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

```
In [1]:  !pip install sqlalchemy==1.3.9
```

```
Collecting sqlalchemy==1.3.9
  Downloading SQLAlchemy-1.3.9.tar.gz (6.0 MB)
  ──────────────────────────────── 6.0/6.0 MB 104.1 MB/s eta 0:00:00
  Preparing metadata (setup.py) ... one
Building wheels for collected packages: sqlalchemy
  Building wheel for sqlalchemy (setup.py) ...done
  Created wheel for sqlalchemy: filename=SQLAlchemy-1.3.9-cp312-cp312-linux_x86_64.whl size=1160111 sha256=9e316f084d72a4602c1091238f7ca7fa55e8f10e649951258d6e6ed4993d34d3
  Stored in directory: /home/jupyterlab/.cache/pip/wheels/b3/1c/42/0e26b8d512adc6bce10ff71a05229366b4ccec641cd3b42111
Successfully built sqlalchemy
Installing collected packages: sqlalchemy
  Attempting uninstall: sqlalchemy
    Found existing installation: SQLAlchemy 2.0.37
    Uninstalling SQLAlchemy-2.0.37:
      Successfully uninstalled SQLAlchemy-2.0.37
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.
jupyterhub 5.2.1 requires SQLAlchemy>=1.4.1, but you have sqlalchemy 1.3.9 which is incompatible.
Successfully installed sqlalchemy-1.3.9
```

