Customer Credit Card Transactions:

A Data Analysis Project

"Unveiling Patterns and Trends in Spending"

Report By:
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Introduction

This report provides an analysis of credit card spending behavior based on a dataset of credit card transactions. The insights were generated using a dashboard created in Power BI, which connects to an SQL Server Management Studio containing the uploaded CSV file. The analysis includes various dimensions such as revenue, interest earned, transaction amounts, customer demographics, and spending patterns.

Project Objective

To develop a comprehensive credit card weekly dashboard that provide real-time insights into key performance metrics and trends, enabling stakeholders to monitor and analyze credit card operations effectively.

Tools Utilized

- Microsoft Excel
- SQL
- Power Bi

Tools and Methodology

- A CSV file containing the data was used as the primary data source.
- The CSV file was uploaded to an SQL Server Management Studio to manage and manipulate the data efficiently.
- DAX queries were employed within Power BI to generate new columns and measures, providing deeper insights and refined data visualization.
- Power BI was utilized to create the dashboard for visualizing key insights.

Excel CSV Files Example

To illustrate the data used in the analysis, the following is a sample of the CSV file uploaded to SQL Server. These files contains credit card transaction data, which is used for analyses and visualizations in the Power BI dashboard.

These tables provides a snapshot of the types of data included in the CSV file, such as transaction details, customer demographics, and expenditure categories.

credit_card.csv

Client_Num	Card_Category	Annual_Fees	Activation_30_Days	Customer_Acq_Cost	Week_Start_Date	Week_Num	Qtr	current_year	Credit_Limit	Total_Revolving_Bal	Total_Trans_Amt	Total_Trans_Vol	Avg_Utilization_Ratio	Use Chip	Exp Type	Interest_Earned	Delinquent_Acc
708082083	Blue	200	0	87	1/1/2023	Week-1	Q1	2023	3544	1661	15149	111	0.469	Chip	Travel	4393.21	0
708083283	Blue	445	1	108	1/1/2023	Week-1	Q1	2023	3421	2517	992	21	0.736	Swipe	Entertainment	69.44	0
708084558	Blue	140	0	106	1/1/2023	Week-1	Q1	2023	8258	1771	1447	23	0.214	Chip	Bills	202.58	0
708085458	Blue	250	1	150	1/1/2023	Week-1	Q1	2023	1438.3	0	3940	82	0	Online	Grocery	236.4	0
708086958	Blue	320	1	106	1/1/2023	Week-1	Q1	2023	3128	749	4369	59	0.239	Swipe	Fuel	1004.87	1
708095133	Blue	100	0	94	1/1/2023	Week-1	Q1	2023	33304	1833	1448	29	0.055	Swipe	Bills	275.12	0
708098133	Blue	225	1	75	1/1/2023	Week-1	Q1	2023	2834	1418	1598	39	0.5	Swipe	Bills	159.8	1
708099183	Blue	400	1	75	1/1/2023	Week-1	Q1	2023	5723	1873	2732	63	0.327	Swipe	Grocery	409.8	0
708100533	Blue	200	1	64	1/1/2023	Week-1	Q1	2023	2679	2277	4943	85	0.85	Chip	Food	588.6	0
708103608	Platinum	95	1	80	1/1/2023	Week-1	Q1	2023	11898	2517	15798	128	0.212	Chip	Grocery	3791.52	0
708104658	Blue	455	1	118	1/1/2023	Week-1	Q1	2023	1438.3	890	2928	48	0.619	Swipe	Fuel	732	0
708108333	Blue	485	0	86	1/1/2023	Week-1	Q1	2023	5590	0	1507	32	0	Swipe	Entertainment	150.7	0
708112008	Blue	440	1	86	1/1/2023	Week-1	Q1	2023	23510	1049	1661	35	0.045	Swipe	Grocery	465.08	0
708113208	Blue	300	1	149	1/1/2023	Week-1	Q1	2023	1688	0	4375	69	0	Chip	Fuel	525	0
708117933	Blue	360	0	70	1/1/2023	Week-1	Q1	2023	1880	0	2469	34	0	Chip	Bills	419.73	1
708119658	Blue	340	0	44	1/1/2023	Week-1	Q1	2023	12836	1034	2519	53	0.081	Swipe	Bills	554.18	0
708121908	Blue	405	0	71	1/1/2023	Week-1	Q1	2023	22917	0	2045	45	0	Swipe	Grocery	265.85	0
708123033	Silver	355	0	78	1/1/2023	Week-1	Q1	2023	11463	0	14511	105	0	Swipe	Fuel	3047.31	0
708125733	Blue	220	0	69	1/1/2023	Week-1	Q1	2023	1438.3	0	4311	77	0	Swipe	Entertainment	1207.08	0
708128733	Blue	125	1	105	1/1/2023	Week-1	Q1	2023	1814	0	5014	99	0	Swipe	Entertainment	1303.64	0
708129933	Blue	350	1	77	1/1/2023	Week-1	Q1	2023	2072	1544	4210	64	0.745	Chip	Entertainment	884.1	0
708132783	Blue	250	1	92	1/1/2023	Week-1	Q1	2023	16411	1179	3929	71	0.072	Swipe	Food	785.8	1
708134283	Blue	125	1	101	1/1/2023	Week-1	Q1	2023	3131	629	1483	31	0.201	Swipe	Food	311.43	0
708136908	Blue	110	1	73	1/1/2023	Week-1	Q1	2023	2616	801	4655	68	0.306	Swipe	Entertainment	605.15	0
708139833	Blue	460	0	111	1/1/2023	Week-1	Q1	2023	6391	0	2323	44	0	Swipe	Grocery	441.37	0
708145908	Blue	320	0	78	1/1/2023	Week-1	Q1	2023	4906	2185	3999	71	0.445	Swipe	Bills	959.76	0
708147108	Blue	320	0	112	1/1/2023	Week-1	Q1	2023	21084	2517	2309	71	0.119	Swipe	Travel	277.08	0
708148158	Blue	175	0	73	1/1/2023	Week-1	Q1	2023	1827	0	4207	86	0	Swipe	Fuel	925.54	0
708151008	Blue	440	1	86	1/1/2023	Week-1	Q1	2023	6250	644	2433	41	0.103	Swipe	Fuel	486.6	0
708152358	Blue	335	1	101	1/1/2023	Week-1	Q1	2023	18512	1664	8019	57	0.09	Swipe	Food	721.71	0

