

UNIVERSITY OF BARISHAL
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

DATABASE PROJECT REPORT

Smart Banking with ATM System

A Report Submitted in Partial Fulfillment of the Requirements for the Course:
CSE-2102: Database Management System Lab

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Session: 2021-2022

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Submission Date:

23 February 2025

1. Overview of the Project

The **Smart Banking with ATM System** is a secure and efficient desktop application developed in Java. It uses JDBC to connect to a MySQL database. It allows users to manage their bank accounts, perform transactions, and request banking services easily.

The system stores and processes data using a structured relational database, including many tables for key banking features. Database operations efficiently manage account creation, secure login, deposits, withdrawals, balance inquiries, fund transfers, and transaction history tracking.

Security is ensured using password encryption, and SQL injection prevention while the database handles transaction management to maintain accuracy and consistency. Designed for customers and administrators, the system simplifies banking operations and can be expanded with mobile app integration and multi-factor authentication for future improvements.

2. Objectives of the Project

The primary objective of this project is to design and develop a database-driven banking system to efficiently create and manage user accounts, transactions, and administrative tasks.

Key goals include:

- Secure user registration and login.
- Managing deposits, withdrawals, and fund transfers.
- Providing transaction history and mini statements.
- Handling service requests like checkbooks and online banking.
- Ensuring strong security measures like password encryption and audit trails.

3. Motivation of the Project

With the increasing need for digital banking solutions, this project aims to create a user-friendly and efficient banking system that offers secure transactions, account management, and administrative features.

4. Requirements of the Project

- Java for application development.
- MySQL for database management.
- JDBC for database connectivity.
- Secure authentication mechanisms.
- Efficient transaction processing.

5. Scope of the Project

This system supports both users and administrators. The system provides secure login and account management. Users can manage their accounts and perform transactions, while administrators oversee accounts, monitor transactions, and generate reports.

6. Designing (Entity Relationship) ER Diagram

Scenario of the Smart Banking System

The Smart Banking System allows users to create and manage their accounts for seamless banking operations. Users can perform deposits, withdrawals, and balance inquiries within their accounts.

Each account is linked to multiple transactions, including deposits, withdrawals, and fund transfers. The system ensures that all transactions are securely recorded, providing users with a complete transaction history.

To access their accounts, users must go through the login process using their credentials. Secure authentication ensures that only authorized users can manage their accounts and perform transactions.

Additionally, users can request various services such as loan applications, checkbook requests, and account upgrades. These services enhance the banking experience by providing additional financial support and convenience.

Steps of Drawing ERD

Step 1: Identify the Entities Required

The Smart Banking System allows **users** to create and manage their **accounts** for seamless banking operations. Users can perform deposits, withdrawals, and balance inquiries within their accounts.

Each **account** is linked to multiple **transactions**, including deposits, withdrawals, and fund transfers. The system ensures that all transactions are securely recorded, providing users with a complete transaction history.

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Additionally, users can request various **services** such as loan applications, checkbook requests, and account upgrades. These services enhance the banking experience by providing additional financial support and convenience.

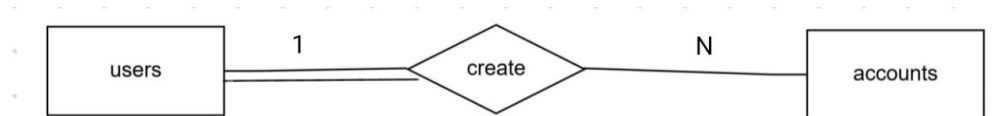
- i. Users
- ii. Accounts
- iii. Transactions
- iv. Login
- v. Services