Connect to the database

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

```
In [2]:  !pip install ipython-sql
         !pip install ipython-sql prettytable
```

```
Collecting ipython-sql
  Downloading ipython_sql-0.5.0-py3-none-any.whl.metadata (17 kB)
Collecting prettytable (from ipython-sql)
  Downloading prettytable-3.17.0-py3-none-any.whl.metadata (34 kB)
Requirement already satisfied: ipython in /opt/conda/lib/python3.12/site-packages (from ipython-sql) (8.31.0)
Collecting sqlalchemy>=2.0 (from ipython-sql)
  Downloading sqlalchemy-2.0.46-cp312-cp312-manylinux2014_x86_64.manylinux_2_17_x86_64.manylinux_2_28_x86_64.whl.metadata (9.5 kB)
Collecting sqlparse (from ipython-sql)
  Downloading sqlparse-0.5.5-py3-none-any.whl.metadata (4.7 kB)
Requirement already satisfied: six in /opt/conda/lib/python3.12/site-packages (from ipython-sql) (1.17.0)
Requirement already satisfied: ipython-genutils in /opt/conda/lib/python3.12/site-packages (from ipython-sql) (0.2.0)
Requirement already satisfied: greenlet>=1 in /opt/conda/lib/python3.12/site-packages (from sqlalchemy>=2.0->ipython-sql) (3.1.1)
Requirement already satisfied: typing-extensions>=4.6.0 in /opt/conda/lib/python3.12/site-packages (from sqlalchemy>=2.0->ipython-sql) (4.12.2)
Requirement already satisfied: decorator in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (5.1.1)
Requirement already satisfied: jedi>=0.16 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (0.19.2)
Requirement already satisfied: matplotlib-inline in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (0.1.7)
Requirement already satisfied: pexpect>4.3 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (4.9.0)
Requirement already satisfied: prompt_toolkit<3.1.0,>=3.0.41 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (3.0.50)
Requirement already satisfied: pygments>=2.4.0 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (2.19.1)
Requirement already satisfied: stack_data in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (0.6.3)
Requirement already satisfied: traitlets>=5.13.0 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (5.14.3)
Requirement already satisfied: wcwidth in /opt/conda/lib/python3.12/site-packages (from prettytable->ipython-sql) (0.2.13)
Requirement already satisfied: parso<0.9.0,>=0.8.4 in /opt/conda/lib/python3.12/site-packages (from jedi>=0.16->ipython->ipython-sql) (0.8.4)
Requirement already satisfied: ptyprocess>=0.5 in /opt/conda/lib/python3.12/site-packages (from pexpect>4.3->ipython->ipython-sql) (0.7.0)
Requirement already satisfied: executing>=1.2.0 in /opt/conda/lib/python3.12/site-packages (from stack_data->ipython->ipython-sql) (2.1.0)
Requirement already satisfied: asttokens>=2.1.0 in /opt/conda/lib/python3.12/site-packages (from stack_data->ipython->ipython-sql) (3.0.0)
Requirement already satisfied: pure_eval in /opt/conda/lib/python3.12/site-packages (from stack_data->ipython->ipython-sql) (0.2.3)
Downloading ipython_sql-0.5.0-py3-none-any.whl (20 kB)
Downloading sqlalchemy-2.0.46-cp312-cp312-manylinux2014_x86_64.manylinux_2_17_x86_64.manylinux_2_28_x86_64.whl (3.3 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 3.3/3.3 MB 122.2 MB/s eta 0:00:00
Downloading prettytable-3.17.0-py3-none-any.whl (34 kB)
Downloading sqlparse-0.5.5-py3-none-any.whl (46 kB)
Installing collected packages: sqlparse, sqlalchemy, prettytable, ipython-sql
  Attempting uninstall: sqlalchemy
    Found existing installation: SQLAlchemy 1.3.9
    Uninstalling SQLAlchemy-1.3.9:
      Successfully uninstalled SQLAlchemy-1.3.9
Successfully installed ipython-sql-0.5.0 prettytable-3.17.0 sqlalchemy-2.0.46 sqlparse-0.5.5
Requirement already satisfied: ipython-sql in /opt/conda/lib/python3.12/site-packages (0.5.0)
Requirement already satisfied: prettytable in /opt/conda/lib/python3.12/site-packages (3.17.0)
Requirement already satisfied: ipython in /opt/conda/lib/python3.12/site-packages (from ipython-sql) (8.31.0)
Requirement already satisfied: sqlalchemy>=2.0 in /opt/conda/lib/python3.12/site-packages (from ipython-sql) (2.0.46)
Requirement already satisfied: sqlparse in /opt/conda/lib/python3.12/site-packages (from ipython-sql) (0.5.5)
Requirement already satisfied: six in /opt/conda/lib/python3.12/site-packages (from ipython-sql) (1.17.0)
Requirement already satisfied: ipython-genutils in /opt/conda/lib/python3.12/site-packages (from ipython-sql) (0.2.0)
Requirement already satisfied: wcwidth in /opt/conda/lib/python3.12/site-packages (from prettytable) (0.2.13)
Requirement already satisfied: greenlet>=1 in /opt/conda/lib/python3.12/site-packages (from sqlalchemy>=2.0->ipython-sql) (3.1.1)
Requirement already satisfied: typing-extensions>=4.6.0 in /opt/conda/lib/python3.12/site-packages (from sqlalchemy>=2.0->ipython-sql) (4.12.2)
Requirement already satisfied: decorator in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (5.1.1)
Requirement already satisfied: jedi>=0.16 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (0.19.2)
Requirement already satisfied: matplotlib-inline in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (0.1.7)
Requirement already satisfied: pexpect>4.3 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (4.9.0)
Requirement already satisfied: prompt_toolkit<3.1.0,>=3.0.41 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (3.0.50)
Requirement already satisfied: pygments>=2.4.0 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (2.19.1)
Requirement already satisfied: stack_data in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (0.6.3)
Requirement already satisfied: traitlets>=5.13.0 in /opt/conda/lib/python3.12/site-packages (from ipython->ipython-sql) (5.14.3)
Requirement already satisfied: parso<0.9.0,>=0.8.4 in /opt/conda/lib/python3.12/site-packages (from jedi>=0.16->ipython->ipython-sql) (0.8.4)
Requirement already satisfied: ptyprocess>=0.5 in /opt/conda/lib/python3.12/site-packages (from pexpect>4.3->ipython->ipython-sql) (0.7.0)
Requirement already satisfied: executing>=1.2.0 in /opt/conda/lib/python3.12/site-packages (from stack_data->ipython->ipython-sql) (2.1.0)
Requirement already satisfied: asttokens>=2.1.0 in /opt/conda/lib/python3.12/site-packages (from stack_data->ipython->ipython-sql) (3.0.0)
Requirement already satisfied: pure_eval in /opt/conda/lib/python3.12/site-packages (from stack_data->ipython->ipython-sql) (0.2.3)
```

