

(https://skills.network/?

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<u>SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2022-01-</u>

<u>01</u>)

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Space X Falcon 9 First Stage Landing Prediction

Assignment: SQL Notebook for Peer Assignment

Estimated time needed: 60 minutes

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

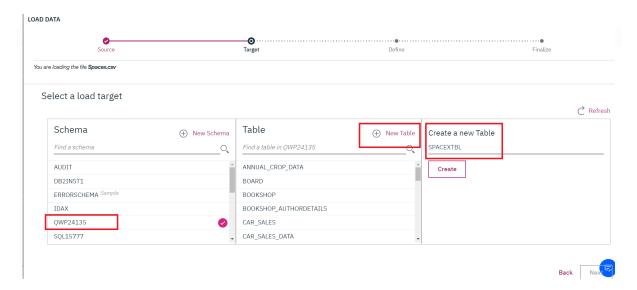
This assignment requires you to load the spacex dataset.

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):

<u>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=1000SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2022-01-01)</u>

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

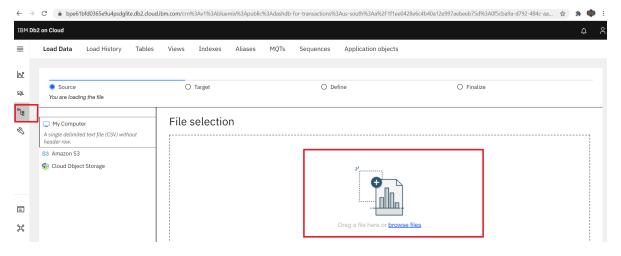
Note: While loading Spacex dataset, ensure that detect datatypes is disabled. Later click on the pencil icon(edit option).

- 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.

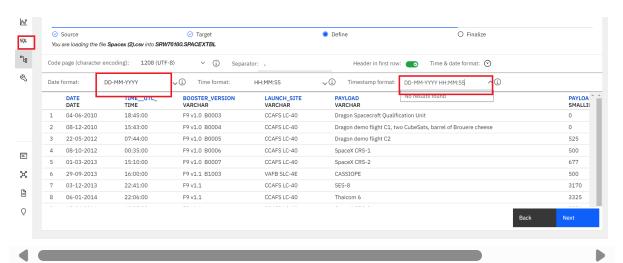


Changes to be considered when having DB2 instance with the new UI having Go to UI screen

- 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=1SkillsNetwork-Channel-SkillsNetworkCoursesIBMDS0321ENSkillsNetwork26802033-2022-01-01) 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.



Objectives

- Understand the Spacex DataSet
- Load the dataset into a table in a Db2 database
- Execute SQL queries to answer assignment questions

Import Libraries

```
In [1]:  | !pip install sqlalchemy==1.3.9
!pip install -q pandas==1.1.5
print("Installation complete.")
```

Requirement already satisfied: sqlalchemy==1.3.9 in /home/jupyterlab/cond a/envs/python/lib/python3.7/site-packages (1.3.9)
Installation complete.

Start Here

Connect to the database

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

```
In [2]: N %load_ext sql
print("Done.")
```

Done.

- In [4]:

 # Number of columns

 %sql SELECT colcount AS "Number of Columns" FROM syscat.tables WHERE tabna
 - * ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd 0tgtu0lqde00.databases.appdomain.cloud:32459/bludb Done.
 - Out[4]: Number of Columns

* $ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd0tgtu0lqde00.databases.appdomain.cloud:32459/bludbDone.$

Out[5]: Number of Rows

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In [6]: # Column names and info

%sql SELECT colno, colname, typename, length FROM syscat.columns WHERE tab

* $ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd0tgtu0lqde00.databases.appdomain.cloud:32459/bludbDone.$

Out[6]:	colno	colname	typename	length

•	•		
4	DATE	DATE	0
3	TIME	TIMEUTC_	1
14	VARCHAR	BOOSTER_VERSION	2
12	VARCHAR	LAUNCH_SITE	3
61	VARCHAR	PAYLOAD	4
2	SMALLINT	PAYLOAD_MASSKG_	5
11	VARCHAR	ORBIT	6
57	VARCHAR	CUSTOMER	7
32	VARCHAR	MISSION_OUTCOME	8
22	VARCHAR	LANDING_OUTCOME	9

^{*} $ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd0tgtu0lqde00.databases.appdomain.cloud:32459/bludbDone.$

Out[7]:	DATE	timeutc_	booster_version	launch_site	payload	payload_mass_	_kg_	orbit	cus
	2010- 06-04	18:45:00	F9 v1.0 B0003	CCAFS LC- 40	Dragon Spacecraft Qualification Unit		0	LEO	S
	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)	(
	2012- 05-22	07:44:00	F9 v1.0 B0005	CCAFS LC- 40	Dragon demo flight C2		525	LEO (ISS)	(
	2012- 10-08	00:35:00	F9 v1.0 B0006	CCAFS LC- 40	SpaceX CRS-1		500	LEO (ISS)	
	4								

Solve the Assignment Tasks

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"

