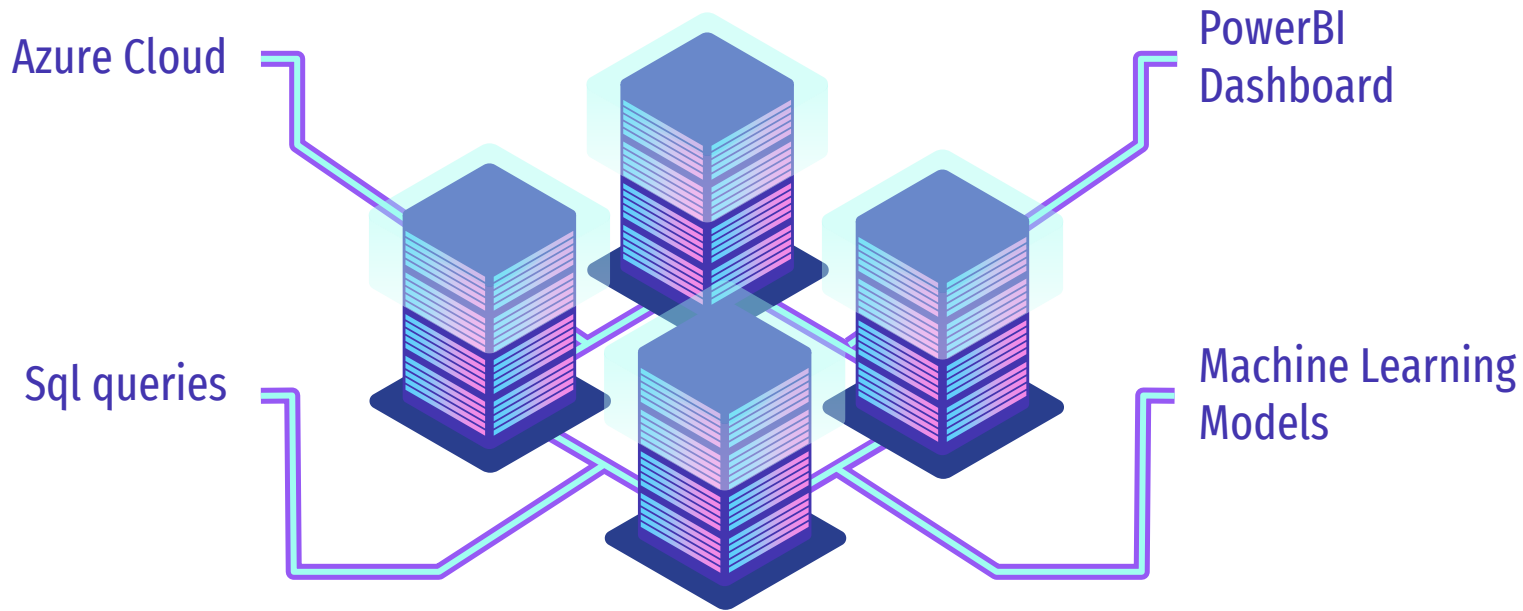


AZURE-BASED BANKING INTELLIGENCE & ANALYTICS SYSTEM

E-Youth bootcamp project



System Component



1. Azure Cloud

Microsoft Azure

bankinganalyticsdb

Copilot

MostafaNabil31515@o...
DEFAULT DIRECTORY

Home >

Create SQL Database

Microsoft

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ Azure for Students

Resource group * ⓘ (New) E-TOUCH

[Create new](#)

Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name * bankinganalyticsdb ✓

Server * ⓘ (new) bankinganalyticsdb (UAE North)

[Create new](#)

Compute + storage * ⓘ

General Purpose - Serverless

Standard-series (Gen5), 2 vCores, 32 GB storage, zone redundant disabled

[Configure database](#)

Behavior when free offer limit reached

Behavior when free offer limit reached ⓘ ☒ Auto-pause the database until next month

When free offer limit is reached, the database will not be accessible until the next month.

First 100,000 vCore seconds free

Overage billing ¹ Disabled

ESTIMATED STORAGE COST / MONTH	0.00 USD
COMPUTE COST / VCORE SECOND ²	0.000000 USD

¹ There will be no charges for usage within the free limits. The database will be paused automatically when the free limits are reached.