customer.csv

Client_Num	Customer_Age	Gender	Dependent_Count	Education_Level	Marital_Status	state_cd	Zipcode	Car_Owner	House_Owner	Personal_loan	contact	Customer_Job	Income	Cust_Satisfaction_Score
708082083	24	F	1	Uneducated	Single	FL	91750	no	yes	no	unknown	Businessman	202326	3
708083283	62	F	0	Unknown	Married	NJ	91750	no	no	no	cellular	Selfemployeed	5225	2
708084558	32	F	1	Unknown	Married	NJ	91750	yes	no	no	unknown	Selfemployeed	14235	2
708085458	38	M	2	Uneducated	Single	NY	91750	no	no	no	cellular	Blue-collar	45683	1
708086958	48	M	4	Graduate	Single	TX	91750	yes	yes	no	cellular	Businessman	59279	1
708095133	33	F	1	High School	Single	NY	91750	no	yes	no	cellular	Selfemployeed	14254	3
708098133	34	F	3	Graduate	Single	CA	91750	yes	no	no	telephone	Selfemployeed	14975	2
708099183	34	F	2	Uneducated	Single	CA	91750	no	no	no	cellular	Retirees	31982	2
708100533	48	M	2	High School	Married	NJ	91750	yes	no	no	telephone	Businessman	86668	2
708103608	53	F	1	Graduate	Married	NJ	91750	yes	yes	no	cellular	Businessman	223196	1
708104658	31	F	0	Post-Graduate	Single	CA	91750	no	yes	no	telephone	Businessman	33625	2
708108333	34	F	4	Graduate	Single	NY	91750	no	no	no	cellular	Selfemployeed	14975	3
708112008	51	F	2	Graduate	Single	NJ	91750	yes	yes	no	cellular	Selfemployeed	14975	2
708113208	36	M	1	High School	Single	NJ	91750	yes	no	no	telephone	White-collar	59416	3
708117933	49	F	4	Graduate	Married	CA	91750	no	yes	no	unknown	Retirees	28122	1
708119658	53	F	2	Graduate	Single	FL	91750	yes	no	no	cellular	Govt	29021	1
708121908	49	F	1	Graduate	Married	TX	91750	no	no	no	unknown	Selfemployeed	20632	3
708123033	47	F	5	Graduate	Married	FL	91750	no	no	no	cellular	Businessman	172101	2
708125733	43	F	4	Graduate	Single	FL	91750	no	no	no	cellular	Retirees	57168	2
708128733	47	M	3	Graduate	Married	NY	91750	no	no	no	cellular	Govt	89954	2
708129933	34	F	3	Uneducated	Single	TX	91750	yes	yes	yes	telephone	Blue-collar	53762	1
708132783	37	F	5	Unknown	Married	NJ	91750	yes	yes	no	cellular	Selfemployeed	45476	3
708134283	63	M	0	Graduate	Single	TX	91750	yes	yes	yes	cellular	Selfemployeed	14975	2
708136908	55	M	2	Doctorate	Married	MO	91750	yes	yes	no	cellular	Retirees	72878	2
708139833	38	F	1	Unknown	Single	NY	91750	no	no	no	cellular	Businessman	25667	3
708145908	40	M	3	Graduate	Single	MA	91750	no	yes	no	cellular	Blue-collar	47224	1
708147108	55	F	0	Graduate	Single	NY	91750	yes	no	no	unknown	White-collar	25341	2
708148158	33	M	2	Doctorate	Single	NY	91750	no	yes	yes	cellular	Blue-collar	53644	3
708151008	54	F	1	Uneducated	Married	CA	91750	no	yes	no	cellular	Govt	27423	2
708152358	46	M	3	Graduate	Married	NY	91750	yes	yes	no	cellular	Blue-collar	110014	2
708153558	44	M	4	Graduate	Unknown	IA	91750	no	no	no	telephone	Businessman	109186	3
708154833	40	F	3	Graduate	Married	NJ	91750	yes	yes	no	cellular	Govt	25835	2
708155733	44	F	3	Graduate	Married	CA	91750	yes	yes	no	unknown	Selfemployeed	11345	2
708158133	51	F	2	Uneducated	Single	NY	91750	yes	no	no	cellular	Selfemployeed	23215	2
708160008	60	M	0	Graduate	Single	CA	91750	no	no	no	cellular	Businessman	103581	3
708161133	49	F	2	Unknown	Single	TX	91750	yes	yes	no	cellular	Selfemployeed	44555	3
708162558	43	F	5	Graduate	Married	TX	91750	no	yes	no	cellular	Selfemployeed	12381	2
708163758	54	M	1	Graduate	Single	NY	91750	no	yes	no	unknown	White-collar	123809	1
708170508	32	F	0	Graduate	Married	FL	91750	yes	no	no	unknown	Selfemployeed	14975	1