Task 1

Task 1

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

In [8]: # Task 1 ANSWER
%sql SELECT DISTINCT LAUNCH_SITE FROM SPACEXDATASET;

* $ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd0tgtu0lqde00.databases.appdomain.cloud:32459/bludbDone.$

Out[8]: launch_site CCAFS LC-40 CCAFS SLC-40 KSC LC-39A VAFB SLC-4E Task

2

Task 2 Display 5 records where launch sites begin with the string 'CCA'

In [9]: # Task 2 ANSWER %sql SELECT * FROM SPACEXDATASET WHERE launch_site LIKE 'CCA%' LIMIT 5;

* $ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd0tgtu0lqde00.databases.appdomain.cloud:32459/bludbDone.$

Out[9]:	DATE	timeutc_	booster_version	launch_site	payload	payload_masskg_	orbit	cus
	2010- 06-04	18:45:00	F9 v1.0 B0003	CCAFS LC- 40	Dragon Spacecraft Qualification Unit	0	LEO	૬
	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)	(1
	2012- 05-22	07:44:00	F9 v1.0 B0005	CCAFS LC- 40	Dragon demo flight C2	525	LEO (ISS)	(
	2012- 10-08	00:35:00	F9 v1.0 B0006	CCAFS LC- 40	SpaceX CRS-1	500	LEO (ISS)	
	2013- 03-01	15:10:00	F9 v1.0 B0007	CCAFS LC- 40	SpaceX CRS-2	677	LEO (ISS)	
	4							

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

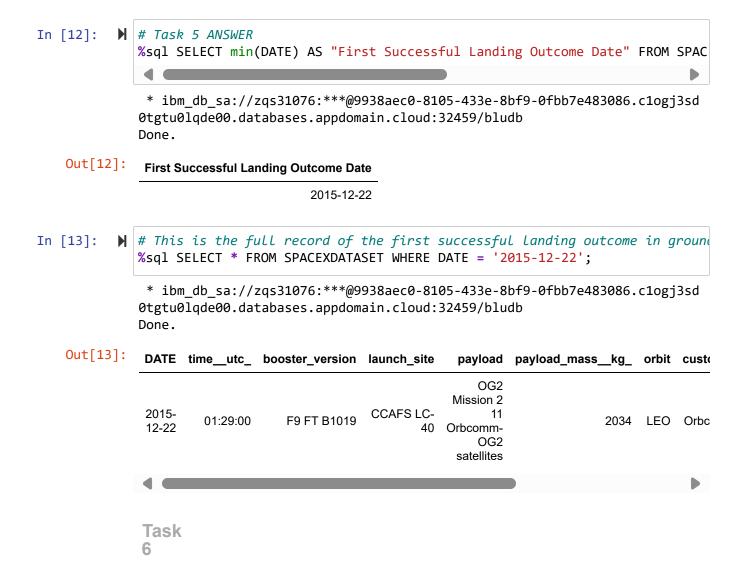
Task 4

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

Task 5

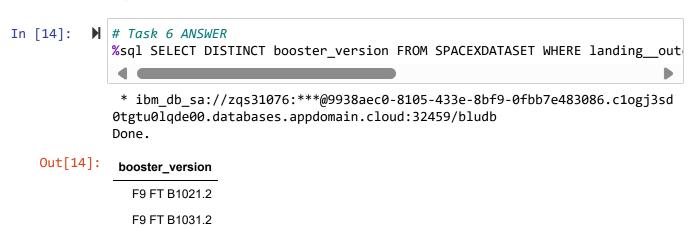
List the date when the first successful landing outcome in ground pad was achieved.

