

Query a database

Previously, you explored how SQL is an important tool in the world of cybersecurity and is essential when querying databases. You examined a few basic SQL queries and keywords used to extract needed information from a database. In this reading, you'll review those basic SQL queries and learn a new keyword that will help you organize your output. You'll also learn about the *Chinook* database, which this course uses for queries in readings and quizzes.

Basic SQL query

There are two essential keywords in any SQL query: *SELECT* and *FROM*. You will use these keywords every time you want to query a SQL database. Using them together helps SQL identify what data you need from a database and the table you are returning it from.

The video demonstrated this SQL query:

```
SELECT employee_id, device_id
```

```
FROM employees;
```

In readings and quizzes, this course uses a sample database called the *Chinook* database to run queries. The *Chinook* database includes data that might be created at a digital media company. A security analyst employed by this company might need to query this data. For example, the database contains eleven tables, including an *employees* table, a *customers* table, and an *invoices* table. These tables include data such as names and addresses.

As an example, you can run this query to return data from the *customers* table of the *Chinook* database:

```
SELECT customerid, city, country
FROM customers;
```

CustomerId	City	Country
1	São José dos Campos	Brazil
2	Stuttgart	Germany
3	Montréal	Canada
4	Oslo	Norway
5	Prague	Czech Republic
6	Prague	Czech Republic
7	Vienne	Austria

8	Brussels	Belgium
9	Copenhagen	Denmark
10	São Paulo	Brazil
11	São Paulo	Brazil
12	Rio de Janeiro	Brazil
13	Brasília	Brazil
14	Edmonton	Canada
15	Vancouver	Canada
16	Mountain View	USA
17	Redmond	USA
18	New York	USA
19	Cupertino	USA
20	Mountain View	USA
21	Reno	USA
22	Orlando	USA
23	Boston	USA
24	Chicago	USA
25	Madison	USA

+-----+-----+-----+
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The *SELECT* keyword indicates which columns to return. For example, you can return the *customerid* column from the *Chinook* database with

```
SELECT customerid
```

You can also select multiple columns by separating them with a comma. For example, if you want to return both the *customerid* and *city* columns, you should write *SELECT customerid, city*.

If you want to return all columns in a table, you can follow the *SELECT* keyword with an asterisk (*). The first line in the query will be *SELECT **.

Note: Although the tables you're querying in this course are relatively small, using *SELECT ** may not be advisable when working with large databases and tables; in those cases, the final output may be difficult to understand and might be slow to run.

FROM

The *SELECT* keyword always comes with the *FROM* keyword. *FROM* indicates which table to query. To use the *FROM* keyword, you should write it after the *SELECT* keyword, often on a new line, and follow it with the name of the table you're querying. If you want to return all columns from the *customers* table, you can write:

```
SELECT *
```

```
FROM customers;
```

When you want to end the query here, you put a semicolon (;) at the end to tell SQL that this is the entire query.

Note: Line breaks are not necessary in SQL queries, but are often used to make the query easier to understand. If you prefer, you can also write the previous query on one line as

```
SELECT * FROM customers;
and here would be the databases answer for
SELECT * FROM customers ORDER BY country, city;
```

CustomerId	FirstName	LastName	Company	Address	City
56	Diego	Gutiérrez	None	307 Macacha Güemes	Buenos Aires
55	Mark	Taylor	None	421 Bourke Street	Sidney
7	Astrid	Gruber	None	Rotenturmstraße 4, 1010 Innere Stadt	Vienne
8	Daan	Peeters	None	Grétrystraat 63	Brussels
13	Fernanda	Ramos	None	Qe 7 Bloco G	Brasília
12	Roberto	Almeida	Riotur	Praça Pio X, 119	Rio de Janeiro
1	Luís	Gonçalves	Embraer - Empresa Brasileira de Aeronáutica S.A.	Av. Brigadeiro Faria Lima, 217	Brasília
10	Eduardo	Martins	Woodstock Discos	Rua Dr. Falcão Filho, 155	São Paulo
11	Alexandre	Rocha	Banco do Brasil S.A.	Av. Paulista, 2022	São Paulo
14	Mark	Philips	Telus	8210 111 ST NW	Edmonton
31	Martha	Silk	None	194A Chain Lake Drive	Halifax
3	François	Tremblay	None	1498 rue Bélanger	Montréal
30	Edward	Francis	None	230 Elgin Street	Ottawa
29	Robert	Brown	None	796 Dundas Street West	Toronto
15	Jennifer	Peterson	Rogers Canada	700 W Pender Street	Vancouver
32	Aaron	Mitchell	None	696 Osborne Street	Winnipeg
33	Ellie	Sullivan	None	5112 48 Street	Yellowknife
57	Luis	Rojas	None	Calle Lira, 198	Santiago
5	František	Wichterlová	JetBrains s.r.o.	Klanova 9/506	Prague
6	Helena	Holý	None	Rilská 3174/6	Prague
9	Kara	Nielsen	None	Sønder Boulevard 51	Copenhagen
44	Terhi	Hämäläinen	None	Porthaninkatu 9	Helsinki
42	Wyatt	Girard	None	9, Place Louis Barthou	Bordeaux
43	Isabelle	Mercier	None	68, Rue Jouvence	Dijon
41	Marc	Dubois	None	11, Place Bellecour	Lyon

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ORDER BY

Database tables are often very complicated, and this is where other SQL keywords come in handy. *ORDER BY* is an important keyword for organizing the data you extract from a table.