Loading CSV Data into SQL Server

To efficiently manage and analyze the credit card transaction data, the CSV file is loaded into SQL Server. This process involves creating the necessary database and tables, importing the data, and preparing it for connection with Power BI. Below are the steps involved:

1. Create Database and Tables

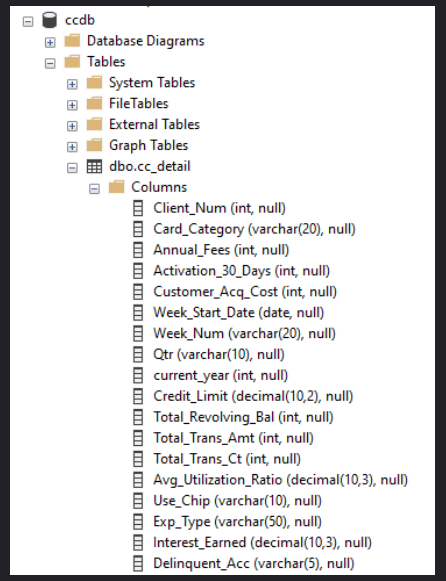
2. Import Data from CSV File

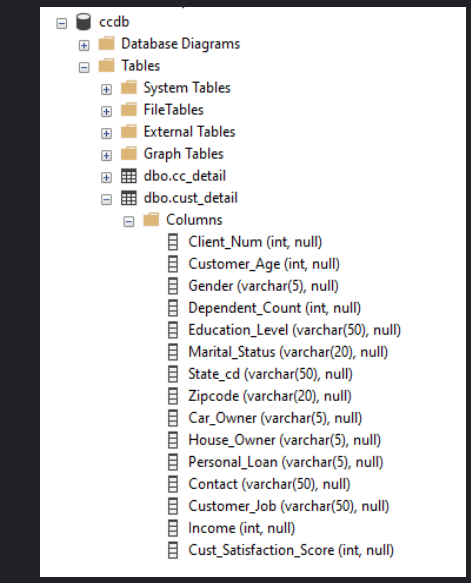
3. Connect to Power BI

- **Create Database and Tables**

First, we create a new database in SQL Server to store the credit card transaction data. Then, we define the structure of the tables according to the schema of the CSV file. The following SQL queries are used to create the database and tables:

```sql
CREATE database ccdb;

CREATE TABLE cc_detail (
    Client_Num INT,
    Card_Category VARCHAR(20),
    Annual_Fees INT,
    Activation_30_Days INT,
    Customer_Acq_Cost INT,
    Week_Start_Date DATE,
    Week_Num VARCHAR(20),
    Qtr VARCHAR(10),
    current_year INT,
    Credit_Limit DECIMAL(10,2),
    Total_Revolving_Bal INT,
    Total_Trans_Amt INT,
    Total_Trans_Ct INT,
    Avg_Utilization_Ratio DECIMAL(10,3),
    Use_Chip VARCHAR(10),
    Exp_Type VARCHAR(50),
    Interest_Earned DECIMAL(10,3),
    Delinquent_Acc VARCHAR(5)
);

CREATE TABLE cust_detail (
    Client_Num INT,
    Customer_Age INT,
    Gender VARCHAR(5),
    Dependent_Count INT,
    Education_Level VARCHAR(50),
    Marital_Status VARCHAR(20),
    State_cd VARCHAR(50),
    Zipcode VARCHAR(20),
    Car_Owner VARCHAR(5),
    House_Owner VARCHAR(5),
    Personal_Loan VARCHAR(5),
    Contact VARCHAR(50),
    Customer_Job VARCHAR(50),
    Income INT,
    Cust_Satisfaction_Score INT
);
```



