jupyter-labs-eda-sql-coursera_sqllite

October 30, 2025

Assignment: SQL Notebook for Peer Assignment

Estimated time needed: **60** minutes.

0.1 Introduction

Using this Python notebook you will:

1. Understand the Spacex DataSet
2. Load the dataset into the corresponding table in a Db2 database
3. Execute SQL queries to answer assignment questions

0.2 Overview of the DataSet

SpaceX has gained worldwide attention for a series of historic milestones.

It is the only private company ever to return a spacecraft from low-earth orbit, which it first accomplished in December 2010. SpaceX advertises Falcon 9 rocket launches on its website with a cost of 62 million dollars wheras other providers cost upward of 165 million dollars each, much of the savings is because Space X can reuse the first stage.

Therefore if we can determine if the first stage will land, we can determine the cost of a launch.

This information can be used if an alternate company wants to bid against SpaceX for a rocket launch.

This dataset includes a record for each payload carried during a SpaceX mission into outer space.

0.2.1 Download the datasets

This assignment requires you to load the spacex dataset.

In many cases the dataset to be analyzed is available as a .CSV (comma separated values) file, perhaps on the internet. Click on the link below to download and save the dataset (.CSV file):

Spacex DataSet

```
[2]: !pip install sqlalchemy==1.3.9
```

```
Collecting sqlalchemy==1.3.9
  Using cached SQLAlchemy-1.3.9.tar.gz (6.0 MB)
  Installing build dependencies: started
  Installing build dependencies: finished with status 'done'
  Getting requirements to build wheel: started
```

```
  Getting requirements to build wheel: finished with status 'done'
  Preparing metadata (pyproject.toml): started
  Preparing metadata (pyproject.toml): finished with status 'done'
Building wheels for collected packages: sqlalchemy
  Building wheel for sqlalchemy (pyproject.toml): started
  Building wheel for sqlalchemy (pyproject.toml): finished with status 'done'
  Created wheel for sqlalchemy:
filename=sqlalchemy-1.3.9-cp310-cp310-win_amd64.whl size=1164283
sha256=7986bc3fdc64574c26204f92f29daa705edde8ff7e3bb6fe06e0b92e96a36124
  Stored in directory: c:\users\claud\appdata\local\pip\cache\wheels\8b\6d\9c\e1
793e5a2d85b89b8c362a4f0e3def54b786bcd14923b9ff00
Successfully built sqlalchemy
Installing collected packages: sqlalchemy
  Attempting uninstall: sqlalchemy
    Found existing installation: SQLAlchemy 2.0.44
    Uninstalling SQLAlchemy-2.0.44:
      Successfully uninstalled SQLAlchemy-2.0.44
Successfully installed sqlalchemy-1.3.9

ERROR: pip's dependency resolver does not currently take into account all the
packages that are installed. This behaviour is the source of the following
dependency conflicts.
ipython-sql 0.5.0 requires sqlalchemy>=2.0, but you have sqlalchemy 1.3.9 which
is incompatible.

[notice] A new release of pip is available: 23.1 -> 25.3
[notice] To update, run: C:\Users\claud\AppData\Local\Microsoft\WindowsApps\Pyth
onSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\python.exe -m pip install
--upgrade pip
```

[3]: `!pip install "SQLAlchemy>=1.4.1,<3.0" --upgrade`

```
Collecting SQLAlchemy<3.0,>=1.4.1
  Using cached sqlalchemy-2.0.44-cp310-cp310-win_amd64.whl (2.1 MB)
Requirement already satisfied: greenlet>=1 in c:\users\claud\appdata\local\packa
ges\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from SQLAlchemy<3.0,>=1.4.1) (3.2.4)
Requirement already satisfied: typing-extensions>=4.6.0 in c:\users\claud\appdat
a\local\packages\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\l
ocal-packages\python310\site-packages (from SQLAlchemy<3.0,>=1.4.1) (4.15.0)
Installing collected packages: SQLAlchemy
  Attempting uninstall: SQLAlchemy
    Found existing installation: SQLAlchemy 1.3.9
    Uninstalling SQLAlchemy-1.3.9:
      Successfully uninstalled SQLAlchemy-1.3.9
Successfully installed SQLAlchemy-2.0.44


[notice] A new release of pip is available: 23.1 -> 25.3
```

```
[notice] To update, run: C:\Users\claud\AppData\Local\Microsoft\WindowsApps\Pyth
onSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\python.exe -m pip install
--upgrade pip
```

