Apply SQL JOIN

Project description

The management at my organization has asked me to investigate potential security issues and update employee computers as required. As a Linux administrator, I used SQL with filters to perform security-related tasks. But for this scenario, I applied SQL join to play with the values of the two tables. This task is related to relational database management.

Inner Join

I created a SQL query on MariaDB to join two tables focusing on the intersection of two tables, where we only care about rows that have corresponding values in both.

This is the "employees" table.

```
MariaDB [organization]> SELECT * FROM employees;
+-------------+-------------+----------+------------------------+-------------+
| employee_id | device_id   | username | department             | office      |
+-------------+-------------+----------+------------------------+-------------+
|        1000 | a320b137c219 | elarson  | Marketing              | East-170    |
|        1001 | b239c825d303 | bmoreno  | Marketing              | Central-276 |
|        1002 | c116d593e558 | tshah    | Human Resources        | North-434   |
|        1003 | d394e816f943 | sgilmore | Finance                | South-153   |
|        1004 | e218f877g788 | eraab    | Human Resources        | South-127   |
|        1005 | f551g340h864 | gesparza | Human Resources        | South-366   |
|        1006 | g329h357i597 | alevitsk | Information Technology  | East-320    |
|        1007 | h174i497j413 | wjaffrey | Finance                | North-406   |
|        1008 | i858j583k571 | abernard | Finance                | South-170   |
|        1009 | NULL        | lrodriqu | Sales                  | South-134   |
|        1010 | k2421212m542 | jlansky  | Finance                | South-109   |
|        1011 | l748m120n401 | drosas   | Sales                  | South-292   |
|        1012 | m756n668o146 | nmason   | Information Technology  | North-160   |
|        1013 | n205o559p243 | zbernal  | Information Technology  | South-229   |
|        1014 | NULL        | asundara | Information Technology  | West-219    |
|        1015 | p611q262r945 | jsoto    | Finance                | North-271   |
|        1016 | q793r736s288 | sbaelish | Human Resources        | North-229   |
|        1017 | r550s824t230 | jclark   | Finance                | North-188   |
|        1018 | s310t540u653 | abellmas | Finance                | North-403   |
|        1019 | t815u205v470 | mcouliba | Information Technology  | North-108   |
|        1020 | u899v381w363 | arutley  | Marketing              | South-351   |
|        1021 | v200w121x977 | smartell | Information Technology  | South-138   |
|        1022 | w237x430y567 | arusso   | Finance                | West-465    |
|        1023 | x253y759z103 | aalonso  | Information Technology  | West-393    |
|        1024 | y976z753a267 | iuduike  | Sales                  | South-215   |
|        1025 | z381a365b233 | jhill    | Sales                  | North-115   |
|        1026 | a998b568c863 | apatel   | Human Resources        | West-320    |
|        1027 | b806c503d354 | mrah     | Marketing              | West-246    |
|        1028 | c603d749e374 | aestrada | Human Resources        | West-121    |
|        1029 | d336e475f676 | ivelasco | Finance                | East-156    |
|        1030 | e391f189g913 | mabadi   | Marketing              | West-375    |
|        1031 | f419g188h578 | dkot     | Marketing              | West-408    |
|        1032 | g773h303i639 | jrafael  | Information Technology  | Central-309 |
|        1033 | NULL        | yappiah  | Information Technology  | West-387    |
|        1034 | i679j565k940 | bsand    | Human Resources        | East-484    |
|        1035 | j236k3031245 | bisles   | Sales                  | South-171   |
```