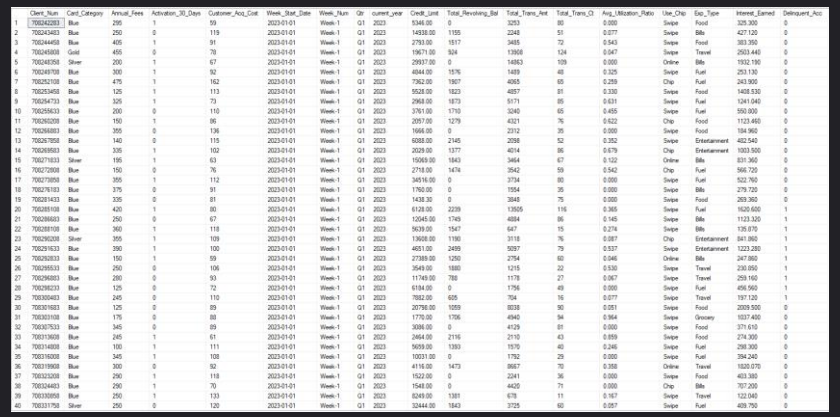


- **Import Data from CSV Files**

After creating the database and tables, the next step is to import the data from the CSV file into the SQL Server tables. This can be done using SQL Server Management Studio (SSMS) or T-SQL commands. An example T-SQL command for importing data is:

```
BULK INSERT cc_detail
FROM 'C:\Users\sohai\Downloads\POWER BI CONTENT\Dashboard Project 7\credit_card.csv'
WITH (
    FIELDTERMINATOR = ',',
    ROWTERMINATOR = '\n',
    FIRSTROW = 2
);

select * from cc_detail

BULK INSERT cust_detail
FROM 'C:\Users\sohai\Downloads\POWER BI CONTENT\Dashboard Project 7\customer.csv'
WITH (
    FIELDTERMINATOR = ',',
    ROWTERMINATOR = '\n',
    FIRSTROW = 2
);

select * from cust_detail
```

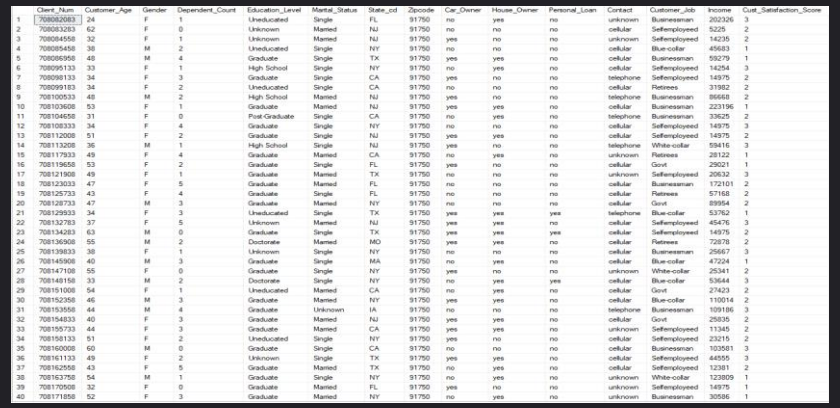
cc_detail



Data Output | Messages | Notifications

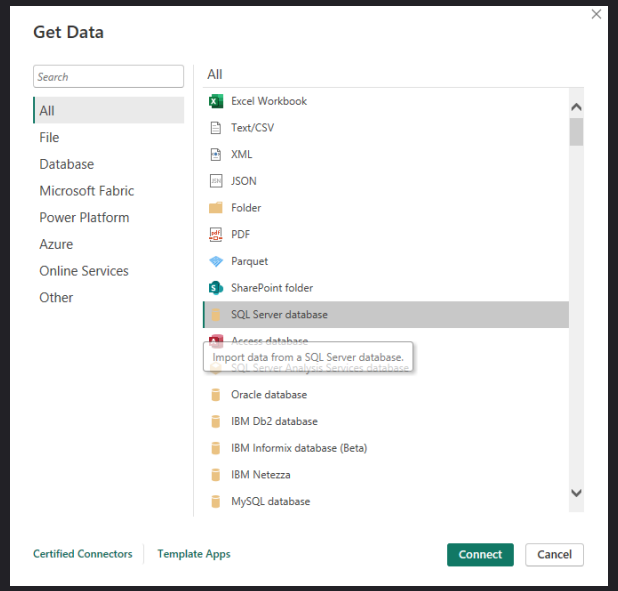
```
COPY 10108

Query returned successfully in 82 msec.
```

