LAXMI BANK

CORE BANKING SYSTEM – TRANSACTION AND ANALYTICAL DATA MANAGEMENT

Task 2: ExtensoData Internship

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1. Introduction

This project aims to build a prototype of a Core Banking System: Laxmi Bank, featuring essential transaction capabilities and an analytics layer to support business insights. The backend employs FastAPI with SQLAlchemy connected to a MySQL database, while the frontend and admin dashboard are developed using Streamlit.

2. Objectives

- To manage bank accounts and transactions securely.
- To provide a simple dashboard for analytics.
- To store and organize transaction history for future analysis.

3. Tools & Technologies

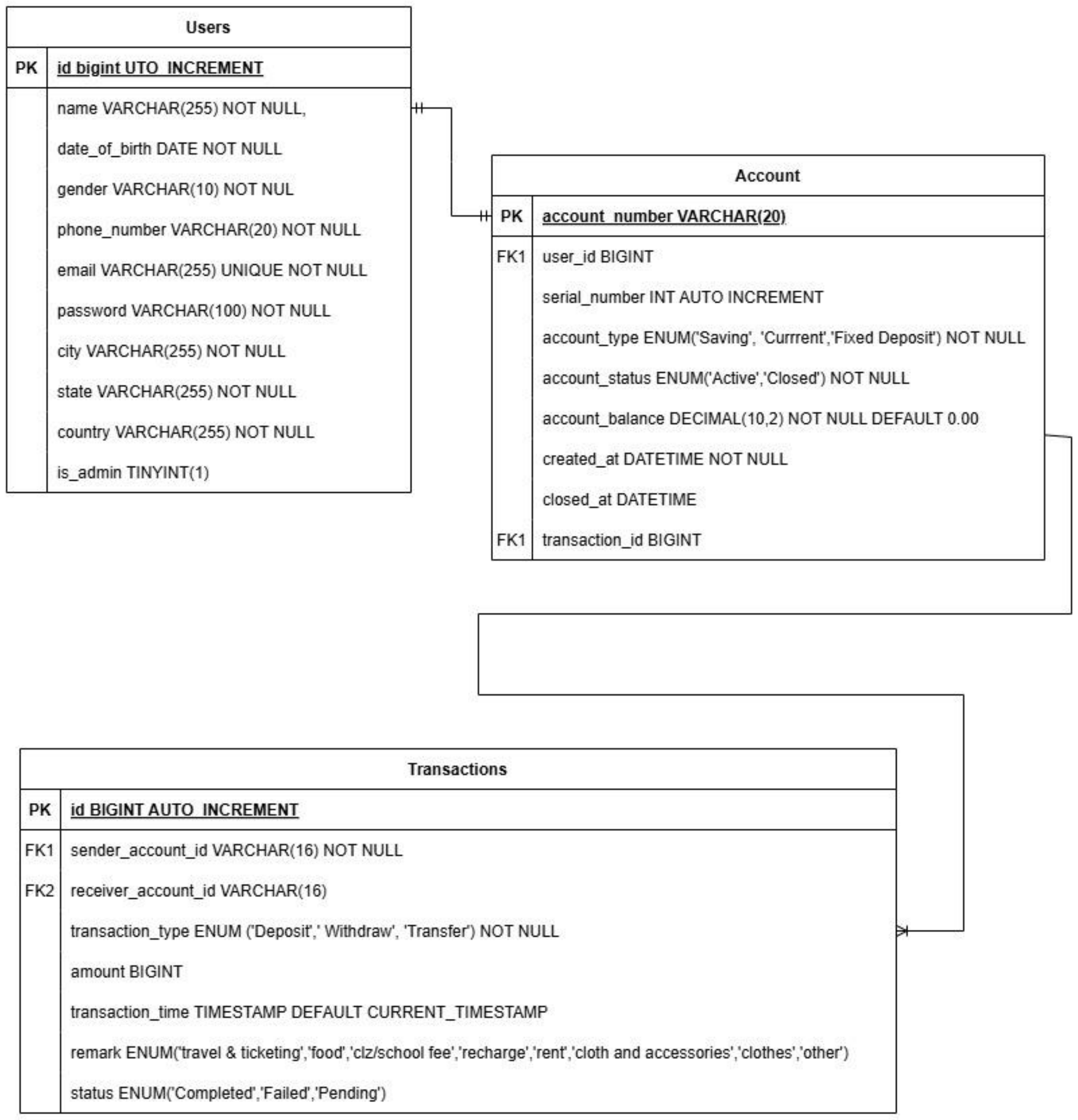
Technology	Purpose
Python	Core programming language
FastAPI	API development
SQLAlchemy	ORM for database interaction
MySQL	Relational database
Streamlit	Web interface/dashboard
Pandas	Data processing & dataframe display
Plotly Express	Graphical representation
Git & GitHub	Version control
Faker	Dummy data for testing
Postman	API testing

