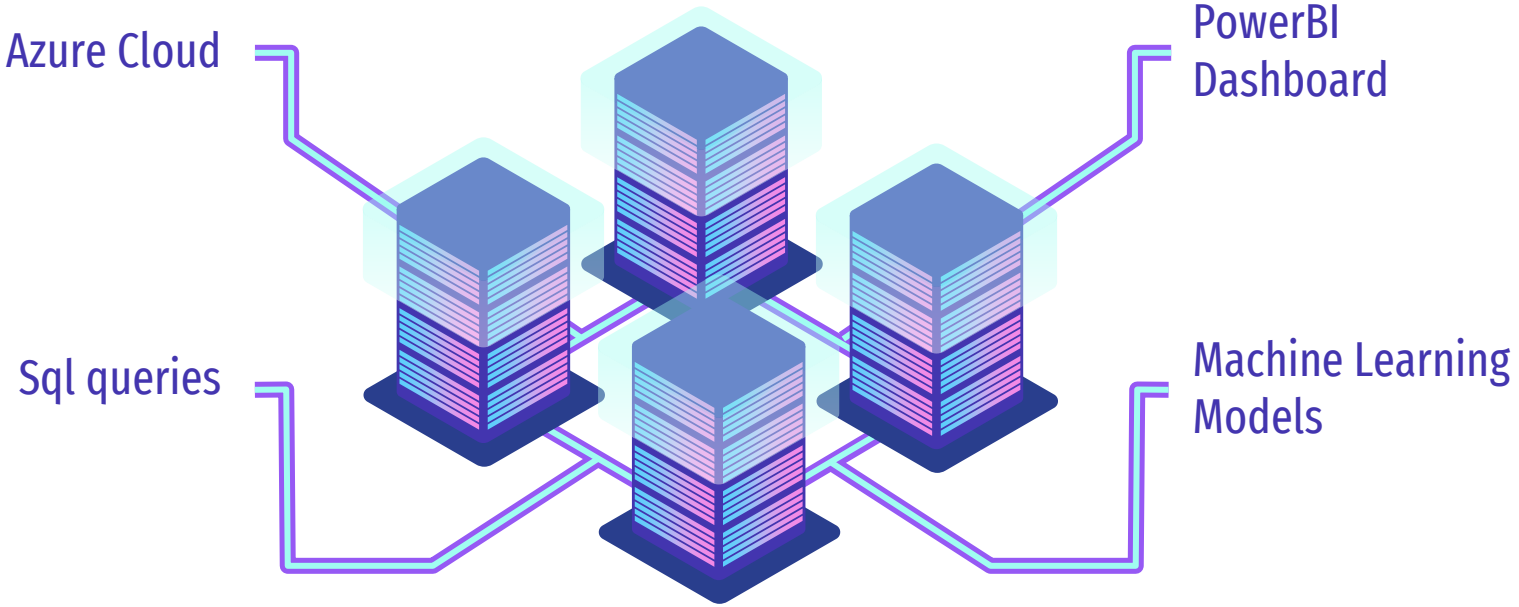
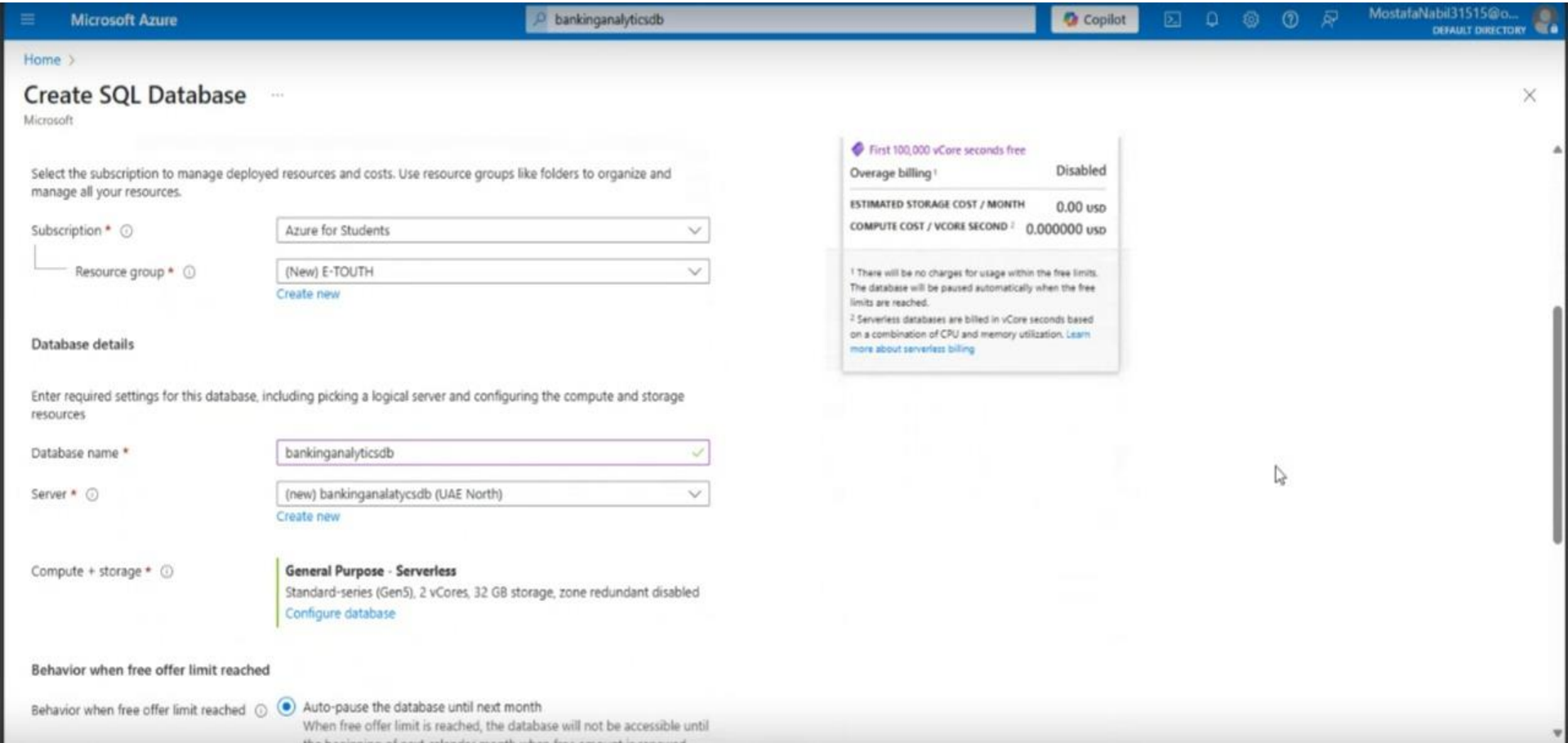
AZURE-BASED BANKING INTELLIGENCE & ANALYTICS SYSTEM