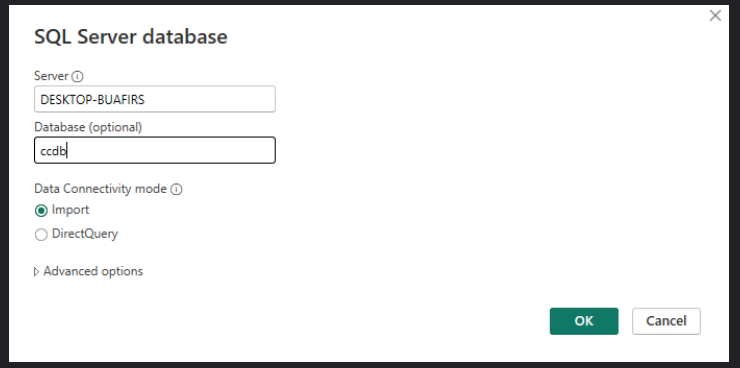
cust_detail

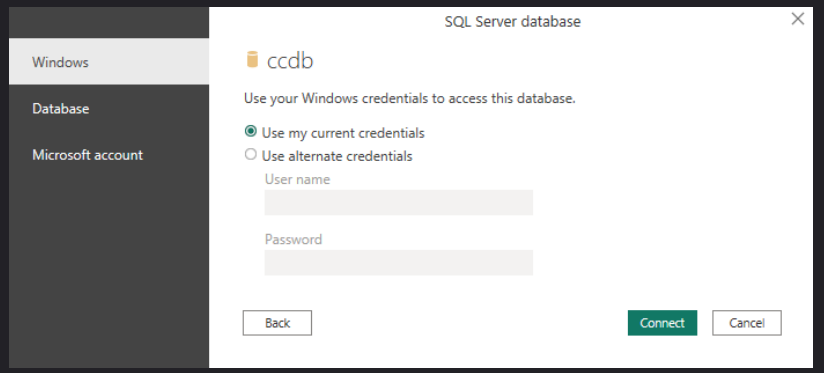


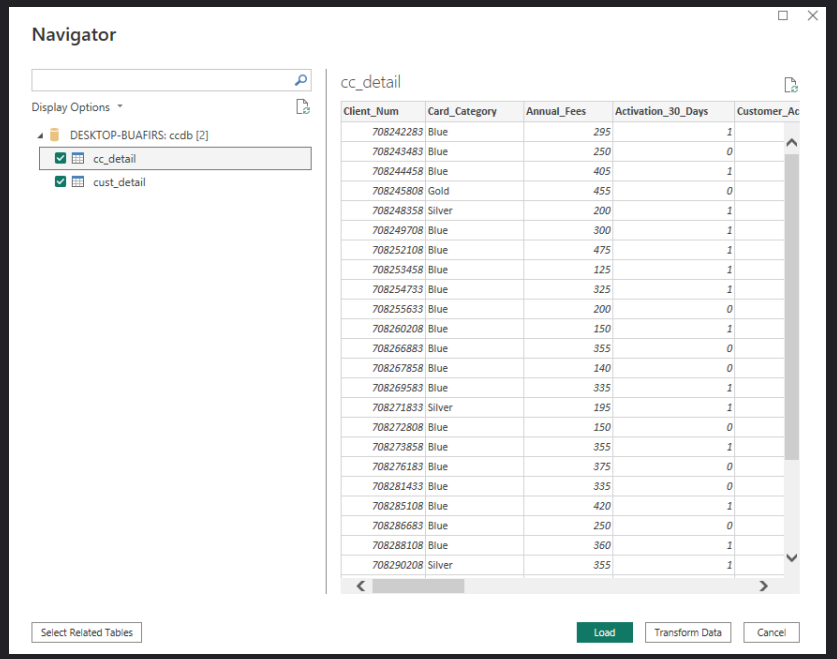
- **Connect Power BI**

Once the data is successfully imported into SQL Server, it can be connected to Power BI. In Power BI Desktop, use the SQL Server connector to establish a connection, select the relevant tables, and start building the dashboard and reports based on the imported data.