This is the "machines" table.

```
MariaDB [organization]> SELECT * FROM machines;
+--------------+------------------+---------------+---------------+-------------+
| device_id    | operating_system | email_client  | OS_patch_date | employee_id |
+--------------+------------------+---------------+---------------+-------------+
| a184b775c707 | OS 1             | Email Client 1| 2021-09-01    |        1156 |
| a192b174c940 | OS 2             | Email Client 1| 2021-06-01    |        1052 |
| a305b818c708 | OS 3             | Email Client 2| 2021-06-01    |        1182 |
| a317b635c465 | OS 1             | Email Client 2| 2021-03-01    |        1130 |
| a320b137c219 | OS 2             | Email Client 2| 2021-03-01    |        1000 |
| a398b471c573 | OS 3             | Email Client 2| 2021-12-01    |           0 |
| a667b270c984 | OS 1             | Email Client 1| 2021-03-01    |        1078 |
| a821b452c176 | OS 2             | Email Client 2| 2021-12-01    |        1104 |
| a998b568c863 | OS 3             | Email Client 1| 2021-12-01    |        1026 |
| b157c491d493 | OS 2             | Email Client 1| 2021-03-01    |           0 |
| b239c825d303 | OS 1             | Email Client 1| 2021-03-01    |        1001 |
| b264c773d977 | OS 2             | Email Client 2| 2021-03-01    |        1157 |
| b265c937d713 | OS 2             | Email Client 1| 2021-09-01    |        1131 |
| b433c245d868 | OS 1             | Email Client 1| 2021-06-01    |        1079 |
| b551c837d758 | OS 3             | Email Client 1| 2021-03-01    |        1105 |
| b566c710d544 | OS 1             | Email Client 1| 2021-06-01    |        1183 |
| b806c503d354 | OS 2             | Email Client 1| 2021-12-01    |        1027 |
| b979c871d361 | OS 2             | Email Client 1| 2021-03-01    |        1053 |
| c116d593e558 | OS 3             | Email Client 1| 2021-09-01    |        1002 |
| c150d982e144 | OS 2             | Email Client 2| 2021-06-01    |        1132 |
| c185d679e493 | OS 1             | Email Client 2| 2021-09-01    |           0 |
| c406d877e950 | OS 2             | Email Client 1| 2021-06-01    |        1158 |
| c547d140e477 | OS 2             | Email Client 1| 2021-03-01    |        1054 |
| c568d742e974 | OS 2             | Email Client 2| 2021-09-01    |        1080 |
| c597d792e215 | OS 2             | Email Client 1| 2021-09-01    |        1106 |
| c603d749e374 | OS 1             | Email Client 1| 2021-12-01    |        1028 |
| c986d200e170 | OS 2             | Email Client 2| 2021-09-01    |        1184 |
| d168e758f876 | OS 2             | Email Client 1| 2021-09-01    |        1107 |
| d280e557f635 | OS 3             | Email Client 1| 2021-03-01    |           0 |
| d336e475f676 | OS 2             | Email Client 2| 2021-06-01    |        1029 |
| d394e816f943 | OS 3             | Email Client 2| 2021-03-01    |        1003 |
| d647e310f618 | OS 2             | Email Client 2| 2021-06-01    |        1081 |
| d693e351f221 | OS 2             | Email Client 2| 2021-09-01    |        1133 |
| d790e839f461 | OS 1             | Email Client 1| 2021-06-01    |        1185 |
| d831e972f553 | OS 1             | Email Client 1| 2021-09-01    |        1055 |
| d881e710f732 | OS 3             | Email Client 2| 2021-03-01    |        1159 |
| e113f288g203 | OS 2             | Email Client 2| 2021-03-01    |        1108 |
```