In [3]:
```python
%load_ext sql
```

In [4]:
```python
import csv, sqlite3
import prettytable
prettytable.DEFAULT = 'DEFAULT'

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

In [5]:
```python
!pip install -q pandas
```

In [6]:
```python
%sql sqlite:///my_data1.db
```

In [7]:
```python
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")
```

Out[7]: 101

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

In [8]:
```python
#DROP THE TABLE IF EXISTS

%sql DROP TABLE IF EXISTS SPACEXTABLE;
```
 * sqlite:///my_data1.db
Done.

Out[8]: []

In [9]:
```python
%sql create table SPACEXTABLE as select * from SPACEXTBL where Date is not null
```
 * sqlite:///my_data1.db
Done.

Out[9]: []

In [10]:
```python
%sql SELECT * FROM SPACEXTBL
```
 * sqlite:///my_data1.db
Done.

Date	Time (UTC)	Booster_Version	Launch_Site	Payload	PAYLOAD_MASS__KG_	Orbit	Customer	Mission_Outcome	Landing_Outcome
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
2013-09-29	16:00:00	F9 v1.1 B1003	VAFB SLC-4E	CASSIOPE	500	Polar LEO	MDA	Success	Uncontrolled (ocean)
2013-12-03	22:41:00	F9 v1.1	CCAFS LC-40	SES-8	3170	GTO	SES	Success	No attempt
2014-01-06	22:06:00	F9 v1.1	CCAFS LC-40	Thaicom 6	3325	GTO	Thaicom	Success	No attempt
2014-04-18	19:25:00	F9 v1.1	CCAFS LC-40	SpaceX CRS-3	2296	LEO (ISS)	NASA (CRS)	Success	Controlled (ocean)
2014-07-14	15:15:00	F9 v1.1	CCAFS LC-40	OG2 Mission 1 6 Orbcomm-OG2 satellites	1316	LEO	Orbcomm	Success	Controlled (ocean)
2014-08-05	8:00:00	F9 v1.1	CCAFS LC-40	AsiaSat 8	4535	GTO	AsiaSat	Success	No attempt
2014-09-07	5:00:00	F9 v1.1 B1011	CCAFS LC-40	AsiaSat 6	4428	GTO	AsiaSat	Success	No attempt
2014-09-21	5:52:00	F9 v1.1 B1010	CCAFS LC-40	SpaceX CRS-4	2216	LEO (ISS)	NASA (CRS)	Success	Uncontrolled (ocean)
2015-01-10	9:47:00	F9 v1.1 B1012	CCAFS LC-40	SpaceX CRS-5	2395	LEO (ISS)	NASA (CRS)	Success	Failure (drone ship)
2015-02-11	23:03:00	F9 v1.1 B1013	CCAFS LC-40	DSCOVR	570	HEO	U.S. Air Force NASA NOAA	Success	Controlled (ocean)
2015-03-02	3:50:00	F9 v1.1 B1014	CCAFS LC-40	ABS-3A Eutelsat 115 West B	4159	GTO	ABS Eutelsat	Success	No attempt
2015-04-14	20:10:00	F9 v1.1 B1015	CCAFS LC-40	SpaceX CRS-6	1898	LEO (ISS)	NASA (CRS)	Success	Failure (drone ship)
2015-04-27	23:03:00	F9 v1.1 B1016	CCAFS LC-40	Turkmen 52 / MonacoSAT	4707	GTO	Turkmenistan National Space Agency	Success	No attempt
2015-06-28	14:21:00	F9 v1.1 B1018	CCAFS LC-40	SpaceX CRS-7	1952	LEO (ISS)	NASA (CRS)	Failure (in flight)	Precluded (drone ship)