² Serverless databases are billed in vCore seconds based on a combination of CPU and memory utilization. [Learn more about serverless billing](#)

1. Azure Cloud

Microsoft Azure

bankinganalyticsdb

Copilot

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DEFAULT DIRECTORY

Home >

Create SQL Database

Microsoft

Get started with a 30 day free trial period, and then 15 USD/server/month.

Enable Microsoft Defender for SQL * ⓘ ☐ Start free trial
☒ Not now

Ledger

Ledger cryptographically verifies the integrity of your data and detects any tampering that might have occurred. [Learn more](#) ⓘ

Ledger **Not configured**
[Configure ledger](#)

Server identity

Use system assigned and user assigned managed identities to enable central access management between this database and other Azure resources. [Learn more](#) ⓘ

Server identity **Not enabled**
[Configure Identities](#)

Transparent data encryption key management

Transparent data encryption encrypts your databases, backups, and logs at rest without any changes to your application. To enable encryption, go to each database. Database level settings if enabled, will override the server level setting. [Learn more](#) ⓘ

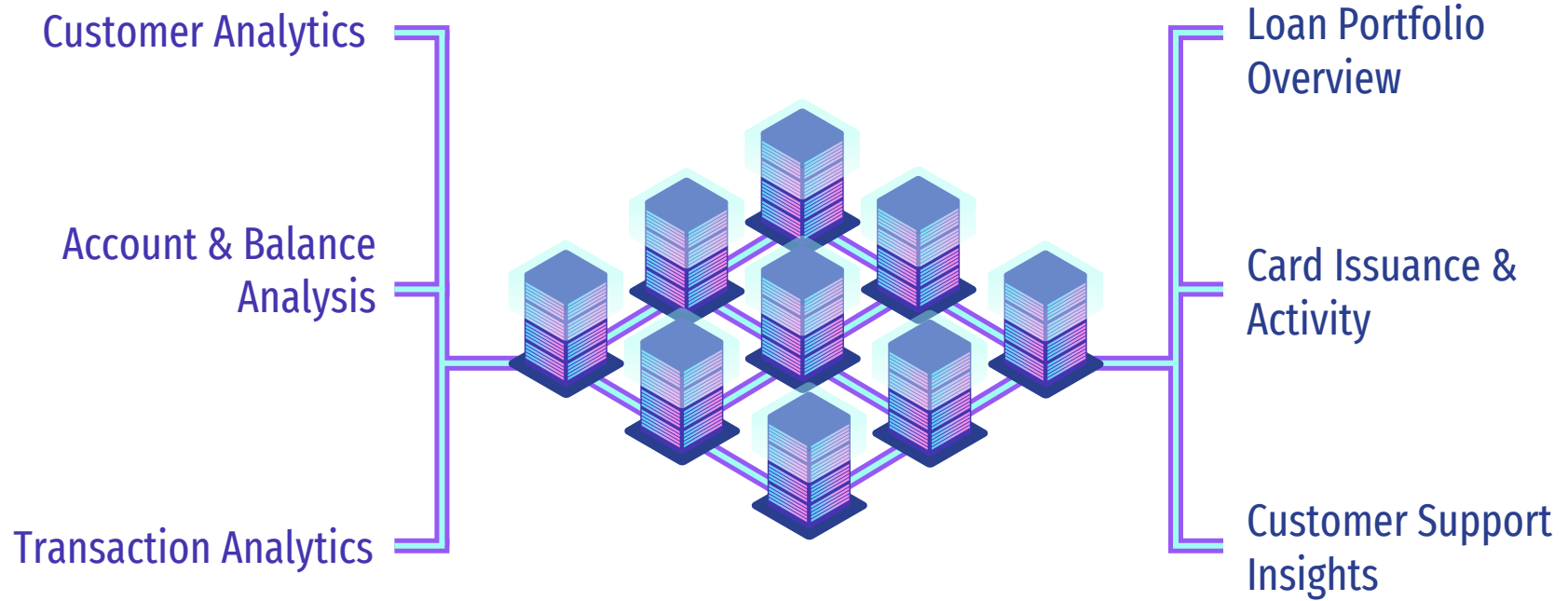
Cost summary

General Purpose (GP_S_Gen5_2)	
Cost per GB (in USD)	0.00
Max storage selected (in GB)	x 41.6
💜 First 32 GB storage free	
💜 First 100,000 vCore seconds free	
Overage billing ¹	Disabled
ESTIMATED STORAGE COST / MONTH	0.00 USD
COMPUTE COST / VCORE SECOND²	0.000000 USD

¹ There will be no charges for usage within the free limits. The database will be paused automatically when the free limits are reached.

