Task 1. Match employees to their machines

First, you must identify which employees are using which machines. The data is located in the `machines` and `employees` tables.

You must use a SQL inner join to return the records you need based on a connecting column. In the scenario, both tables include the `device_id` column, which you'll use to perform the join.

1. Run the following query to retrieve all records from the `machines` table:

```
SELECT *
FROM machines;
```

```
MariaDB [organization]> clear
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 |
```

You'll note that this query is not sufficient to perform the join and retrieve the information you need.

2. Complete the query to perform an inner join between the `machines` and `employees` tables on the `device_id` column. Replace `X` and `Y` with this column name:

Note: *Placing the `employees` table after `INNER JOIN` makes it the right table.*

To complete a join you need to link the joined tables on a common column. In the case of the `employees` and `machines` tables, the `device_id` column is common.

The correct query to solve this step:

```
SELECT *
FROM machines
INNER JOIN employees ON machines.device_id = employees.device_id;
```

```
MariaDB [organization]> SELECT *
    ->
    -> FROM machines
    ->
    -> INNER JOIN employees ON machines.device_id = employees.device_id;
+--------------+------------------+----------------+---------------+------------+--
----------+-------------+----------+-----------------------+-------------+
| device_id    | operating_system | email_client   | OS_patch_date | employee_id | e
mployee_id | device_id    | username | department            | office      |
+--------------+------------------+----------------+---------------+------------+--
----------+-------------+----------+-----------------------+-------------+
| a320b137c219 | OS 2             | Email Client 2 | 2021-03-01    |        1000 |
      1000 | a320b137c219 | elarson  | Marketing             | East-170    |
| b239c825d303 | OS 1             | Email Client 1 | 2021-03-01    |        1001 |
      1001 | b239c825d303 | bmoreno  | Marketing             | Central-276 |
| c116d593e558 | OS 3             | Email Client 1 | 2021-09-01    |        1002 |
      1002 | c116d593e558 | tshah    | Human Resources       | North-434   |
| d394e816f943 | OS 3             | Email Client 2 | 2021-03-01    |        1003 |
      1003 | d394e816f943 | sgilmore | Finance               | South-153   |
| e218f877g788 | OS 2             | Email Client 1 | 2021-09-01    |        1004 |
      1004 | e218f877g788 | eraab    | Human Resources       | South-127   |
| f551g340h864 | OS 3             | Email Client 2 | 2021-12-01    |        1005 |
      1005 | f551g340h864 | gesparza | Human Resources       | South-366   |
| g329h357i597 | OS 1             | Email Client 2 | 2021-06-01    |        1006 |
      1006 | g329h357i597 | alevitsk | Information Technology | East-320    |
| h174i497j413 | OS 2             | Email Client 1 | 2021-03-01    |        1007 |
      1007 | h174i497j413 | wjaffrey | Finance               | North-406   |
| i858j583k571 | OS 2             | Email Client 2 | 2021-06-01    |        1008 |
      1008 | i858j583k571 | abernard | Finance               | South-170   |
| k2421212m542 | OS 1             | Email Client 1 | 2021-03-01    |        1010 |
      1010 | k2421212m542 | jlansky  | Finance               | South-109   |
| l748m120n401 | OS 3             | Email Client 1 | 2021-09-01    |        1011 |
```

Note: *If the output of the query is too wide for your shell, press the* ***Open Linux Console*** *button described in the Lab features section to open a full-screen view of the Bash shell, where you can re-enter the query*

Task 2. Return more data

You now must return the information on all machines and the employees who have machines. Next, you must do the reverse and retrieve the information of all employees and any machines that are assigned to them.

To achieve this, you'll complete a left join and a right join on the `employees` and `machines` tables. The results will include all records from one or the other table. You must link these tables using the common `device_id` column.

