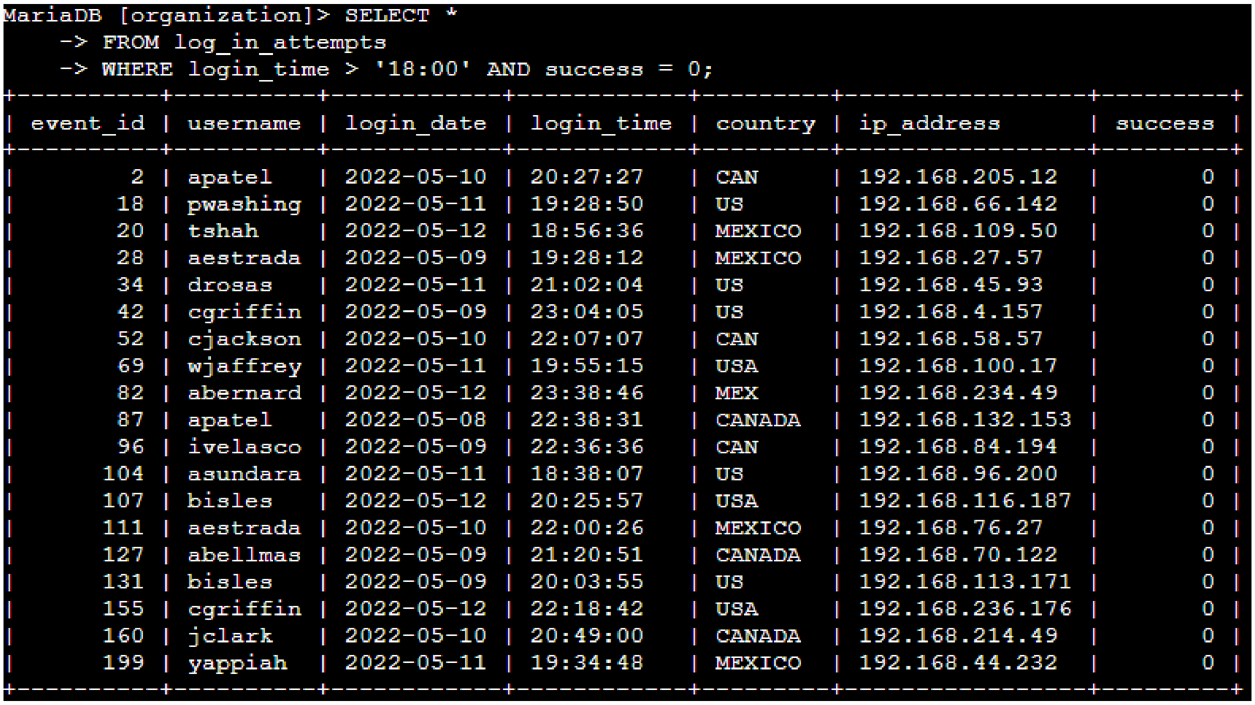
Apply filters to SQL queries

Project description

As a part of the security team, I need to investigate potential security incidents and prepare for security updates to machines. I use SQL queries to quickly gather information about suspicious login attempts and gather information about employee machines.