² Serverless databases are billed in vCore seconds based on a combination of CPU and memory utilization. [Learn more about serverless billing](#)

2. SQL queries



2.1.Customer Analytics

```
----- 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

```
-- 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 -----

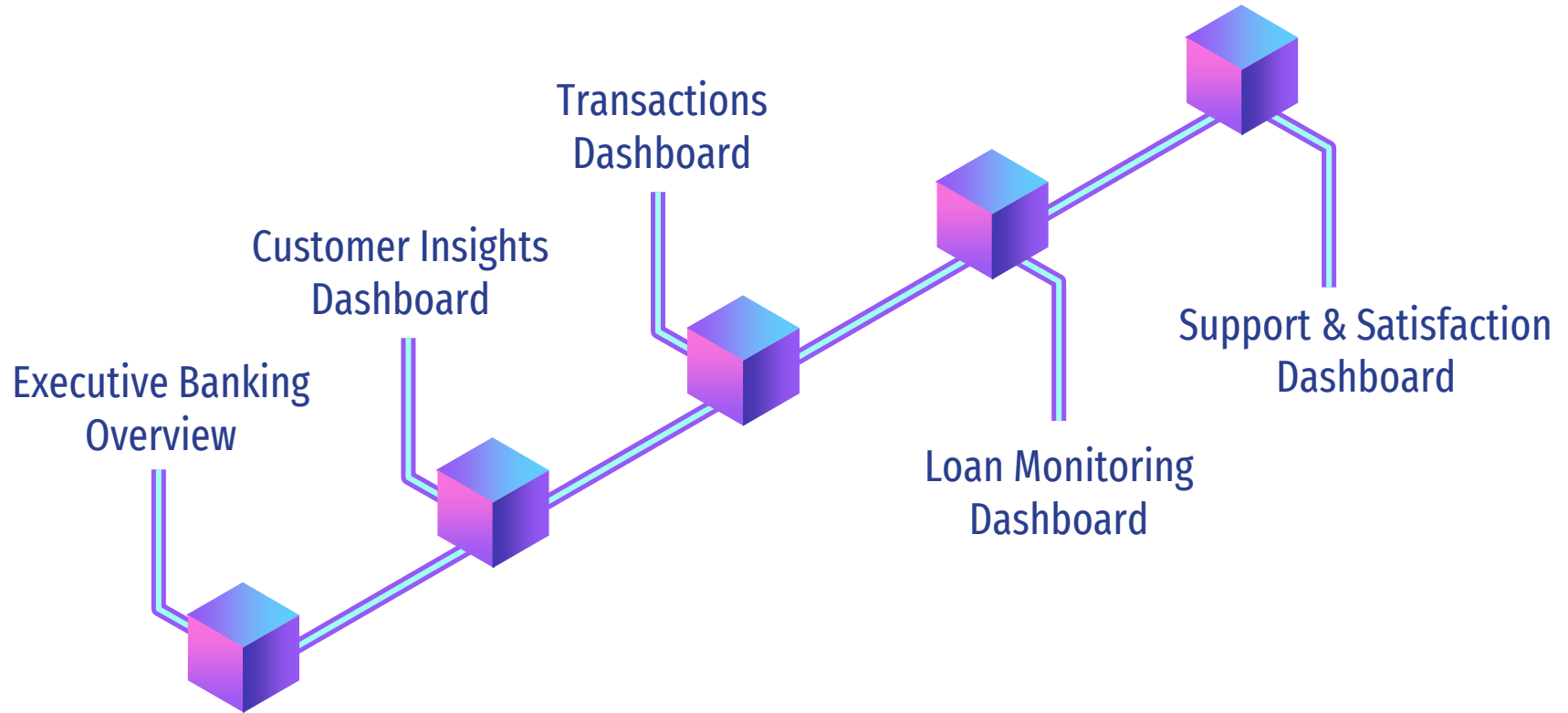
-- 1. Total number of support calls

```
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



Banking Analytics
Dashboard



Executive Overview



Support & Satisfaction



Customer Insights



Loan Monitoring



Transactions

EYouth
Data Analytics
Bootcamp

5000

Customers



\$249,370,795

Balance Amount



20000