0.2.2 Connect to the database

Let us first load the SQL extension and establish a connection with the database

```
[4]: !pip install ipython-sql
     !pip install ipython-sql prettytable
```

```
Requirement already satisfied: ipython-sql in c:\users\claud\appdata\local\packa
ges\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (0.5.0)
Requirement already satisfied: prettytable in c:\users\claud\appdata\local\packa
ges\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython-sql) (3.16.0)
Requirement already satisfied: ipython in c:\users\claud\appdata\local\packages\
pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython-sql) (8.14.0)
Requirement already satisfied: sqlalchemy>=2.0 in c:\users\claud\appdata\local\p
ackages\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython-sql) (2.0.44)
Requirement already satisfied: sqlparse in c:\users\claud\appdata\local\packages
\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython-sql) (0.5.3)
Requirement already satisfied: six in c:\users\claud\appdata\local\packages\pyth
onsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython-sql) (1.16.0)
Requirement already satisfied: ipython-genutils in c:\users\claud\appdata\local\
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packages\python310\site-packages (from ipython-sql) (0.2.0)
Requirement already satisfied: greenlet>=1 in c:\users\claud\appdata\local\packa
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Requirement already satisfied: typing-extensions>=4.6.0 in c:\users\claud\appdat
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ocal-packages\python310\site-packages (from sqlalchemy>=2.0->ipython-sql)
(4.15.0)
Requirement already satisfied: backcall in c:\users\claud\appdata\local\packages
\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
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Requirement already satisfied: decorator in c:\users\claud\appdata\local\package
s\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython->ipython-sql) (5.1.1)
Requirement already satisfied: jedi>=0.16 in c:\users\claud\appdata\local\packag
es\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython->ipython-sql) (0.19.0)
```

Requirement already satisfied: matplotlib-inline in c:\users\claud\appdata\local
\packages\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython->ipython-sql) (0.1.6)
Requirement already satisfied: pickleshare in c:\users\claud\appdata\local\packa
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packages\python310\site-packages (from ipython->ipython-sql) (0.7.5)
Requirement already satisfied: prompt-toolkit!=3.0.37,<3.1.0,>=3.0.30 in c:\user
s\claud\appdata\local\packages\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p
0\localcache\local-packages\python310\site-packages (from ipython->ipython-sql)
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Requirement already satisfied: pygments>=2.4.0 in c:\users\claud\appdata\local\p
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Requirement already satisfied: traitlets>=5 in c:\users\claud\appdata\local\pack
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packages\python310\site-packages (from ipython->ipython-sql) (5.9.0)
Requirement already satisfied: colorama in c:\users\claud\appdata\local\packages
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Requirement already satisfied: wcwidth in c:\users\claud\appdata\local\packages\
pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from prettytable->ipython-sql) (0.2.6)
Requirement already satisfied: parso<0.9.0,>=0.8.3 in c:\users\claud\appdata\loc
al\packages\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from jedi>=0.16->ipython->ipython-sql) (0.8.3)
Requirement already satisfied: executing>=1.2.0 in c:\users\claud\appdata\local\
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packages\python310\site-packages (from stack-data->ipython->ipython-sql) (1.2.0)
Requirement already satisfied: asttokens>=2.1.0 in c:\users\claud\appdata\local\
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packages\python310\site-packages (from stack-data->ipython->ipython-sql) (2.2.1)
Requirement already satisfied: pure-eval in c:\users\claud\appdata\local\package
s\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
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[notice] A new release of pip is available: 23.1 -> 25.3
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onSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\python.exe -m pip install
--upgrade pip