E-Youth bootcamp project

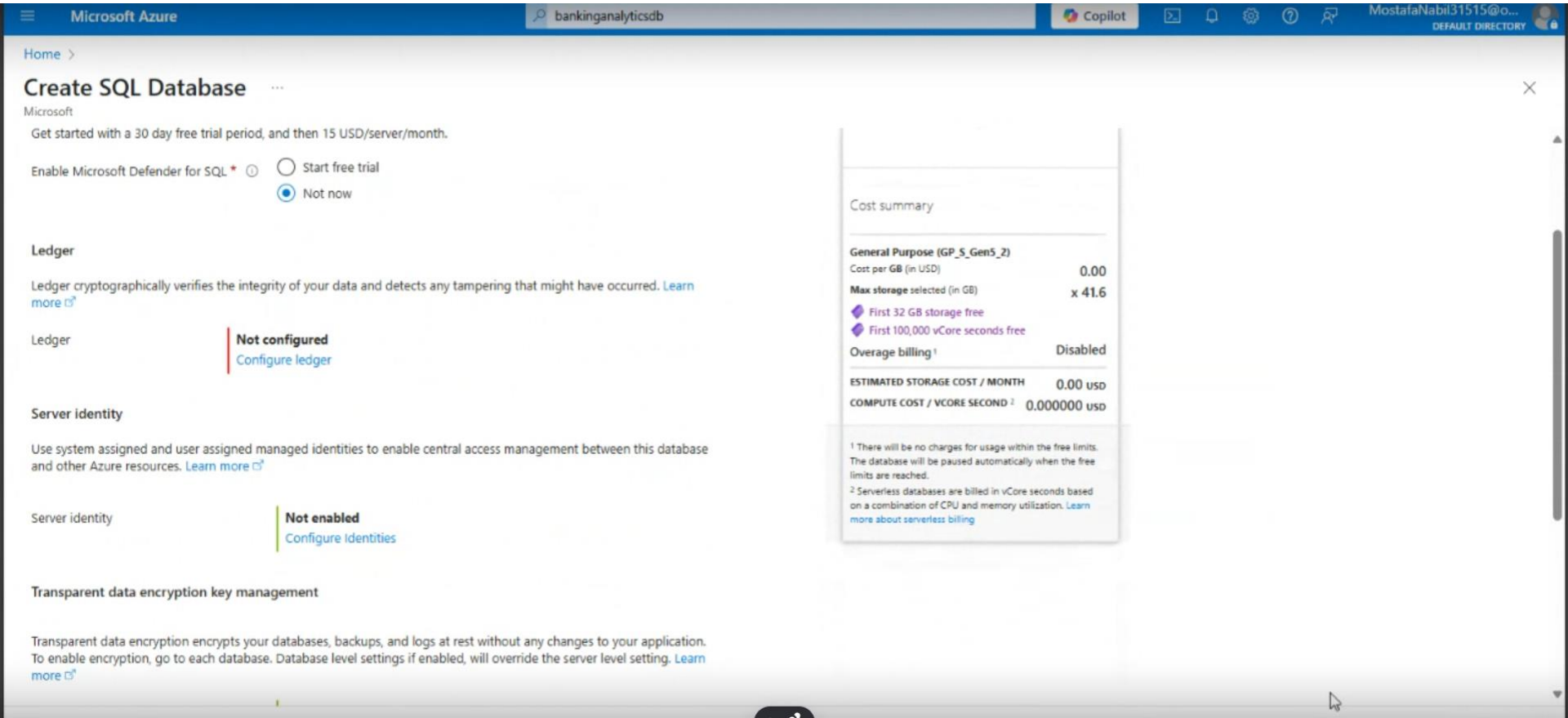
System Component



1. Azure Cloud



1. Azure Cloud

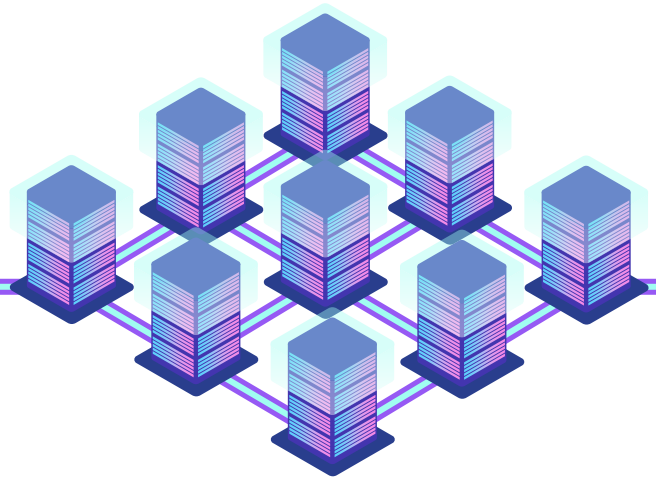


2. SQL queries

Customer Analytics

Account & Balance Analysis

Transaction Analytics



Loan Portfolio Overview

Card Issuance & Activity

Customer Support Insights

2.1.Customer Analytics

```sql
------------------------------ Customer Analysis Queries ------------------------------

-- 1. Count total active customers (those with at least one account)
SELECT COUNT(DISTINCT c.customer_id) AS total_active_customers
FROM Customers c
JOIN Accounts a ON c.customer_id = a.customer_id;

-- 2. Monthly new customers (group by year and month of join_date)
SELECT FORMAT(join_date, 'yyyy-MM') AS month, COUNT(*) AS new_customers
FROM Customers
GROUP BY FORMAT(join_date, 'yyyy-MM')
ORDER BY month;

-- 3. Average number of accounts per customer
SELECT AVG(account_count*1.0) AS avg_accounts_per_customer
FROM (
    SELECT customer_id, COUNT(*) AS account_count
    FROM Accounts
    GROUP BY customer_id
) AS sub;

-- 4. Identify potential churn risks (customers with no transactions in the last 6 months)
SELECT c.customer_id, c.first_name, c.last_name
FROM Customers c
LEFT JOIN Accounts a ON c.customer_id = a.customer_id
LEFT JOIN Transactions t ON a.account_id = t.account_id
    AND t.transaction_date >= DATEADD(MONTH, -6, GETDATE())
GROUP BY c.customer_id, c.first_name, c.last_name
HAVING COUNT(t.transaction_id) = 0;
```

2.2. Account & Balance Analysis

```
------------------------------ Account Analysis Queries ------------------------------

-- 1. Total balance by account type
SELECT account_type, SUM(balance) AS total_balance
FROM Accounts
GROUP BY account_type;

-- 2. Average balance per customer (across all their accounts)
SELECT AVG(customer_balance*1.0) AS avg_balance_per_customer
FROM (
    SELECT customer_id, SUM(balance) AS customer_balance
    FROM Accounts
    GROUP BY customer_id
) AS sub;

-- 3. Identify dormant accounts (no transactions in the last 6 months)
SELECT a.account_id, a.customer_id, a.account_type, a.balance, a.open_date
FROM Accounts a
LEFT JOIN Transactions t ON a.account_id = t.account_id
    AND t.transaction_date >= DATEADD(MONTH, -6, GETDATE())
GROUP BY a.account_id, a.customer_id, a.account_type, a.balance, a.open_date
HAVING COUNT(t.transaction_id) = 0;

-- 4. Account age vs balance (for correlation analysis externally)
SELECT account_id, balance, DATEDIFF(MONTH, open_date, GETDATE()) AS account_age_months
FROM Accounts;
```

2.3. Transaction Analytics

```
---------------------------- Transaction Analysis Queries ----------------------------


-- 1. Monthly transaction trends (count and total amount)
SELECT FORMAT(transaction_date, 'yyyy-MM') AS month,
       COUNT(*) AS transactions_count,
       SUM(amount) AS total_amount
FROM Transactions
GROUP BY FORMAT(transaction_date, 'yyyy-MM')
ORDER BY month;

-- 2. Top transaction types by count and total amount
SELECT transaction_type, COUNT(*) AS count, SUM(amount) AS total_amount
FROM Transactions
GROUP BY transaction_type
ORDER BY total_amount DESC;

-- 3. Average transaction value by account type
SELECT a.account_type, AVG(t.amount*1.0) AS avg_transaction_value
FROM Transactions t
JOIN Accounts a ON t.account_id = a.account_id
GROUP BY a.account_type;
```

2.4. Loan Portfolio Overview

```
---------------------- Loan Portfolio Analysis Queries ------------------------


-- 1. Total loan amount disbursed by loan type
SELECT loan_type, SUM(amount) AS total_loan_amount
FROM Loans
GROUP BY loan_type;

-- 2. Average interest rate per loan type
SELECT loan_type, AVG(interest_rate*1.0) AS avg_interest_rate
FROM Loans
GROUP BY loan_type;

-- 3. Loans maturing this year (based on end_date)
SELECT loan_type, COUNT(*) AS loans_maturing_this_year
FROM Loans
WHERE YEAR(end_date) = YEAR(GETDATE())
GROUP BY loan_type;
```

