(id)
    ->
    ->      ON DELETE CASCADE
    ->
    -> );
ERROR 1050 (42S01): Table 'orders' already exists
MariaDB [db4]> create database db56;
Query OK, 1 row affected (0.003 sec)

MariaDB [db4]> use db56;
Database changed
MariaDB [db56]> --DELETE CASCADE
MariaDB [db56]> CREATE TABLE cust(
    ->
    ->    id INT AUTO_INCREMENT PRIMARY KEY,
    ->
    ->    first_name VARCHAR(100),
    ->
    ->    last_name VARCHAR(100),
    ->
    ->    email VARCHAR(100)
```

```
    ->
    -> );
Query OK, 0 rows affected (0.011 sec)

MariaDB [db56]> CREATE TABLE orders(
    ->
    ->    id INT AUTO_INCREMENT PRIMARY KEY,
    ->
    ->    order_date DATE,
    ->
    ->    amount DECIMAL(8,2),
    ->
    ->    customer_id INT,
    ->
    ->    FOREIGN KEY(customer_id)
    ->
    ->       REFERENCES cust(id)
    ->
    ->       ON DELETE CASCADE
    ->
    -> );
Query OK, 0 rows affected (0.015 sec)

MariaDB [db56]> INSERT INTO cust (first_name, last_name, email)
    ->
    -> VALUES ('Boy', 'George', 'george@gmail.com'),
    ->
    ->       ('George', 'Michael', 'gm@gmail.com'),
    ->
    ->       ('David', 'Bowie', 'david@gmail.com'),
    ->
    ->       ('Blue', 'Steele', 'blue@gmail.com'),
    ->
    ->       ('Bette', 'Davis', 'bette@aol.com');
Query OK, 5 rows affected (0.003 sec)
```

Records: 5 Duplicates: 0 Warnings: 0

MariaDB [db56]> INSERT INTO orders (order_date, amount, customer_id)
    ->
    -> VALUES ('2016/02/10', 99.99, 1),
    ->
    ->   ('2017/11/11', 35.50, 1),
    ->
    ->   ('2014/12/12', 800.67, 2),
    ->
    ->   ('2015/01/03', 12.50, 2),
    ->
    ->   ('1999/04/11', 450.25, 5);
Query OK, 5 rows affected (0.003 sec)
Records: 5 Duplicates: 0 Warnings: 0

MariaDB [db56]> select * from cust;
+----+------------+-----------+------------------+
| id | first_name | last_name | email |
+----+------------+-----------+------------------+
1	Boy	George	george@gmail.com
2	George	Michael	gm@gmail.com
3	David	Bowie	david@gmail.com
4	Blue	Steele	blue@gmail.com
5	Bette	Davis	bette@aol.com
+----+------------+-----------+------------------+
5 rows in set (0.000 sec)

MariaDB [db56]> select * from orders;
+----+------------+--------+-------------+
| id | order_date | amount | customer_id |
+----+------------+--------+-------------+
| 1 | 2016-02-10 | 99.99 | 1 |
| 2 | 2017-11-11 | 35.50 | 1 |

```
|  3 | 2014-12-12 | 800.67 |           2 |
|  4 | 2015-01-03 |  12.50 |           2 |
|  5 | 1999-04-11 | 450.25 |           5 |
+----+------------+--------+-------------+
5 rows in set (0.000 sec)

MariaDB [db56]> delete from cust where first_name='Boy';
Query OK, 1 row affected (0.005 sec)

MariaDB [db56]> select * from orders;
+----+------------+--------+-------------+
| id | order_date | amount | customer_id |
+----+------------+--------+-------------+
|  3 | 2014-12-12 | 800.67 |           2 |
|  4 | 2015-01-03 |  12.50 |           2 |
|  5 | 1999-04-11 | 450.25 |           5 |
+----+------------+--------+-------------+
3 rows in set (0.001 sec)

MariaDB [db56]> delete from orders where customer_id=2;
Query OK, 2 rows affected (0.004 sec)

MariaDB [db56]> select * from cust;
+----+------------+-----------+-----------------+
| id | first_name | last_name | email           |
+----+------------+-----------+-----------------+
|  2 | George     | Michael   | gm@gmail.com    |
|  3 | David      | Bowie     | david@gmail.com |
|  4 | Blue       | Steele    | blue@gmail.com  |
|  5 | Bette      | Davis     | bette@aol.com   |
+----+------------+-----------+-----------------+
4 rows in set (0.001 sec)

MariaDB [db56]>
```

CODE SCREENSHOTS :


```
MySQL Client (MariaDB 11.4 (x64)) - "C:\Program Files\MariaDB 11.4\bin\mysql.exe" "--defaults-file=C:\Program Files\MariaDB 11.4\data\my.ini" -uroot -p