Transactions

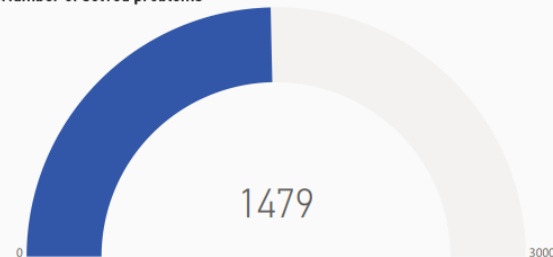


1.58

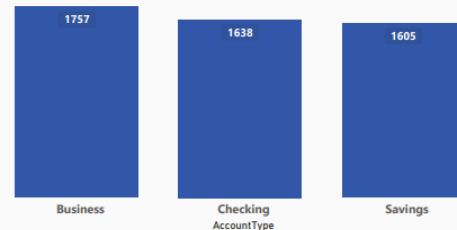
Avg Accounts Per Customer



Number of solved problems



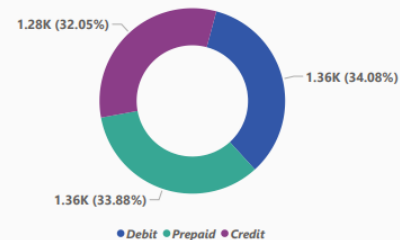
Number of Customers by Account Type



Transaction Amount by Month



Number of Customers by Card Type



3.2. Support & Satisfaction



Banking Analytics
Dashboard



Executive Overview



Support & Satisfaction



Customer Insights



Loan Monitoring



Transactions

1.34

Average Call Per Customer

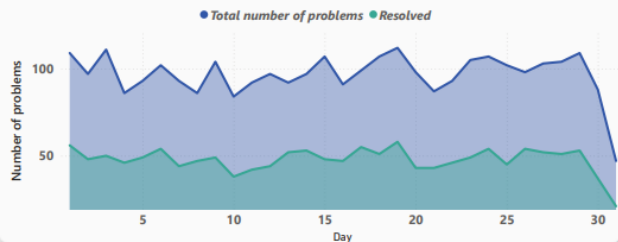


49.30%

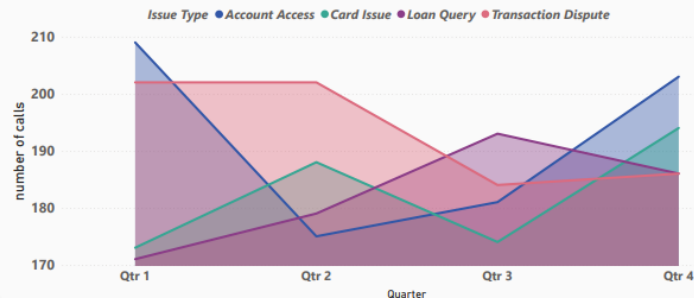
Percentage of Resolved problems



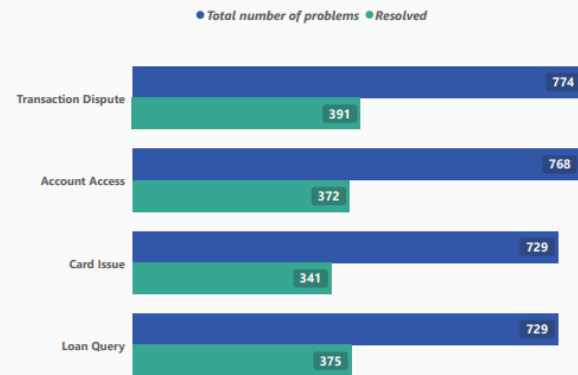