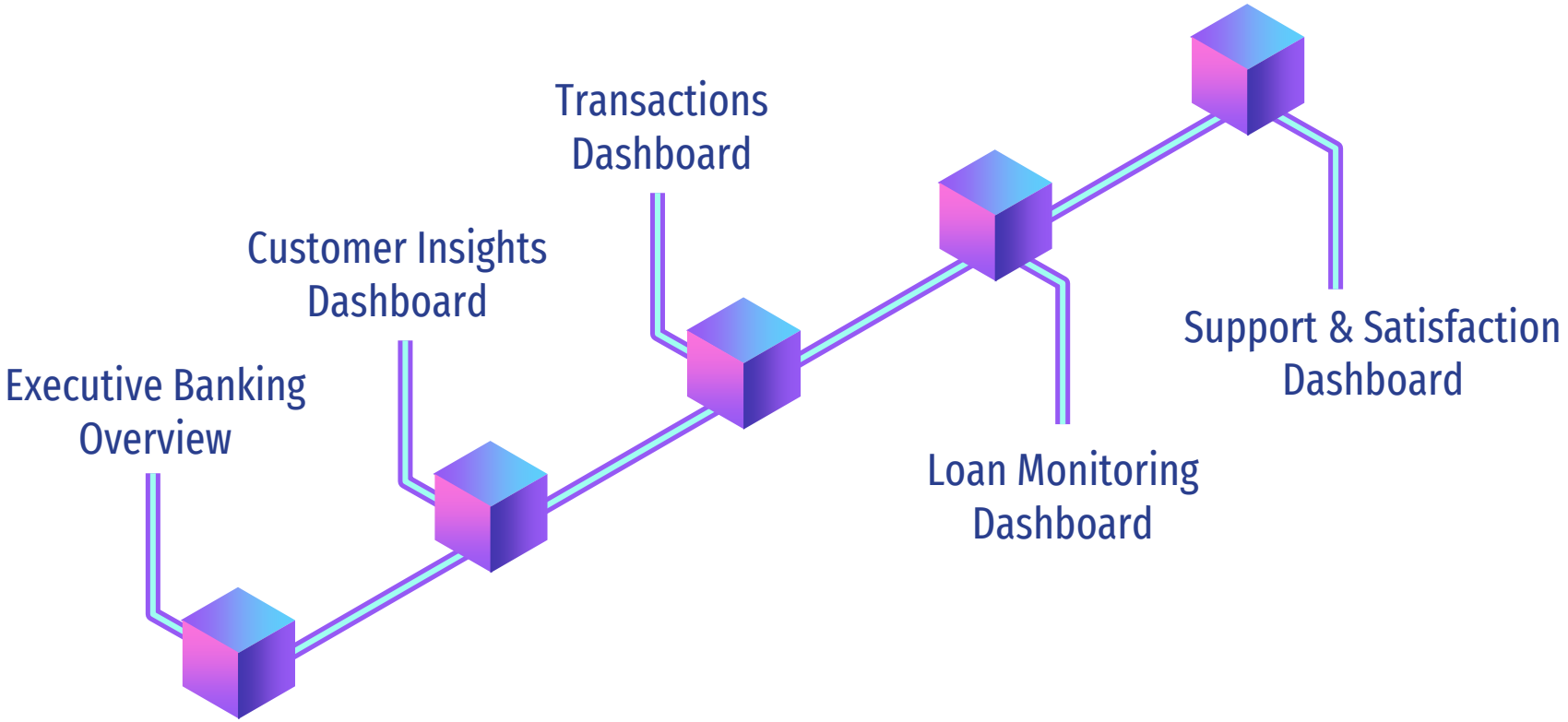
2.5. Card Issuance & Activity

```sql
-- 1. Monthly card issuance trends (group by year and month of issue_date)
SELECT FORMAT(issue_date, 'yyyy-MM') AS month, COUNT(*) AS cards_issued
FROM Cards
GROUP BY FORMAT(issue_date, 'yyyy-MM')
ORDER BY month;

-- 2. Active vs expired cards (based on expiry_date compared to current date)
SELECT
    SUM(CASE WHEN expiry_date >= GETDATE() THEN 1 ELSE 0 END) AS active_cards,
    SUM(CASE WHEN expiry_date < GETDATE() THEN 1 ELSE 0 END) AS expired_cards
FROM Cards;

-- 3. Card type distribution (count of each card type)
SELECT card_type, COUNT(*) AS count
FROM Cards
GROUP BY card_type;

-- 4. Average number of cards per customer by card type
SELECT card_type, AVG(card_count*1.0) AS avg_cards_per_customer
FROM (
    SELECT customer_id, card_type, COUNT(*) AS card_count
    FROM Cards
    GROUP BY customer_id, card_type
) AS sub
GROUP BY card_type;
```

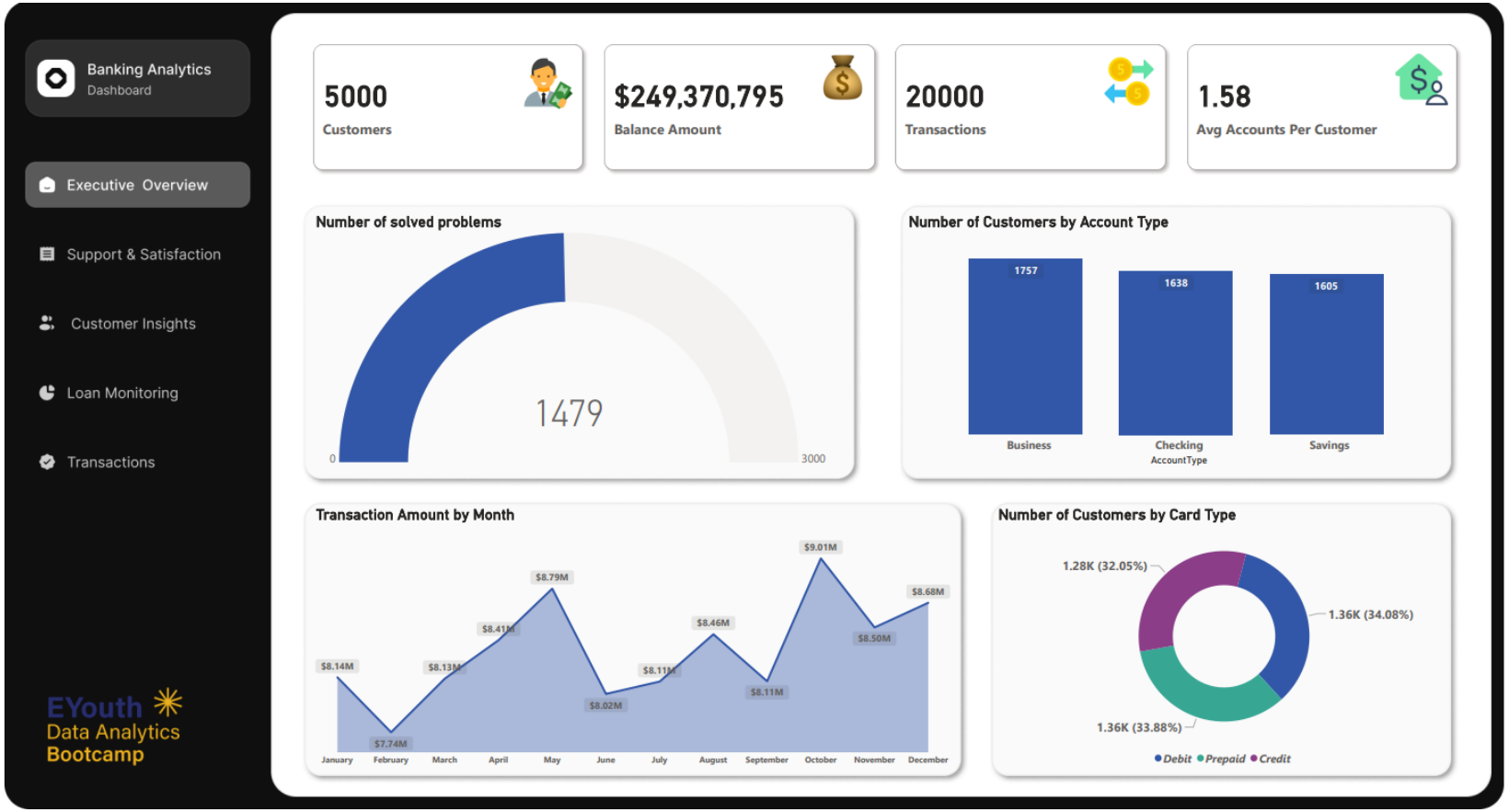
2.6. Customer Support Insights

```
------------------------ Customer Support Insights Queries ------------------------

-- 1. Total number of support calls
SELECT COUNT(*) AS total_support_calls
FROM SupportCalls;

-- 2. Most frequent issue type (top issue category)
SELECT TOP 1 IssueType
FROM SupportCalls
GROUP BY IssueType
ORDER BY COUNT(*) DESC;
  return go(f, seed, [])
```