Enter password: ****
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 3
Server version: 11.4.0-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CREATE TABLE customers(
    ->     id INT,
    ->     first_name VARCHAR(100),
    ->     last_name VARCHAR(100),
    ->     email VARCHAR(100)
    -> );
ERROR 1046 (3D000): No database selected
MariaDB [(none)]> create database db4;
Query OK, 1 row affected (0.006 sec)

MariaDB [(none)]> use db4;
Database changed
MariaDB [db4]> CREATE TABLE customers(
    ->     id INT,
    ->     first_name VARCHAR(100),
    ->     last_name VARCHAR(100),
    ->     email VARCHAR(100)
    -> );
Query OK, 0 rows affected (0.042 sec)

MariaDB [db4]> CREATE TABLE orders(
    ->     o_id INT,
    ->     order_date DATE,
    ->     amount DECIMAL(8,2),
    ->     customer_id INT
    -> );
Query OK, 0 rows affected (0.015 sec)

MariaDB [db4]> INSERT INTO customers (id,first_name, last_name, email)
    -> VALUES (1,'Boy', 'George', 'george@gmail.com'),
    ->        (2,'George', 'Michael', 'gm@gmail.com'),
```



```
MySQL Client (MariaDB 11.4 (x64)) - "C:\Program Files\MariaDB 11.4\bin\mysql.exe" "--defaults-file=C:\Program Files\MariaDB 11.4\data\my.ini" -uroot -p

+------+------------+-----------+------------------+
5 rows in set (0.001 sec)

MariaDB [db4]> select * from customers;
+------+------------+-----------+------------------+
| id   | first_name | last_name | email            |
+------+------------+-----------+------------------+
|    1 | Boy        | George    | george@gmail.com |
|    2 | George     | Michael   | gm@gmail.com     |
|    3 | David      | Bowie     | david@gmail.com  |
|    4 | Blue       | Steele    | blue@gmail.com   |
|    5 | Bette      | Davis     | bette@aol.com    |
+------+------------+-----------+------------------+
5 rows in set (0.000 sec)

MariaDB [db4]> select * from orders;
+------+------------+--------+-------------+
| o_id | order_date | amount | customer_id |
+------+------------+--------+-------------+
|  111 | 2016-02-10 |  99.99 |           1 |
|  222 | 2017-11-11 |  35.50 |           1 |
|  333 | 2014-12-12 | 800.67 |           2 |
|  444 | 2015-01-03 |  12.50 |           2 |
|  555 | 1999-04-11 | 450.25 |           3 |
+------+------------+--------+-------------+
5 rows in set (0.000 sec)

MariaDB [db4]> select * from customers natural join orders where customers.id = orders.customer_id;
+------+------------+-----------+------------------+------+------------+--------+-------------+
| id   | first_name | last_name | email            | o_id | order_date | amount | customer_id |
+------+------------+-----------+------------------+------+------------+--------+-------------+
|    1 | Boy        | George    | george@gmail.com |  111 | 2016-02-10 |  99.99 |           1 |
|    1 | Boy        | George    | george@gmail.com |  222 | 2017-11-11 |  35.50 |           1 |
|    2 | George     | Michael   | gm@gmail.com     |  333 | 2014-12-12 | 800.67 |           2 |
|    2 | George     | Michael   | gm@gmail.com     |  444 | 2015-01-03 |  12.50 |           2 |
|    3 | David      | Bowie     | david@gmail.com  |  555 | 1999-04-11 | 450.25 |           3 |
+------+------------+-----------+------------------+------+------------+--------+-------------+
5 rows in set (0.001 sec)

MariaDB [db4]>
```

```
|      1 | Boy         | George    | george@gmail.com   | 222  | 2017-11-11 |  35.50 |           1 |
|      2 | George      | Michael   | gm@gmail.com       | 333  | 2014-12-12 | 800.67 |           2 |
|      2 | George      | Michael   | gm@gmail.com       | 444  | 2015-01-03 |  12.50 |           2 |
|      3 | David       | Bowie     | david@gmail.com    | 555  | 1999-04-11 | 450.25 |           3 |
+--------+-------------+-----------+--------------------+------+------------+--------+-------------+
5 rows in set (0.001 sec)