Retrieve after hours failed login attempts

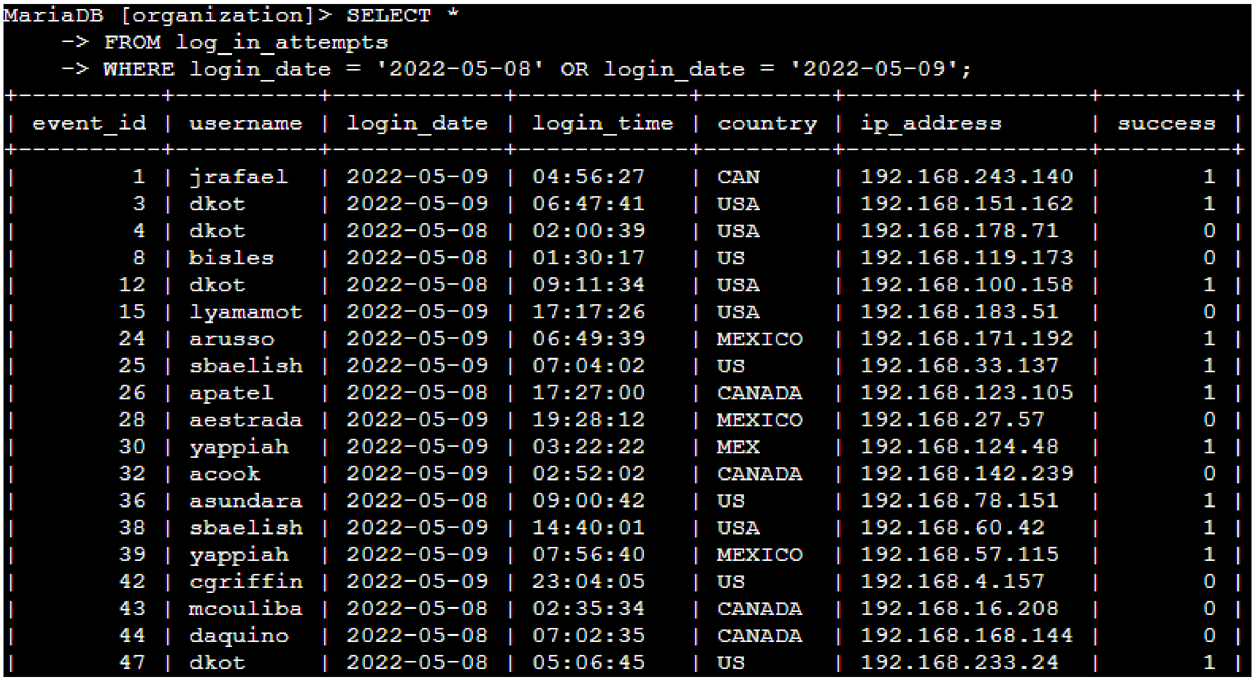
I am investigating a recent potential security incident that happened after business hours. In order to do this, I need to review the log of failed login attempts that occurred after 18:00 by querying the `log_in_attempts` table. The query in the image below returns all columns from the `log_in_attempts` table and filters the results. The keyword `WHERE` is used to filter the results by the conditions specified and the `AND` operator specifies that both of the conditions must be met simultaneously. The two conditions in this case are `login_time > '18:00'`, which indicates that the value in the `login_time` column should be a time later than 18:00, and `success = 0`, which indicates that the value in the success column should be 0–representing the Boolean value `FALSE`. Dates and times must be written in quotation marks, but numerical values do not need to be.



```
MariaDB [organization]> SELECT *
    -> FROM log_in_attempts
    -> WHERE login_time > '18:00' AND success = 0;
+----------+----------+------------+------------+---------+-----------------+---------+
| event_id | username | login_date | login_time | country | ip_address      | success |
+----------+----------+------------+------------+---------+-----------------+---------+
|        2 | apatel   | 2022-05-10 | 20:27:27   | CAN     | 192.168.205.12  |       0 |
|       18 | pwashing | 2022-05-11 | 19:28:50   | US      | 192.168.66.142  |       0 |
