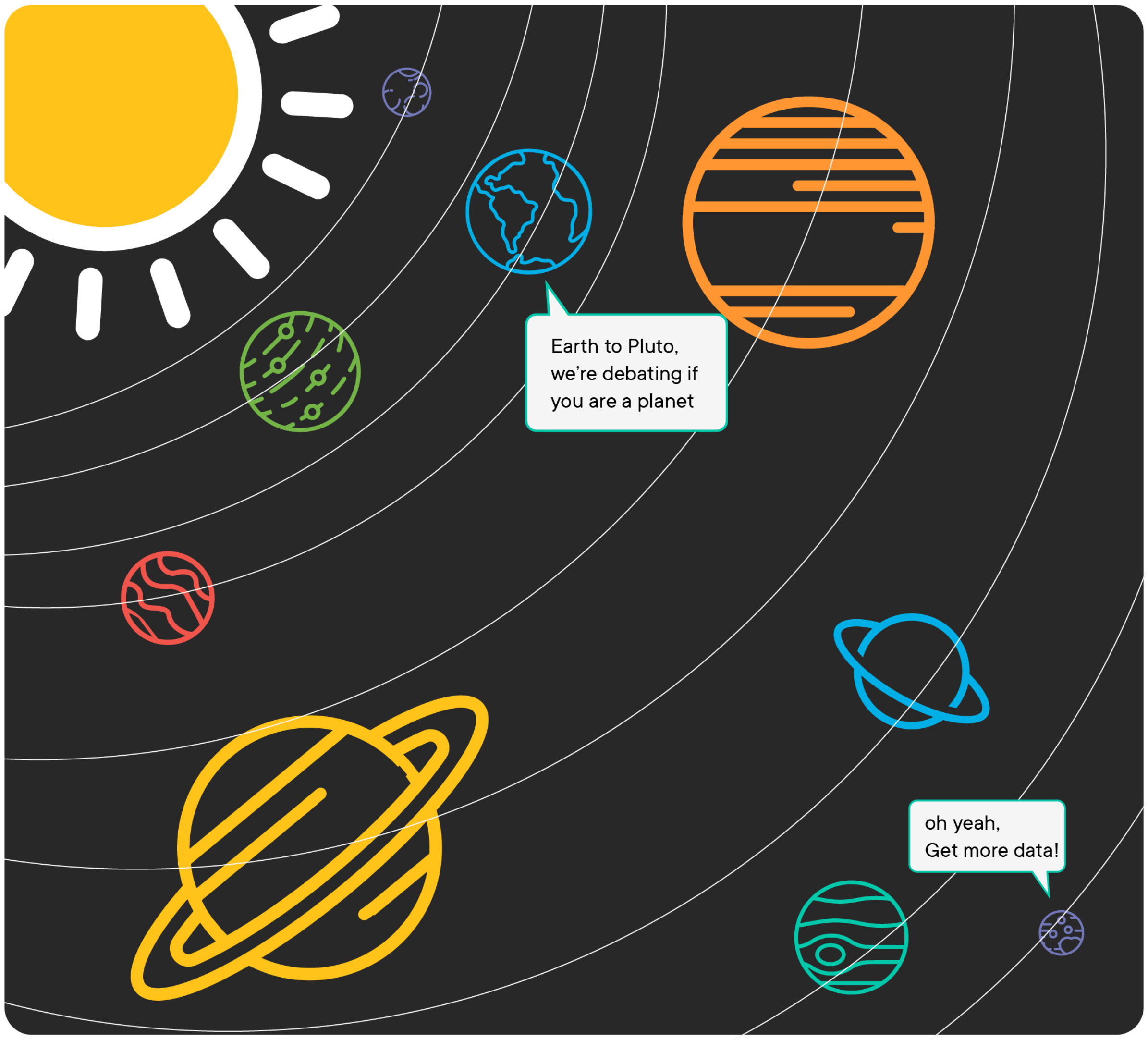
Filtering Data with SQL - Lab

Introduction

NASA wants to go to Mars! Before they build their rocket, NASA needs to track information about all of the planets in the Solar System. In this lab, you'll practice querying the database with various `SELECT` statements. This will include selecting different columns and implementing other SQL clauses like `WHERE` to return the data desired.



Objectives

You will practice the following:

- Retrieve a subset of records from a table using a `WHERE` clause
- Filter results using conditional operators such as `BETWEEN` , `IS NULL` , and `LIKE`

Connecting to the Database

To get started, import `sqlite3` as well as `pandas` for conveniently displaying results. Then, connect to the SQLite database located at `planets.db` .

In [1]:
```
import sqlite3
import pandas as pd
conn = sqlite3.connect('planets.db')
```

Database Schema

This database contains a single table, `planets` . This is the schema:

```
CREATE TABLE planets (
  id INTEGER PRIMARY KEY,
  name TEXT,
  color TEXT,
  num_of_moons INTEGER,
  mass REAL,
  rings BOOLEAN
);
```

The data looks something like this:

id	name	color	num_of_moons	mass	rings
1	Mercury	gray	0	0.55	FALSE
2	Venus	yellow	0	0.82	FALSE
3	Earth	blue	1	1.00	FALSE
4	Mars	red	2	0.11	FALSE
5	Jupiter	orange	67	317.90	FALSE
6	Saturn	hazel	62	95.19	TRUE
7	Uranus	light blue	27	14.54	TRUE
8	Neptune	dark blue	14	17.15	TRUE

SQL Queries

Write SQL queries for each of the statements below using the same pandas wrapping syntax from the previous lesson.

