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

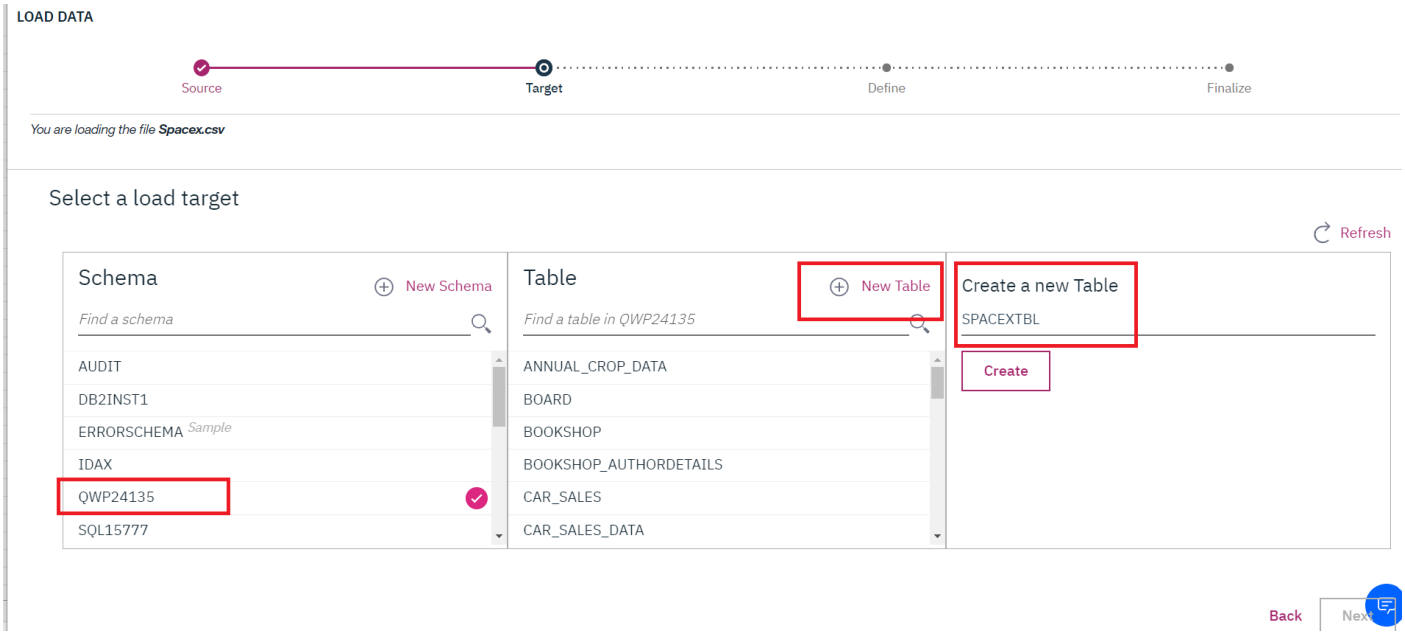
This assignment requires you to load the spacex dataset.

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 (https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-SkillsNetwork/labs/module_2/data/Spacex.csv?utm_medium=Exinfluencer&utm_source=Exinfluencer&utm_content=000026UJ&utm_term=10006555&utm_id=NA-SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2021-01-01)

Store the dataset in database table

it is highly recommended to manually load the table using the database console LOAD tool in DB2.



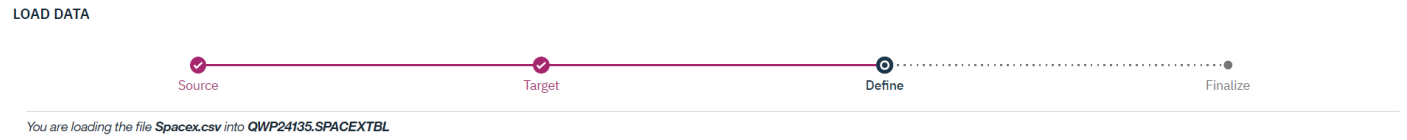
Now open the Db2 console, open the LOAD tool, Select / Drag the .CSV file for the dataset, Next create a New Table, and then follow the steps on-screen instructions to load the data. Name the new table as follows:

SPACEXDATASET

Follow these steps while using old DB2 UI which is having Open Console Screen

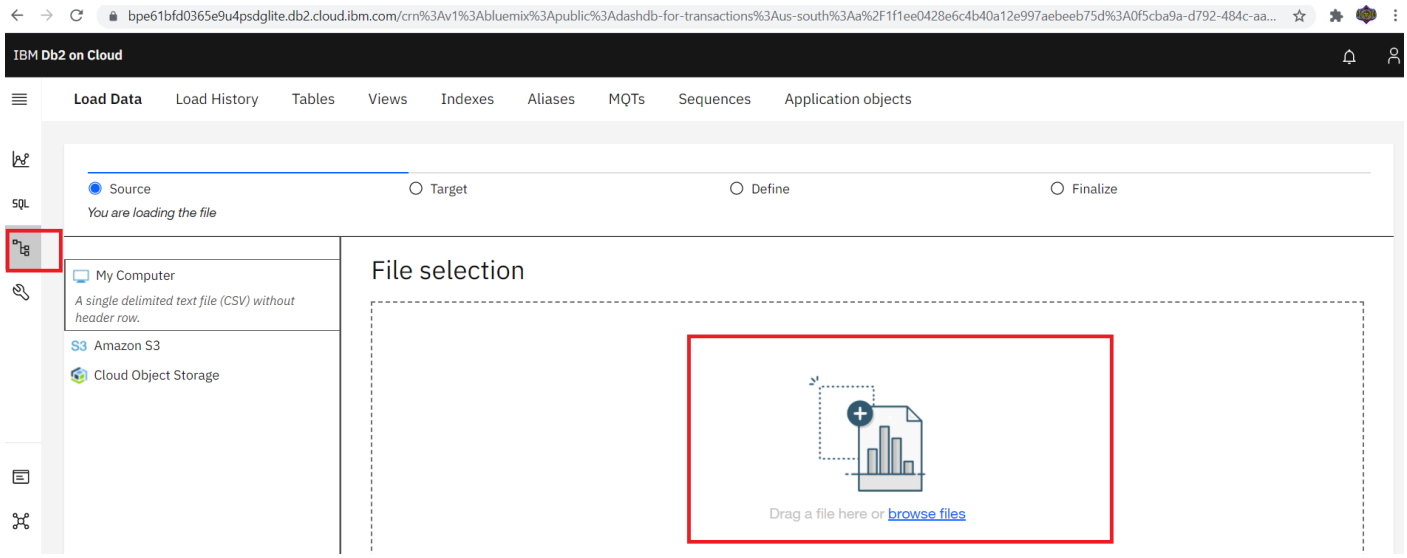
Note:While loading Spacex dataset, ensure that detect datatypes is disabled. Later click on the pencil icon(edit option).

1. Change the Date Format by manually typing DD-MM-YYYY and timestamp format as DD-MM-YYYY HH\:MM:SS
2. Change the PAYLOAD*MASS*_KG_ datatype to INTEGER.

