

# Apply Filters to SQL queries

## 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.

## Retrieve after hours failed login attempts

There were suspicious activities that occurred after business hours (after 18:00). All after hours login attempts that failed need to be investigated.

I created a SQL query on MariaDB to filter for failed login attempts that occurred after business hours.

```
MariaDB [organization]> SELECT * FROM log_in_attempts WHERE login_time > '18:00' AND success = 'FALSE';
```

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

19 rows in set, 1 warning (0.116 sec)

The result is based on the `log_in_attempts` table where the `login_time` column is after 18:00 and the login attempts are failed (0). The filter "Select \*" means to select everything (all columns) and FROM `log_in_attempts` means it is from the `log_in_attempts` table. Success indicates the status of the login. If it is zero, it is a failure whereas if it is one, it is a success. Therefore, there were 19 failed login attempts after 18:00.

## Retrieve login attempts on specific dates

A suspicious event occurred on 2022-05-09. Any login activity that happened on 2022-05-09 or on the day before needs to be investigated. Therefore, I created a SQL query to filter for login attempts that occurred on specific dates.

```
MariaDB [organization]> SELECT *  
->  
-> FROM log_in_attempts  
->  
-> WHERE login_date = '2022-05-09' OR login_date = '2022-05-08';
```

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
49	asundara	2022-05-08	14:00:01	US	192.168.173.213	0
53	nmason	2022-05-08	11:51:38	CAN	192.168.133.188	1
56	acook	2022-05-08	04:56:30	CAN	192.168.209.130	1
58	ivelasco	2022-05-09	17:20:54	CAN	192.168.57.162	0
61	dtanaka	2022-05-09	09:45:18	USA	192.168.98.221	1
65	aalonso	2022-05-09	23:42:12	MEX	192.168.52.37	1
66	aestrada	2022-05-08	21:58:32	MEX	192.168.67.223	1
67	abernard	2022-05-09	11:53:41	MEX	192.168.118.29	1
68	mrhah	2022-05-08	17:16:13	US	192.168.42.248	1
70	tmitchel	2022-05-09	10:55:17	MEXICO	192.168.87.199	1
71	mcouliba	2022-05-09	06:57:42	CAN	192.168.55.169	0
72	alevitsk	2022-05-08	12:09:10	CANADA	192.168.139.176	1
79	abernard	2022-05-09	11:41:15	MEX	192.168.158.170	0
80	cjackson	2022-05-08	02:18:10	CANADA	192.168.33.140	1
83	lrodriqu	2022-05-08	08:10:23	USA	192.168.67.69	1
87	apatel	2022-05-08	22:38:31	CANADA	192.168.132.153	0
90	gesparza	2022-05-09	00:49:05	CANADA	192.168.87.201	0
92	pwashing	2022-05-08	00:36:12	US	192.168.247.219	0
96	ivelasco	2022-05-09	22:36:36	CAN	192.168.84.194	0
97	irocklow	2022-05-09	02:40:22	MEXICO	192.168.22.221	1

169	alevitsk	2022-05-08	08:10:43	CANADA	192.168.210.228	0
170	sbaelish	2022-05-09	16:43:18	USA	192.168.65.113	0
172	mabadi	2022-05-08	08:06:50	US	192.168.180.41	1
178	sgilmore	2022-05-08	12:27:22	CAN	192.168.52.216	0
184	alevitsk	2022-05-08	03:09:48	CAN	192.168.33.70	0
186	bisles	2022-05-09	04:29:17	USA	192.168.40.72	0
187	arusso	2022-05-09	00:36:26	MEX	192.168.77.137	0
189	nmason	2022-05-08	05:37:24	CANADA	192.168.168.117	1
190	jsoto	2022-05-09	05:09:21	USA	192.168.25.60	0
191	cjackson	2022-05-08	06:46:07	CANADA	192.168.7.187	0
193	lrodriqu	2022-05-08	07:11:29	US	192.168.125.240	0
197	jsoto	2022-05-08	09:05:09	US	192.168.36.21	0

75 rows in set (0.001 sec)

I selected the `log_in_attempts` table and used the `WHERE` clause and `OR` operator to filter my results to output only login attempts that occurred on 2022-05-05 or 2022-05-08. As a result, there were 75 login attempts in these two days.

## Retrieve login attempts outside of Mexico

After investigating the data and following the pattern, there is a strong indication that login attempts outside of Mexico should be investigated.