Call Resolution Rate Daily



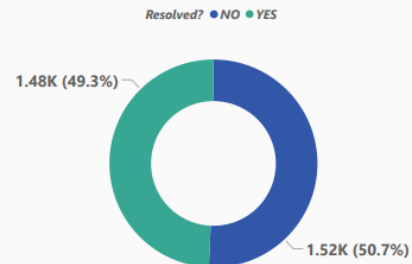
Number of Calls in Quarter By IssueType



Number of Resolved and Unresolved problems by IssueType



Resolved VS Unresolved



3.3. Customer Insights



Banking Analytics
Dashboard

Executive Overview

Support & Satisfaction

Customer Insights

Loan Monitoring

Transactions

2102

Churn Risk Customers



4000

Active Cards

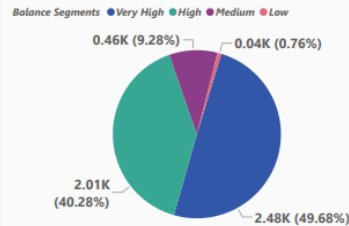


1.46

Avg Cards per Customer



Customers segmentation by Balance



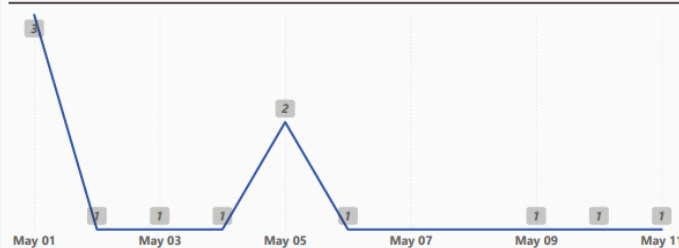
Customers segmentation by Balance

CardType	Number of Customers
Debit	1363
Prepaid	1355
Credit	1282

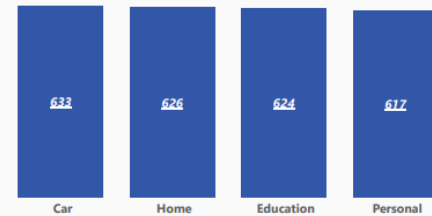