|       20 | tshah    | 2022-05-12 | 18:56:36   | MEXICO  | 192.168.109.50  |       0 |
|       28 | aestrada | 2022-05-09 | 19:28:12   | MEXICO  | 192.168.27.57   |       0 |
|       34 | drosas   | 2022-05-11 | 21:02:04   | US      | 192.168.45.93   |       0 |
|       42 | cgriffin | 2022-05-09 | 23:04:05   | US      | 192.168.4.157   |       0 |
|       52 | cjackson | 2022-05-10 | 22:07:07   | CAN     | 192.168.58.57   |       0 |
|       69 | wjaffrey | 2022-05-11 | 19:55:15   | USA     | 192.168.100.17  |       0 |
|       82 | abernard | 2022-05-12 | 23:38:46   | MEX     | 192.168.234.49  |       0 |
|       87 | apatel   | 2022-05-08 | 22:38:31   | CANADA  | 192.168.132.153 |       0 |
|       96 | ivelasco | 2022-05-09 | 22:36:36   | CAN     | 192.168.84.194  |       0 |
|      104 | asundara | 2022-05-11 | 18:38:07   | US      | 192.168.96.200  |       0 |
|      107 | bisles   | 2022-05-12 | 20:25:57   | USA     | 192.168.116.187 |       0 |
|      111 | aestrada | 2022-05-10 | 22:00:26   | MEXICO  | 192.168.76.27   |       0 |
|      127 | abellmas | 2022-05-09 | 21:20:51   | CANADA  | 192.168.70.122  |       0 |
|      131 | bisles   | 2022-05-09 | 20:03:55   | US      | 192.168.113.171 |       0 |
|      155 | cgriffin | 2022-05-12 | 22:18:42   | USA     | 192.168.236.176 |       0 |
|      160 | jclark   | 2022-05-10 | 20:49:00   | CANADA  | 192.168.214.49  |       0 |
|      199 | yappiah  | 2022-05-11 | 19:34:48   | MEXICO  | 192.168.44.232  |       0 |
+----------+----------+------------+------------+---------+-----------------+---------+
```