4. System Architecture Overview

Core banking System	
Files and Folders	Functions
.env	Store environment-specific or sensitive configs
.gitignore	Tells git what not to track
app.py	Streamlit dashboard and UI
automation.py	Seeds database with Faker
database.py	DB connection and setup using SQLAlchemy
main.py	Entry point for FASTAPI
migration.py	Generates and applies SQL migrations
readme.md	Readme file of github repo
routes.py	Define URL structure of application
auth/ auth_controller.py auth_service.py	Handlers login Auth-related login
account/ account_controller.py account_schema.py account_service.py	Route handlers for account-related APIs Pydantic models for validation Business logic for account handling
user/ user_controller.py user_schema.py user_service.py	Register user Pydantic models for user input/output Service functions related to users
transaction/ transaction_controller.py transaction_schema.py transaction_service.py	API endpoints for transactions Data models for transactions Logic for handling transaction rules
migrations/ 20250410211847_create_users_table.sql 20250410221646_create_transactions_table <other_timestamped>.sql	SQL files for table creation/alteration
venv/ installed Python packages and dependencies	Virtual environment directory

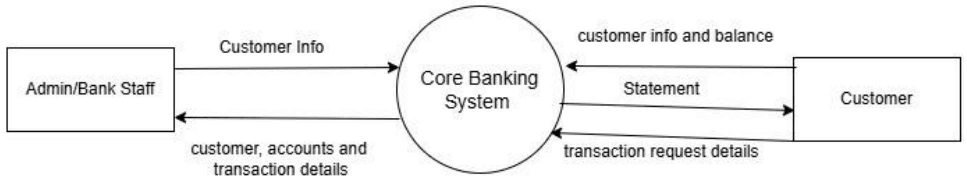
5. ER Diagram

This ERD shows the relationship among Users, Accounts, and Transactions. One user can have one account, and each account may be associated with multiple transactions.


Users
PK
id bigint UTO_INCREMENT
name VARCHAR(255) NOT NULL,
date_of_birth DATE NOT NULL
gender VARCHAR(10) NOT NUL
phone_number VARCHAR(20) NOT NULL
email VARCHAR(255) UNIQUE NOT NULL
password VARCHAR(100) NOT NULL
city VARCHAR(255) NOT NULL
state VARCHAR(255) NOT NULL
country VARCHAR(255) NOT NULL
is_admin TINYINT(1)
Account
PK
account_number VARCHAR(20)
FK1
user_id BIGINT
serial_number INT AUTO INCREMENT
account_type ENUM('Saving', 'Currrent','Fixed Deposit') NOT NULL
account_status ENUM('Active','Closed') NOT NULL
account_balance DECIMAL(10,2) NOT NULL DEFAULT 0.00
created_at DATETIME NOT NULL
closed_at DATETIME
FK1
transaction_id BIGINT
Transactions
PK
id BIGINT AUTO_INCREMENT
FK1
sender_account_id VARCHAR(16) NOT NULL
FK2
receiver_account_id VARCHAR(16)
transaction_type ENUM ('Deposit',' Withdraw', 'Transfer') NOT NULL
amount BIGINT
transaction_time TIMESTAMP DEFAULT CURRENT_TIMESTAMP
remark ENUM('travel & ticketing','food','clz/school fee','recharge','rent','cloth and accessories','clothes','other')
status ENUM('Completed','Failed','Pending')

6. DFD (Level 0 and Level 1)

DFD Level 0 and Level 1 describe the high-level and detailed data flow of the system.