1. Select just the `name` and `color` of each planet

In [2]:
```
pd.read_sql("""
SELECT name,color
FROM planets;
""",conn)
```

Out[2]:

	name	color
0	Mercury	gray
1	Venus	yellow
2	Earth	blue
3	Mars	red
4	Jupiter	orange
5	Saturn	hazel
6	Uranus	light blue
7	Neptune	dark blue

2. Select all columns for each planet whose `num_of_moons` is 0

In [3]:
```
pd.read_sql("""
SELECT *
FROM planets
WHERE num_of_moons = 0;
""",conn)
```

Out[3]:

	id	name	color	num_of_moons	mass	rings
0	1	Mercury	gray	0	0.55	0
1	2	Venus	yellow	0	0.82	0

3. Select the `name` and `mass` of each planet whose `name` has exactly 7 letters

In [4]:
```
pd.read_sql("""
SELECT name,mass
FROM planets
WHERE length(name)=7;
""",conn)
```

Out[4]:

	name	mass
0	Mercury	0.55
1	Jupiter	317.90
2	Neptune	17.15

4. Select all columns for each planet whose `mass` is greater than 1.00

In [5]:
```
pd.read_sql("""
SELECT *
FROM planets
WHERE mass > 1.00;
""",conn)
```

Out[5]:

	id	name	color	num_of_moons	mass	rings
0	5	Jupiter	orange	68	317.90	0
1	6	Saturn	hazel	62	95.19	1
2	7	Uranus	light blue	27	14.54	1
3	8	Neptune	dark blue	14	17.15	1

5. Select the `name` and `mass` of each planet whose `mass` is less than or equal to 1.00

In [6]:
```
pd.read_sql("""
SELECT name,mass
FROM planets
WHERE mass <= 1.00;
""",conn)
```

Out[6]:

	name	mass
0	Mercury	0.55
1	Venus	0.82
2	Earth	1.00
3	Mars	0.11

6. Select the `name` and `mass` of each planet whose `mass` is between 0 and 50

In [7]:
```
pd.read_sql("""
SELECT name,mass
FROM planets
WHERE mass BETWEEN 0 AND 50;
""",conn)
```

Out[7]:

	name	mass
0	Mercury	0.55
1	Venus	0.82
2	Earth	1.00
3	Mars	0.11
4	Uranus	14.54
5	Neptune	17.15

7. Select all columns for planets that have at least one moon and a `mass` less than 1.00

Hint: You can use `AND` to chain together two conditions in SQL, similar to `and` in Python

In [8]:
```
pd.read_sql("""
SELECT *
FROM planets
WHERE num_of_moons>=1 AND mass < 1.00;
""",conn)
```

Out[8]:

	id	name	color	num_of_moons	mass	rings
0	4	Mars	red	2	0.11	0

8. Select the `name` and `color` of planets that have a `color` containing the string "blue"

In [9]:
```
pd.read_sql("""
SELECT name,color
FROM planets
WHERE color LIKE "%blue%";
""",conn)
```

Out[9]:

	name	color
0	Earth	blue
1	Uranus	light blue
2	Neptune	dark blue

9. Select the count of planets that don't have rings as `planets_without_rings`

Note: even though the schema states that `rings` is a `BOOLEAN` and the example table shows values `TRUE` and `FALSE`, SQLite does not actually support booleans natively. From the [documentation (https://www.sqlite.org/datatype3.html#boolean_datatype)](https://www.sqlite.org/datatype3.html#boolean_datatype):

> SQLite does not have a separate Boolean storage class. Instead, Boolean values are stored as integers 0 (false) and 1 (true).

In [10]:
```
pd.read_sql("""
SELECT COUNT(*) AS planets_without_rings
FROM planets
WHERE rings = 0;
""",conn)
```

Out[10]:

	planets_without_rings
0	5

10. Select the name of all planets, along with a value `has_rings` that returns "Yes" if the planet does have rings, and "No" if it does not

In [11]:
```
pd.read_sql("""
SELECT name,
       CASE rings
       WHEN 1 THEN "Yes"
       WHEN 0 THEN "No"
       END AS has_rings
FROM planets;
""", conn)
```

Out[11]:

	name	has_rings
0	Mercury	No
1	Venus	No
2	Earth	No
3	Mars	No
4	Jupiter	No
5	Saturn	Yes
6	Uranus	Yes
7	Neptune	Yes

Summary

Congratulations! NASA is one step closer to embarking upon its mission to Mars. In this lab, You practiced writing `SELECT` statements that query a single table to get specific information. You also used other clauses and specified column names to cherry-pick the data we wanted to retrieve.