In [76]:
```
# import libraries
import pandas as pd
import sqlite3
```

In [77]:
```
!pip install ipython-sql
```

```
Requirement already satisfied: ipython-sql in /opt/anaconda3/lib/python3.8/site-packages (0.5.0)
Requirement already satisfied: ipython in /opt/anaconda3/lib/python3.8/site-packages (from ipython-sql) (7.22.0)
Requirement already satisfied: sqlalchemy>=2.0 in /opt/anaconda3/lib/python3.8/site-packages (from ipython-sql) (2.0.44)
Requirement already satisfied: sqlparse in /opt/anaconda3/lib/python3.8/site-packages (from ipython-sql) (0.5.3)
Requirement already satisfied: six in /opt/anaconda3/lib/python3.8/site-packages (from ipython-sql) (1.15.0)
Requirement already satisfied: prettytable in /opt/anaconda3/lib/python3.8/site-packages (from ipython-sql) (3.11.0)
Requirement already satisfied: ipython-genutils in /opt/anaconda3/lib/python3.8/site-packages (from ipython-sql) (0.2.0)
Requirement already satisfied: typing-extensions>=4.6.0 in /opt/anaconda3/lib/python3.8/site-packages (from sqlalchemy>=2.0->ipython-sql) (4.13.2)
Requirement already satisfied: greenlet>=1 in /opt/anaconda3/lib/python3.8/site-packages (from sqlalchemy>=2.0->ipython-sql) (1.0.0)
Requirement already satisfied: pickleshare in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (0.7.5)
Requirement already satisfied: jedi>=0.16 in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (0.17.2)
Requirement already satisfied: prompt-toolkit!=3.0.0,!=3.0.1,<3.1.0,>=2.0.0 in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (3.0.17)
Requirement already satisfied: appnope in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (0.1.2)
Requirement already satisfied: backcall in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (0.2.0)
Requirement already satisfied: pygments in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (2.8.1)
Requirement already satisfied: traitlets>=4.2 in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (5.0.5)
Requirement already satisfied: setuptools>=18.5 in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (52.0.0.post20210125)
Requirement already satisfied: decorator in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (5.0.6)
Requirement already satisfied: pexpect>4.3 in /opt/anaconda3/lib/python3.8/site-packages (from ipython->ipython-sql) (4.8.0)
Requirement already satisfied: parso<0.8.0,>=0.7.0 in /opt/anaconda3/lib/python3.8/site-packages (from jedi>=0.16->ipython->ipython-sql) (0.7.0)
Requirement already satisfied: ptyprocess>=0.5 in /opt/anaconda3/lib/python3.8/site-packages (from pexpect>4.3->ipython->ipython-sql) (0.7.0)
Requirement already satisfied: wcwidth in /opt/anaconda3/lib/python3.8/site-packages (from prompt-toolkit!=3.0.0,!=3.0.1,<3.1.0,>=2.0.0->ipython->ipython-sql) (0.2.5)
```

In [81]:
```
# load csv file
df = pd.read_csv("Acquisition_Credit_Data.csv")
```

In [82]:
```
df
```

Out[82]:

	account_id	acquisition_channel	open_date	month	credit_line	balance	revenue	charge_off_amount	charge_off_flag	days_past_due	acquisition_cost
0	A100001	Online	2023-07-07	2023-07-01	4900	723.83	19.09	0.0	0	0	130
1	A100002	Mail	2024-04-08	2024-04-01	4800	916.81	37.28	0.0	0	0	150
2	A100003	Online	2024-01-28	2024-01-01	8100	872.38	22.84	0.0	0	0	180
3	A100004	Partner	2023-05-19	2023-05-01	2300	600.00	5.28	0.0	0	0	130
4	A100005	Partner	2023-10-26	2023-10-01	5700	407.63	7.75	0.0	0	0	150
...	...	...	...	...	...	...	...	...	...	...	...
595	A100596	Partner	2023-06-07	2023-06-01	5900	2430.11	41.07	0.0	0	0	180
596	A100597	Mail	2024-09-12	2024-09-01	7700	1760.65	25.08	0.0	0	0	180
597	A100598	Online	2024-12-02	2024-12-01	4900	1442.09	23.34	0.0	0	0	120
598	A100599	Partner	2024-09-19	2024-09-01	3700	2270.87	38.02	0.0	0	0	120
599	A100600	Online	2024-01-02	2024-01-01	6500	1630.81	29.93	0.0	0	0	130