This is the query that produces username, operating system, and employee ID from both tables. The username is from one of the tables and so is the operating system. For the table that can be found on both, we use "table.column" format to avoid ambiguity. In this case it is the employee table (employee ID). As the result goes, there are 185 usernames with respective operating systems and device IDs. Other variations can be found in the next pages of Inner Join.

```
MariaDB [organization]> SELECT username, operating_system, employees.device_id
    ->
    ->
    ->
    -> FROM  employees
    ->
    ->
    ->
    -> INNER JOIN machines ON employees.device_id = machines.device_id;
+----------+------------------+--------------+
| username | operating_system | device_id    |
+----------+------------------+--------------+
| elarson  | OS 2             | a320b137c219 |
| bmoreno  | OS 1             | b239c825d303 |
| tshah    | OS 3             | c116d593e558 |
| sgilmore | OS 3             | d394e816f943 |
| eraab    | OS 2             | e218f877g788 |
| gesparza | OS 3             | f551g340h864 |
| alevitsk | OS 1             | g329h357i597 |
| wjaffrey | OS 2             | h174i497j413 |
| abernard | OS 2             | i858j583k571 |
| jlansky  | OS 1             | k2421212m542 |
| drosas   | OS 3             | l748m120n401 |
| nmason   | OS 1             | m756n668o146 |
| zbernal  | OS 1             | n205o559p243 |
| jsoto    | OS 1             | p611q262r945 |
| sbaelish | OS 2             | q793r736s288 |
| jclark   | OS 2             | r550s824t230 |
| abellmas | OS 1             | s310t540u653 |
| mcouliba | OS 3             | t815u205v470 |
| arutley  | OS 3             | u899v381w363 |
| smartell | OS 2             | v200w121x977 |
| arusso   | OS 2             | w237x430y567 |
| aalonso  | OS 1             | x253y759z103 |
```

```
| iquraish | OS 1             | b566c710d544 |
| ptsosie  | OS 2             | c986d200e170 |
| revens   | OS 1             | d790e839f461 |
| sacosta  | OS 1             | e281f433g404 |
| bbode    | OS 1             | f963g637h851 |
| noshiro  | OS 1             | g164h566i795 |
| slefkowi | OS 3             | h784i120j837 |
| rlaghari | OS 3             | k570l183m949 |
| esantiag | OS 1             | l186m618n319 |
| zwarren  | OS 2             | m340n287o441 |
| orainier | OS 1             | n516o853p957 |
| sshah2   | OS 3             | o225p357q829 |
| aabara   | OS 2             | p791q114r509 |
| jmartine | OS 3             | q308r573s459 |
| areyes   | OS 2             | r520s571t459 |
+----------+------------------+--------------+
185 rows in set (0.001 sec)
```
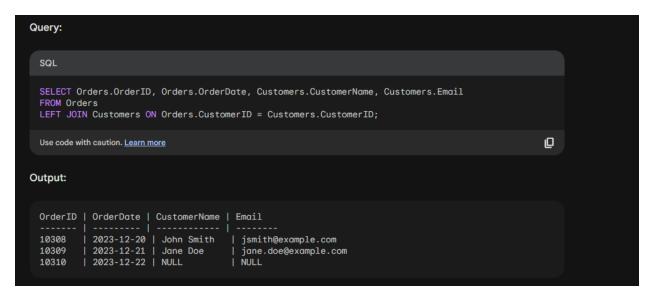
This query will produce username, employee ID, operating system, device ID and their respective office.

```
MariaDB [organization]> SELECT username, employees.employee_id, operating_system, employees.device_id,
ice FROM employees INNER JOIN machines ON employees.device_id = machines.device_id;
+-----------+-------------+------------------+--------------+----------------+--------------+
| username  | employee_id | operating_system | device_id    | email_client   | office       |
+-----------+-------------+------------------+--------------+----------------+--------------+
| elarson   |        1000 | OS 2             | a320b137c219 | Email Client 2 | East-170     |
| bmoreno   |        1001 | OS 1             | b239c825d303 | Email Client 1 | Central-276  |
| tshah     |        1002 | OS 3             | c116d593e558 | Email Client 1 | North-434    |
| sgilmore  |        1003 | OS 3             | d394e816f943 | Email Client 2 | South-153    |
| eraab     |        1004 | OS 2             | e218f877g788 | Email Client 1 | South-127    |
| gesparza  |        1005 | OS 3             | f551g340h864 | Email Client 2 | South-366    |
| alevitsk  |        1006 | OS 1             | g329h357i597 | Email Client 2 | East-320     |
| wjaffrey  |        1007 | OS 2             | h174i497j413 | Email Client 1 | North-406    |
| abernard  |        1008 | OS 2             | i858j583k571 | Email Client 2 | South-170    |
| jlansky   |        1010 | OS 1             | k2421212m542 | Email Client 1 | South-109    |
| drosas    |        1011 | OS 3             | l748m120n401 | Email Client 1 | South-292    |