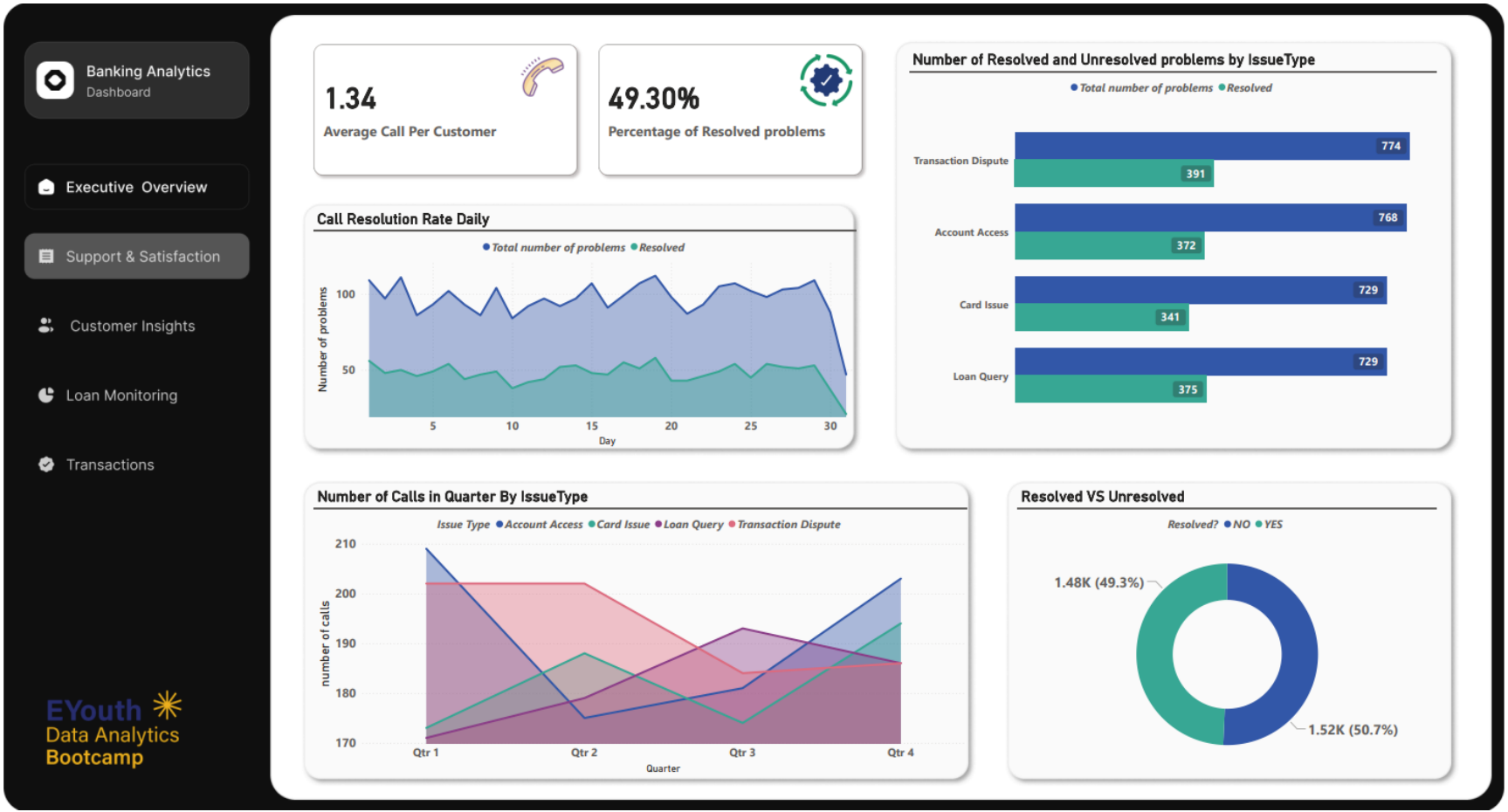
3. PowerBI Dashboard



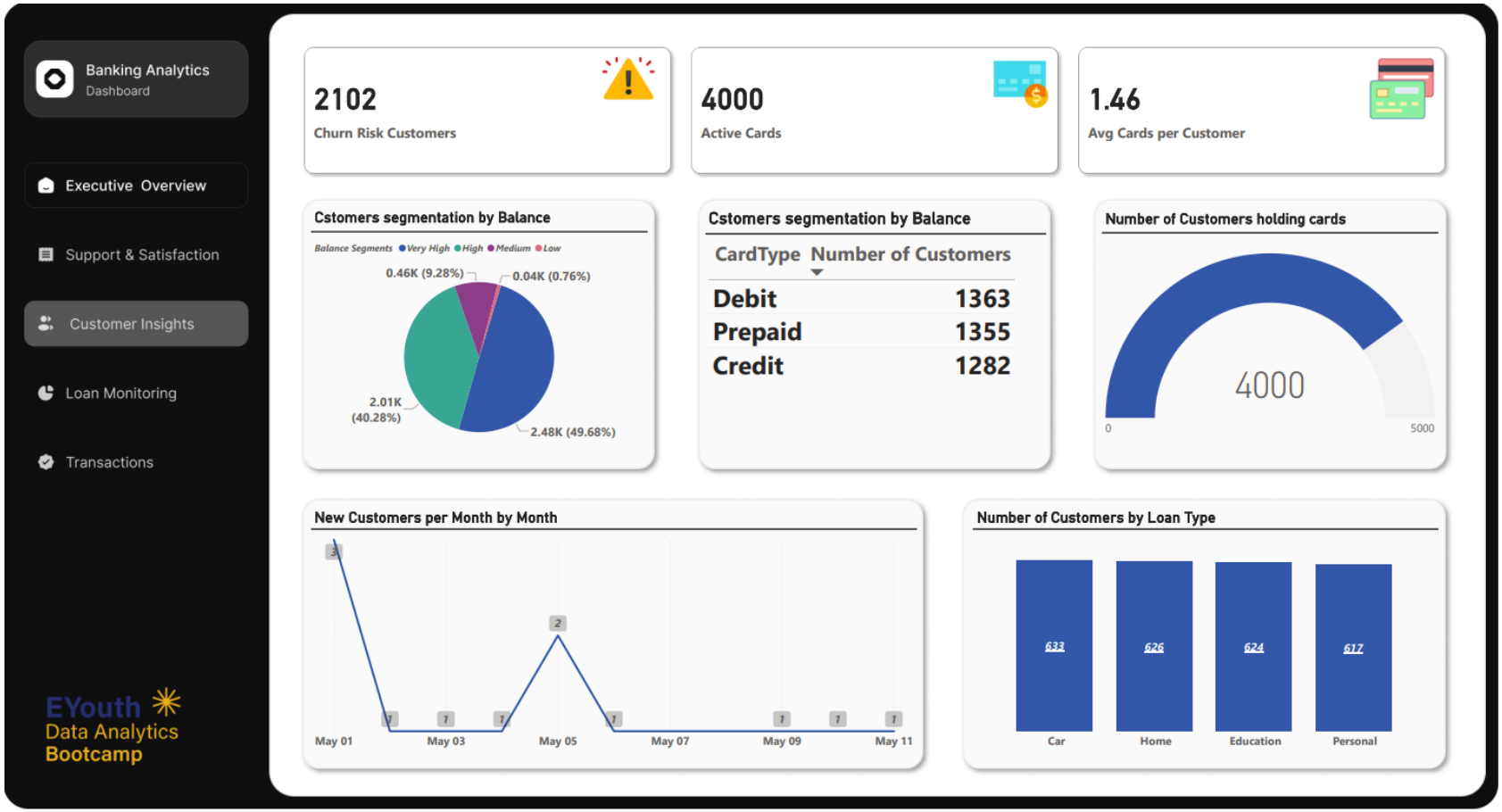
3.1.Executive Banking Overview



3.2. Support & Satisfaction



3.3. Customer Insights



3.4. Loan Monitoring Dashboard

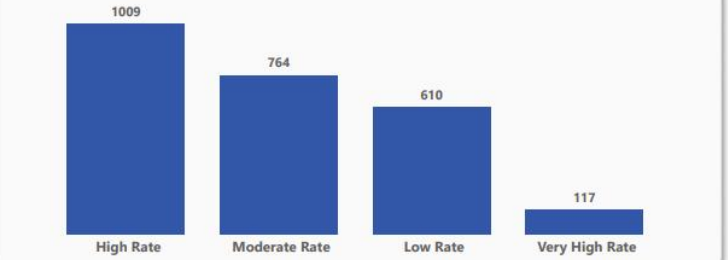
Banking Analytics
Dashboard

- Executive Overview
- Support & Satisfaction
- Customer Insights
- Loan Monitoring
- Transactions

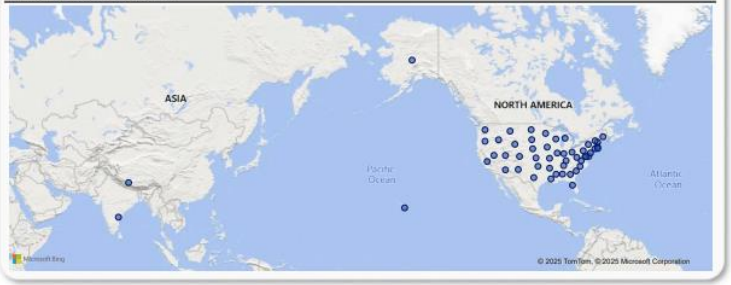
EYouth
Data Analytics
Bootcamp

2.5K	$246,664	$616,658,893	7.48
Number of Loans	Avg Loan Amount Per Customer	Total Loan Amount	Avg Interest by Loan Type