Retrieve login attempts on specific dates

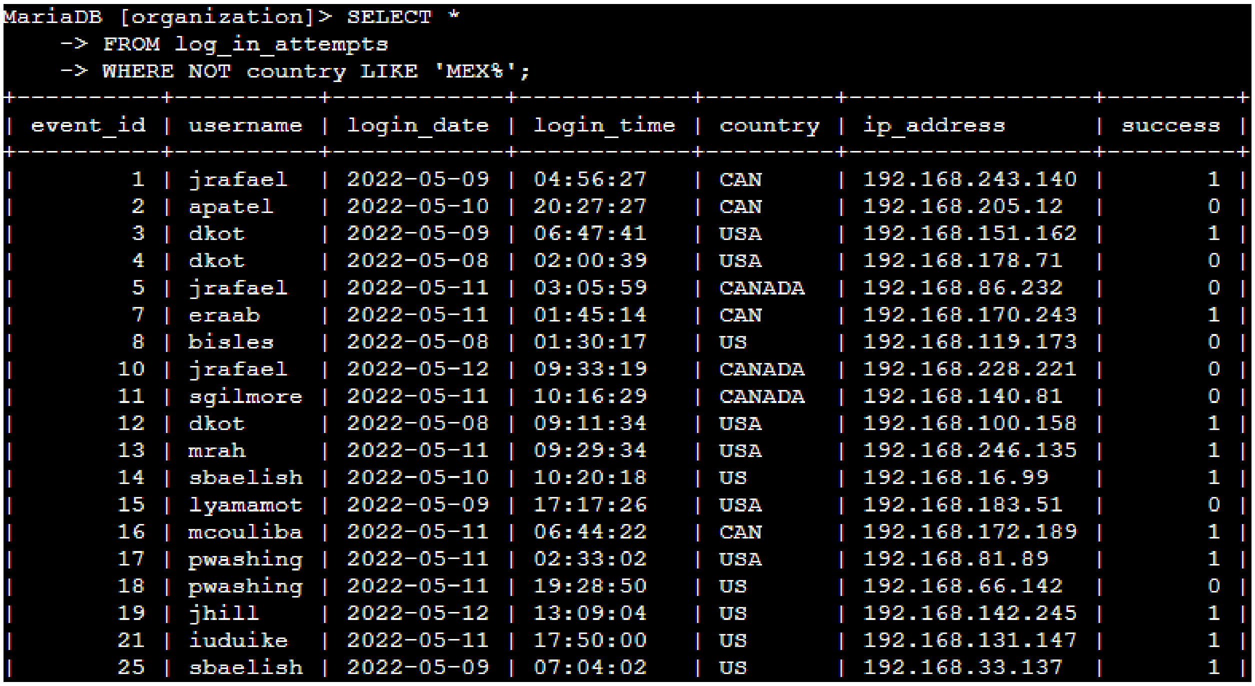
I am investigating a suspicious event that occurred on 2022-05-09 by reviewing the login attempts on that day and the day before. The following query once again returns all of the columns from the `log_in_attempts` table, but this time, I am filtering for records in which the value in the `login_date` column is either 2022-05-09 or 2022-05-08. Using the OR operator indicates that either one of the conditions must be met.



```
MariaDB [organization]> SELECT *
    -> FROM log_in_attempts
    -> WHERE login_date = '2022-05-08' OR login_date = '2022-05-09';
+----------+----------+------------+------------+---------+-----------------+---------+
| event_id | username | login_date | login_time | country | ip_address      | success |
+----------+----------+------------+------------+---------+-----------------+---------+
|        1 | jrafael  | 2022-05-09 | 04:56:27   | CAN     | 192.168.243.140 |       1 |
|        3 | dkot     | 2022-05-09 | 06:47:41   | USA     | 192.168.151.162 |       1 |
|        4 | dkot     | 2022-05-08 | 02:00:39   | USA     | 192.168.178.71  |       0 |
|        8 | bisles   | 2022-05-08 | 01:30:17   | US      | 192.168.119.173 |       0 |
|       12 | dkot     | 2022-05-08 | 09:11:34   | USA     | 192.168.100.158 |       1 |
|       15 | lyamamot | 2022-05-09 | 17:17:26   | USA     | 192.168.183.51  |       0 |
|       24 | arusso   | 2022-05-09 | 06:49:39   | MEXICO  | 192.168.171.192 |       1 |
|       25 | sbaelish | 2022-05-09 | 07:04:02   | US      | 192.168.33.137  |       1 |
|       26 | apatel   | 2022-05-08 | 17:27:00   | CANADA  | 192.168.123.105 |       1 |
|       28 | aestrada | 2022-05-09 | 19:28:12   | MEXICO  | 192.168.27.57   |       0 |
|       30 | yappiah  | 2022-05-09 | 03:22:22   | MEX     | 192.168.124.48  |       1 |
|       32 | acook    | 2022-05-09 | 02:52:02   | CANADA  | 192.168.142.239 |       0 |
|       36 | asundara | 2022-05-08 | 09:00:42   | US      | 192.168.78.151  |       1 |
|       38 | sbaelish | 2022-05-09 | 14:40:01   | USA     | 192.168.60.42   |       1 |
|       39 | yappiah  | 2022-05-09 | 07:56:40   | MEXICO  | 192.168.57.115  |       1 |
|       42 | cgriffin | 2022-05-09 | 23:04:05   | US      | 192.168.4.157   |       0 |
|       43 | mcouliba | 2022-05-08 | 02:35:34   | CANADA  | 192.168.16.208  |       0 |
|       44 | daquino  | 2022-05-08 | 07:02:35   | CANADA  | 192.168.168.144 |       0 |
|       47 | dkot     | 2022-05-08 | 05:06:45   | US      | 192.168.233.24  |       1 |
```