2015-12-22	1:29:00	F9 FT B1019	CCAFS LC-40	OG2 Mission 2 11 Orbcomm-OG2 satellites	2034	LEO	Orbcomm	Success	Success (ground pad)
2016-01-17	18:42:00	F9 v1.1 B1017	VAFB SLC-4E	Jason-3	553	LEO	NASA (LSP) NOAA CNES	Success	Failure (drone ship)
2016-03-04	23:35:00	F9 FT B1020	CCAFS LC-40	SES-9	5271	GTO	SES	Success	Failure (drone ship)
2016-04-08	20:43:00	F9 FT B1021.1	CCAFS LC-40	SpaceX CRS-8	3136	LEO (ISS)	NASA (CRS)	Success	Success (drone ship)
2016-05-06	5:21:00	F9 FT B1022	CCAFS LC-40	JCSAT-14	4696	GTO	SKY Perfect JSAT Group	Success	Success (drone ship)
2016-05-27	21:39:00	F9 FT B1023.1	CCAFS LC-40	Thaicom 8	3100	GTO	Thaicom	Success	Success (drone ship)
2016-06-15	14:29:00	F9 FT B1024	CCAFS LC-40	ABS-2A Eutelsat 117 West B	3600	GTO	ABS Eutelsat	Success	Failure (drone ship)
2016-07-18	4:45:00	F9 FT B1025.1	CCAFS LC-40	SpaceX CRS-9	2257	LEO (ISS)	NASA (CRS)	Success	Success (ground pad)
2016-08-14	5:26:00	F9 FT B1026	CCAFS LC-40	JCSAT-16	4600	GTO	SKY Perfect JSAT Group	Success	Success (drone ship)
2017-01-14	17:54:00	F9 FT B1029.1	VAFB SLC-4E	Iridium NEXT 1	9600	Polar LEO	Iridium Communications	Success	Success (drone ship)
2017-02-19	14:39:00	F9 FT B1031.1	KSC LC-39A	SpaceX CRS-10	2490	LEO (ISS)	NASA (CRS)	Success	Success (ground pad)
2017-03-16	6:00:00	F9 FT B1030	KSC LC-39A	EchoStar 23	5600	GTO	EchoStar	Success	No attempt
2017-03-30	22:27:00	F9 FT B1021.2	KSC LC-39A	SES-10	5300	GTO	SES	Success	Success (drone ship)
2017-05-01	11:15:00	F9 FT B1032.1	KSC LC-39A	NROL-76	5300	LEO	NRO	Success	Success (ground pad)
2017-05-15	23:21:00	F9 FT B1034	KSC LC-39A	Inmarsat-5 F4	6070	GTO	Inmarsat	Success	No attempt
2017-06-03	21:07:00	F9 FT B1035.1	KSC LC-39A	SpaceX CRS-11	2708	LEO (ISS)	NASA (CRS)	Success	Success (ground pad)
2017-06-23	19:10:00	F9 FT B1029.2	KSC LC-39A	BulgariaSat-1	3669	GTO	Bulsatcom	Success	Success (drone ship)
2017-06-25	20:25:00	F9 FT B1036.1	VAFB SLC-4E	Iridium NEXT 2	9600	LEO	Iridium Communications	Success	Success (drone ship)
2017-07-05	23:38:00	F9 FT B1037	KSC LC-39A	Intelsat 35e	6761	GTO	Intelsat	Success	No attempt
2017-08-14	16:31:00	F9 B4 B1039.1	KSC LC-39A	SpaceX CRS-12	3310	LEO (ISS)	NASA (CRS)	Success	Success (ground pad)

Date	Time (UTC)	Booster_Version	Launch_Site	Payload	PAYLOAD_MASS_KG_	Orbit	Customer	Mission_Outcome	Landing_Outcome
2017-08-24	18:51:00	F9 FT B1038.1	VAFB SLC-4E	Formosat-5	475	SSO	NSPO	Success	Success (drone ship)