Admin/Bank Staff
Customer Info
customer, accounts and transaction details
Core Banking System
customer info and balance
Statement
transaction request details
Customer

Figure 1.1 Level 0 DFD for Core Banking System

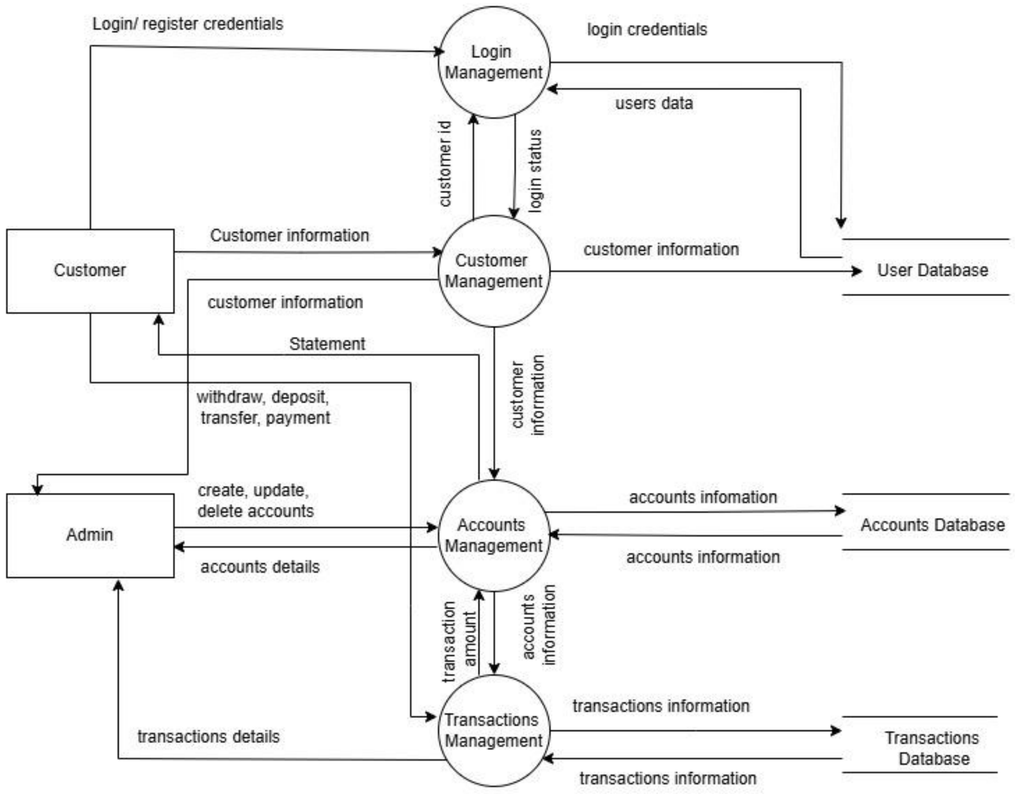
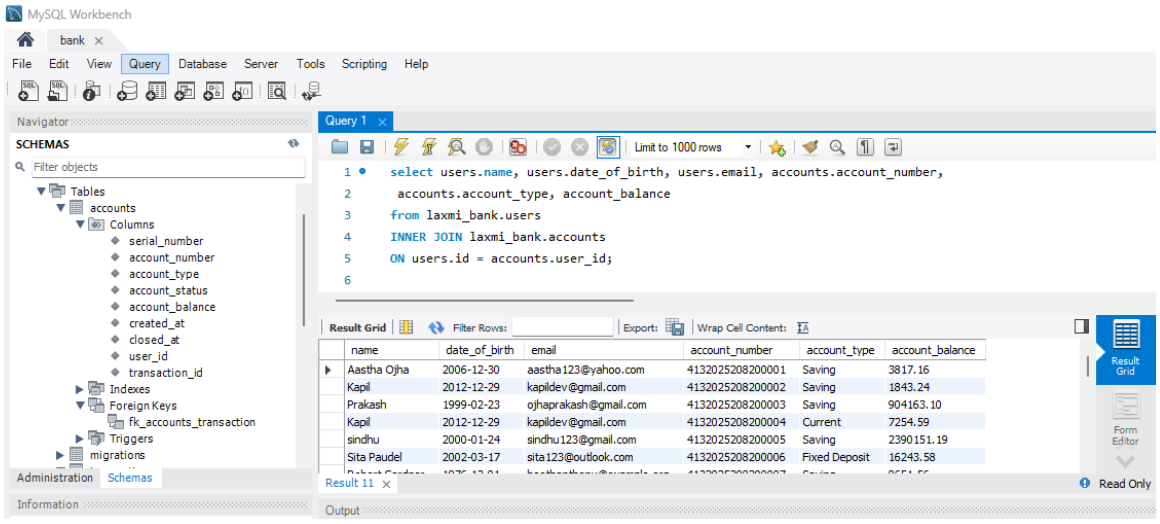