Retrieve login attempts outside of Mexico

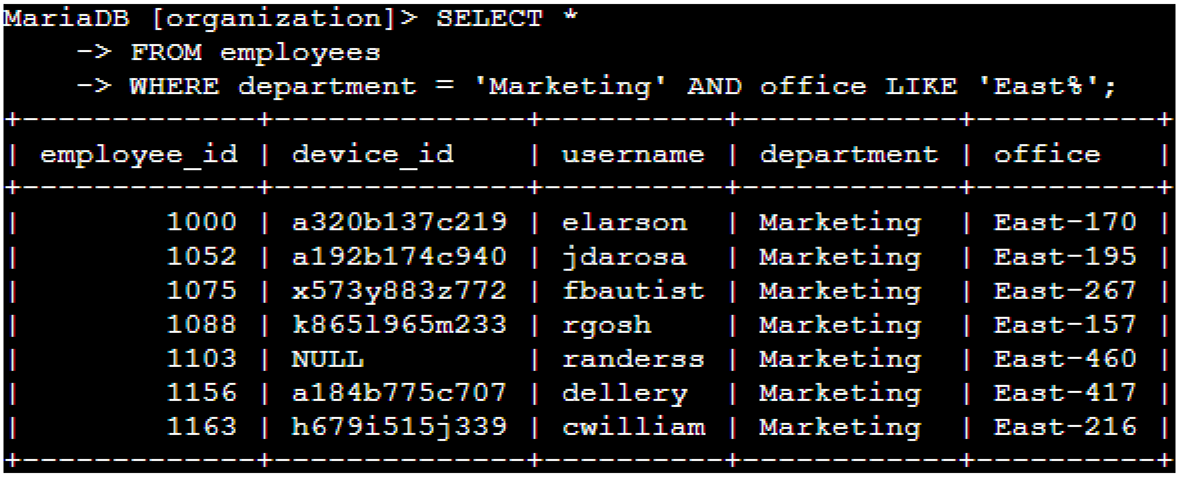
The security team discovered suspicious login activity and determined that it originated outside of Mexico, so I am reviewing login attempts that occurred in other countries. The query I used returns all of the columns from the `log_in_attempts` table and excludes records in which the country is Mexico. In the table, login attempts from Mexico may be recorded as MEX or MEXICO, so I use the `LIKE` operator, which searches for a pattern in the column. The `MEX%` pattern matches values that start with MEX followed by any number of characters. I place the `NOT` operator before the condition in order to negate the condition. This will return all records that do not meet the condition.



```
MariaDB [organization]> SELECT *
    -> FROM log_in_attempts
    -> WHERE NOT country LIKE 'MEX%';
+----------+----------+------------+------------+---------+-----------------+---------+
| event_id | username | login_date | login_time | country | ip_address      | success |
+----------+----------+------------+------------+---------+-----------------+---------+
|        1 | jrafael  | 2022-05-09 | 04:56:27   | CAN     | 192.168.243.140 |       1 |
|        2 | apatel   | 2022-05-10 | 20:27:27   | CAN     | 192.168.205.12  |       0 |
|        3 | dkot     | 2022-05-09 | 06:47:41   | USA     | 192.168.151.162 |       1 |
|        4 | dkot     | 2022-05-08 | 02:00:39   | USA     | 192.168.178.71  |       0 |
|        5 | jrafael  | 2022-05-11 | 03:05:59   | CANADA  | 192.168.86.232  |       0 |
|        7 | eraab    | 2022-05-11 | 01:45:14   | CAN     | 192.168.170.243 |       1 |
|        8 | bisles   | 2022-05-08 | 01:30:17   | US      | 192.168.119.173 |       0 |
|       10 | jrafael  | 2022-05-12 | 09:33:19   | CANADA  | 192.168.228.221 |       0 |
|       11 | sgilmore | 2022-05-11 | 10:16:29   | CANADA  | 192.168.140.81  |       0 |
|       12 | dkot     | 2022-05-08 | 09:11:34   | USA     | 192.168.100.158 |       1 |
|       13 | mrah     | 2022-05-11 | 09:29:34   | USA     | 192.168.246.135 |       1 |
|       14 | sbaelish | 2022-05-10 | 10:20:18   | US      | 192.168.16.99   |       1 |
|       15 | lyamamot | 2022-05-09 | 17:17:26   | USA     | 192.168.183.51  |       0 |
|       16 | mcouliba | 2022-05-11 | 06:44:22   | CAN     | 192.168.172.189 |       1 |
|       17 | pwashing | 2022-05-11 | 02:33:02   | USA     | 192.168.81.89   |       1 |
|       18 | pwashing | 2022-05-11 | 19:28:50   | US      | 192.168.66.142  |       0 |
|       19 | jhill    | 2022-05-12 | 13:09:04   | US      | 192.168.142.245 |       1 |
|       21 | iuduike  | 2022-05-11 | 17:50:00   | US      | 192.168.131.147 |       1 |
|       25 | sbaelish | 2022-05-09 | 07:04:02   | US      | 192.168.33.137  |       1 |
```

