**Fraud Detection and Analysis**

1. What are the patterns or trends in fraudulent transactions (is\_fraud) based on merchant category, transaction amount, or geolocation?

SELECT

category AS Merchant\_Category,

COUNT(\*) AS Total\_Transactions,

SUM(CASE WHEN is\_fraud = 1 THEN 1 ELSE 0 END) AS Fraudulent\_Transactions,

ROUND((SUM(CASE WHEN is\_fraud = 1 THEN 1 ELSE 0 END) \* 100.0) / COUNT(\*), 2) AS Fraud\_Percentage,

AVG(amt) AS Average\_Transaction\_Amount,

AVG(CASE WHEN is\_fraud = 1 THEN amt ELSE NULL END) AS Avg\_Fraudulent\_Transaction\_Amount,

MIN(merch\_lat) AS Min\_Latitude,

MAX(merch\_lat) AS Max\_Latitude,

MIN(merch\_long) AS Min\_Longitude,

MAX(merch\_long) AS Max\_Longitude

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY category

ORDER BY Fraud\_Percentage DESC;

1. Are there specific merchants or zip codes with a high concentration of fraudulent transactions?

SELECT Merchant, Zip,

SUM(CASE WHEN is\_fraud = 1 THEN 1 ELSE 0 END) AS Fraudulent\_Transactions

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY Merchant, Zip

ORDER BY Fraudulent\_Transactions DESC

1. What is the average transaction amount (amt) for fraud vs. non-fraud transactions?

SELECT

AVG(amt) AS Average\_Transaction\_Amount,

AVG(CASE WHEN is\_fraud = 1 THEN amt ELSE NULL END) AS Avg\_Fraudulent\_Transaction\_Amount,

AVG(CASE WHEN is\_fraud = 0 THEN amt ELSE NULL END) AS Avg\_NonFraudulent\_Transaction\_Amount

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions];

**Customer Demographics Insights**

1. How does gender (gender)correlate with transaction categories(category) and amounts(amt)?

SELECT gender, category,

COUNT(\*) AS Total\_Transactions,

AVG(amt) AS Average\_Transaction\_Amount,

SUM(amt) AS Total\_Transaction\_Amount

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY gender, category

ORDER BY gender, category;

1. Which job roles (job) are associated with the highest average transaction amounts?

SELECT TOP 1 Job, Avg(Amt) AS Average\_Transaction\_Amount

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY Job

ORDER BY Average\_Transaction\_Amount DESC;

1. What is the age distribution(calculated from dob) of customers engaging in transactions for different categories?

SELECT

DATEDIFF(YEAR, dob, GETDATE()) AS Age, COUNT(\*) AS Total\_Count,

Category, Sum(amt) AS Total\_Amount

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY Category,DATEDIFF(YEAR, dob, GETDATE())

ORDER BY Age, Total\_Amount;

1. Which cities(city) or states(state) have the highest spending populations(amt), and how does that relate to city population(city\_pop)?

SELECT state, city, city\_pop, sum(amt) as Total\_Spending\_Amount

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY state, city, city\_pop

ORDER BY state, city\_pop, Total\_Spending\_Amount

**Geographic and Merchant Analysis**

1. Are there specific regions(lat,long,city,zip,state) where particular transaction categories (category)are more prevalent?

SELECT State,City, Lat, Long, Zip, Category, COUNT(\*) AS Number\_of\_Transactions

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY state,city, lat,long, zip,category

ORDER BY Number\_of\_Transactions DESC, state DESC;

1. How far are merchants(merch\_lat, merch\_long) from customer locations(lat, long), and does the distance influence fraudulent activity or transaction amounts?

SELECT

SQRT( POWER(111.1 \* (merch\_lat - lat), 2) +

POWER(111.1 \* (merch\_long - long), 2)

) AS Distance\_KM,

SUM(CASE WHEN is\_fraud = 1 THEN 1 ELSE 0 END) AS Fraudulent\_Transactions,

COUNT(\*) AS Total\_Transactions,

AVG(amt) AS Average\_Transaction\_Amount

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY merch\_lat, merch\_long, lat, long

ORDER BY Distance\_KM;

1. What are the top-performing merchants(merchant) by transaction volume or revenue (amt)?

SELECT Merchant, SUM(amt) AS Total\_Transaction\_Amount

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY Merchant

ORDER BY Total\_Transaction\_Amount DESC

**Time and Transaction Patterns**

1. What are the peak hours, days, or months for transactions based on trans\_date\_trans\_time?

SELECT

DATEPART(HOUR, trans\_date\_trans\_time) AS Hour,

DATEPART(DAY, trans\_date\_trans\_time) AS Day,

DATEPART(MONTH, trans\_date\_trans\_time) AS Month,

SUM(amt) AS Total\_Transaction

FROM

[Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY

DATEPART(HOUR, trans\_date\_trans\_time),

DATEPART(DAY, trans\_date\_trans\_time),

DATEPART(MONTH, trans\_date\_trans\_time)