Figure 1.2 Level 1 DFD for Core Banking System

7. Database Schema

The system includes four MySQL tables: users, accounts, transactions, and migrations.



```sql
select users.name, users.date_of_birth, users.email, accounts.account_number,
 accounts.account_type, account_balance
from laxmi_bank.users
INNER JOIN laxmi_bank.accounts
ON users.id = accounts.user_id;
```

name	date_of_birth	email	account_number	account_type	account_balance
Aastha Ojha	2006-12-30	aastha123@yahoo.com	413202520820001	Saving	3817.16
Kapil	2012-12-29	kapildev@gmail.com	413202520820002	Saving	1843.24
Prakash	1999-02-23	ojhaprakash@gmail.com	413202520820003	Saving	904163.10
Kapil	2012-12-29	kapildev@gmail.com	413202520820004	Current	7254.59
sindhu	2000-01-24	sindhu123@gmail.com	413202520820005	Saving	2390151.19
Sita Paudel	2002-03-17	sita123@outlook.com	413202520820006	Fixed Deposit	16243.58

8. Core Functionalities

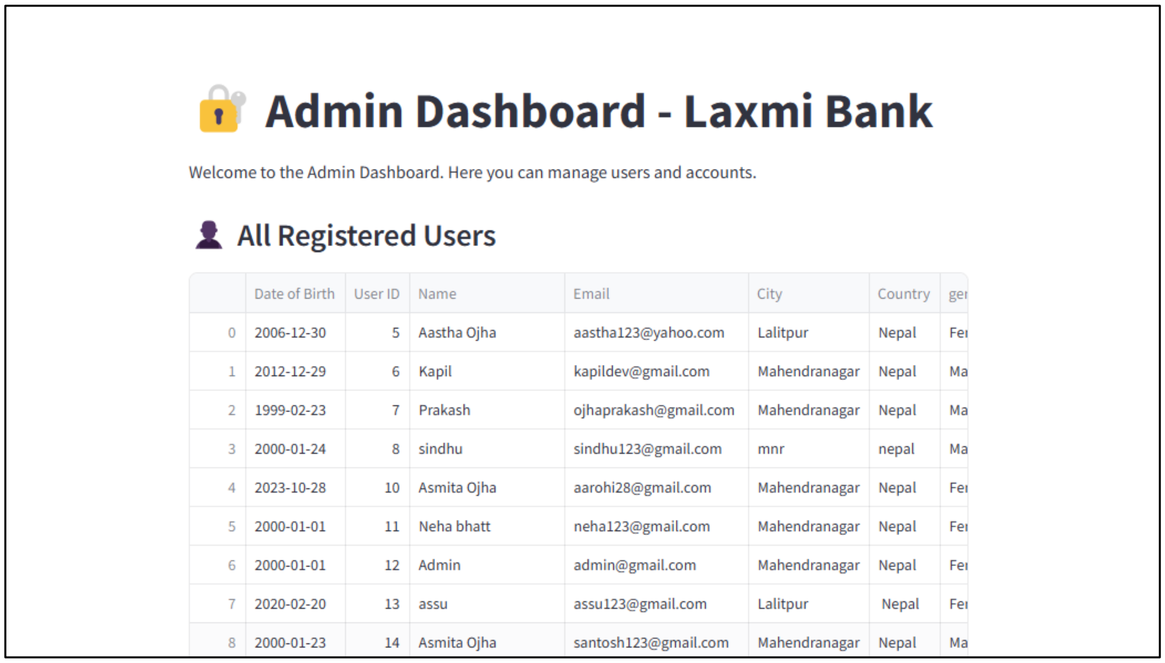
- Account creation and management
- Deposit, Withdrawal, and Transfer
- Admin Dashboard using Streamlit
- API testing via Postman
- Github repo