Step 2: Identify the Attributes and Primary key for each Entity

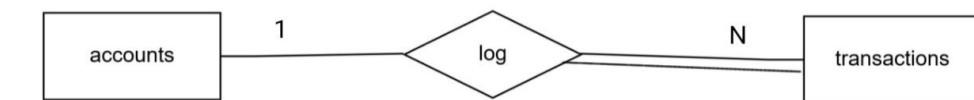
- i. **users** (user_id, form_no, name, fathurname, dob, gender, email, phone, address, nid_number, passport_number, occupation, created_at)
- ii. **accounts** (account_id, user_id, card_no, account_type, balance, created_at)
- iii. **transactions** (transaction_id, account_id, transaction_type, amount, date, description)
- iv. **login** (login_id, user_id, card_no, pin_no, last_login)
- v. **services** (service_id, user_id, service_name)

Step 3: Identify the Relationships needed

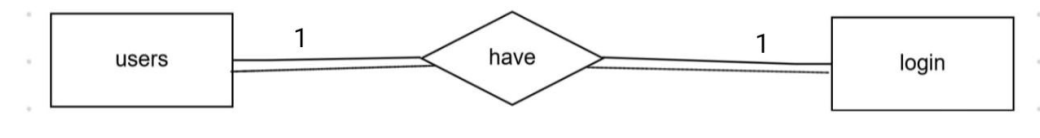
- i. Users create Accounts:



- ii. Accounts log Transactions:



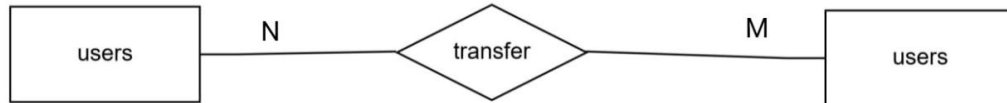
- iii. Users have Login:



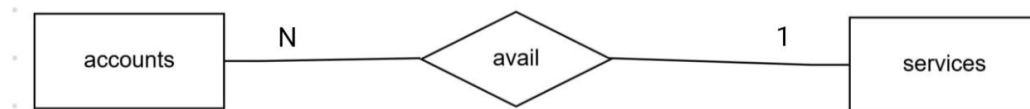
iv. Users request Services:



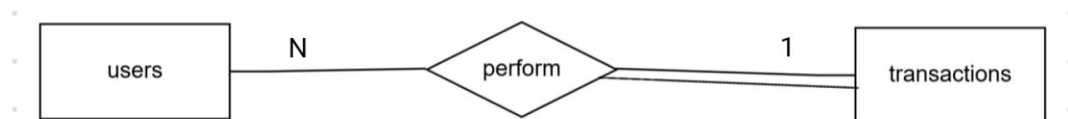
v. Users transfer Users:



vi. Accounts avail Services:



vii. Users perform Transactions:



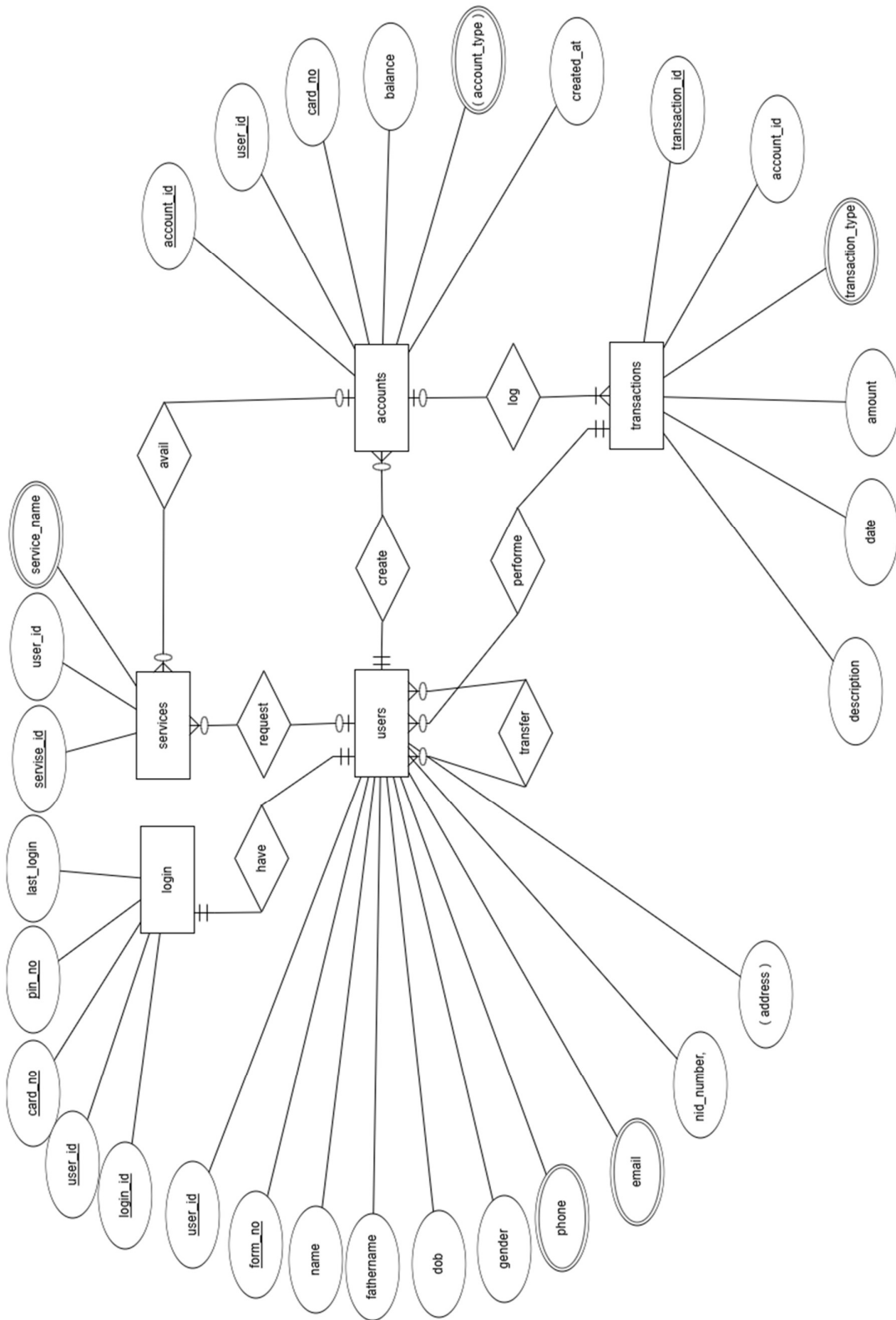


Figure: ER Diagram

7. Reduction to Database Schema

1. **users** (user_id, form_no, name, fathename, dob, gender, email, phone, address, nid_number, passport_number, occupation, created_at)
2. **accounts** (account_id, user_id, card_no, account_type, balance, created_at)
3. **transactions** (transaction_id, account_id, transaction_type, amount, date, description)
4. **foundTransfers** (transfer_id, sender_id, receiver_id, transaction_id, transfer_amount, transfer_date)
5. **login** (login_id, user_id, card_no, pin_no, last_login)
6. **services** (service_id, user_id, service_name)