2017-09-07	14:00:00	F9 B4 B1040.1	KSC LC-39A	Boeing X-37B OTV-5	4990	LEO	U.S. Air Force	Success	Success (ground pad)
2017-10-09	12:37:00	F9 B4 B1041.1	VAFB SLC-4E	Iridium NEXT 3	9600	Polar LEO	Iridium Communications	Success	Success (drone ship)
2017-10-11	22:53:00	F9 FT B1031.2	KSC LC-39A	SES-11 / EchoStar 105	5200	GTO	SES EchoStar	Success	Success (drone ship)
2017-10-30	19:34:00	F9 B4 B1042.1	KSC LC-39A	Koreasat 5A	3500	GTO	KT Corporation	Success	Success (drone ship)
2017-12-15	15:36:00	F9 FT B1035.2	CCAFS SLC-40	SpaceX CRS-13	2205	LEO (ISS)	NASA (CRS)	Success	Success (ground pad)
2017-12-23	1:27:00	F9 FT B1036.2	VAFB SLC-4E	Iridium NEXT 4	9600	Polar LEO	Iridium Communications	Success	Controlled (ocean)
2018-01-08	1:00:00	F9 B4 B1043.1	CCAFS SLC-40	Zuma	5000	LEO	Northrop Grumman	Success (payload status unclear)	Success (ground pad)
2018-01-31	21:25:00	F9 FT B1032.2	CCAFS SLC-40	GovSat-1 / SES-16	4230	GTO	SES	Success	Controlled (ocean)
2018-02-22	14:17:00	F9 FT B1038.2	VAFB SLC-4E	Paz Tintin A & B	2150	SSO	Hisdesat exactEarth SpaceX	Success	No attempt
2018-03-06	5:33:00	F9 B4 B1044	CCAFS SLC-40	Hispasat 30W-6 PODSat	6092	GTO	Hispasat NovaWurks	Success	No attempt
2018-03-30	14:14:00	F9 B4 B1041.2	VAFB SLC-4E	Iridium NEXT 5	9600	Polar LEO	Iridium Communications	Success	No attempt
2018-04-02	20:30:00	F9 B4 B1039.2	CCAFS SLC-40	SpaceX CRS-14	2647	LEO (ISS)	NASA (CRS)	Success	No attempt
2018-04-18	22:51:00	F9 B4 B1045.1	CCAFS SLC-40	Transiting Exoplanet Survey Satellite (TESS)	362	HEO	NASA (LSP)	Success	Success (drone ship)
2018-05-11	20:14:00	F9 B5 B1046.1	KSC LC-39A	Bangabandhu-1	3600	GTO	Thales-Alenia/BTRC	Success	Success (drone ship)
2018-05-22	19:47:58	F9 B4 B1043.2	VAFB SLC-4E	Iridium NEXT 6 GRACE-FO 1, 2	6460	Polar LEO	Iridium Communications GFZ , NASA	Success	No attempt
2018-06-04	4:45:00	F9 B4 B1040.2	CCAFS SLC-40	SES-12	5384	GTO	SES	Success	No attempt
2018-06-29	9:42:00	F9 B4 B1045.2	CCAFS SLC-40	SpaceX CRS-15	2697	LEO (ISS)	NASA (CRS)	Success	No attempt
2018-07-22	5:50:00	F9 B5B1047.1	CCAFS SLC-40	Telstar 19V	7075	GTO	Telesat	Success	Success
2018-07-25	11:39:00	F9 B5B1048.1	VAFB SLC-4E	Iridium NEXT-7	9600	Polar LEO	Iridium Communications	Success	Success
2018-08-07	5:18:00	F9 B5 B1046.2	CCAFS SLC-40	Merah Putih	5800	GTO	Telkom Indonesia	Success	Success
2018-09-10	4:45:00	F9 B5B1049.1	CCAFS SLC-40	Telstar 18V / Apstar-5C	7060	GTO	Telesat	Success	Success
2018-10-08	2:22:00	F9 B5 B1048.2	VAFB SLC-4E	SAOCOM 1A	3000	SSO	CONAE	Success	Success