DAX Queries Implementation and Explanation

To enhance our analysis and provide more granular insights into credit card spending behavior, we used Data Analysis Expressions (DAX) in Power BI. DAX allows us to create calculated columns and measures that summarize, filter, and manipulate data dynamically. The following DAX queries have been implemented to derive key metrics for our dashboard:

```
AgeGroup = SWITCH(
    TRUE(),
    'cust_detail'[Customer_Age] < 30, "20-30",
    'cust_detail'[Customer_Age] >= 30 && 'cust_detail'[Customer_Age] < 40, "30-40",
    'cust_detail'[Customer_Age] >= 40 && 'cust_detail'[Customer_Age] < 50, "40-50",
    'cust_detail'[Customer_Age] >= 50 && 'cust_detail'[Customer_Age] < 60, "50-60",
    'cust_detail'[Customer_Age] >= 60, "60+",
    "unknown"
)
```

Purpose: Categorizes customers into age groups to analyze spending patterns by age demographic.

```
IncomeGroup = SWITCH(
    TRUE(),
    'cust_detail'[Income] < 35000, "Low",
    'cust_detail'[Income] >= 35000 && 'cust_detail'[Income] < 70000, "Med",
    'cust_detail'[Income] > 70000, "High",
    "unknown"
)
```

Purpose: Segments customers by income levels to assess revenue contributions from different income brackets.

```
Revenue = 'cc_detail'[Annual_Fees] + 'cc_detail'[Total_Trans_Amt] + 'cc_detail'[Interest_Earned]
```

Purpose: Calculates total revenue generated from fees, transactions, and interest to measure overall financial performance.

```
Current_week_revenue = CALCULATE(
    SUM('cc_detail'[Revenue]),
    FILTER(
        ALL('cc_detail'),
        'cc_detail'[Week_Num2] = MAX('cc_detail'[Week_Num2])))
```

Purpose: Computes the total revenue for the current week to analyze recent spending trends and patterns.

```
Previous_week_revenue = CALCULATE(
    SUM('cc_detail'[Revenue]),
    FILTER(
        ALL('cc_detail'),
        'cc_detail'[Week_Num2] = MAX('cc_detail'[Week_Num2])-1))
```

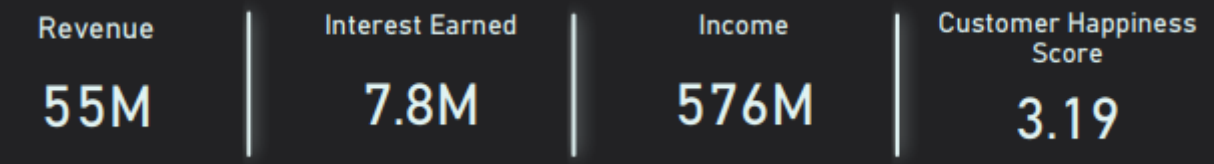
Purpose: Determines the revenue for the previous week, allowing for week-over-week performance comparisons.

These DAX queries enable dynamic analysis and visualization, making it easier to identify trends, patterns, and anomalies in credit card spending behaviors across different customer segments.

Key Insights

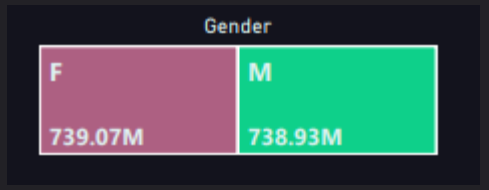
1. Overview Metrics

- **Revenue**: Total revenue from credit card transactions is reported at 55 million.
- **Interest Earned**: The total interest earned from credit card transactions amounts to 7.8 million.
- **Income**: The total income from all credit card-related activities stands at 576 million.
- **Customer Happiness Score**: The average customer happiness score is recorded at 3.19.

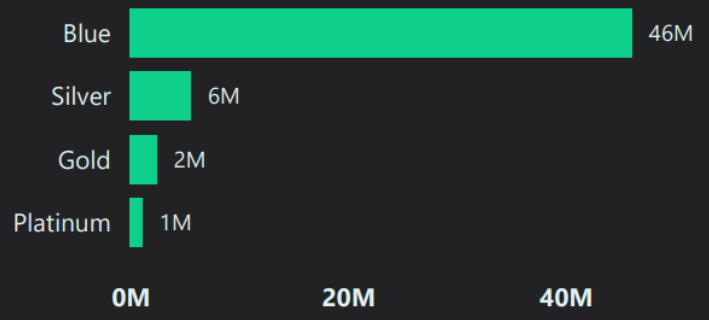


2. Revenue Analysis by Different Segments

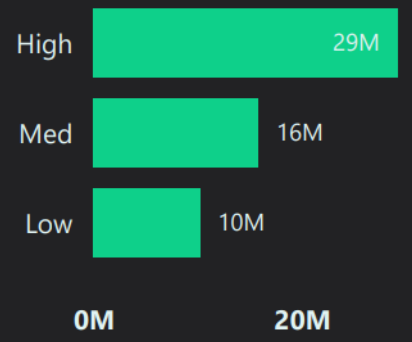
- **Gender**: Revenue is almost equally split between male and female customers, with females slightly ahead.