Requirement already satisfied: ipython-sql in c:\users\claud\appdata\local\packa
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(4.15.0)
Requirement already satisfied: backcall in c:\users\claud\appdata\local\packages
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Requirement already satisfied: decorator in c:\users\claud\appdata\local\package
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packages\python310\site-packages (from ipython->ipython-sql) (5.1.1)
Requirement already satisfied: jedi>=0.16 in c:\users\claud\appdata\local\packag
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packages\python310\site-packages (from ipython->ipython-sql) (0.19.0)
Requirement already satisfied: matplotlib-inline in c:\users\claud\appdata\local
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packages\python310\site-packages (from ipython->ipython-sql) (0.1.6)
Requirement already satisfied: pickleshare in c:\users\claud\appdata\local\packa
ges\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython->ipython-sql) (0.7.5)
Requirement already satisfied: prompt-toolkit!=3.0.37,<3.1.0,>=3.0.30 in c:\user
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0\localcache\local-packages\python310\site-packages (from ipython->ipython-sql)
(3.0.39)
Requirement already satisfied: pygments>=2.4.0 in c:\users\claud\appdata\local\p
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packages\python310\site-packages (from ipython->ipython-sql) (2.16.1)

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Requirement already satisfied: stack-data in c:\users\claud\appdata\local\packag
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packages\python310\site-packages (from ipython->ipython-sql) (0.6.2)
Requirement already satisfied: traitlets>=5 in c:\users\claud\appdata\local\pack
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packages\python310\site-packages (from ipython->ipython-sql) (5.9.0)
Requirement already satisfied: colorama in c:\users\claud\appdata\local\packages
\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from ipython->ipython-sql) (0.4.6)
Requirement already satisfied: parso<0.9.0,>=0.8.3 in c:\users\claud\appdata\loc
al\packages\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from jedi>=0.16->ipython->ipython-sql) (0.8.3)
Requirement already satisfied: executing>=1.2.0 in c:\users\claud\appdata\local\
packages\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from stack-data->ipython->ipython-sql) (1.2.0)
Requirement already satisfied: asttokens>=2.1.0 in c:\users\claud\appdata\local\
packages\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from stack-data->ipython->ipython-sql) (2.2.1)
Requirement already satisfied: pure-eval in c:\users\claud\appdata\local\package
s\pythonsoftwarefoundation.python.3.10_qbz5n2kfra8p0\localcache\local-
packages\python310\site-packages (from stack-data->ipython->ipython-sql) (0.2.2)


[notice] A new release of pip is available: 23.1 -> 25.3
[notice] To update, run: C:\Users\claud\AppData\Local\Microsoft\WindowsApps\Pyth
onSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\python.exe -m pip install
--upgrade pip
```

[5]:
```python
%load_ext sql
```

[6]:
```python
import csv, sqlite3
import prettytable
prettytable.DEFAULT = 'DEFAULT'

con = sqlite3.connect("my_data1.db")
cur = con.cursor()
```

[7]:
```python
!pip install -q pandas
```

```
[notice] A new release of pip is available: 23.1 -> 25.3
[notice] To update, run: C:\Users\claud\AppData\Local\Microsoft\WindowsApps\Pyth
onSoftwareFoundation.Python.3.10_qbz5n2kfra8p0\python.exe -m pip install
--upgrade pip
```

[8]:
```python
%sql sqlite:///my_data1.db
```

```
[9]: import pandas as pd
     df = pd.read_csv("https://cf-courses-data.s3.us.cloud-object-storage.appdomain.
       ↪cloud/IBM-DS0321EN-SkillsNetwork/labs/module_2/data/Spacex.csv")
     df.to_sql("SPACEXTBL", con, if_exists='replace', index=False,method="multi")
```

[9]: 101

Note:This below code is added to remove blank rows from table

```
[10]: #DROP THE TABLE IF EXISTS

      %sql DROP TABLE IF EXISTS SPACEXTABLE;
```

```
 * sqlite:///my_data1.db
Done.
```

[10]: []

```
[11]: %sql create table SPACEXTABLE as select * from SPACEXTBL where Date is not null
```

```
 * sqlite:///my_data1.db
Done.
```

[11]: []

0.3 Tasks

Now write and execute SQL queries to solve the assignment tasks.

Note: If the column names are in mixed case enclose it in double quotes For Example "Landing_Outcome"

0.3.1 Task 1

Display the names of the unique launch sites in the space mission

```
[12]: # Task 1: Display unique launch site names
      %sql SELECT DISTINCT "Launch_Site" FROM SPACEXTABLE;
```

