Assignment: SQL Notebook for Peer Assignment

Estimated time needed: **60** minutes.

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

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.

Download the datasets

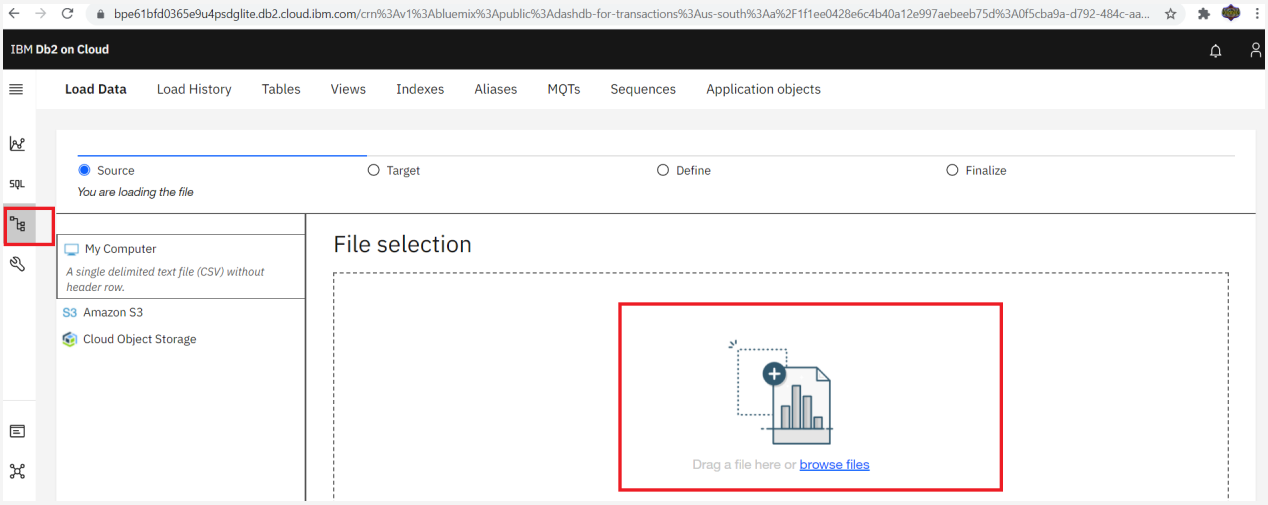
This assignment requires you to load the spacex dataset.

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):