1. Run the following SQL query to connect the `machines` and `employees` tables through a left join. You must replace the keyword `X` in the query:

The correct query to solve this step:

```
SELECT *
FROM machines
LEFT JOIN employees ON machines.device_id = employees.device_id;
```

```
MariaDB [organization]> SELECT *
    ->
    -> FROM machines
    ->
    -> INNER JOIN employees ON machines.device_id = employees.device_id;
+--------------+------------------+----------------+---------------+-------------+--
----------+-------------+----------+-----------------------+-------------+
| device_id    | operating_system | email_client   | OS_patch_date | employee_id | e
mployee_id | device_id    | username | department            | office      |
+--------------+------------------+----------------+---------------+-------------+--
----------+-------------+----------+-----------------------+-------------+
| a320b137c219 | OS 2             | Email Client 2 | 2021-03-01    |        1000 |
      1000 | a320b137c219 | elarson  | Marketing             | East-170    |
| b239c825d303 | OS 1             | Email Client 1 | 2021-03-01    |        1001 |
      1001 | b239c825d303 | bmoreno  | Marketing             | Central-276 |
| c116d593e558 | OS 3             | Email Client 1 | 2021-09-01    |        1002 |
      1002 | c116d593e558 | tshah    | Human Resources       | North-434   |
| d394e816f943 | OS 3             | Email Client 2 | 2021-03-01    |        1003 |
      1003 | d394e816f943 | sgilmore | Finance               | South-153   |
| e218f877g788 | OS 2             | Email Client 1 | 2021-09-01    |        1004 |
      1004 | e218f877g788 | eraab    | Human Resources       | South-127   |
| f551g340h864 | OS 3             | Email Client 2 | 2021-12-01    |        1005 |
      1005 | f551g340h864 | gesparza | Human Resources       | South-366   |
| g329h357i597 | OS 1             | Email Client 2 | 2021-06-01    |        1006 |
      1006 | g329h357i597 | alevitsk | Information Technology | East-320    |
| h174i497j413 | OS 2             | Email Client 1 | 2021-03-01    |        1007 |
      1007 | h174i497j413 | wjaffrey | Finance               | North-406   |
| i858j583k571 | OS 2             | Email Client 2 | 2021-06-01    |        1008 |
      1008 | i858j583k571 | abernard | Finance               | South-170   |
| k242l212m542 | OS 1             | Email Client 1 | 2021-03-01    |        1010 |
      1010 | k242l212m542 | jlansky  | Finance               | South-109   |
| l748m120n401 | OS 3             | Email Client 1 | 2021-09-01    |        1011 |
```

Note: *In a left join, all records from the table referenced after* `FROM` *and before* `LEFT JOIN` *are included in the result. In this case, all records from the* `machines` *table are included, regardless of whether they are assigned to an employee or not.*

2. Run the following SQL query to connect the `machines` and `employees` tables through a right join. You must replace the keyword `X` in the query to solve the problem:

Note: *In a right join, all records from the table referenced after* `RIGHT JOIN` *are included in the result. In this case, all records from the* `employees` *table are included, regardless of whether they have a machine or not.*

The correct query to solve this step:

```
SELECT *
FROM machines
RIGHT JOIN employees ON machines.device_id = employees.device_id;
```

```
MariaDB [organization]> SELECT *
    ->
    -> FROM machines
    ->
    -> RIGHT JOIN employees ON machines.device_id = employees.device_id;
+--------------+-----------------+---------------+--------------+-------------+--
----------+-------------+----------+----------------------+-------------+
| device_id    | operating_system | email_client   | OS_patch_date | employee_id | e
mployee_id | device_id    | username | department           | office      |
+--------------+-----------------+---------------+--------------+-------------+--
----------+-------------+----------+----------------------+-------------+
| a320b137c219 | OS 2            | Email Client 2 | 2021-03-01    |        1000 |
      1000 | a320b137c219 | elarson  | Marketing            | East-170    |
| b239c825d303 | OS 1            | Email Client 1 | 2021-03-01    |        1001 |
      1001 | b239c825d303 | bmoreno  | Marketing            | Central-276 |
| c116d593e558 | OS 3            | Email Client 1 | 2021-09-01    |        1002 |
      1002 | c116d593e558 | tshah    | Human Resources      | North-434   |
| d394e816f943 | OS 3            | Email Client 2 | 2021-03-01    |        1003 |
      1003 | d394e816f943 | sgilmore | Finance              | South-153   |
| e218f877g788 | OS 2            | Email Client 1 | 2021-09-01    |        1004 |
      1004 | e218f877g788 | eraab    | Human Resources      | South-127   |
| f551g340h864 | OS 3            | Email Client 2 | 2021-12-01    |        1005 |
      1005 | f551g340h864 | gesparza | Human Resources      | South-366   |
| g329h357i597 | OS 1            | Email Client 2 | 2021-06-01    |        1006 |
      1006 | g329h357i597 | alevitsk | Information Technology | East-320    |
| h174i497j413 | OS 2            | Email Client 1 | 2021-03-01    |        1007 |
      1007 | h174i497j413 | wjaffrey | Finance              | North-406   |
| i858j583k571 | OS 2            | Email Client 2 | 2021-06-01    |        1008 |
      1008 | i858j583k571 | abernard | Finance              | South-170   |
| NULL         | NULL            | NULL           | NULL          |        NULL |
      1009 | NULL         | lrodriqu | Sales                | South-134   |
| k2421212m542 | OS 1            | Email Client 1 | 2021-03-01    |        1010 |
```