Hint:Use min function

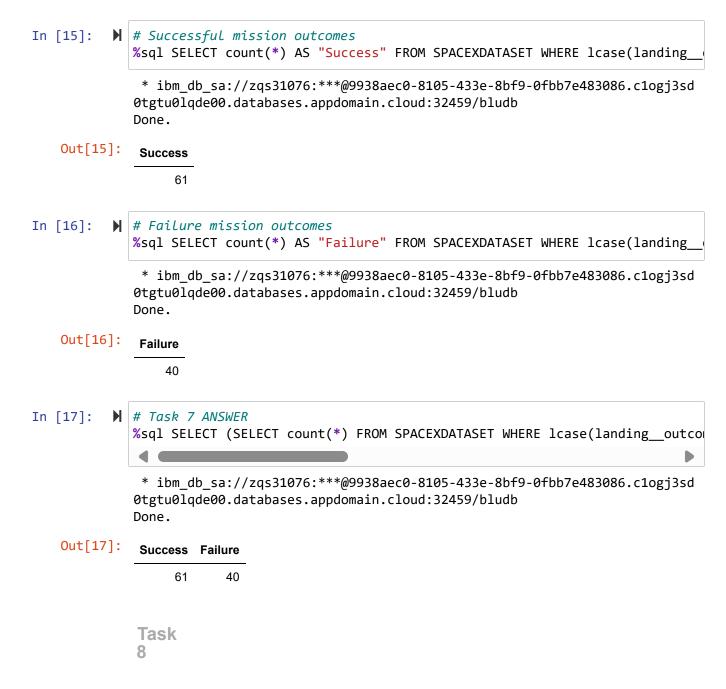


F9 FT B1022 F9 FT B1026

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



List the total number of successful and failure mission outcomes



Task 8

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

```
In [18]:
              # Maximum PayLoad Mass (kg)
              %sql SELECT max(payload_mass__kg_) AS "Max Payload Mass (kg)" FROM SPACEXD
               * ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.clogj3sd
              0tgtu0lqde00.databases.appdomain.cloud:32459/bludb
              Done.
    Out[18]:
               Max Payload Mass (kg)
                             15600
In [19]:
              # Task 8 ANSWER
              %sql SELECT booster_version, payload_mass__kg_ FROM SPACEXDATASET WHERE pa
               * ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.clogj3sd
              0tgtu0lqde00.databases.appdomain.cloud:32459/bludb
              Done.
    Out[19]:
               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 records which will display the month names, failure landing_outcomes in drone ship, booster versions, launch_site for the months in year 2015.

In [20]:

Number of Unique Launch Dates

%sql SELECT count(DISTINCT Date) AS "Number of Unique Launch Dates" FROM Second Sec

* ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd 0tgtu0lqde00.databases.appdomain.cloud:32459/bludb Done.

Out[20]: Number of Unique Launch Dates

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In [21]: # Selecting Year, Month, Day, and Day of week from 'Date' information.

%sql SELECT DATE, YEAR(DATE) AS "Year", MONTH(DATE) AS "Month", DAY(DATE)

* $ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd0tgtu0lqde00.databases.appdomain.cloud:32459/bludbDone.$

Out[21]:

DATE	Year	Month	Day	day_of_week
2010-06-04	2010	6	4	6
2010-12-08	2010	12	8	4
2012-05-22	2012	5	22	3
2012-10-08	2012	10	8	2
2013-03-01	2013	3	1	6

In [22]: # Selecting Year, Month, Day, and Day of week from 'Date' information.

%sql SELECT DATE, YEAR(DATE) AS "Year", MONTHNAME(DATE) AS "Month", DAY(DA

* ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd 0tgtu0lqde00.databases.appdomain.cloud:32459/bludb Done.

Out[22]:

day_of_week_1	day_of_week	Day	Month	Year	DATE
Friday	6	4	June	2010	2010-06-04
Wednesday	4	8	December	2010	2010-12-08
Tuesday	3	22	May	2012	2012-05-22
Monday	2	8	October	2012	2012-10-08
Friday	6	1	March	2013	2013-03-01

In [23]: ▶ # All Landing outcomes from 2015 %sql SELECT MONTHNAME(DATE) AS "Month", landing_outcome, booster_version,

> * ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.clogj3sd 0tgtu0lqde00.databases.appdomain.cloud:32459/bludb Done.

Out[23]:

Month	landing_outcome	booster_version	launch_site
January	Failure (drone ship)	F9 v1.1 B1012	CCAFS LC-40
February	Controlled (ocean)	F9 v1.1 B1013	CCAFS LC-40
March	No attempt	F9 v1.1 B1014	CCAFS LC-40
April	Failure (drone ship)	F9 v1.1 B1015	CCAFS LC-40
April	No attempt	F9 v1.1 B1016	CCAFS LC-40
June	Precluded (drone ship)	F9 v1.1 B1018	CCAFS LC-40
December	Success (ground pad)	F9 FT B1019	CCAFS LC-40

%sql SELECT MONTHNAME(DATE) AS "Month", landing_outcome, booster_version,

Out[24]:	Month	landing_outcome	booster_version	launch_site
	January	Failure (drone ship)	F9 v1.1 B1012	CCAFS LC-40
	April	Failure (drone ship)	F9 v1.1 B1015	CCAFS LC-40

Task 10

Task 10

Rank the count of successful landing_outcomes between the date 04-06-2010 and 20-03-2017 in descending order.

^{*} ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.clogj3sd 0tgtu0lqde00.databases.appdomain.cloud:32459/bludb Done.

In [25]: # Task 10 ANSWER
Rank the counts (of SUCCESSFUL Landing_outcomes between the date 04-06-20
%sql SELECT landing_outcome, count(landing_outcome) AS "Count" FROM SPAC

* $ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd0tgtu0lqde00.databases.appdomain.cloud:32459/bludbDone.$

Out[25]: landing_outcome Count Success (drone ship) 5 Success (ground pad) 3

In [26]: # PowerPoint Slide Answer (Includes all landing outcomes, not just the succeeding the succeeding and the succeeding that the counts (of ALL landing_outcomes between the date 04-06-2010 and sequence with the succeeding sequence of the succeeding sequence o

* ibm_db_sa://zqs31076:***@9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd 0tgtu0lqde00.databases.appdomain.cloud:32459/bludb Done.

Out[26]:	landing_outcome	Count
	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

End Here