InterestRate Buckets By LoanType



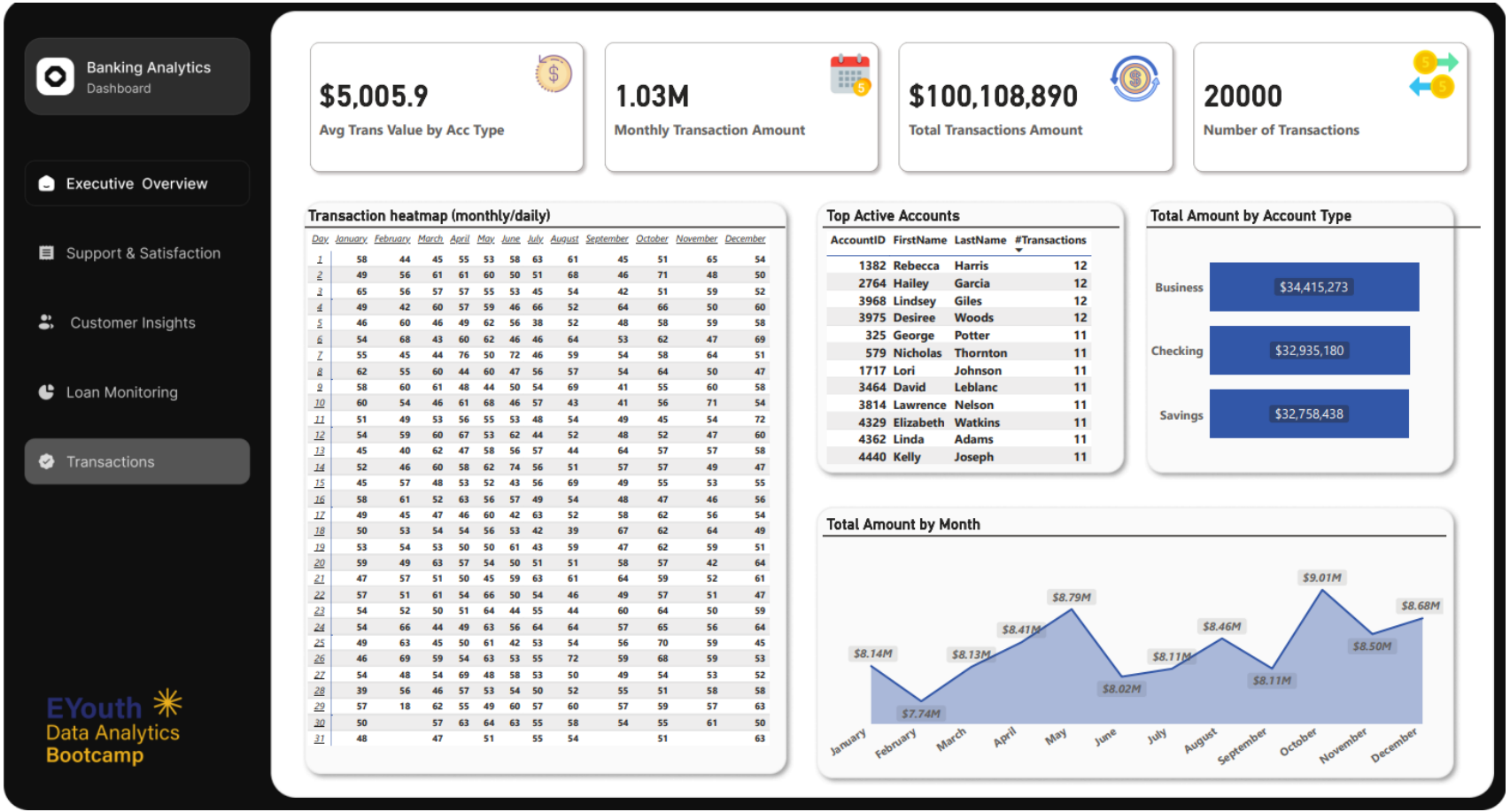
Loan distribution map



2025	2026	2027	2028	2029	2030

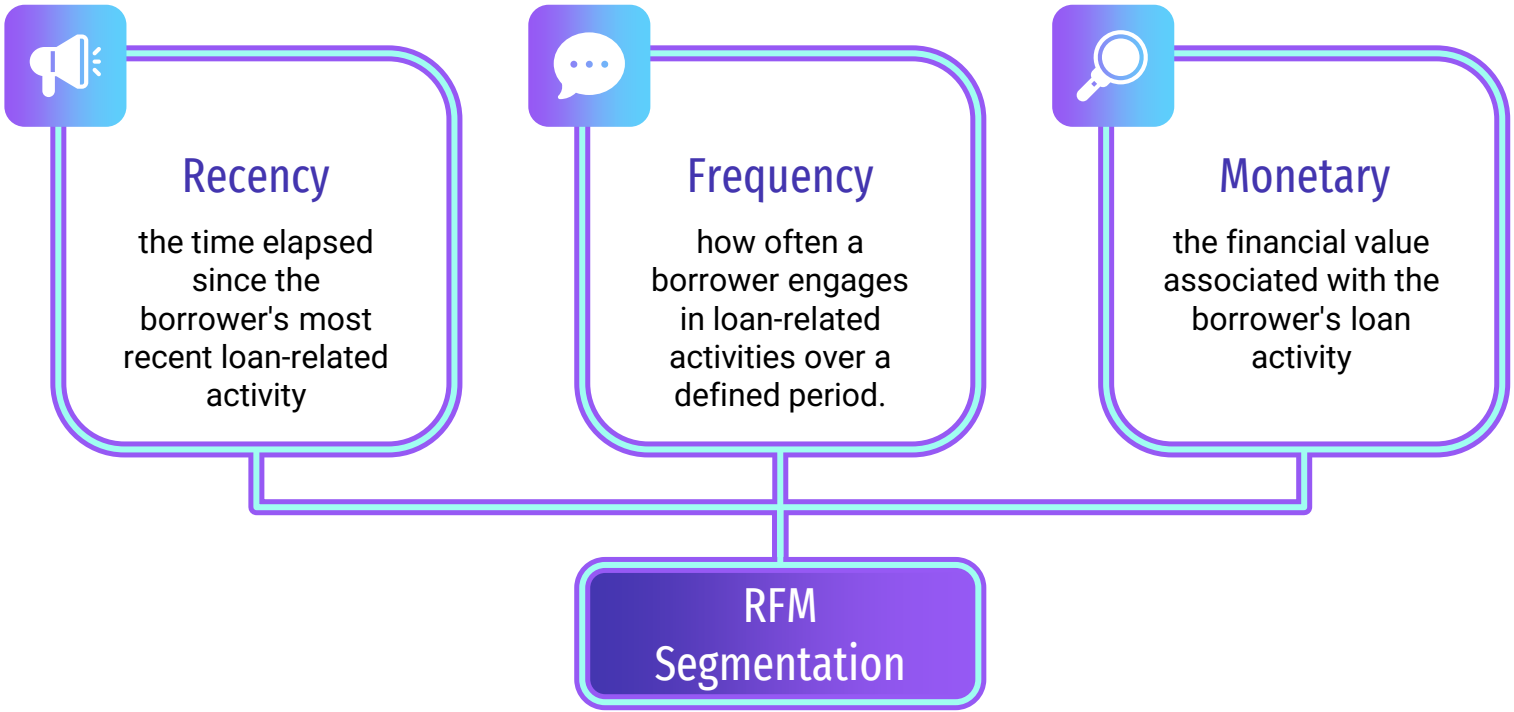
LoanID	CustomerID	Year	Month	LoanType	InterestRate	DefaultRisk
8	1605	2025	October	Car	8.12	Low
18	1201	2025	July	Education	5.64	Low
19	867	2025	May	Personal	7.47	Low
24	3391	2025	June	Education	4.44	Low
30	2152	2025	September	Car	6.75	Low
38	519	2025	May	Car	4.97	Low
41	4035	2025	June	Home	3.18	Low
45	4160	2025	September	Home	5.47	Low
46	4225	2025	December	Education	12.03	Low
52	4912	2025	November	Personal	6.89	Low
56	1922	2025	June	Personal	8.36	Low
61	4260	2025	September	Home	5.40	Low
66	3954	2025	October	Personal	11.62	Low
68	424	2025	December	Home	7.31	Low
78	1710	2025	June	Personal	2.71	Low
91	3017	2025	May	Education	9.96	Low
94	4485	2025	June	Education	7.03	Low
99	3732	2025	September	Home	5.07	Low
100	3915	2025	November	Home	7.65	Low
112	2106	2025	October	Education	12.18	Low
119	1056	2025	December	Home	10.17	Low
121	4794	2025	June	Personal	3.07	Low
135	2269	2025	July	Personal	6.08	Low

3.5. Transaction Dashboard

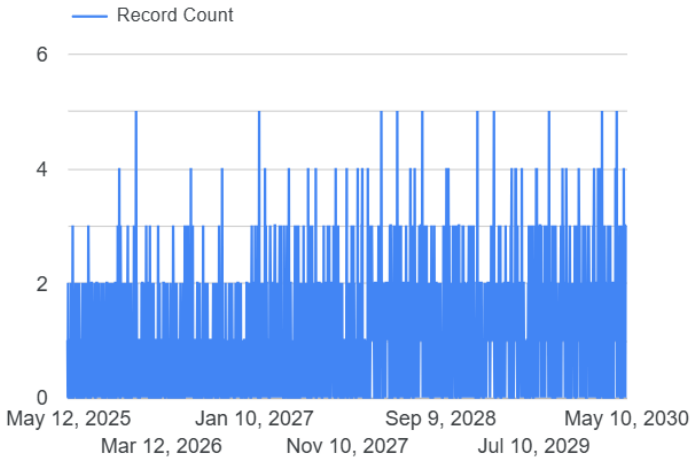


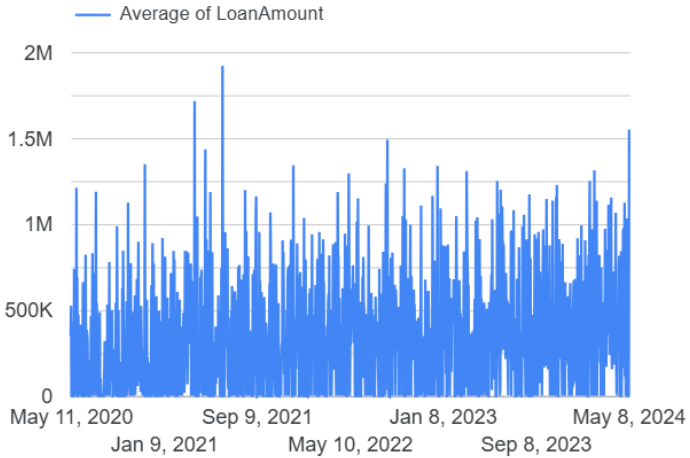