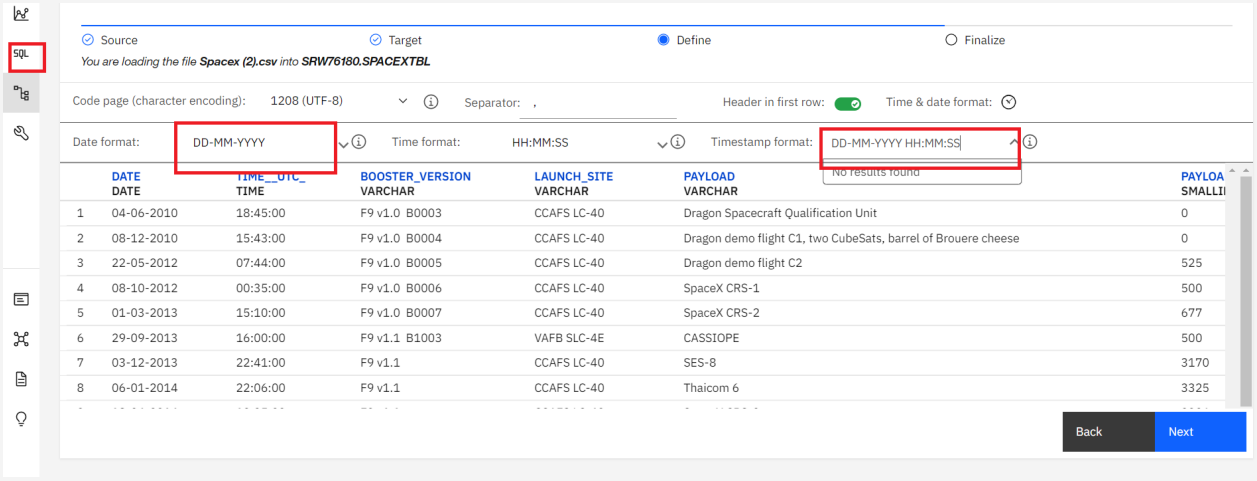
Spacex DataSet

Navigate to the Go to UI screen

- Refer to this insruction in this link for viewing the Go to UI screen.
- Later click on **Data link(below SQL)** in the Go to UI screen and click on **Load Data** tab.
- Later browse for the downloaded spacex file.



- Once done select the schema andload the file.



In [23]:
```
!pip install sqlalchemy==1.3.9
!pip install ibm_db_sa
!pip install ipython-sql
```

```
Requirement already satisfied: sqlalchemy==1.3.9 in /opt/conda/envs/Python-3.10/
lib/python3.10/site-packages (1.3.9)
Requirement already satisfied: ibm_db_sa in /opt/conda/envs/Python-3.10/lib/pyth
on3.10/site-packages (0.3.8)
Requirement already satisfied: ibm-db>=2.0.0 in /opt/conda/envs/Python-3.10/lib/
python3.10/site-packages (from ibm_db_sa) (3.1.3)
Requirement already satisfied: sqlalchemy>=0.7.3 in /opt/conda/envs/Python-3.10/
lib/python3.10/site-packages (from ibm_db_sa) (1.3.9)
Requirement already satisfied: ipython-sql in /opt/conda/envs/Python-3.10/lib/py
thon3.10/site-packages (0.4.1)
Requirement already satisfied: prettytable<1 in /opt/conda/envs/Python-3.10/lib/
python3.10/site-packages (from ipython-sql) (0.7.2)
Requirement already satisfied: ipython-genutils>=0.1.0 in /opt/conda/envs/Python
-3.10/lib/python3.10/site-packages (from ipython-sql) (0.2.0)
Requirement already satisfied: sqlparse in /opt/conda/envs/Python-3.10/lib/pytho
n3.10/site-packages (from ipython-sql) (0.4.3)
Requirement already satisfied: six in /opt/conda/envs/Python-3.10/lib/python3.10
/site-packages (from ipython-sql) (1.16.0)
Requirement already satisfied: sqlalchemy>=0.6.7 in /opt/conda/envs/Python-3.10/
lib/python3.10/site-packages (from ipython-sql) (1.3.9)
Requirement already satisfied: ipython>=1.0 in /opt/conda/envs/Python-3.10/lib/p
ython3.10/site-packages (from ipython-sql) (8.4.0)
Requirement already satisfied: jedi>=0.16 in /opt/conda/envs/Python-3.10/lib/pyt
hon3.10/site-packages (from ipython>=1.0->ipython-sql) (0.18.1)
Requirement already satisfied: pygments>=2.4.0 in /opt/conda/envs/Python-3.10/li
b/python3.10/site-packages (from ipython>=1.0->ipython-sql) (2.11.2)
Requirement already satisfied: pickleshare in /opt/conda/envs/Python-3.10/lib/py
thon3.10/site-packages (from ipython>=1.0->ipython-sql) (0.7.5)
Requirement already satisfied: backcall in /opt/conda/envs/Python-3.10/lib/pytho
n3.10/site-packages (from ipython>=1.0->ipython-sql) (0.2.0)
Requirement already satisfied: prompt-toolkit!=3.0.0,!=3.0.1,<3.1.0,>=2.0.0 in /
opt/conda/envs/Python-3.10/lib/python3.10/site-packages (from ipython>=1.0->ipyt
hon-sql) (3.0.20)
Requirement already satisfied: matplotlib-inline in /opt/conda/envs/Python-3.10/
lib/python3.10/site-packages (from ipython>=1.0->ipython-sql) (0.1.6)
Requirement already satisfied: setuptools>=18.5 in /opt/conda/envs/Python-3.10/l
ib/python3.10/site-packages (from ipython>=1.0->ipython-sql) (63.4.1)
Requirement already satisfied: decorator in /opt/conda/envs/Python-3.10/lib/pyth
on3.10/site-packages (from ipython>=1.0->ipython-sql) (5.1.1)
Requirement already satisfied: pexpect>4.3 in /opt/conda/envs/Python-3.10/lib/py
thon3.10/site-packages (from ipython>=1.0->ipython-sql) (4.8.0)
Requirement already satisfied: traitlets>=5 in /opt/conda/envs/Python-3.10/lib/p
ython3.10/site-packages (from ipython>=1.0->ipython-sql) (5.1.1)
Requirement already satisfied: stack-data in /opt/conda/envs/Python-3.10/lib/pyt
hon3.10/site-packages (from ipython>=1.0->ipython-sql) (0.2.0)
Requirement already satisfied: parso<0.9.0,>=0.8.0 in /opt/conda/envs/Python-3.1
0/lib/python3.10/site-packages (from jedi>=0.16->ipython>=1.0->ipython-sql) (0.8
.3)
Requirement already satisfied: ptyprocess>=0.5 in /opt/conda/envs/Python-3.10/li
b/python3.10/site-packages (from pexpect>4.3->ipython>=1.0->ipython-sql) (0.7.0)
Requirement already satisfied: wcwidth in /opt/conda/envs/Python-3.10/lib/python
3.10/site-packages (from prompt-toolkit!=3.0.0,!=3.0.1,<3.1.0,>=2.0.0->ipython>=
1.0->ipython-sql) (0.2.5)
Requirement already satisfied: pure-eval in /opt/conda/envs/Python-3.10/lib/pyth
on3.10/site-packages (from stack-data->ipython>=1.0->ipython-sql) (0.2.2)
Requirement already satisfied: executing in /opt/conda/envs/Python-3.10/lib/pyth
on3.10/site-packages (from stack-data->ipython>=1.0->ipython-sql) (0.8.3)
Requirement already satisfied: asttokens in /opt/conda/envs/Python-3.10/lib/pyth
on3.10/site-packages (from stack-data->ipython>=1.0->ipython-sql) (2.0.5)
```