Retrieve employees in Marketing

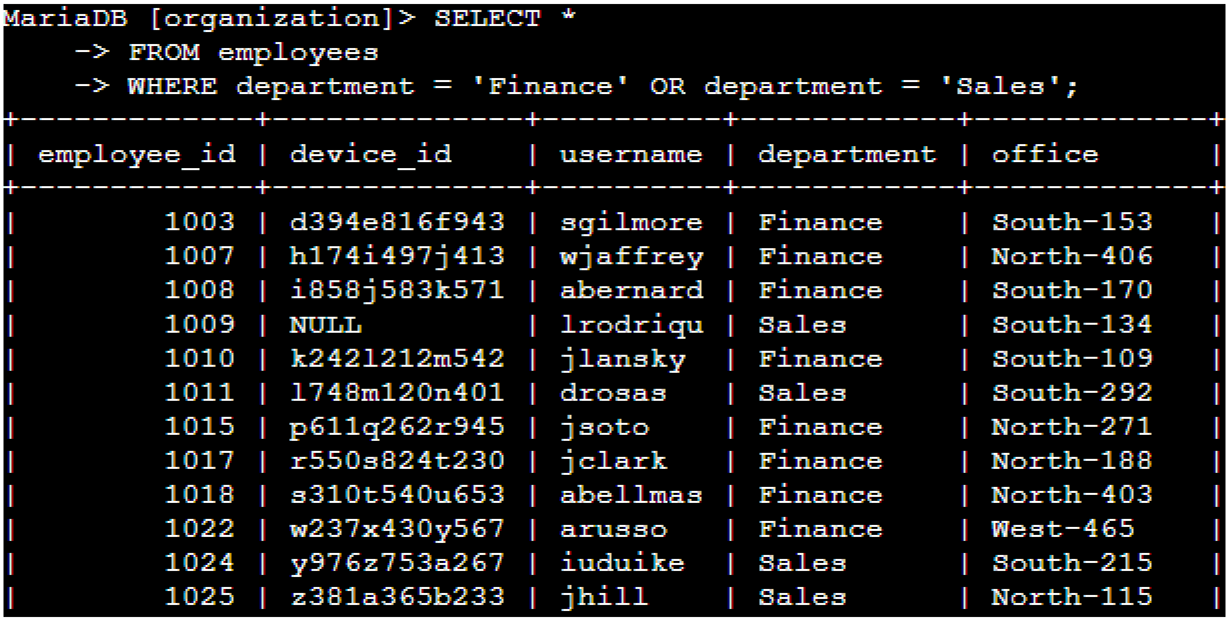
The security team is planning updates for employee machines that belong to the Marketing department in the East building, so I need to identify these machines. The query that I use returns all of the columns from the `employees` table. I also use the keyword `WHERE` and the `AND` operator to filter for records that meet two conditions simultaneously. The first condition is that the department column must contain the value ‘Marketing’. The second condition uses the `LIKE` operator to search for values in the office column that start with East followed by any number of characters.



```
MariaDB [organization]> SELECT *
    -> FROM employees
    -> WHERE department = 'Marketing' AND office LIKE 'East%';
+-------------+---------------+----------+------------+----------+
| employee_id | device_id     | username | department | office   |
+-------------+---------------+----------+------------+----------+
|        1000 | a320b137c219  | elarson  | Marketing  | East-170 |
|        1052 | a192b174c940  | jdarosa  | Marketing  | East-195 |
|        1075 | x573y883z772  | fbautist | Marketing  | East-267 |
|        1088 | k8651965m233  | rgosh    | Marketing  | East-157 |
|        1103 | NULL          | randerss | Marketing  | East-460 |
|        1156 | a184b775c707  | dellery  | Marketing  | East-417 |
|        1163 | h679i515j339  | cwilliam | Marketing  | East-216 |
+-------------+---------------+----------+------------+----------+
```