Task 3. Retrieve login attempt data

To continue investigating the security incident, you must retrieve the information on all employees who have made login attempts. To achieve this, you'll perform an inner join on the `employees` and `log_in_attempts` tables, linking them on the common `username` column.

- Run the following SQL query to perform an inner join on the `employees` and `log_in_attempts` tables. Replace `X` with the name of the right table. Then replace `Y` and `Z` with the name of the column that connects the two tables:

Note: *You must specify the table name with the column name (table.column) when joining the tables.*

The correct query to solve this step:

```
SELECT *

FROM employees

INNER JOIN log_in_attempts ON employees.username =
log_in_attempts.username;
```

```
MariaDB [organization]> SELECT *
    ->
    -> FROM employees
    ->
    -> INNER JOIN log_in_attempts ON employees.username = log_in_attempts.username;
+-------------+-------------+----------+-----------------------+------------+----
------+----------+------------+------------+---------+----------------+---------+
| employee_id | device_id     | username | department            | office       | eve
nt_id | username | login_date | login_time | country | ip_address       | success |
+-------------+-------------+----------+-----------------------+------------+----
------+----------+------------+------------+---------+----------------+---------+
|        1032 | g773h303i639 | jrafael  | Information Technology | Central-309 |
    1 | jrafael  | 2022-05-09 | 04:56:27   | CAN     | 192.168.243.140 |       0 |
|        1026 | a998b568c863 | apatel   | Human Resources        | West-320    |
    2 | apatel   | 2022-05-10 | 20:27:27   | CAN     | 192.168.205.12  |       0 |
|        1031 | f419g188h578 | dkot     | Marketing              | West-408    |
    3 | dkot     | 2022-05-09 | 06:47:41   | USA     | 192.168.151.162 |       0 |
|        1031 | f419g188h578 | dkot     | Marketing              | West-408    |
    4 | dkot     | 2022-05-08 | 02:00:39   | USA     | 192.168.178.71  |       0 |
|        1032 | g773h303i639 | jrafael  | Information Technology | Central-309 |
    5 | jrafael  | 2022-05-11 | 03:05:59   | CANADA  | 192.168.86.232  |       0 |
|        1020 | u899v381w363 | arutley  | Marketing              | South-351   |
    6 | arutley  | 2022-05-12 | 17:00:59   | MEXICO  | 192.168.3.24    |       0 |
|        1004 | e218f877g788 | eraab    | Human Resources        | South-127   |
    7 | eraab    | 2022-05-11 | 01:45:14   | CAN     | 192.168.170.243 |       0 |
|        1035 | j236k3031245 | bisles   | Sales                  | South-171   |
    8 | bisles   | 2022-05-08 | 01:30:17   | US      | 192.168.119.173 |       0 |
|        1033 | NULL         | yappiah  | Information Technology | West-387    |
    9 | yappiah  | 2022-05-11 | 13:47:29   | MEX     | 192.168.59.136  |       0 |
|        1032 | g773h303i639 | jrafael  | Information Technology | Central-309 |
   10 | jrafael  | 2022-05-12 | 09:33:19   | CANADA  | 192.168.228.221 |       0 |
|        1003 | d394e816f943 | sgilmore | Finance                | South-153   |
   11 | sgilmore | 2022-05-11 | 10:16:29   | CANADA  | 192.168.140.81  |       0 |
```