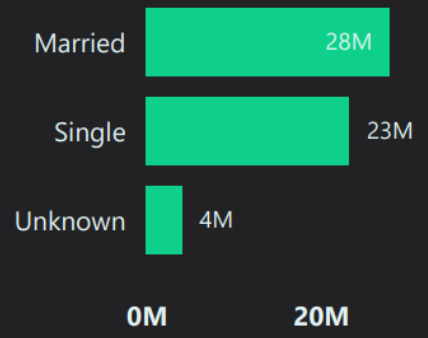
- **Card Category**: The highest revenue is generated from Blue cardholders (46 million), followed by Silver (6 million), Gold (2 million), and Platinum (1 million) cardholders.



- **Income Group**: High-income groups contribute the most to revenue (29 million), followed by medium (16 million) and low-income groups (10 million).

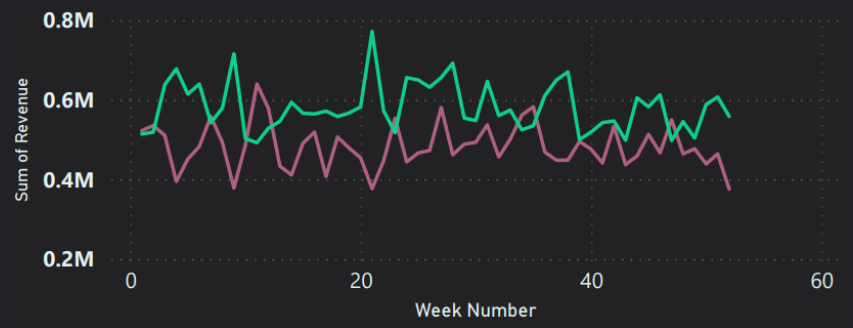


- **Marital Status**: Married customers contribute 28 million to the revenue, followed by single customers at 23 million.

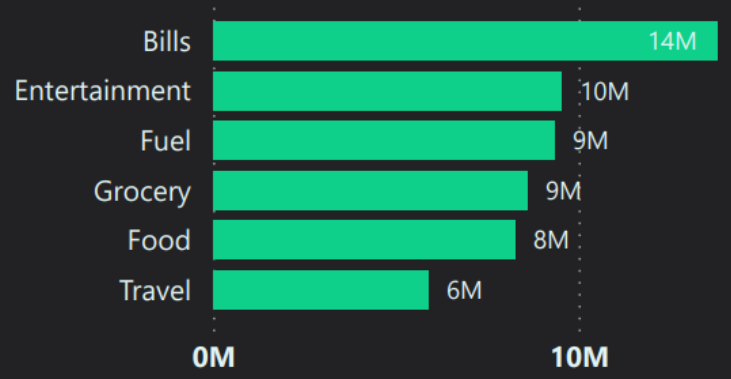


3. Spending Patterns and Trends

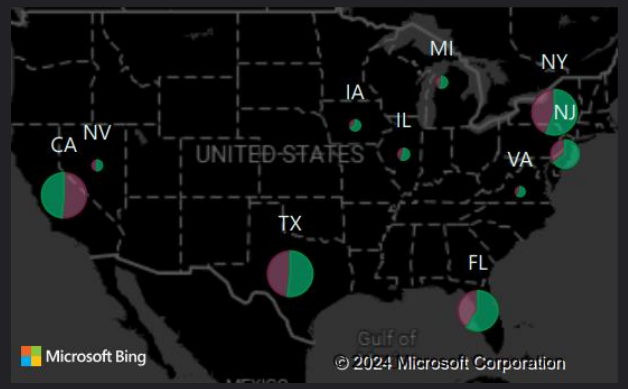
- **Weekly Revenue**: Revenue shows fluctuations across weeks, indicating varying spending behaviors.



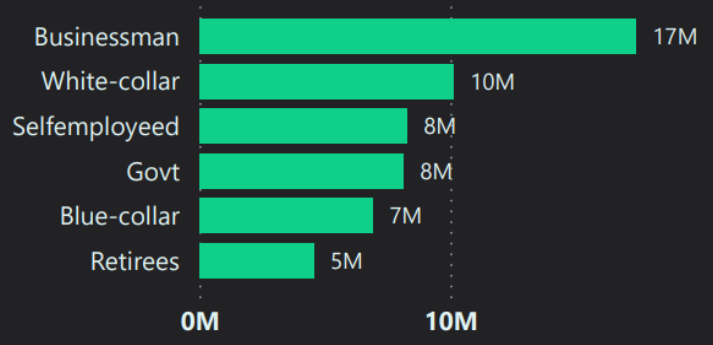
- **Expenditure Type**: The highest revenue by expenditure type is from bills (14 million), followed by entertainment (10 million) and fuel (9 million).