| nmason    |        1012 | OS 1             | m756n668o146 | Email Client 2 | North-160    |
| sbernal   |        1013 | OS 1             | n205o559p243 | Email Client 2 | South-229    |
| jsoto     |        1015 | OS 1             | p611q262r945 | Email Client 2 | North-271    |
| sbaelish  |        1016 | OS 2             | q793r736s288 | Email Client 1 | North-229    |
| jclark    |        1017 | OS 2             | r550s824t230 | Email Client 1 | North-188    |
| abellmas  |        1018 | OS 1             | s310t540u653 | Email Client 2 | North-403    |
| mcouliba  |        1019 | OS 3             | t815u205v470 | Email Client 1 | North-108    |
| arutley   |        1020 | OS 3             | u899v381w363 | Email Client 1 | South-351    |
| smartell  |        1021 | OS 2             | v200w121x977 | Email Client 2 | South-138    |
| arusso    |        1022 | OS 2             | w237x430y567 | Email Client 2 | West-465     |
| aalonso   |        1023 | OS 1             | x253y759z103 | Email Client 2 | West-393     |
| iuduike   |        1024 | OS 2             | y976z753a267 | Email Client 2 | South-215    |
| jhill     |        1025 | OS 3             | z381a365b233 | Email Client 2 | North-115    |
| apatel    |        1026 | OS 3             | a998b568c863 | Email Client 1 | West-320     |
| mrah      |        1027 | OS 2             | b806c503d354 | Email Client 1 | West-246     |
| aestrada  |        1028 | OS 1             | c603d749e374 | Email Client 1 | West-121     |
| ivelasco  |        1029 | OS 2             | d336e475f676 | Email Client 2 | East-156     |
| mabadi    |        1030 | OS 3             | e391f189g913 | Email Client 2 | West-375     |
| dkot      |        1031 | OS 1             | f419g188h578 | Email Client 1 | West-408     |
| jrafael   |        1032 | OS 2             | g773h303i639 | Email Client 2 | Central-309  |
| bsand     |        1034 | OS 1             | i679j565k940 | Email Client 1 | East-484     |
| bisles    |        1035 | OS 1             | j236k3031245 | Email Client 1 | South-171    |
| rjensen   |        1036 | OS 3             | k5501533m205 | Email Client 2 | Central-239  |
| dtanaka   |        1037 | OS 3             | l693m585n528 | Email Client 1 | West-468     |
| btang     |        1038 | OS 1             | m873n636o225 | Email Client 2 | Central-260  |
| cjackson  |        1039 | OS 1             | n253o917p623 | Email Client 2 | East-378     |
| dtarlu    |        1040 | OS 2             | o783p832q394 | Email Client 2 | East-337     |
```

```
| aezra     |    1177 | OS 1 |    | v691w183x928 | Email Client 2 | East-190    |
| nlannist  |    1178 | OS 3 |    | w986x187y885 | Email Client 2 | North-196   |
| asalas    |    1179 | OS 1 |    | x174y934z376 | Email Client 2 | North-445   |
| medwards  |    1180 | OS 2 |    | y131z211a578 | Email Client 1 | Central-340 |
| sessa     |    1181 | OS 1 |    | z803a233b718 | Email Client 2 | South-207   |
| mmora     |    1182 | OS 3 |    | a305b818c708 | Email Client 2 | Central-250 |
| lquraish  |    1183 | OS 1 |    | b566c710d544 | Email Client 1 | East-400    |
| ptsosie   |    1184 | OS 2 |    | c986d200e170 | Email Client 2 | Central-247 |
| revens    |    1185 | OS 1 |    | d790e839f461 | Email Client 1 | North-330   |
| sacosta   |    1186 | OS 1 |    | e281f433g404 | Email Client 2 | North-460   |
| bbode     |    1187 | OS 1 |    | f963g637h851 | Email Client 1 | East-351    |
| noshiro   |    1188 | OS 1 |    | g164h566i795 | Email Client 1 | West-252    |
| slefkowi  |    1189 | OS 3 |    | h784i120j837 | Email Client 2 | West-342    |
| rlaghari  |    1192 | OS 3 |    | k5701183m949 | Email Client 1 | East-138    |
| esantiag  |    1193 | OS 1 |    | 1186m618n319 | Email Client 2 | Central-300 |
| zwarren   |    1194 | OS 2 |    | m340n287o441 | Email Client 2 | West-212    |
| orainier  |    1195 | OS 1 |    | n516o853p957 | Email Client 1 | East-346    |
| sshah2    |    1196 | OS 3 |    | o225p357q829 | Email Client 1 | South-385   |
| aabara    |    1197 | OS 2 |    | p791q114r509 | Email Client 1 | North-159   |
| jmartine  |    1198 | OS 3 |    | q308r573s459 | Email Client 1 | South-117   |
| areyes    |    1199 | OS 2 |    | r520s571t459 | Email Client 2 | East-100    |
+-----------+---------+------+----+--------------+----------------+-------------+
185 rows in set (0.001 sec)
```