Retrieve employees in Finance or Sales

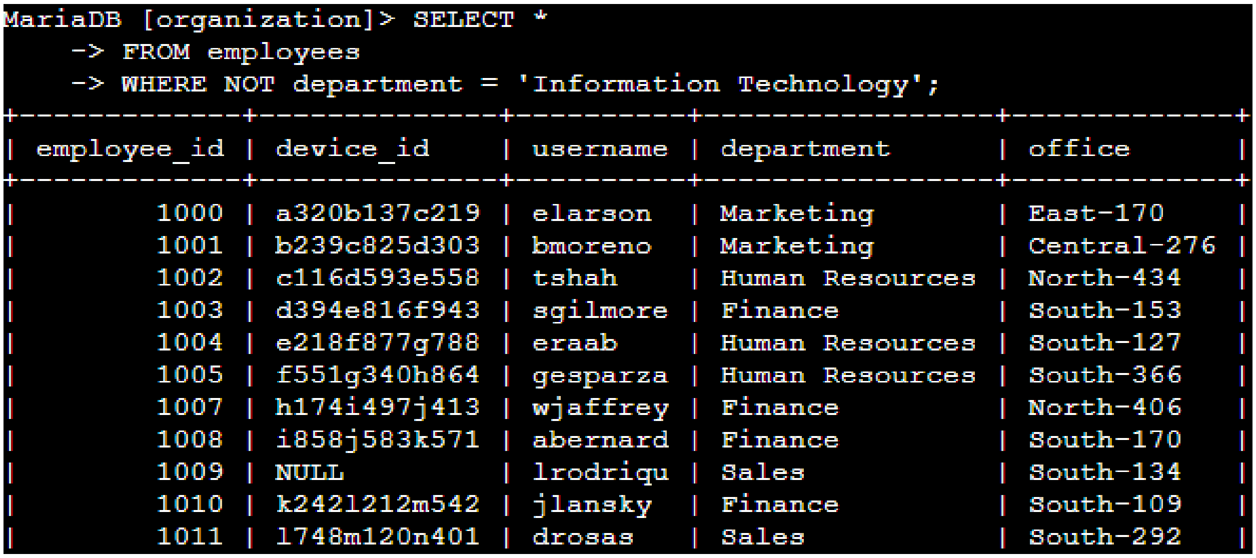
The team wants to perform security updates on employee machines for employees that work in the Finance and Sales departments. To find information on these employee machines, I query all of the columns from the `employees` table. I filter the records using the `OR` operator to return all records in which the value in the department column is either ‘Finance’ or ‘Sales’.



```
MariaDB [organization]> SELECT *
    -> FROM employees
    -> WHERE department = 'Finance' OR department = 'Sales';
+-------------+---------------+----------+------------+-------------+
| employee_id | device_id     | username | department | office      |
+-------------+---------------+----------+------------+-------------+
|        1003 | d394e816f943  | sgilmore | Finance    | South-153   |
|        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 | 1748m120n401  | drosas   | Sales      | South-292   |
|        1015 | p611q262r945  | jsoto    | Finance    | North-271   |
|        1017 | r550s824t230  | jclark   | Finance    | North-188   |
|        1018 | s310t540u653  | abellmas | Finance    | North-403   |
|        1022 | w237x430y567  | arusso   | Finance    | West-465    |
|        1024 | y976z753a267  | iuduike  | Sales      | South-215   |
|        1025 | z381a365b233  | jhill    | Sales      | North-115   |
```

Retrieve all employees not in IT

The team wants to perform another security update on all employee machines. The IT department is the only one that has already received the security update. The following query returns all data from the `employees` table, but filters out information for employees in the IT department. I use the condition `NOT department = ‘Information Technology’` to return records with a value in the department column that is not ‘Information Technology’.



```
MariaDB [organization]> SELECT *
    -> FROM employees
    -> WHERE NOT department = 'Information Technology';
+-------------+---------------+----------+-----------------+--------------+
| 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    |
|        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 | 1748m120n401  | drosas   | Sales           | South-292    |
```

Summary

In order to investigate various potential security issues, I queried the `log_in_attempts` table. I used SQL filters to look at failed login attempts after business hours, login attempts on two specific days, and login attempts that came from outside of Mexico. Then I retrieved information from the `employees` table so that the security team could perform security updates on employee machines. I used SQL to filter the employee machines by department and office building.

This lab demonstrates the power of SQL in efficiently retrieving information from databases. I learned the vital filtering abilities of SQL and how to apply them to common security tasks like investigating logins and enumerating assets.