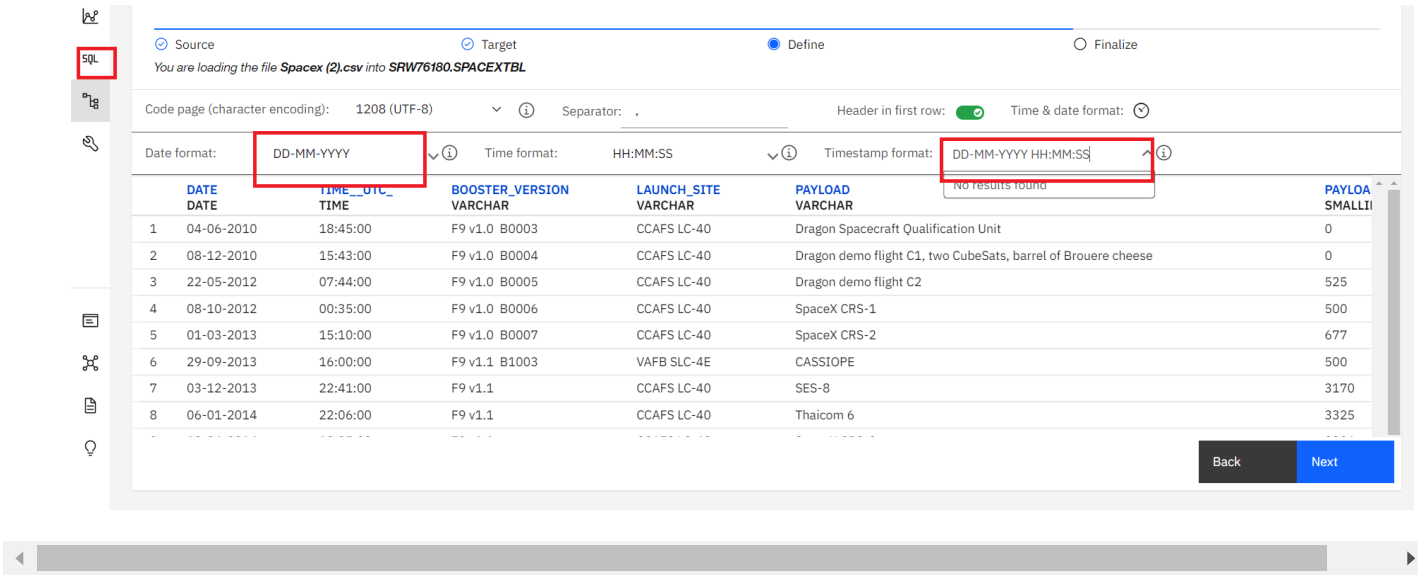


Changes to be considered when having DB2 instance with the new UI having Go to UI screen

- Refer to this insruction in this link (https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Sign%20up%20for%20IBM%20Cloud%20-%20Create%20Db2%20service%20instance%20-%20Get%20started%20with%20the%20Db2%20console/instructional-labs.md.html?utm_medium=Exinfluencer&utm_source=Exinfluencer&utm_content=000026UJ&utm_term=10006555&utm_id=SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2021-01-01) for viewing the new 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 [1]:

```
!pip install sqlalchemy==1.3.9
!pip install ibm_db_sa
!pip install ipython-sql
```

```
Requirement already satisfied: sqlalchemy==1.3.9 in /home/jupyterlab/conda/en
vs/python/lib/python3.6/site-packages (1.3.9)
Requirement already satisfied: ibm_db_sa in /home/jupyterlab/conda/envs/pytho
n/lib/python3.6/site-packages (0.3.3)
Requirement already satisfied: sqlalchemy>=0.7.3 in /home/jupyterlab/conda/en
vs/python/lib/python3.6/site-packages (from ibm_db_sa) (1.3.9)
Requirement already satisfied: ipython-sql in /home/jupyterlab/conda/envs/pyt
hon/lib/python3.6/site-packages (0.3.9)
Requirement already satisfied: ipython>=1.0 in /home/jupyterlab/conda/envs/py
thon/lib/python3.6/site-packages (from ipython-sql) (7.16.1)
Requirement already satisfied: sqlparse in /home/jupyterlab/conda/envs/pytho
n/lib/python3.6/site-packages (from ipython-sql) (0.4.1)
Requirement already satisfied: prettytable in /home/jupyterlab/conda/envs/pyt
hon/lib/python3.6/site-packages (from ipython-sql) (2.1.0)
Requirement already satisfied: sqlalchemy>=0.6.7 in /home/jupyterlab/conda/en
vs/python/lib/python3.6/site-packages (from ipython-sql) (1.3.9)
Requirement already satisfied: six in /home/jupyterlab/conda/envs/python/lib/
python3.6/site-packages (from ipython-sql) (1.15.0)
Requirement already satisfied: ipython-genutils>=0.1.0 in /home/jupyterlab/co
nda/envs/python/lib/python3.6/site-packages (from ipython-sql) (0.2.0)
Requirement already satisfied: decorator in /home/jupyterlab/conda/envs/pytho
n/lib/python3.6/site-packages (from ipython>=1.0->ipython-sql) (4.4.2)
Requirement already satisfied: backcall in /home/jupyterlab/conda/envs/pytho
n/lib/python3.6/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 i
n /home/jupyterlab/conda/envs/python/lib/python3.6/site-packages (from ipytho
n>=1.0->ipython-sql) (3.0.19)
Requirement already satisfied: pexpect; sys_platform != "win32" in /home/jupy
terlab/conda/envs/python/lib/python3.6/site-packages (from ipython>=1.0->ipyt
hon-sql) (4.8.0)
Requirement already satisfied: pygments in /home/jupyterlab/conda/envs/pytho
n/lib/python3.6/site-packages (from ipython>=1.0->ipython-sql) (2.9.0)
Requirement already satisfied: traitlets>=4.2 in /home/jupyterlab/conda/envs/
python/lib/python3.6/site-packages (from ipython>=1.0->ipython-sql) (4.3.3)
Requirement already satisfied: jedi>=0.10 in /home/jupyterlab/conda/envs/pyth
on/lib/python3.6/site-packages (from ipython>=1.0->ipython-sql) (0.17.2)
Requirement already satisfied: pickleshare in /home/jupyterlab/conda/envs/pyt
hon/lib/python3.6/site-packages (from ipython>=1.0->ipython-sql) (0.7.5)
Requirement already satisfied: setuptools>=18.5 in /home/jupyterlab/conda/env
s/python/lib/python3.6/site-packages (from ipython>=1.0->ipython-sql) (49.6.
0.post20210108)
Requirement already satisfied: wcwidth in /home/jupyterlab/conda/envs/python/
lib/python3.6/site-packages (from prettytable->ipython-sql) (0.2.5)
Requirement already satisfied: importlib-metadata; python_version < "3.8" in
/home/jupyterlab/conda/envs/python/lib/python3.6/site-packages (from prettyta
ble->ipython-sql) (4.6.1)
Requirement already satisfied: ptyprocess>=0.5 in /home/jupyterlab/conda/env
s/python/lib/python3.6/site-packages (from pexpect; sys_platform != "win32"->
ipython>=1.0->ipython-sql) (0.7.0)
Requirement already satisfied: parso<0.8.0,>=0.7.0 in /home/jupyterlab/conda/
envs/python/lib/python3.6/site-packages (from jedi>=0.10->ipython>=1.0->ipyth
on-sql) (0.7.1)
Requirement already satisfied: zipp>=0.5 in /home/jupyterlab/conda/envs/pytho
n/lib/python3.6/site-packages (from importlib-metadata; python_version < "3.
8"->prettytable->ipython-sql) (3.5.0)
Requirement already satisfied: typing-extensions>=3.6.4; python_version < "3.
8" in /home/jupyterlab/conda/envs/python/lib/python3.6/site-packages (from im
```

```
portlib-metadata; python_version < "3.8"->prettytable->ipython-sql) (3.10.0.
0)
```