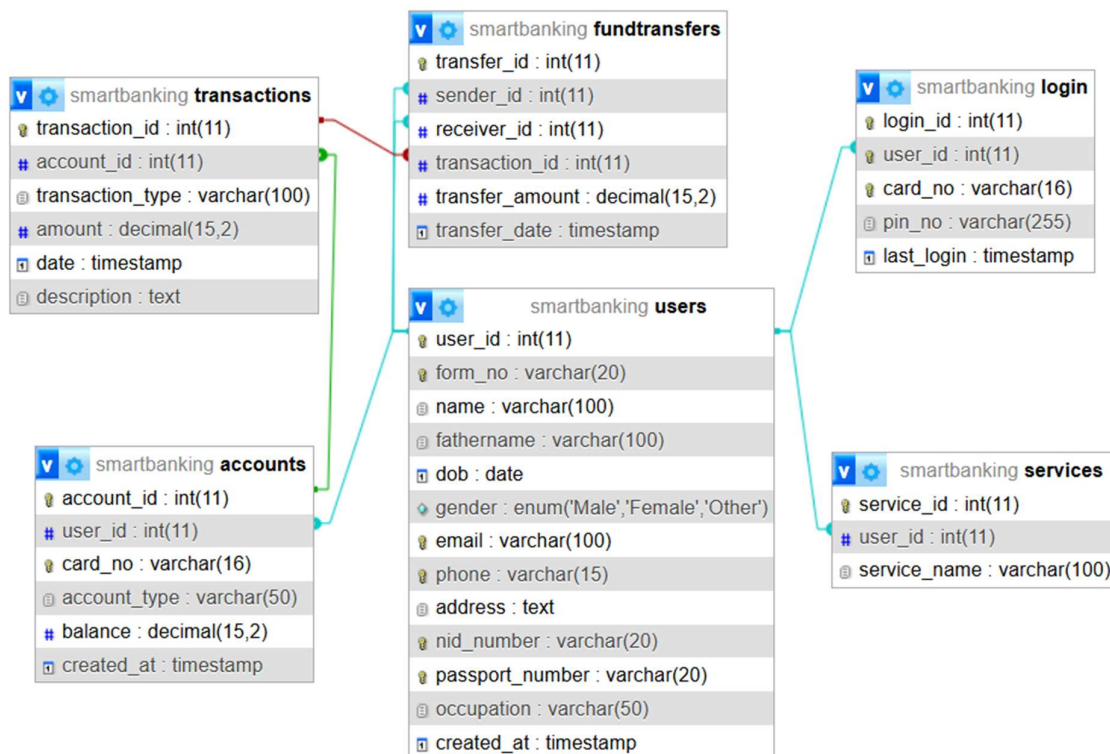


Figure: Schema Diagram

8. Implementing the Database in MySQL

Sample table data in the database

Table 1: users

user_id	form_no	name	fathername	dob	gender	email	phone	address	nid_number	passport_numl	occupation	created_at
22	6774	neloy debnath	narayan debnath	2000-01-01	Male	neloy@gmail.com	01785249652	barishal sadar	1321654654		Student	2025-01-20 00:
23	2052	ashik debnath	goutom debnath	1920-01-01	Male	ashik@gamil.com	01785259332	galachipa	1234565982		Student	2025-01-21 23:
24	4951	rana	khan	1920-01-01	Male	rana@gmail.com	7989422336	patuakhali	64656		Business	2025-01-22 01:
28	5142	smith	s smith	1920-01-01	Male	smith@gmail.com	1321645	aus	665421	764521	Salaried	2025-01-26 01:
29	2943	jhon	ven	1920-01-01	Male	jhon@gmail.com	1234654	usa	123456	33121	Salaried	2025-01-26 01:
30	5401	msd	mohammod	1984-01-01	Male	msd@gmail.com	01734569825	dhaka	789654123	321456987	Salaried	2025-01-26 01:
31	5883	motu	motu	1920-01-01	Male	motu@gmail.com	85456465	barishla	987645	645312	Self-Employed	2025-02-11 23:
32	5990	doha	doha sir	1992-05-01	Male	doha@gmail.com	0178523695	dhaka	1236487987	1245679823	Salaried	2025-02-11 23:

Table 2: login

login_id	user_id	card_no	pin_no	last_login
1	20	5040936049625624	1111	2025-01-19 23:20:08
2	22	5040936052131700	1990	2025-01-20 00:57:21
3	23	5040936076831768	5670	2025-01-21 23:40:27
4	24	5040936036262256	1234	2025-01-22 01:05:29
5	29	5040936073590043	179cf283...	2025-01-26 01:43:22
6	30	5040936072656185	5664	2025-01-26 01:48:52
7	31	5040936025136564	1562	2025-02-11 23:08:38
8	32	5040936047182824	7805	2025-02-11 23:27:46
9	33	5040936065911738	4585	2025-02-12 09:53:12
10	34	5040936021115211	3227	2025-02-12 14:10:05