Day	January	February	March	April	May	June	July	August	September	October	November	December
1	58	44	45	55	53	58	63	61	45	51	65	54
2	49	56	61	61	60	50	51	68	46	71	48	50
3	65	56	57	57	55	53	45	54	42	51	59	52
4	49	42	60	57	59	46	66	52	64	66	50	60
5	46	60	46	49	62	56	38	52	48	58	59	58
6	54	68	43	60	62	46	46	64	53	62	47	69
7	55	45	44	76	50	72	46	59	54	58	64	51
8	62	55	60	44	60	47	56	57	54	64	50	47
9	58	60	61	48	44	50	54	69	41	55	60	58
10	60	54	46	61	68	46	57	43	41	56	71	54
11	51	49	53	56	55	53	48	54	49	45	54	72
12	54	59	60	67	53	62	44	52	48	52	47	60
13	45	40	62	47	58	56	57	44	64	57	57	58
14	52	46	60	58	62	74	56	51	57	57	49	47
15	45	57	48	53	52	43	56	69	49	55	53	55
16	58	61	52	63	56	57	49	54	48	47	46	56
17	49	45	47	46	60	42	63	52	58	62	56	54
18	50	53	54	54	56	53	42	39	67	62	64	49
19	53	54	53	50	50	61	43	59	47	62	59	51
20	59	49	63	57	54	50	51	51	58	57	42	64
21	47	57	51	50	45	59	63	61	64	59	52	61
22	57	51	61	54	66	50	54	46	49	57	51	47
23	54	52	50	51	64	44	55	44	60	64	50	59
24	54	66	44	49	63	56	64	64	57	65	56	64
25	49	63	45	50	61	42	53	54	56	70	59	45
26	46	69	59	54	63	53	55	72	59	68	59	53
27	54	48	54	69	48	58	53	50	49	54	53	52
28	39	56	46	57	53	54	50	52	55	51	58	58
29	57	18	62	55	49	60	57	60	57	59	57	63
30	50		57	63	64	63	55	58	54	55	61	50
31	48		47		51		55	54		51		63