Connect to the database

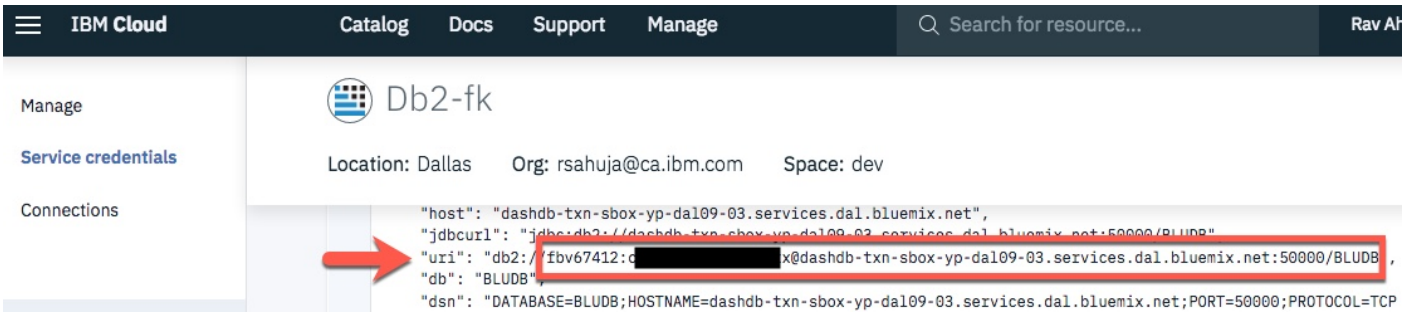
Let us first load the SQL extension and establish a connection with the database

In [2]:

```
%load_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 [ ]:

In [ ]:

In [6]:

```
%sql ibm_db_sa://jgl54010:t5rx38n6nr%2Btnv8w@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.net:50000/BLUDB?security=SSL
```

```
(ibm_db_dbi.OperationalError) ibm_db_dbi::OperationalError: [IBM][CLI Driver] SQL30081N  A communication error has been detected. Communication protocol being used: "SSL".  Communication API being used: "SOCKETS".  Location where the error was detected: "".  Communication function detecting the error: "sqlccSSLSocketSetup".  Protocol specific error code(s): "420", "*", "*".  SQLSTATE=08001 SQLCODE=-30081
(Background on this error at: http://sqlalche.me/e/e3q8)
Connection info needed in SQLAlchemy format, example:
               postgresql://username:password@hostname/dbname
               or an existing connection: dict_keys(['ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.net:50000/BLUDB'])
```

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 [7]:

```
%sql select DISTINCT(UCASE(LAUNCH_SITE)) from SPACEXTBL
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.net:50000/BLUDB
Done.
```

Out[7]:

1
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 [18]:

```
%sql select LAUNCH_SITE from SPACEXTBL where (LAUNCH_SITE) LIKE 'CCA%' LIMIT 5
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[18]:

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 [24]:

```
%sql select SUM(PAYLOAD_MASS__KG_) from SPACEXTBL where CUSTOMER='NASA (CRS)'
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[24]:

1
45596

Task 4

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

In [25]:

```
%sql select AVG(PAYLOAD_MASS__KG_) from SPACEXTBL where BOOSTER_VERSION='F9 v1.1'
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[25]:

1
2928.400000

Task 5

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

Hint:Use min function

In [46]:

```
%sql select MIN (DATE) from SPACEXTBL where LANDING__OUTCOME = 'Success (ground pad)'
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[46]:

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 [103]:

```
%sql select BOOSTER_VERSION, PAYLOAD_MASS__KG_ from SPACEXTBL where LANDING__OUTCOME = 'Su
ccess (drone ship)' and PAYLOAD_MASS__KG_ \
BETWEEN 4000 and 6000
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[103]:

booster_version	payload_mass__kg_
F9 FT B1022	4696
F9 FT B1026	4600
F9 FT B1021.2	5300
F9 FT B1031.2	5200

Task 7

List the total number of successful and failure mission outcomes

In [58]:

```
%sql select COUNT(*) from SPACEXTBL where (MISSION_OUTCOME) LIKE 'Success%'
# %sql select COUNT(*) from SPACEXTBL where (MISSION_OUTCOME) LIKE 'Failure%'
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[58]:

1
100

Task 8

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

In [61]:

```
%sql select BOOSTER_VERSION from SPACEXTBL where PAYLOAD_MASS__KG_ = (select Max(PAYLOAD_M
ASS__KG_) from SPACEXTBL)
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[61]:

booster_version
F9 B5 B1048.4
F9 B5 B1049.4
F9 B5 B1051.3
F9 B5 B1056.4
F9 B5 B1048.5
F9 B5 B1051.4
F9 B5 B1049.5
F9 B5 B1060.2
F9 B5 B1058.3
F9 B5 B1051.6
F9 B5 B1060.3
F9 B5 B1049.7

Task 9

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

In [70]:

```
%sql select BOOSTER_VERSION, LAUNCH_SITE, LANDING__OUTCOME, DATE from SPACEXTBL where LAND
ING__OUTCOME ='Failure (drone ship)' and YEAR(DATE) < 2016
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[70]:

booster_version	launch_site	landing__outcome	DATE
F9 v1.1 B1012	CCAFS LC-40	Failure (drone ship)	2015-01-10
F9 v1.1 B1015	CCAFS LC-40	Failure (drone ship)	2015-04-14

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 [102]:

```
%sql select count(LANDING__OUTCOME), LANDING__OUTCOME from SPACEXTBL where DATE BETWEEN '2
010-06-04' and '2017-03-20' GROUP BY LANDING__OUTCOME \
ORDER BY Count DESC
```

```
 * ibm_db_sa://jgl54010:***@dashdb-txn-sbox-yp-dal09-08.services.dal.bluemix.
net:50000/BLUDB
Done.
```

Out[102]:

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

Reference Links

- Hands-on Lab : String Patterns, Sorting and Grouping (https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20String%20Patterns%20-%20Sorting%20-%20Grouping/instructional-labs.md.html?utm_medium=Exinfluencer&utm_source=Exinfluencer&utm_content=000026UJ&utm_term=10006555&utm_id SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2021-01-01&origin=www.coursera.org)
- Hands-on Lab: Built-in functions (https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Built-in%20functions%20/Hands-on_Lab__Built-in_Functions.md.html?utm_medium=Exinfluencer&utm_source=Exinfluencer&utm_content=000026UJ&utm_term=10006555&utm_id SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2021-01-01&origin=www.coursera.org)
- Hands-on Lab : Sub-queries and Nested SELECT Statements (https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Labs_Coursera_V5/labs/Lab%20-%20Sub-queries%20and%20Nested%20SELECTs%20/instructional-labs.md.html?utm_medium=Exinfluencer&utm_source=Exinfluencer&utm_content=000026UJ&utm_term=10006555&utm_id SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2021-01-01&origin=www.coursera.org)
- Hands-on Tutorial: Accessing Databases with SQL magic (https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%205/DB0201EN-Week3-1-3-SQLmagic.ipynb?utm_medium=Exinfluencer&utm_source=Exinfluencer&utm_content=000026UJ&utm_term=10006555&utm_id SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2021-01-01)
- Hands-on Lab: Analyzing a real World Data Set (https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DB0201EN-SkillsNetwork/labs/Module%205/DB0201EN-Week3-1-4-Analyzing.ipynb?utm_medium=Exinfluencer&utm_source=Exinfluencer&utm_content=000026UJ&utm_term=10006555&utm_id SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2021-01-01)

Author(s)

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Other Contributors

Rav Ahuja

Change log

Date	Version	Changed by	Change Description
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