I created a SQL query to filter for login attempts that occurred outside of Mexico.

```
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	lrodriqu	2022-05-08	17:17:26	US	192.168.125.240	0



183	nmason	2022-05-11	05:29:36	CANADA	192.168.137.147	0
184	alevitsk	2022-05-08	03:09:48	CAN	192.168.33.70	0
185	jsoto	2022-05-10	13:34:58	USA	192.168.151.91	0
186	bisles	2022-05-09	04:29:17	USA	192.168.40.72	0
188	jsoto	2022-05-11	00:39:09	USA	192.168.21.88	0
189	nmason	2022-05-08	05:37:24	CANADA	192.168.168.117	1
190	jsoto	2022-05-09	05:09:21	USA	192.168.25.60	0
191	cjackson	2022-05-08	06:46:07	CANADA	192.168.7.187	0
192	bisles	2022-05-10	08:32:03	USA	192.168.201.40	1
193	lrodrigu	2022-05-08	07:11:29	US	192.168.125.240	0
194	jclark	2022-05-12	14:11:04	CAN	192.168.197.247	0
195	alevitsk	2022-05-11	06:59:13	CANADA	192.168.236.78	1
196	acook	2022-05-10	09:56:48	CAN	192.168.52.90	0
197	jsoto	2022-05-08	09:05:09	US	192.168.36.21	0
200	jclark	2022-05-12	01:11:45	CANADA	192.168.91.103	1

144 rows in set (0.001 sec)

I used the **WHERE** clause and **NOT** operator to filter the outputs and receive the login attempts outside Mexico. However, the word "Mexico" could be "Mex", "MEX", and etc. To simplify this, I chose **LIKE** with **MEX%** as the pattern to match as **MEX** and **MEXICO**. The **%** sign indicates any unspecified characters when used with **LIKE**. As a result, there were 144 login attempts outside Mexico.

## Retrieve employees in Marketing

My team wants to update certain computers across departments. I created a SQL query to filter for employee machines from employees in the Marketing department in the East building.

```
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	e218f877q788	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	lrodrigu	Sales	South-134
1010	k242l212m542	jlansky	Finance	South-109
1011	l748m120n401	drogas	Sales	South-292

```

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 | k865l965m233 | rgosh | Marketing | East-157 |
| 1103 | NULL | randers | Marketing | East-460 |
| 1156 | a184b775c707 | dellery | Marketing | East-417 |
| 1163 | h679i515j339 | cwilliam | Marketing | East-216 |
+-----+-----+-----+-----+-----+
7 rows in set (0.001 sec)

```

I first selected all the data in the `employee` table and used the `WHERE` clause to filter employees who are part of the marketing team and reside in the east building using `AND office LIKE 'East%'`. As a result, there are 7 employees who match the criteria.

## Retrieve employees in Finance or Sales

Across departments, plenty of employee data needs to be updated. I created a SQL query to filter for employee machines from employees in the Finance or Sales departments.

```

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 | lrodrigu | Sales | South-134 |
| 1010 | k242l212m542 | jlansky | Finance | South-109 |
| 1011 | l748m120n401 | 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 |
| 1029 | d336e475f676 | ivelasco | Finance | East-156 |
| 1035 | j236k303l245 | bisles | Sales | South-171 |
+-----+-----+-----+-----+-----+

```

1147	r454s225t299	tvega	Finance	West-177
1148	s328t505u907	dharvey	Finance	South-181
1159	d881e710f732	jshen	Finance	East-193
1164	i682j513k442	fsmeltz	Finance	North-163
1169	NULL	mmitchel	Sales	Central-250
1174	s371t911u987	eortiz	Finance	North-428
1175	t959u687v394	jclark2	Finance	North-194
1176	u849v569w521	nliu	Sales	West-220
1181	z803a233b718	sessa	Finance	South-207
1185	d790e839f461	revens	Sales	North-330
1186	e281f433g404	sacosta	Sales	North-460
1187	f963g637h851	bbode	Finance	East-351
1188	g164h566i795	noshiro	Finance	West-252
1195	n516o853p957	orainier	Finance	East-346

71 rows in set (0.001 sec)

I selected the Finance department and Sales department. By using the **WHERE** clause and **OR** operator I filtered the outputs to make sure all employees who are members of both departments are listed. As a result, there are 71 people who happen to be members of both departments.

## Retrieve all employees not in IT

I created a SQL query to filter for employee machines from employees not in the Information Technology department.

```
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



```

1180 | y1312211a378 | medwards | Human Resources | Central-340
1181 | z803a233b718 | sessa | Finance | South-207
1183 | b566c710d544 | lquraish | Human Resources | East-400
1184 | c986d200e170 | ptsosie | Human Resources | Central-247
1185 | d790e839f461 | revens | Sales | North-330
1186 | e281f433g404 | sacosta | Sales | North-460
1187 | f963g637h851 | bbode | Finance | East-351
1188 | g164h566i795 | noshiro | Finance | West-252
1189 | h784i120j837 | slefkowi | Human Resources | West-342
1190 | NULL | kcarter | Marketing | Central-270
1191 | NULL | shakimi | Marketing | Central-366
1194 | m340n287o441 | zwarren | Human Resources | West-212
1195 | n516o853p957 | orainier | Finance | East-346
1198 | q308r573s459 | jmartine | Marketing | South-117
1199 | r520s571t459 | areyes | Human Resources | East-100
-----+-----+-----+-----+-----
161 rows in set (0.001 sec)

```

First, I started by selecting all data from the `employee` table. Then, I used a `WHERE` clause with `NOT` to filter for employees not in the IT department.

## Summary

I applied filters to SQL queries to get specific information on `employee` and `log_in_attempts` tables. I used the `AND`, `OR`, `NOT` operators to filter for the specific information and I used `LIKE` and the `(%)` sign filter for patterns.