600 rows × 11 columns

In [83]:
```
# create a connection to sqlite3 database
cnn = sqlite3.connect('jupyter_sql.db')
```

In [92]:
```
df.to_sql('Data', cnn)
```

In [93]:
```
# load sql module to iPython
%load_ext sql
```

```
The sql extension is already loaded. To reload it, use:
  %reload_ext sql
```

In [94]:
```
# connection to database
%sql sqlite:///jupyter_sql.db
```

In [95]:
```
# Aggregate function SUM for total balance, total revenue, and total acquisition cost
```

In [96]:
```
%%sql

SELECT acquisition_channel, SUM(balance) AS total_balance, SUM(revenue) AS total_revenue, SUM(acquisition_cost) AS total_acquisition_cost
FROM Data
GROUP BY acquisition_channel
ORDER BY total_revenue DESC
```

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

Out[96]:

acquisition_channel	total_balance	total_revenue	total_acquisition_cost
Online	636785.2399999998	10463.360000000004	39750
Mail	345115.9799999999	5981.259999999998	21940
Partner	247798.46999999986	3918.980000000001	15520

In [97]:
```
# Rounded aggregate function SUM for total balance, total revenue, and total acquisition cost
```

In [97]:
```
%%sql

SELECT acquisition_channel, ROUND(SUM(balance),2) AS total_balance, ROUND(SUM(revenue),2) AS total_revenue, ROUND(SUM(acquisition_cost),2) AS total_acquisition_cost
FROM Data
GROUP BY acquisition_channel
ORDER BY total_revenue DESC
```

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

Out[97]:

acquisition_channel	total_balance	total_revenue	total_acquisition_cost
Online	636785.24	10463.36	39750.0
Mail	345115.98	5981.26	21940.0
Partner	247798.47	3918.98	15520.0

In [98]:
```
# P&L metrics calculations, total revenue, total chargeoffs,and net income
```

In [122...
```
%%sql


SELECT acquisition_channel,SUBSTR(month, 1,7) AS month, ROUND(SUM(revenue),2) AS total_revenue,SUM(charge_off_amount) AS total_chargeoffs,
    SUM(acquisition_cost) AS total_acquisition_cost, SUM(revenue - charge_off_amount - acquisition_cost) AS net_income
FROM Data
GROUP BY month, acquisition_channel
LIMIT 6
```

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

Out[122...

acquisition_channel	month	total_revenue	total_chargeoffs	total_acquisition_cost	net_income
Mail	2023-01	134.6	0.0	520	-385.4
Online	2023-01	353.64	0.0	1350	-996.36
Partner	2023-01	163.54	0.0	630	-466.46
Mail	2023-02	283.37	0.0	1310	-1026.63
Online	2023-02	601.99	0.0	1530	-928.01
Partner	2023-02	258.58	0.0	1000	-741.42

In [ ]:
```
# Monthly Revenue and Charge-Off Trend
```

In [105...
```
%%sql

SELECT acquisition_channel, SUBSTR(month, 1,7) AS month, SUM(revenue) AS monthly_revenue,SUM(charge_off_amount) AS monthly_chargeoffs,
SUM(revenue - charge_off_amount) AS net_income
FROM Data
GROUP BY acquisition_channel, month
ORDER BY acquisition_channel, month
LIMIT 6
```

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

Out[105...

acquisition_channel	month	monthly_revenue	monthly_chargeoffs	net_income
Mail	2023-01	134.6	0.0	134.6
Mail	2023-02	283.37	0.0	283.37
Mail	2023-03	292.07	0.0	292.07
Mail	2023-04	166.48	0.0	166.48
Mail	2023-05	300.12999999999994	0.0	300.12999999999994
Mail	2023-06	401.51	0.0	401.51