```
 * sqlite:///my_data1.db
Done.
```

[12]: [('CCAFS LC-40',), ('VAFB SLC-4E',), ('KSC LC-39A',), ('CCAFS SLC-40',)]

0.3.2 Task 2

Display 5 records where launch sites begin with the string 'CCA'

```
[13]: #Display 5 records where launch sites begin with the string 'CCA'

      %sql SELECT * FROM SPACEXTABLE WHERE "Launch_Site" LIKE 'CCA%' LIMIT 5;
```

```
 * sqlite:///my_data1.db
Done.
```

[13]: [('2010-06-04', '18:45:00', 'F9 v1.0 B0003', 'CCAFS LC-40', 'Dragon Spacecraft
      Qualification Unit', 0, 'LEO', 'SpaceX', 'Success', 'Failure (parachute)'),
       ('2010-12-08', '15:43:00', 'F9 v1.0 B0004', 'CCAFS LC-40', 'Dragon demo flight
      C1, two CubeSats, barrel of Brouere cheese', 0, 'LEO (ISS)', 'NASA (COTS) NRO',
      'Success', 'Failure (parachute)'),
       ('2012-05-22', '7:44:00', 'F9 v1.0 B0005', 'CCAFS LC-40', 'Dragon demo flight
      C2', 525, 'LEO (ISS)', 'NASA (COTS)', 'Success', 'No attempt'),
       ('2012-10-08', '0:35:00', 'F9 v1.0 B0006', 'CCAFS LC-40', 'SpaceX CRS-1', 500,
      'LEO (ISS)', 'NASA (CRS)', 'Success', 'No attempt'),
       ('2013-03-01', '15:10:00', 'F9 v1.0 B0007', 'CCAFS LC-40', 'SpaceX CRS-2',
      677, 'LEO (ISS)', 'NASA (CRS)', 'Success', 'No attempt')]

0.3.3 Task 3

Display the total payload mass carried by boosters launched by NASA (CRS)

```
[14]: # Display the total payload mass carried by boosters launched by NASA (CRS)

      %sql SELECT SUM("PAYLOAD_MASS__KG_") AS Total_Payload_Mass FROM SPACEXTABLE␣
       ↪WHERE "Customer" = 'NASA (CRS)';
```

 * sqlite:///my_data1.db
Done.

[14]: [(45596,)]

0.3.4 Task 4

Display average payload mass carried by booster version F9 v1.1

```
[15]: %sql SELECT AVG("PAYLOAD_MASS__KG_") AS Avg_Payload_Mass FROM SPACEXTABLE WHERE␣
       ↪"Booster_Version" = 'F9 v1.1';
```

 * sqlite:///my_data1.db
Done.

[15]: [(2928.4,)]

0.3.5 Task 5

List the date when the first succesful landing outcome in ground pad was acheived.
Hint:Use min function

```
[16]: %sql SELECT MIN("Date") AS First_Successful_RTLS FROM SPACEXTABLE WHERE␣
       ↪"Landing_Outcome" LIKE 'Succes%';
```

 * sqlite:///my_data1.db
Done.

[16]: [('2015-12-22',)]

```
[17]: %sql SELECT DISTINCT "Landing_Outcome" FROM SPACEXTABLE;
```

```
 * sqlite:///my_data1.db
Done.
```

[17]: [('Failure (parachute)',),
      ('No attempt',),
      ('Uncontrolled (ocean)',),
      ('Controlled (ocean)',),
      ('Failure (drone ship)',),
      ('Precluded (drone ship)',),
      ('Success (ground pad)',),
      ('Success (drone ship)',),
      ('Success',),
      ('Failure',),
      ('No attempt ',)]

0.3.6 Task 6

List the names of the boosters which have success in drone ship and have payload mass greater than 4000 but less than 6000

[35]: ```
%sql SELECT "Booster_Version" FROM SPACEXTABLE WHERE "Landing_Outcome" =␣
 ↪'Success (drone ship)' AND "PAYLOAD_MASS__KG_" BETWEEN 4000 AND 6000;
```

```
 * sqlite:///my_data1.db
Done.
```