ORDER BY sequences the records returned by a query based on a specified column or columns. This can be in either ascending or descending order.

Sorting in ascending order

To use the *ORDER BY* keyword, write it at the end of the query and specify a column to base the sort on. In this example, SQL will return the *customerid*, *city*, and *country* columns from the *customers* table, and the records will be sequenced by the *city* column:

```
SELECT customerid, city, country
FROM customers
ORDER BY city;
```

```
+-----+-----+-----+
| CustomerId | City      | Country    |
+-----+-----+-----+
| 48 | Amsterdam | Netherlands |
| 59 | Bangalore | India       |
| 36 | Berlin   | Germany     |
| 38 | Berlin   | Germany     |
| 42 | Bordeaux | France      |
| 23 | Boston   | USA         |
| 13 | Brasília | Brazil      |
| 8  | Brussels | Belgium     |
| 45 | Budapest | Hungary     |
| 56 | Buenos Aires | Argentina  |
| 24 | Chicago  | USA         |
| 9  | Copenhagen | Denmark    |
| 19 | Cupertino | USA         |
| 58 | Delhi     | India       |
| 43 | Dijon     | France      |
| 46 | Dublin    | Ireland     |
| 54 | Edinburgh | United Kingdom |
| 14 | Edmonton | Canada      |
| 26 | Fort Worth | USA         |
| 37 | Frankfurt | Germany     |
| 31 | Halifax   | Canada      |
| 44 | Helsinki  | Finland     |
| 34 | Lisbon    | Portugal     |
| 52 | London    | United Kingdom |
| 53 | London    | United Kingdom |
+-----+-----+-----+
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```

The *ORDER BY* keyword sorts the records based on the column specified after this keyword. By default, as shown in this example, the sequence will be in ascending order. This means

- if you choose a column containing numeric data, it sorts the output from the smallest to largest. For example, if sorting on *customerid*, the ID numbers are sorted from smallest to largest.
- if the column contains alphabetic characters, such as in the example with the *city* column, it orders the records from the beginning of the alphabet to the end.

Sorting in descending order

You can also use the *ORDER BY* with the *DESC* keyword to sort in descending order. The *DESC* keyword is short for "descending" and tells SQL to sort numbers from largest to smallest, or alphabetically from Z to A. This can be done by following *ORDER BY* with the *DESC* keyword. For example, you can run this query to examine how the results differ when *DESC* is applied:

```
SELECT customerid, city, country
FROM customers
ORDER BY city DESC;
```

CustomerId	City	Country
33	Yellowknife	Canada
32	Winnipeg	Canada
49	Warsaw	Poland
7	Vienne	Austria
15	Vancouver	Canada
27	Tucson	USA
29	Toronto	Canada
10	São Paulo	Brazil
11	São Paulo	Brazil
1	São José dos Campos	Brazil
2	Stuttgart	Germany
51	Stockholm	Sweden
55	Sidney	Australia
57	Santiago	Chile
28	Salt Lake City	USA
47	Rome	Italy
12	Rio de Janeiro	Brazil
21	Reno	USA
17	Redmond	USA
5	Prague	Czech Republic
6	Prague	Czech Republic
35	Porto	Portugal
39	Paris	France
40	Paris	France
30	Ottawa	Canada

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Now, cities at the end of the alphabet are listed first.

Sorting based on multiple columns

You can also choose multiple columns to order by. For example, you might first choose the *country* and then the *city* column. SQL then sorts the output by *country*, and for rows with the same

country, it sorts them based on *city*. You can run this to explore how SQL displays this:

```
SELECT customerid, city, country
FROM customers
ORDER BY country, city;
```

```
+-----+-----+-----+
| CustomerId | City          | Country    |
+-----+-----+-----+
| 56 | Buenos Aires | Argentina  |
| 55 | Sidney       | Australia  |
| 7  | Vienne       | Austria    |
| 8  | Brussels     | Belgium    |
| 13 | Brasília     | Brazil     |
| 12 | Rio de Janeiro | Brazil     |
| 1  | São José dos Campos | Brazil     |
| 10 | São Paulo    | Brazil     |
| 11 | São Paulo    | Brazil     |
| 14 | Edmonton     | Canada     |
| 31 | Halifax      | Canada     |
| 3  | Montréal     | Canada     |
| 30 | Ottawa       | Canada     |
| 29 | Toronto      | Canada     |
| 15 | Vancouver    | Canada     |
| 32 | Winnipeg     | Canada     |
| 33 | Yellowknife  | Canada     |
| 57 | Santiago     | Chile      |
| 5  | Prague       | Czech Republic |
| 6  | Prague       | Czech Republic |
| 9  | Copenhagen   | Denmark    |
| 44 | Helsinki     | Finland    |
| 42 | Bordeaux     | France     |
| 43 | Dijon        | France     |
| 41 | Lyon         | France     |
+-----+-----+-----+
```

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Key takeaways

SELECT and *FROM* are important keywords in SQL queries. You use *SELECT* to indicate which columns to return and *FROM* to indicate which table to query. You can also include *ORDER BY* in your query to organize the output. These foundational SQL skills will support you as you move into more advanced queries.

Revision #5

Created 9 July 2023 15:48:36 by naruzkurai

Updated 9 July 2023 16:19:22 by naruzkurai