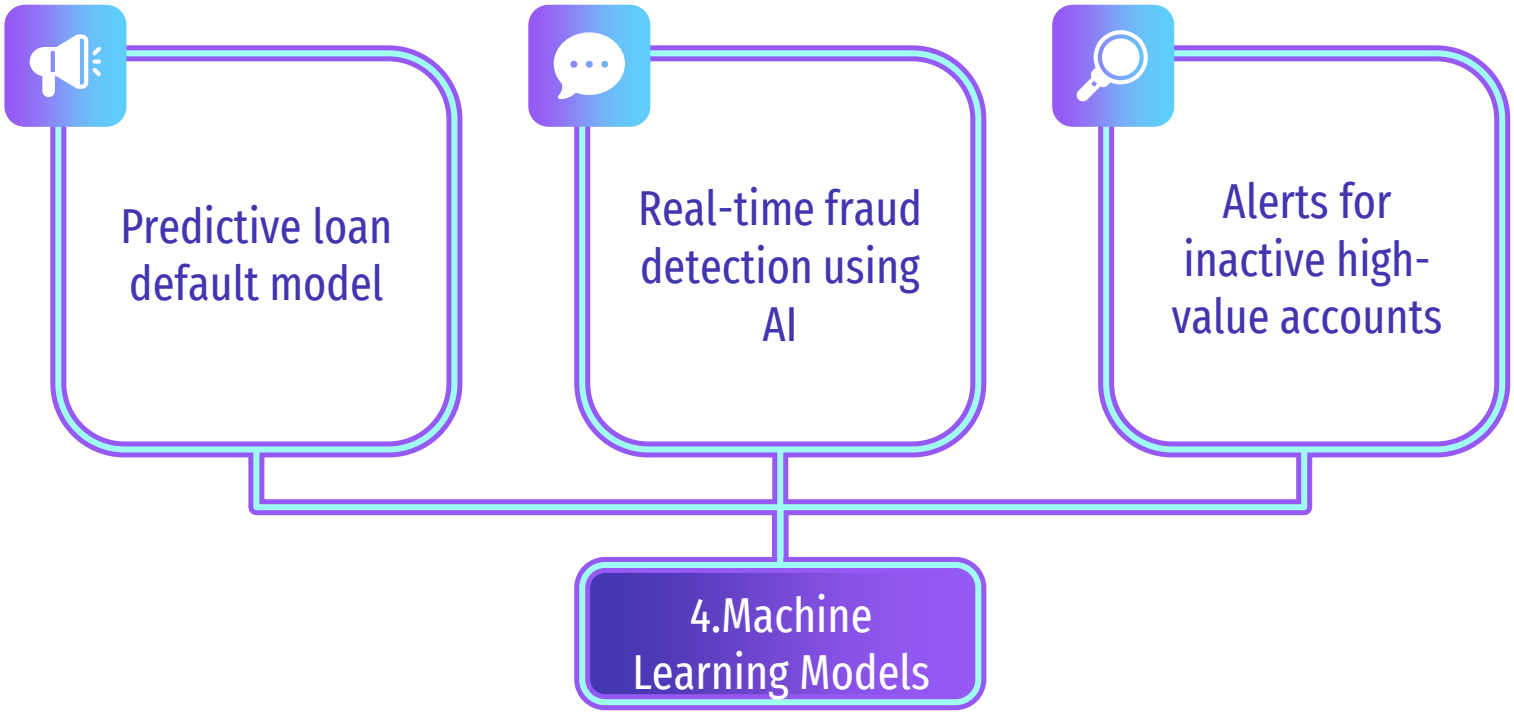
AccountID	FirstName	LastName	#Transactions
1382	Rebecca	Harris	12
2764	Hailey	Garcia	12
3968	Lindsey	Giles	12
3975	Desiree	Woods	12
325	George	Potter	11
579	Nicholas	Thornton	11
1717	Lori	Johnson	11
3464	David	Leblanc	11
3814	Lawrence	Nelson	11
4329	Elizabeth	Watkins	11
4362	Linda	Adams	11
4440	Kelly	Joseph	11


Recency
the time elapsed since the borrower's most recent loan-related activity
Frequency
how often a borrower engages in loan-related activities over a defined period.
Monetary
the financial value associated with the borrower's loan activity
RFM Segmentation