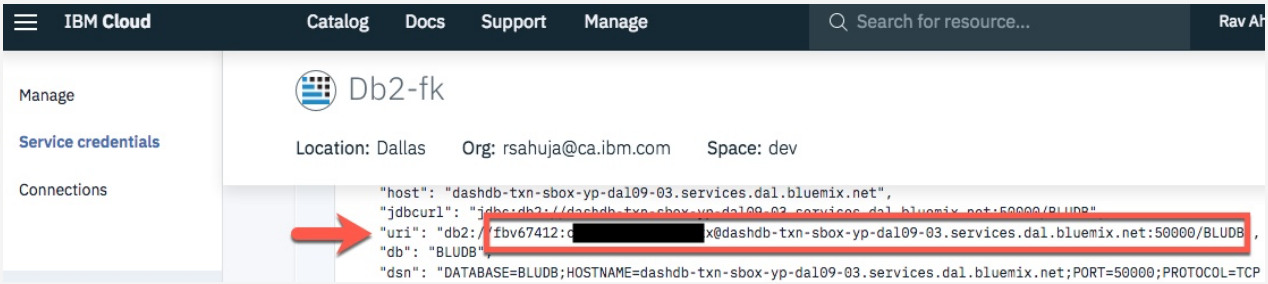
Connect to the database

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

In [24]:
```
%reload_ext sql
```

DB2 magic in case of old UI service credentials.

In the next cell enter your db2 connection string. Recall you created Service Credentials for your Db2 instance before. From the **uri** field of your Db2 service credentials copy everything after db2:// (except the double quote at the end) and paste it in the cell below after ibm_db_sa://



in the following format

%sql ibm_db_sa://my-username:my-password@my-hostname:my-port/my-db-name

DB2 magic in case of new UI service credentials.