- **Geographic Insights**: The dashboard includes a map showing revenue distribution by state, highlighting areas with the highest credit card spending filtered by gender.

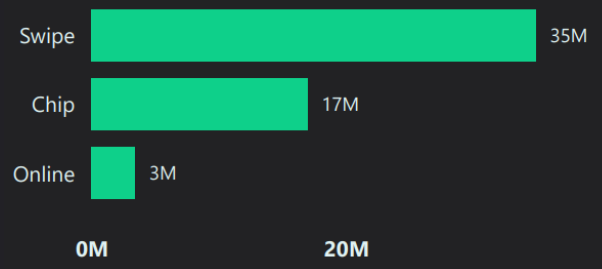


- **Job Type**: Business professionals contribute the most to revenue (17 million), followed by white-collar workers (10 million).

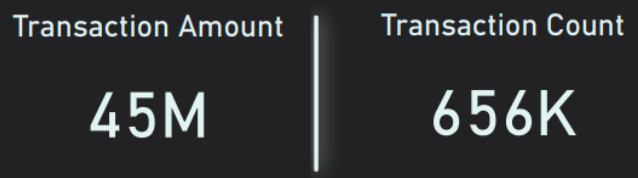


4. Transaction Behavior

- **Use of Card**: Swipe transactions generate the highest revenue (35 million), followed by chip and online transactions.

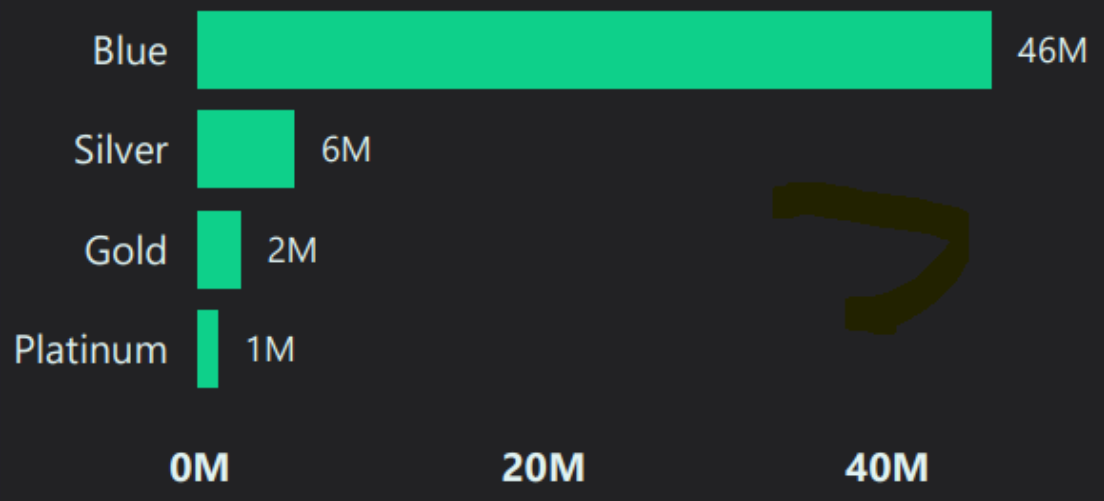


- **Transaction Amount and Count**: The dashboard shows both the transaction amount and count, allowing for a comprehensive view of credit card usage.



5. Key Drivers and Anomalies

Potential anomalies, such as low revenue from high-value card categories like Gold and Platinum, suggest further investigation may be needed.



Recommendations

Based on the insights from the dashboard, there are a few key recommendations to consider that could help improve overall credit card performance and customer engagement:

- **Targeted Marketing:** Focus on high-income and high-spending customers by tailoring marketing efforts with personalized offers, exclusive benefits, and loyalty programs to maximize revenue from these segments.
- **Customer Engagement:** Enhance engagement strategies for lower-spending segments, such as Gold and Platinum cardholders, by encouraging increased usage through exclusive experiences, additional rewards, or personalized financial services.
- **Promotion of Online Transactions:** Boost online transaction revenue by promoting online card usage with special incentives like cashback rewards, discounts at online retailers, or double rewards points. This encourages more online spending while offering convenience and security.

Implementing these strategies can optimize credit card operations and improve customer satisfaction and loyalty.

Conclusion

In developing the credit card spending analysis dashboard, I utilized SQL Server to manage the data and Power BI to visualize the insights. This dashboard provides a detailed overview of customer behavior and spending patterns, allowing for a deeper understanding of the factors driving revenue. The insights generated can help in making informed strategic decisions and refining customer engagement strategies to maximize revenue and improve customer satisfaction.