2018-11-15	20:46:00	F9 B5 B1047.2	KSC LC-39A	Es hail 2	5300	GTO	Es hailSat	Success	Success
2018-12-03	18:34:05	F9 B5 B1046.3	VAFB SLC-4E	SSO-A	4000	SSO	Spaceflight Industries	Success	Success
2018-12-05	18:16:00	F9 B5B1050	CCAFS SLC-40	SpaceX CRS-16	2500	LEO (ISS)	NASA (CRS)	Success	Failure
2018-12-23	13:51:00	F9 B5B1054	CCAFS SLC-40	GPS III-01	4400	MEO	USAF	Success	No attempt
2019-01-11	15:31:00	F9 B5 B1049.2	VAFB SLC-4E	Iridium NEXT-8	9600	Polar LEO	Iridium Communications	Success	Success
2019-02-22	1:45:00	F9 B5 B1048.3	CCAFS SLC-40	Nusantara Satu, Beresheet Moon lander, S5	4850	GTO	PSN, SpaceL / IAI	Success	Success
2019-03-02	7:49:00	F9 B5B1051.1	KSC LC-39A	Crew Dragon Demo-1, SpaceX CRS-17	12055	LEO (ISS)	NASA (CCD)	Success	Success
2019-05-04	6:48:00	F9 B5B1056.1	CCAFS SLC-40	SpaceX CRS-17, Starlink v0.9	2495	LEO (ISS)	NASA (CRS)	Success	Success
2019-05-24	2:30:00	F9 B5 B1049.3	CCAFS SLC-40	Starlink v0.9, RADARSAT Constellation	13620	LEO	SpaceX	Success	Success
2019-06-12	14:17:00	F9 B5 B1051.2	VAFB SLC-4E	RADARSAT Constellation, SpaceX CRS-18	4200	SSO	Canadian Space Agency (CSA)	Success	Success
2019-07-25	22:01:00	F9 B5 B1056.2	CCAFS SLC-40	SpaceX CRS-18, AMOS-17	2268	LEO (ISS)	NASA (CRS)	Success	Success
2019-08-06	23:23:00	F9 B5 B1047.3	CCAFS SLC-40	AMOS-17, Starlink 1 v1.0	6500	GTO	Spacecom	Success	No attempt
2019-11-11	14:56:00	F9 B5 B1048.4	CCAFS SLC-40	Starlink 1 v1.0, SpaceX CRS-19	15600	LEO	SpaceX	Success	Success
2019-12-05	17:29:00	F9 B5B1059.1	CCAFS SLC-40	SpaceX CRS-19, JCSat-18 / Kacific 1	2617	LEO (ISS)	NASA (CRS), Kacific 1	Success	Success
2019-12-17	0:10:00	F9 B5 B1056.3	CCAFS SLC-40	JCSat-18 / Kacific 1, Starlink 2 v1.0	6956	GTO	Sky Perfect JSAT, Kacific 1	Success	Success
2020-01-07	2:33:00	F9 B5 B1049.4	CCAFS SLC-40	Starlink 2 v1.0, Crew Dragon in-flight abort test	15600	LEO	SpaceX	Success	Success

Date	Time (UTC)	Booster_Version	Launch_Site	Payload	PAYLOAD_MASS__KG_	Orbit	Customer	Mission_Outcome	Landing_Outcome
2020-01-19	15:30:00	F9 B5 B1046.4	KSC LC-39A	Crew Dragon in-flight abort test, Starlink 3 v1.0	12050	Sub-orbital	NASA (CTS)	Success	No attempt
2020-01-29	14:07:00	F9 B5 B1051.3	CCAFS SLC-40	Starlink 3 v1.0, Starlink 4 v1.0	15600	LEO	SpaceX	Success	Success
2020-02-17	15:05:00	F9 B5 B1056.4	CCAFS SLC-40	Starlink 4 v1.0, SpaceX CRS-20	15600	LEO	SpaceX	Success	Failure
2020-03-07	4:50:00	F9 B5 B1059.2	CCAFS SLC-40	SpaceX CRS-20, Starlink 5 v1.0	1977	LEO (ISS)	NASA (CRS)	Success	Success