ORDER BY

Month DESC, Day DESC, Hour DESC, Total\_Transaction DESC;

1. Are there temporal patterns in fraudulent transactions vs. legitimate ones?

SELECT

DATEPART(HOUR, trans\_date\_trans\_time) AS Hour,

DATEPART(DAY, trans\_date\_trans\_time) AS Day,

DATEPART(MONTH, trans\_date\_trans\_time) AS Month,

SUM(CASE WHEN is\_fraud = 1 THEN 1 ELSE 0 END) AS Fraudulent\_Transactions,

SUM(CASE WHEN is\_fraud = 0 THEN 1 ELSE 0 END) AS Legitimate\_Transactions,

COUNT(\*) AS Total\_Transactions

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY DATEPART(HOUR, trans\_date\_trans\_time),

DATEPART(DAY, trans\_date\_trans\_time),

DATEPART(MONTH, trans\_date\_trans\_time)

ORDER BY Month ASC, Day ASC, Hour ASC;

Revenue and Expense Trends

1. What is the average transaction amount(amt) per category(category), and which categories generate the most revenue?

SELECT

category,

AVG(amt) AS Average\_Transaction\_Amount,

SUM(amt) AS Total\_Revenue

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY category

ORDER BY Total\_Revenue DESC;

1. What are the trends in spending across different job types(job) and geographic locations(state,city)?

SELECT

job AS Job,

state AS State,

city AS City,

SUM(amt) AS Total\_Amount\_Spent,

COUNT(\*) AS Total\_Transactions

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY job, state, city

ORDER BY Total\_Amount\_Spent DESC;

1. Analyze transaction data(unix\_time) to identify seasonal or periodic spending trends.

SELECT

FORMAT(DATEADD(SECOND, unix\_time, '1970-01-01'), 'yyyy-MM') AS YearMonth,

SUM(amt) AS Total\_Spending,

COUNT(\*) AS Total\_Transactions

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY FORMAT(DATEADD(SECOND, unix\_time, '1970-01-01'), 'yyyy-MM')

ORDER BY YearMonth ASC;

**Customer Behavior and Segmentation**

1. Can customers be segmented based on transaction behavior (e.g., frequency, amounts, categories) for targeted marketing?

SELECT

first AS FirstName,

last AS LastName,

COUNT(trans\_num) AS Transaction\_Frequency,

SUM(amt) AS Total\_Spent,

MAX(amt) AS Max\_Transaction\_Amount

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY first, last

ORDER BY Total\_Spent DESC;

1. What is the lifetime value of customers based on their total transactions(amt) and frequency?

SELECT

first AS FirstName,

last AS LastName,

SUM(amt) AS Total\_Spent,

COUNT(\*) AS Transaction\_Frequency,

AVG(amt) AS Average\_Spending\_Per\_Transaction,

SUM(amt) / COUNT(\*) AS Lifetime\_Value

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY first, last

ORDER BY Lifetime\_Value DESC;

1. Are there correlations between customer demographics(gender,age,job) and spending habits?

SELECT

Gender,

job AS Occupation,

DATEDIFF(YEAR, dob, GETDATE()) AS Age,

COUNT(\*) AS Transaction\_Frequency,

SUM(amt) AS Total\_Spent,

AVG(amt) AS Average\_Spending

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY gender, job, DATEDIFF(YEAR, dob, GETDATE())

ORDER BY Total\_Spent DESC;

**Risk Assessment**

1. What are the characteristics of transactions with high fraud risk based on data points like transaction amount, geolocation, and merchant category?

SELECT

category AS Merchant\_Category,

state AS State,

city AS City,

AVG(amt) AS Average\_Transaction\_Amount,

MAX(amt) AS Highest\_Transaction\_Amount,

SUM(CASE WHEN is\_fraud = 1 THEN 1 ELSE 0 END) AS Fraudulent\_Transactions

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY category, state, city

ORDER BY Fraudulent\_Transactions DESC;

1. Are there particular combinations of customer attributes (e.g., job,city,state) linked to higher fraud rates or specific transaction patterns?

SELECT

job AS Job,

city AS City,

state AS State,

COUNT(\*) AS Total\_Transactions,

SUM(CASE WHEN is\_fraud = 1 THEN 1 ELSE 0 END) AS Fraudulent\_Transactions,

SUM(CASE WHEN is\_fraud = 0 THEN 1 ELSE 0 END) AS Legitimate\_Transactions,

ROUND(100.0 \* SUM(CASE WHEN is\_fraud = 1 THEN 1 ELSE 0 END) / COUNT(\*), 2) AS Fraud\_Percentage

FROM [Financial\_Data\_Analysis].[dbo].[credit\_card\_transactions]

GROUP BY job, city, state

ORDER BY Fraudulent\_Transactions DESC, Fraud\_Percentage DESC;