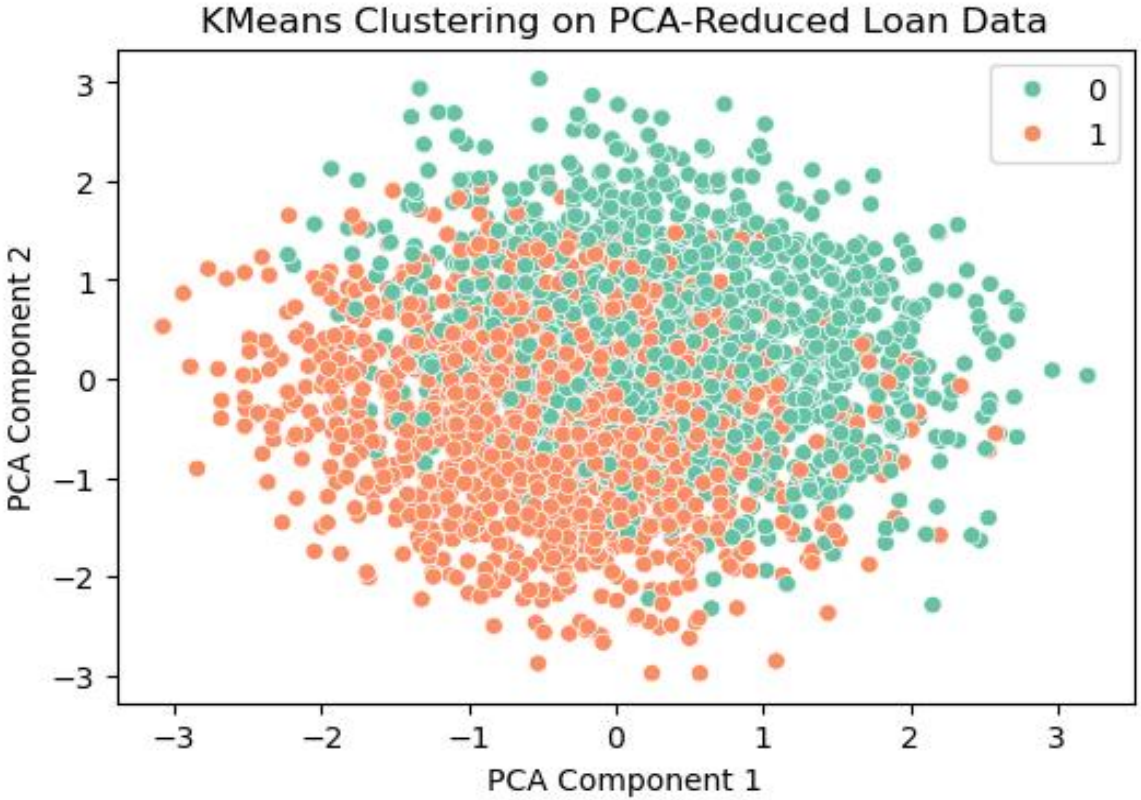
RFM Segmentation



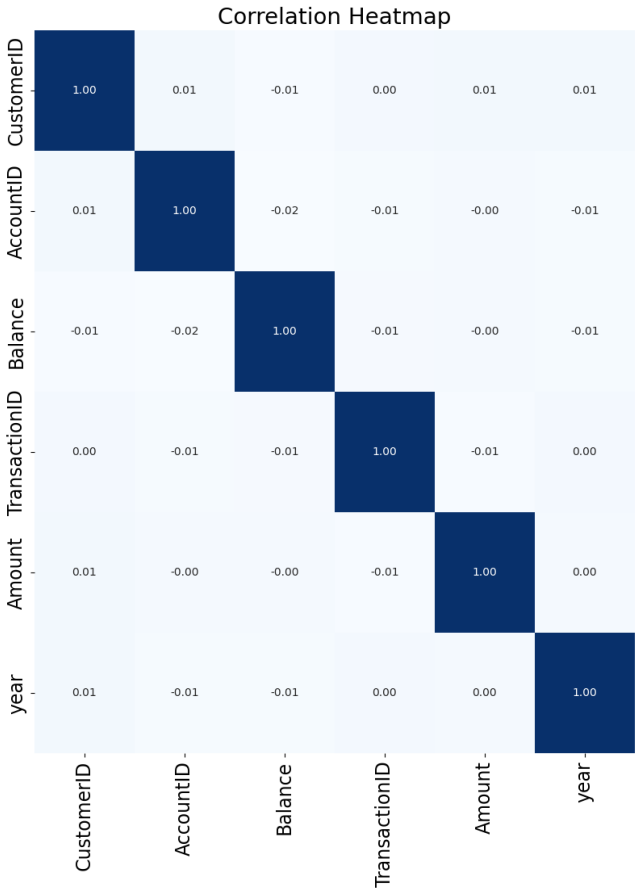


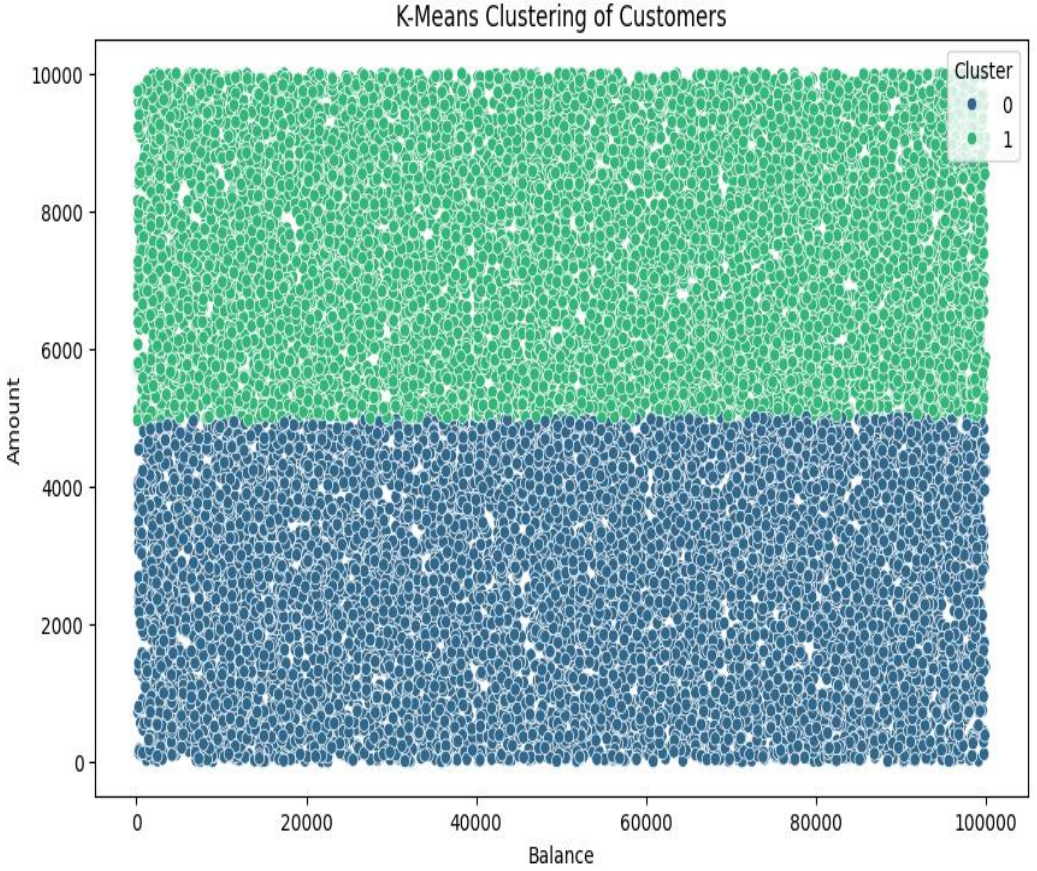

Predictive loan default model
Real-time fraud detection using AI
Alerts for inactive high-value accounts
4.Machine Learning Models

4.1. Predictive loan default model

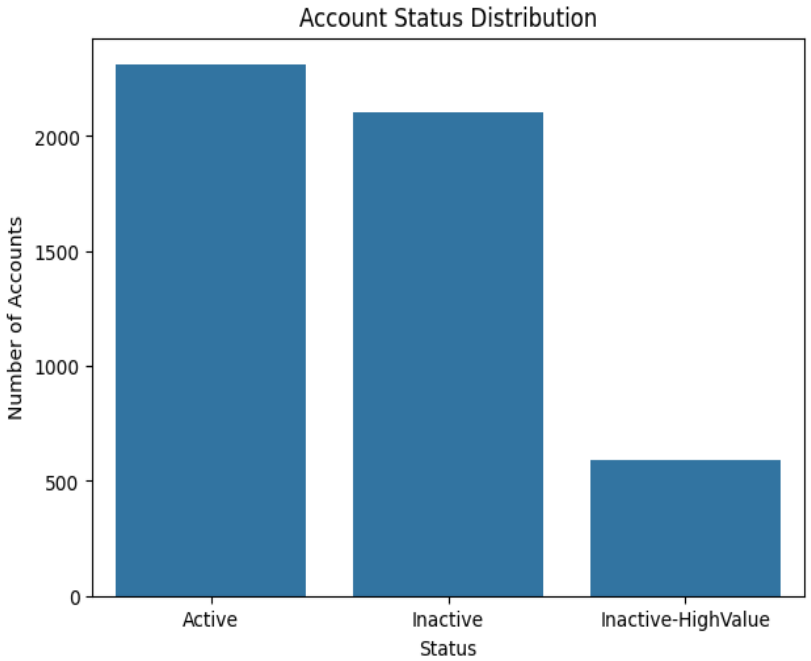


4.2. Real-time fraud detection using AI





4.3. Alerts for inactive high-value accounts



Recommendations

What to do to increase the performance of this project

Problem

only 49% of total problems were solved

Recommendation

1. Gather insights from unresolved cases to improve support quality.
2. conduct regular performance evaluations at both team and individual levels.

Problem

The data contains all the information about either the customer or the loans, but it does not contain any information about whether the customer has paid the loan or not

Recommendation

This additional information if added would make a big difference while making machine learning modes as it would be easier to determine whether this customer will have the ability to pay the loan or not. And this will offer a much better service to the banking system as it will help us to know if it is useful to give a new customer a loan or not.

Problem

The data does not contain any information about the customer loans in other bank services.

Recommendation

Adding information about whether the customer loans to the banking data so
that it would help to determine whether to give the customer the loan or not depending on the data from other bank services.

Our team

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Basmala Samir

Ola Abo Karam


THANK YOU!