Number of Customers holding cards



New Customers per Month by Month



Number of Customers by Loan Type



3.4. Loan Monitoring Dashboard



Banking Analytics
Dashboard



Executive Overview



Support & Satisfaction



Customer Insights



Loan Monitoring



Transactions

2.5K

Number of Loans



\$246,664

Avg Loan Amount Per Customer



\$616,658,893

Total Loan Amount

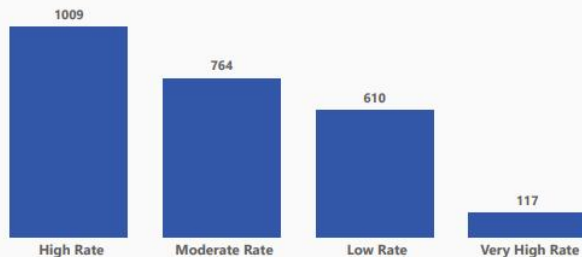


7.48

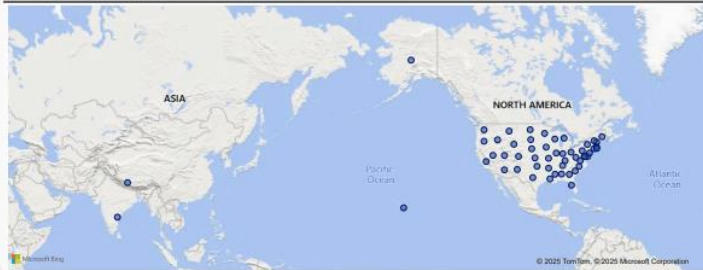
Avg Interest by Loan Type



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



Banking Analytics
Dashboard



Executive Overview



Support & Satisfaction



Customer Insights



Loan Monitoring



Transactions