Left Join

Scenario: An online store wants to generate a report of all orders placed, along with customer details if available, but also including those without associated customer accounts.

Example 1:

Orders Table:

```
OrderID | CustomerID | OrderDate  | OtherOrderDetails
------- | ---------- | --------   | -----------------
10308   | 1          | 2023-12-20 | ...
10309   | 2          | 2023-12-21 | ...
10310   | NULL       | 2023-12-22 | ...
```

Customers Table:

```
CustomerID | CustomerName | Email              | OtherCustomerDetails
---------- | ------------ | --------           | --------------------
1          | John Smith   | jsmith@example.com | ...
2          | Jane Doe     | jane.doe@example.com | ...
```

Query:

```sql
SELECT Orders.OrderID, Orders.OrderDate, Customers.CustomerName, Customers.Email
FROM Orders
LEFT JOIN Customers ON Orders.CustomerID = Customers.CustomerID;
```

Use code with caution. Learn more

Output:

```
OrderID | OrderDate  | CustomerName | Email
------- | ---------- | ------------ | --------
10308   | 2023-12-20 | John Smith   | jsmith@example.com
10309   | 2023-12-21 | Jane Doe     | jane.doe@example.com
10310   | 2023-12-22 | NULL         | NULL
```

Left Join will return all rows from the left table (Orders) even if there's no match in the right table (Customers). For the values that can not be found, it will be shown as NULL.

Right Join

Scenario: A music streaming service wants to identify customers who haven't listened to any songs in the past week, along with their subscription details.

Example 2:

Customers Table:

```
CustomerID | SubscriptionType | OtherCustomerDetails
---------- | ---------------- | --------------------
456        | Premium          | ...
789        | Free             | ...
```

SongsPlayed Table:

```
CustomerID | SongID | PlayDate   | OtherSongDetails
---------- | ------ | ---------- | ----------------
456        | 12345  | 2023-12-25 | ...
```

Query:

```sql
SELECT Customers.CustomerID, Customers.SubscriptionType, SongsPlayed.SongID, SongsPlayed.PlayDate
FROM Customers
RIGHT JOIN SongsPlayed ON Customers.CustomerID = SongsPlayed.CustomerID
WHERE SongsPlayed.PlayDate >= DATE_SUB(CURDATE(), INTERVAL 7 DAY);
```

Use code with caution. Learn more

Output:

```
CustomerID | SubscriptionType | SongID | PlayDate
---------- | ---------------- | ------ | --------
456        | Premium          | 12345  | 2023-12-25
789        | Free             | NULL   | NULL
```

Right Join will return all rows from the Right table (SongsPlayed) even if there's no match in the left table (Customers). For the values that can not be found, it will be shown as NULL.

Summary

I wrote queries to join two tables in three different scenarios: Inner Join, Left Join, and Right Join.