2020-03-18	12:16:00	F9 B5 B1048.5	KSC LC-39A	Starlink 5 v1.0, Starlink 6 v1.0	15600	LEO	SpaceX	Success	Failure
2020-04-22	19:30:00	F9 B5 B1051.4	KSC LC-39A	Starlink 6 v1.0, Crew Dragon Demo-2	15600	LEO	SpaceX	Success	Success
2020-05-30	19:22:00	F9 B5B1058.1	KSC LC-39A	Crew Dragon Demo-2, Starlink 7 v1.0	12530	LEO (ISS)	NASA (CCDev)	Success	Success
2020-06-04	1:25:00	F9 B5 B1049.5	CCAFS SLC-40	Starlink 7 v1.0, Starlink 8 v1.0	15600	LEO	SpaceX, Planet Labs	Success	Success
2020-06-13	9:21:00	F9 B5 B1059.3	CCAFS SLC-40	Starlink 8 v1.0, SkySats-16, -17, -18, GPS III-03	15410	LEO	SpaceX, Planet Labs	Success	Success
2020-06-30	20:10:46	F9 B5B1060.1	CCAFS SLC-40	GPS III-03, ANASIS-II	4311	MEO	U.S. Space Force	Success	Success
2020-07-20	21:30:00	F9 B5 B1058.2	CCAFS SLC-40	ANASIS-II, Starlink 9 v1.0	5500	GTO	Republic of Korea Army, Spaceflight Industries (BlackSky)	Success	Success
2020-08-07	5:12:00	F9 B5 B1051.5	KSC LC-39A	Starlink 9 v1.0, SXRS-1, Starlink 10 v1.0	14932	LEO	SpaceX, Spaceflight Industries (BlackSky), Planet Labs	Success	Success
2020-08-18	14:31:00	F9 B5 B1049.6	CCAFS SLC-40	Starlink 10 v1.0, SkySat-19, -20, -21, SAOCOM 1B	15440	LEO	SpaceX, Planet Labs, PlanetIQ	Success	Success
2020-08-30	23:18:00	F9 B5 B1059.4	CCAFS SLC-40	SAOCOM 1B, GNOMES 1, Tyvak-0172	3130	SSO	CONAE, PlanetIQ, SpaceX	Success	Success
2020-09-03	12:46:14	F9 B5 B1060.2	KSC LC-39A	Starlink 11 v1.0, Starlink 12 v1.0	15600	LEO	SpaceX	Success	Success
2020-10-06	11:29:34	F9 B5 B1058.3	KSC LC-39A	Starlink 12 v1.0, Starlink 13 v1.0	15600	LEO	SpaceX	Success	Success
2020-10-18	12:25:57	F9 B5 B1051.6	KSC LC-39A	Starlink 13 v1.0, Starlink 14 v1.0	15600	LEO	SpaceX	Success	Success
2020-10-24	15:31:34	F9 B5 B1060.3	CCAFS SLC-40	Starlink 14 v1.0, GPS III-04	15600	LEO	SpaceX	Success	Success
2020-11-05	23:24:23	F9 B5B1062.1	CCAFS SLC-40	GPS III-04 , Crew-1	4311	MEO	USSF	Success	Success
2020-11-16	0:27:00	F9 B5B1061.1	KSC LC-39A	Crew-1, Sentinel-6 Michael Freilich	12500	LEO (ISS)	NASA (CCP)	Success	Success
2020-11-21	17:17:08	F9 B5B1063.1	VAFB SLC-4E	Sentinel-6 Michael Freilich, Starlink 15 v1.0	1192	LEO	NASA / NOAA / ESA / EUMETSAT	Success	Success
2020-11-25	2:13:00	F9 B5 B1049.7	CCAFS SLC-40	Starlink 15 v1.0, SpaceX CRS-21	15600	LEO	SpaceX	Success	Success
2020-12-06	16:17:08	F9 B5 B1058.4	KSC LC-39A	SpaceX CRS-21	2972	LEO (ISS)	NASA (CRS)	Success	Success

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

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