\$5,005.9

Avg Trans Value by Acc Type



1.03M

Monthly Transaction Amount



\$100,108,890

Total Transactions Amount



20000

Number of Transactions



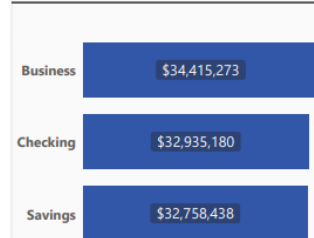
Transaction heatmap (monthly/daily)

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

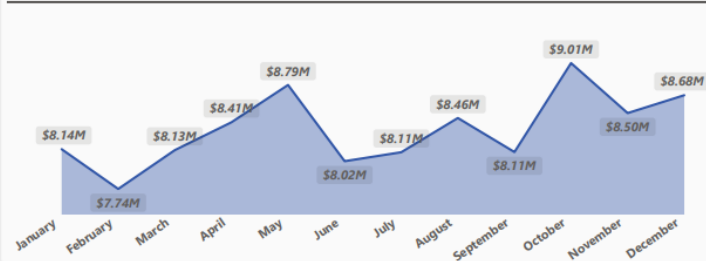
Top Active Accounts

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

Total Amount by Account Type



Total Amount by Month





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.

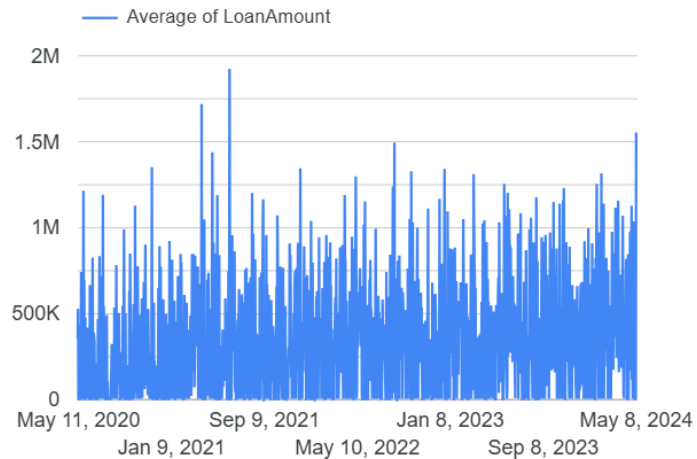
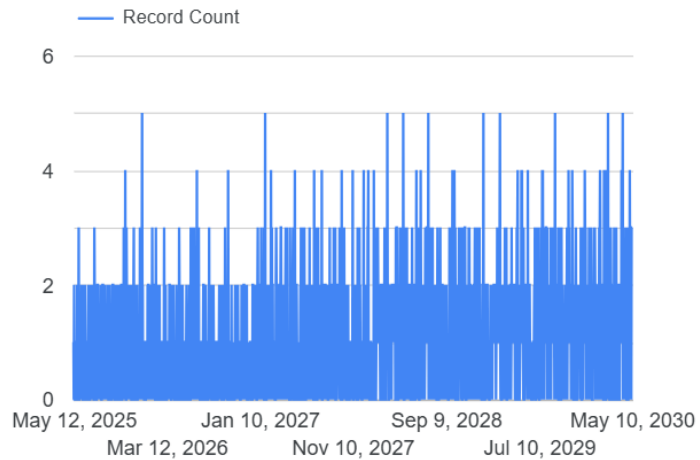


Monetary

the financial value
associated with the
borrower's loan
activity