[35]: [('F9 FT B1022',), ('F9 FT B1026',), ('F9 FT B1021.2',), ('F9 FT B1031.2',)]

0.3.7 Task 7

List the total number of successful and failure mission outcomes

[38]: ```
%sql SELECT "Landing_Outcome", COUNT(*) AS Total FROM SPACEXTABLE GROUP BY␣
 ↪"Landing_Outcome";
```

```
 * sqlite:///my_data1.db
Done.
```

[38]: [('Controlled (ocean)', 5),
      ('Failure', 3),
      ('Failure (drone ship)', 5),
      ('Failure (parachute)', 2),
      ('No attempt', 21),
      ('No attempt ', 1),
      ('Precluded (drone ship)', 1),
      ('Success', 38),
      ('Success (drone ship)', 14),
      ('Success (ground pad)', 9),
      ('Uncontrolled (ocean)', 2)]

0.3.8 Task 8

List all the booster_versions that have carried the maximum payload mass, using a subquery with a suitable aggregate function.

```sql
[40]: %sql SELECT "Booster_Version", "PAYLOAD_MASS__KG_" FROM SPACEXTABLE WHERE␣
      ↪"PAYLOAD_MASS__KG_" = (SELECT MAX("PAYLOAD_MASS__KG_") FROM SPACEXTABLE);
```

```
 * sqlite:///my_data1.db
Done.
```

```
[40]: [('F9 B5 B1048.4', 15600),
       ('F9 B5 B1049.4', 15600),
       ('F9 B5 B1051.3', 15600),
       ('F9 B5 B1056.4', 15600),
       ('F9 B5 B1048.5', 15600),
       ('F9 B5 B1051.4', 15600),
       ('F9 B5 B1049.5', 15600),
       ('F9 B5 B1060.2 ', 15600),
       ('F9 B5 B1058.3 ', 15600),
       ('F9 B5 B1051.6', 15600),
       ('F9 B5 B1060.3', 15600),
       ('F9 B5 B1049.7 ', 15600)]
```

0.3.9 Task 9

List the records which will display the month names, failure landing_outcomes in drone ship ,booster versions, launch_site for the months in year 2015. Note: SQLLite does not support monthnames. So you need to use substr(Date, 6,2) as month to get the months and substr(Date,0,5)='2015' for year.

```sql
[41]: %sql SELECT substr("Date", 6, 2) AS Month, "Booster_Version", "Launch_Site",␣
      ↪"Landing_Outcome" FROM SPACEXTABLE WHERE substr("Date", 1, 4) = '2015' AND␣
      ↪"Landing_Outcome" = 'Failure (drone ship)'
```

```
 * sqlite:///my_data1.db
Done.
```

```
[41]: [('01', 'F9 v1.1 B1012', 'CCAFS LC-40', 'Failure (drone ship)'),
       ('04', 'F9 v1.1 B1015', 'CCAFS LC-40', 'Failure (drone ship)')]
```

0.3.10 Task 10

Rank the count of landing outcomes (such as Failure (drone ship) or Success (ground pad)) between the date 2010-06-04 and 2017-03-20, in descending order.

```sql
[43]: %sql SELECT "Landing_Outcome", COUNT(*) AS Total FROM SPACEXTABLE WHERE "Date"␣
      ↪BETWEEN '2010-06-04' AND '2017-03-20'GROUP BY "Landing_Outcome" ORDER BY␣
      ↪Total DESC;
```

```
 * sqlite:///my_data1.db
Done.
```

```
[43]: [('No attempt', 10),
       ('Success (drone ship)', 5),
       ('Failure (drone ship)', 5),
       ('Success (ground pad)', 3),
       ('Controlled (ocean)', 3),
       ('Uncontrolled (ocean)', 2),
       ('Failure (parachute)', 2),
       ('Precluded (drone ship)', 1)]
```

0.3.11 Reference Links

- Hands-on Lab : String Patterns, Sorting and Grouping

- Hands-on Lab: Built-in functions

- Hands-on Lab : Sub-queries and Nested SELECT Statements

- Hands-on Tutorial: Accessing Databases with SQL magic

- Hands-on Lab: Analyzing a real World Data Set

0.4 Author(s)

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0.5 Other Contributors

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