In [ ]:
```
# Rolling 3-Month Average Revenue (Window Function)
```

In [120...
```
%%sql

WITH monthly AS (
    SELECT acquisition_channel, SUBSTR(month, 1, 7) AS month,SUM(revenue) AS monthly_revenue
    FROM Data
    GROUP BY acquisition_channel, month
)
SELECT acquisition_channel,month,monthly_revenue,AVG(monthly_revenue) OVER (
        PARTITION BY acquisition_channel
        ORDER BY month
        ROWS BETWEEN 2 PRECEDING AND CURRENT ROW
    ) AS rolling_3m_avg_revenue
FROM monthly
LIMIT 6
```

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

Out[120...

acquisition_channel	month	monthly_revenue	rolling_3m_avg_revenue
Mail	2023-01	134.6	134.6
Mail	2023-02	283.37	208.985
Mail	2023-03	292.07	236.67999999999998
Mail	2023-04	166.48	247.30666666666664
Mail	2023-05	300.12999999999994	252.89333333333333
Mail	2023-06	401.51	289.3733333333333

In [ ]:
```
# Month-over-Month (MoM) Growth Rate
```

In [119...
```
%%sql

WITH monthly AS (
    SELECT
        acquisition_channel,
        substr(month, 1, 7) AS month,
        SUM(revenue) AS monthly_revenue
    FROM Data
    GROUP BY acquisition_channel, month
)
SELECT
    acquisition_channel,month,monthly_revenue,
    LAG(monthly_revenue) OVER (PARTITION BY acquisition_channel ORDER BY month) AS prev_month_revenue,
    ROUND(
        (monthly_revenue - LAG(monthly_revenue) OVER (PARTITION BY acquisition_channel ORDER BY month)) * 100.0 /
        NULLIF(LAG(monthly_revenue) OVER (PARTITION BY acquisition_channel ORDER BY month), 0),
        2
    ) AS mom_growth_pct
FROM monthly
LIMIT 6
```

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

Out[119...

acquisition_channel	month	monthly_revenue	prev_month_revenue	mom_growth_pct
Mail	2023-01	134.6	None	None
Mail	2023-02	283.37	134.6	110.53
Mail	2023-03	292.07	283.37	3.07
Mail	2023-04	166.48	292.07	-43.0
Mail	2023-05	300.12999999999994	166.48	80.28
Mail	2023-06	401.51	300.12999999999994	33.78

In [ ]:
```
# Delinquency Rate by Month
```

In [112...
```
%%sql

SELECT
    substr(month, 1, 7) AS month,
    SUM(CASE WHEN days_past_due > 30 THEN 1 ELSE 0 END) * 1.0 / COUNT(*) AS delinquency_rate
FROM Data
GROUP BY substr(month, 1, 7)
ORDER BY month;
```

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

Out[112...

month	delinquency_rate
2023-01	0.0
2023-02	0.03225806451612903
2023-03	0.0
2023-04	0.0
2023-05	0.052631578947368424
2023-06	0.04
2023-07	0.037037037037037035
2023-08	0.0625
2023-09	0.0
2023-10	0.041666666666666664
2023-11	0.0
2023-12	0.045454545454545456
2024-01	0.05
2024-02	0.1111111111111111
2024-03	0.125
2024-04	0.0
2024-05	0.1
2024-06	0.058823529411764705
2024-07	0.0
2024-08	0.03225806451612903
2024-09	0.07407407407407407
2024-10	0.0
2024-11	0.0
2024-12	0.043478260869565216

In [ ]:
```
# Rank Acquisition Channels by Profitability
```

In [115...
```
%%sql

SELECT
    acquisition_channel,
    ROUND(SUM(revenue - charge_off_amount),2) AS total_profit,
    RANK() OVER (ORDER BY SUM(revenue - charge_off_amount) DESC) AS profit_rank
FROM Data
GROUP BY acquisition_channel
```

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

Out[115...

acquisition_channel	total_profit	profit_rank
Online	10463.36	1
Mail	5007.22	2
Partner	2415.01	3

In [ ]:
```

```