RFM
Segmentation

RFM Segmentation





Predictive loan
default model



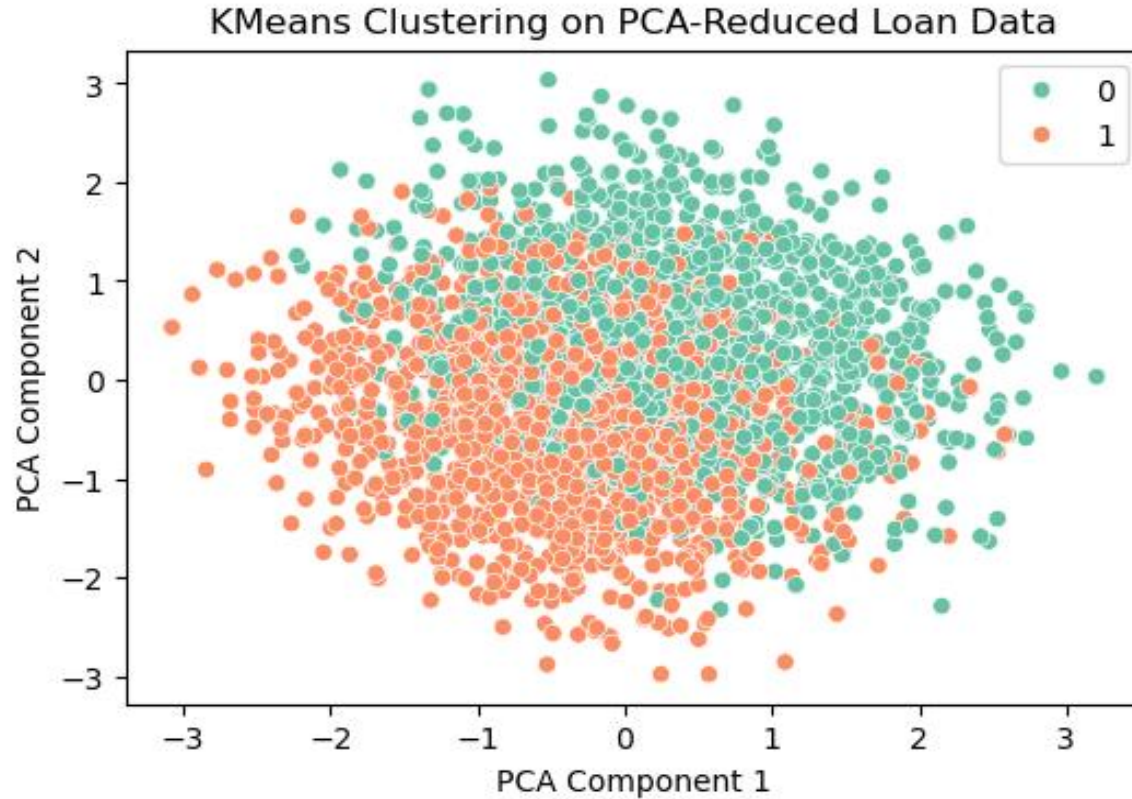
Real-time fraud
detection using
AI



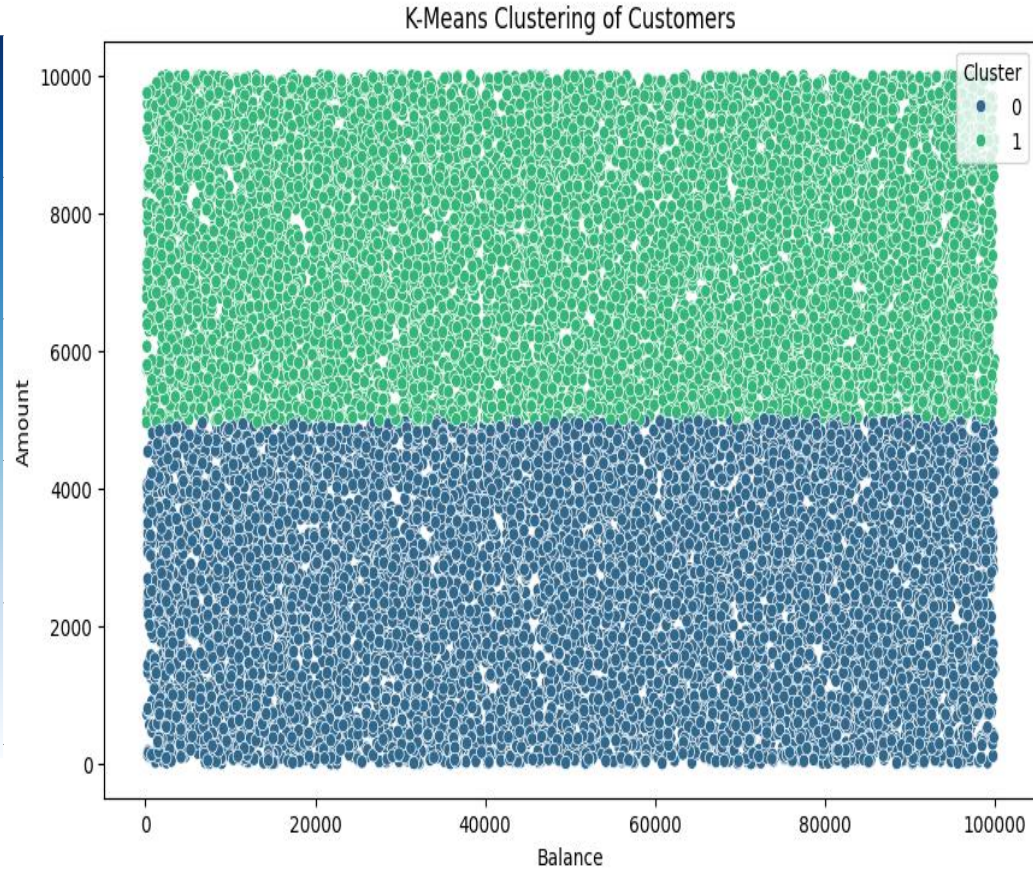
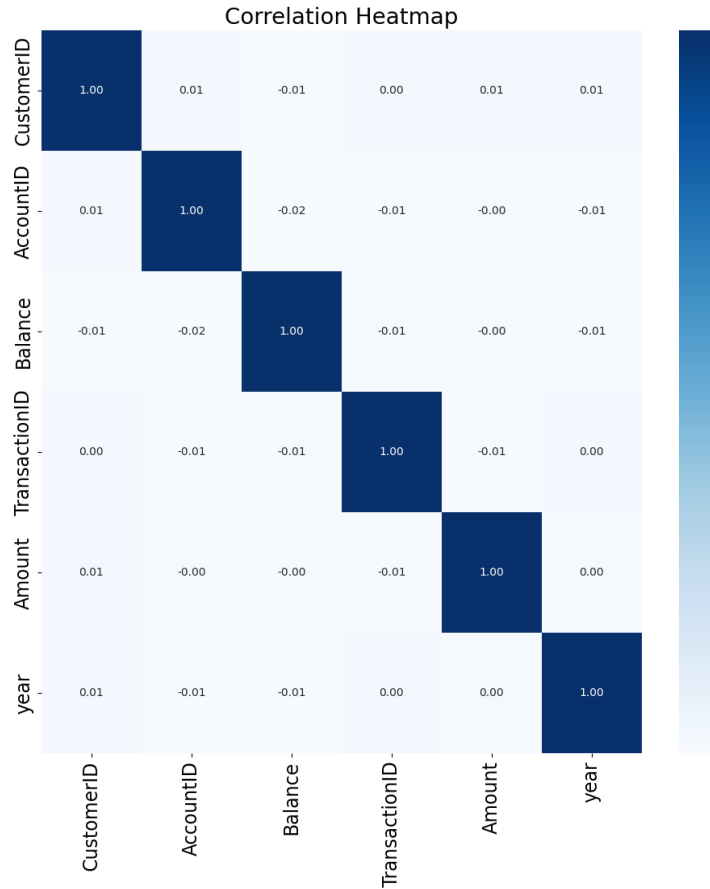
Alerts for
inactive high-
value accounts

4. Machine
Learning Models

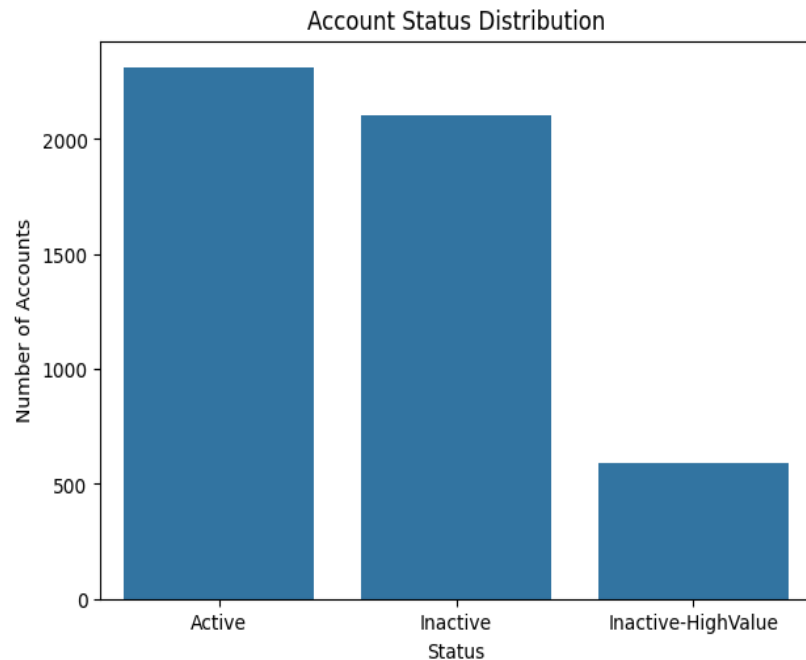
4.1. Predictive loan default model



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 models 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

Abdelrahman Magdy

Mohamed Mustafa

Mustafa Mahmoud

Mennatullah Mohamed

Mostafa Nabil

Aya Ibrahim

Abdelrahman Afify

Basmala Samir

Hebatullah Emad

Ola Abo Karam



THANK YOU!