9. Analytical Dashboard

- Built with Streamlit, Pandas, and Plotly
- View transaction data as DataFrame
- Analyze by type, date, status
- Visual trends through charts

10. Sample Screenshots

Include screenshots of the admin dashboard, DataFrame view, and analytics charts.



🔐 Admin Dashboard - Laxmi Bank

Welcome to the Admin Dashboard. Here you can manage users and accounts.

👤 All Registered Users

	Date of Birth	User ID	Name	Email	City	Country	ger
0	2006-12-30	5	Aastha Ojha	aastha123@yahoo.com	Lalitpur	Nepal	Fe
1	2012-12-29	6	Kapil	kapildev@gmail.com	Mahendranagar	Nepal	Ma
2	1999-02-23	7	Prakash	ojhaprakash@gmail.com	Mahendranagar	Nepal	Ma
3	2000-01-24	8	sindhu	sindhu123@gmail.com	mnr	nepal	Ma
4	2023-10-28	10	Asmita Ojha	aarohi28@gmail.com	Mahendranagar	Nepal	Fe
5	2000-01-01	11	Neha bhatt	neha123@gmail.com	Mahendranagar	Nepal	Fe
6	2000-01-01	12	Admin	admin@gmail.com	Mahendranagar	Nepal	Fe
7	2020-02-20	13	assu	assu123@gmail.com	Lalitpur	Nepal	Fe
8	2000-01-23	14	Asmita Ojha	santosh123@gmail.com	Mahendranagar	Nepal	Ma