MariaDB [db4]> select * from customers join orders;
+--------+-------------+-----------+--------------------+------+------------+--------+-------------+
| id     | first_name  | last_name | email              | o_id | order_date | amount | customer_id |
+--------+-------------+-----------+--------------------+------+------------+--------+-------------+
|      1 | Boy         | George    | george@gmail.com   | 111  | 2016-02-10 |  99.99 |           1 |
|      2 | George      | Michael   | gm@gmail.com       | 111  | 2016-02-10 |  99.99 |           1 |
|      3 | David       | Bowie     | david@gmail.com    | 111  | 2016-02-10 |  99.99 |           1 |
|      4 | Blue        | Steele    | blue@gmail.com     | 111  | 2016-02-10 |  99.99 |           1 |
|      5 | Bette       | Davis     | bette@aol.com      | 111  | 2016-02-10 |  99.99 |           1 |
|      1 | Boy         | George    | george@gmail.com   | 222  | 2017-11-11 |  35.50 |           1 |
|      2 | George      | Michael   | gm@gmail.com       | 222  | 2017-11-11 |  35.50 |           1 |
|      3 | David       | Bowie     | david@gmail.com    | 222  | 2017-11-11 |  35.50 |           1 |
|      4 | Blue        | Steele    | blue@gmail.com     | 222  | 2017-11-11 |  35.50 |           1 |
|      5 | Bette       | Davis     | bette@aol.com      | 222  | 2017-11-11 |  35.50 |           1 |
|      1 | Boy         | George    | george@gmail.com   | 333  | 2014-12-12 | 800.67 |           2 |
|      2 | George      | Michael   | gm@gmail.com       | 333  | 2014-12-12 | 800.67 |           2 |
|      3 | David       | Bowie     | david@gmail.com    | 333  | 2014-12-12 | 800.67 |           2 |
|      4 | Blue        | Steele    | blue@gmail.com     | 333  | 2014-12-12 | 800.67 |           2 |
|      5 | Bette       | Davis     | bette@aol.com      | 333  | 2014-12-12 | 800.67 |           2 |
|      1 | Boy         | George    | george@gmail.com   | 444  | 2015-01-03 |  12.50 |           2 |
|      2 | George      | Michael   | gm@gmail.com       | 444  | 2015-01-03 |  12.50 |           2 |
|      3 | David       | Bowie     | david@gmail.com    | 444  | 2015-01-03 |  12.50 |           2 |
|      4 | Blue        | Steele    | blue@gmail.com     | 444  | 2015-01-03 |  12.50 |           2 |
|      5 | Bette       | Davis     | bette@aol.com      | 444  | 2015-01-03 |  12.50 |           2 |
|      1 | Boy         | George    | george@gmail.com   | 555  | 1999-04-11 | 450.25 |           3 |
|      2 | George      | Michael   | gm@gmail.com       | 555  | 1999-04-11 | 450.25 |           3 |
|      3 | David       | Bowie     | david@gmail.com    | 555  | 1999-04-11 | 450.25 |           3 |
|      4 | Blue        | Steele    | blue@gmail.com     | 555  | 1999-04-11 | 450.25 |           3 |
|      5 | Bette       | Davis     | bette@aol.com      | 555  | 1999-04-11 | 450.25 |           3 |
+--------+-------------+-----------+--------------------+------+------------+--------+-------------+
25 rows in set (0.001 sec)

MariaDB [db4]>
```

```
+----+------------+--------+-------------+
| id | order_date | amount | customer_id |
+----+------------+--------+-------------+
|  1 | 2016-02-10 |  99.99 |           1 |
|  2 | 2017-11-11 |  35.50 |           1 |
|  3 | 2014-12-12 | 800.67 |           2 |
|  4 | 2015-01-03 |  12.50 |           2 |
|  5 | 1999-04-11 | 450.25 |           5 |
+----+------------+--------+-------------+
5 rows in set (0.000 sec)

MariaDB [db56]> delete from cust where first_name='Boy';
Query OK, 1 row affected (0.005 sec)

MariaDB [db56]> select * from orders;
+----+------------+--------+-------------+
| id | order_date | amount | customer_id |
+----+------------+--------+-------------+
|  3 | 2014-12-12 | 800.67 |           2 |
|  4 | 2015-01-03 |  12.50 |           2 |
|  5 | 1999-04-11 | 450.25 |           5 |
+----+------------+--------+-------------+
3 rows in set (0.001 sec)

MariaDB [db56]> delete from orders where customer_id=2;
Query OK, 2 rows affected (0.004 sec)

MariaDB [db56]> select * from cust;
+----+------------+-----------+------------------+
| id | first_name | last_name | email            |
+----+------------+-----------+------------------+
|  2 | George     | Michael   | gm@gmail.com     |
|  3 | David      | Bowie     | david@gmail.com  |
|  4 | Blue       | Steele    | blue@gmail.com   |
|  5 | Bette      | Davis     | bette@aol.com    |
+----+------------+-----------+------------------+
4 rows in set (0.001 sec)

MariaDB [db56]>
```

CONCLUSION : Hence, we have successfully implemented various Join operations, the function IFNULL and the constraint DELETE CASCADE in SQL.