- Use the following format.
- Add security=SSL at the end

%sql ibm_db_sa://my-username:my-password@my-hostname:my-port/my-db-name?security=SSL

In [25]:
```
%sql ibm_db_sa://mgb67380:sZHs8AXjMCRJsSvf@98538591-7217-4024-b027-8baa776ffad1.
```

In [ ]:
```
```

In [26]:
```
%sql ibm_db_sa://
```

Tasks

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

Task 1

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

In [27]:
```
%sql select Unique(LAUNCH_SITE) from SPACEXTBL;
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[27]:

launch_site
CCAFS LC-40
CCAFS SLC-40
KSC LC-39A
VAFB SLC-4E

Task 2

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

In [50]:
```
%sql select LAUNCH_SITE from SPACEXTBL where (LAUNCH_SITE) like 'CCA%' limit 5;
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[50]:

launch_site
CCAFS LC-40
CCAFS LC-40
CCAFS LC-40
CCAFS LC-40
CCAFS LC-40

Task 3

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

In [49]:
```
sql select sum (PAYLOAD_MASS__KG_) from SPACEXTBL where CUSTOMER='NASA (CRS)'
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[49]:

1
45596

Task 4

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

In [51]:
```
sql select avg(PAYLOAD_MASS__KG_) from SPACEXTBL where booster_version like 'F9
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[51]:

1
2534

Task 5

List the date when the first successful landing outcome in ground pad was acheived.

Hint:Use min function

In [59]:
```
sql select min(Date) from SPACEXTBL where LANDING__OUTCOME = 'Success (ground pa
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[59]:

1
2015-12-22

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

In [53]:
```
sql select distinct BOOSTER_VERSION from SPACEXTBL where PAYLOAD_MASS__KG_ betwe
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[53]:

booster_version
F9 FT B1021.2
F9 FT B1031.2
F9 FT B1022
F9 FT B1026

Task 7

List the total number of successful and failure mission outcomes

In [54]:
```
sql select MISSION_OUTCOME, count(*) from SPACEXTBL group by MISSION_OUTCOME
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[54]:

mission_outcome	2
Failure (in flight)	1
Success	99
Success (payload status unclear)	1

Task 8

List the names of the booster_versions which have carried the maximum payload mass. Use a subquery

In [55]:
```
sql select BOOSTER_VERSION,PAYLOAD_MASS__KG_ from SPACEXTBL where PAYLOAD_MASS__
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[55]:

booster_version	payload_mass__kg_
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

Task 9

List the failed landing_outcomes in drone ship, their booster versions, and launch site names for in year 2015

In [58]:
```
sql select BOOSTER_VERSION, LAUNCH_SITE from SPACEXTBL where LANDING__OUTCOME='F
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[58]:

booster_version	launch_site
F9 v1.1 B1012	CCAFS LC-40
F9 v1.1 B1015	CCAFS LC-40

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

In [57]:
```
sql select LANDING__OUTCOME, count(*) as qty from SPACEXTBL where Date between '
```

```
 * ibm_db_sa://mgb67380:***@98538591-7217-4024-b027-8baa776ffad1.c3n41cmd0nqnrk3
9u98g.databases.appdomain.cloud:30875/bludb
Done.
```

Out[57]:

landing__outcome	qty
No attempt	10
Failure (drone ship)	5
Success (drone ship)	5
Controlled (ocean)	3
Success (ground pad)	3
Failure (parachute)	2
Uncontrolled (ocean)	2
Precluded (drone ship)	1

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

Author(s)

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Other Contributors

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Change log

Date	Version	Changed by	Change Description
2021-10-12	0.4	Lakshmi Holla	Changed markdown
2021-08-24	0.3	Lakshmi Holla	Added library update
2021-07-09	0.2	Lakshmi Holla	Changes made in magic sql
2021-05-20	0.1	Lakshmi Holla	Created Initial Version