Figure 1.0: Admin Dashboard

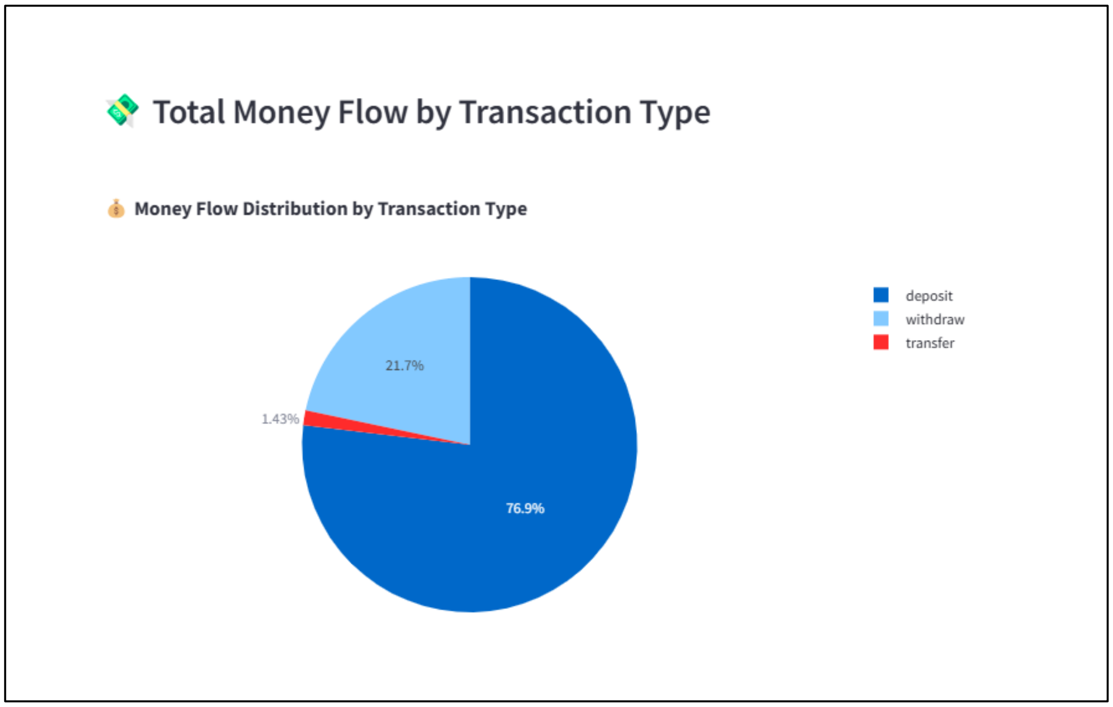
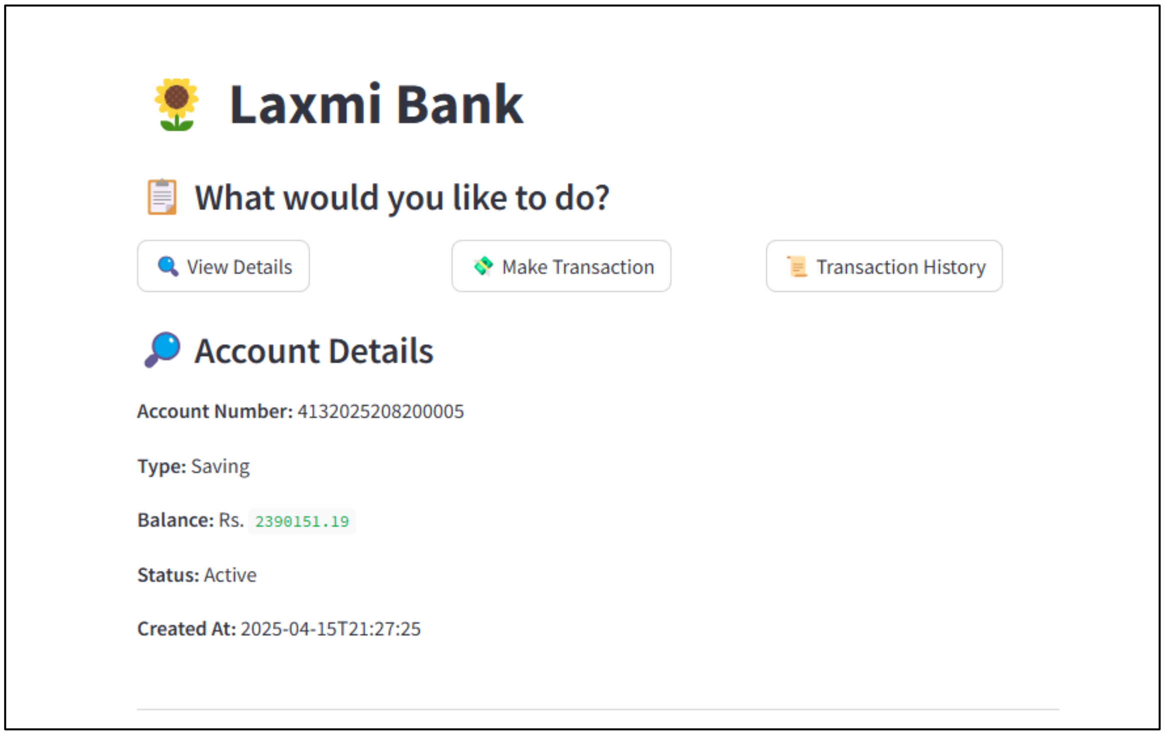


Figure 1.1 : Admin Dashboard



Account Number: 4132025208200005

Type: Saving

Balance: Rs. `2390151.19`

Status: Active

Created At: 2025-04-15T21:27:25

Figure 1.3 : User Dashboard

11. Limitations

- No full-fledged authentication or session handling
- No logout feature
- Basic admin roles

12. Future Enhancements

- Add secure login and token-based authentication
- Introduce PIN verification while transaction
- Export reports as PDF/CSV

13. Conclusion

This project lays the foundation for simple banking system with practical insight into backend services, database design, and analytics.

14. References

- MySQL Documentation
- ChatGPT
- FastAPI Documentation
- SQLAlchemy Docs
- Streamlit Docs
- W3schools
- Postman Docs