```
In [11]: %sql SELECT DISTINCT(Launch_Site) FROM SPACEXTBL
```

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

Out[11]:

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

Task 2

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

```
In [12]: %sql SELECT * from SPACEXTBL WHERE Launch_Site like 'CCA%' LIMIT 5
```

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

Date	Time (UTC)	Booster_Version	Launch_Site	Payload	PAYLOAD_MASS__KG_	Orbit	Customer	Mission_Outcome	Landing_Outcome
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

Task 3

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

```
In [13]: %sql SELECT SUM(PAYLOAD_MASS__KG_) from SPACEXTBL WHERE Customer='NASA (CRS)'
```

 * sqlite:///my_data1.db
Done.

Out[13]:

SUM(PAYLOAD_MASS__KG_)
45596

Task 4

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

```
In [14]: %sql SELECT AVG(PAYLOAD_MASS__KG_) from SPACEXTBL WHERE BOOSTER_VERSION="F9 v1.1"
```

 * sqlite:///my_data1.db
Done.

Out[14]:

AVG(PAYLOAD_MASS__KG_)
2928.4

Task 5

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

Hint:Use min function

```
In [15]: %sql SELECT min(Date) FROM SPACEXTBL WHERE Landing_Outcome='Success (ground pad)'
```

 * sqlite:///my_data1.db
Done.

Out[15]:

min(Date)
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 [16]: %sql SELECT Booster_Version FROM SPACEXTBL WHERE Landing_Outcome='Success (drone ship)' AND (PAYLOAD_MASS__KG_>4000 AND PAYLOAD_MASS__KG_<6000)
```

 * sqlite:///my_data1.db
Done.

Out[16]:

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

Task 7

List the total number of successful and failure mission outcomes

```
In [17]: %sql SELECT Mission_Outcome, COUNT(*) AS "# Missions" FROM SPACEXTBL GROUP BY Mission_Outcome
```

 * sqlite:///my_data1.db
Done.

Out[17]:

Mission_Outcome	# Missions
Failure (in flight)	1
Success	98
Success	1
Success (payload status unclear)	1

Task 8

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

```
In [18]: %sql SELECT Booster_Version FROM SPACEXTBL WHERE PAYLOAD_MASS__KG_ = (SELECT MAX(PAYLOAD_MASS__KG_) FROM SPACEXTBL)
```

 * sqlite:///my_data1.db
Done.

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 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.

In [24]: `%sql SELECT substr(Date, 6,2) AS Month,Landing_Outcome,Booster_version,Launch_Site FROM SPACEXTBL WHERE substr(Date,1,4)='2015' AND Landing_Outcome='Failure (drone ship)'`

    * sqlite:///my_data1.db
    Done.

Out[24]:

Month	Landing_Outcome	Booster_Version	Launch_Site
01	Failure (drone ship)	F9 v1.1 B1012	CCAFS LC-40
04	Failure (drone ship)	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 [32]: `%sql SELECT Landing_Outcome, COUNT(Landing_Outcome) FROM SPACEXTBL WHERE (Date>'2010-06-04' AND Date<'2017-03-20') GROUP BY Landing_Outcome ORDER BY COUNT(Landing_Outcome) DESC`

    * sqlite:///my_data1.db
    Done.

Out[32]:

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

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