Table 3: accounts

account_id	user_id	card_no	account_type	balance	created_at
6	28	5040936069240395	Saving	0.00	2025-01-26 01:35:33
7	29	5040936073590043	Saving	0.00	2025-01-26 01:43:22
9	31	5040936025136564	Saving	400.00	2025-02-11 23:08:38
3	22	5040936052131700	Current	600.00	2025-01-20 00:57:21
5	24	5040936036262256	Fixed Deposit	1000.00	2025-01-22 01:05:29
2	20	5040936049625624	Saving	1050.00	2025-01-19 23:20:08
12	34	5040936021115211	Saving	2500.00	2025-02-12 14:10:05
4	23	5040936076831768	Saving	3000.00	2025-01-21 23:40:27
11	33	5040936065911738	Fixed Deposit	23000.00	2025-02-12 09:53:12
8	30	5040936072656185	Saving	45600.00	2025-01-26 01:48:52
10	32	5040936047182824	Saving	50959.00	2025-02-11 23:27:46

Table 4: Transactions

	transaction_id	account_id	transaction_type	amount	date	description
	67	11	Withdraw	5000.00	2025-02-12 12:24:50	ATM Withdrawal
	68	11	Withdraw	1000.00	2025-02-12 12:25:19	ATM Withdrawal
	69	11	Withdraw	5777.00	2025-02-12 12:25:54	ATM Withdrawal
	70	11	Withdraw	500.00	2025-02-12 12:27:09	ATM Withdrawal
	71	12	Deposit	5000.00	2025-02-12 14:10:34	Cash deposit
	76	12	Transfer	1000.00	2025-02-22 00:41:10	NULL
	77	12	Transfer	1000.00	2025-02-22 00:41:48	NULL
	78	11	Withdraw	723.00	2025-02-22 17:51:42	ATM Withdrawal
	79	11	Withdraw	1000.00	2025-02-22 17:53:24	ATM Withdrawal
	80	12	Transfer	500.00	2025-02-22 18:02:06	NULL
	81	9	Transfer	600.00	2025-02-22 18:04:09	NULL
-	NULL	NULL	NULL	NULL	NULL	NULL

Table 5: fundTransfers

transfer_id	sender_id	receiver_id	transaction_id	transfer_amount	transfer_date
3	34	33	76	1000.00	2025-02-22 00:41:10
4	34	33	77	1000.00	2025-02-22 00:41:48
5	34	32	80	500.00	2025-02-22 18:02:06
6	31	30	81	600.00	2025-02-22 18:04:09

Table 6: services

service_id	user_id	service_name
26	32	Mobile Banking
27	32	POS/Online Shopping
28	32	Pay Bill
29	32	Mobile Wallet
30	33	ATM Card
31	33	Internet Banking
32	33	Mobile Banking
33	33	POS/Online Shopping
34	33	Pay Bill
35	33	Mobile Wallet
36	34	ATM Card
37	34	Internet Banking

9. Future Work

- **Mobile Application Integration:** Develop a mobile banking app for easy access.
- **Multi-Factor Authentication (MFA):** Add OTP and biometric security.
- **AI-Based Fraud Detection:** Detect and prevent suspicious transactions.
- **Cloud-Based Storage:** Improve scalability and data backup.
- **QR Code Payments:** Enable fast and secure transactions.

10. Conclusions:

The **Smart Banking with ATM System** provides a secure, efficient, and user-friendly platform for managing banking operations. It enables users to perform essential transactions like deposits, withdrawals, balance inquiries, and fund transfers while ensuring data security through password encryption and SQL injection prevention.

The system JDBC-based MySQL database efficiently handles user accounts, transactions, and service requests, ensuring seamless banking operations. Administrators can monitor transactions and manage user accounts effectively.

With potential enhancements like mobile app integration, multi-factor authentication, and AI-powered fraud detection, this system can evolve into a more advanced and scalable banking solution, making banking services more accessible and secure for users.