

PASSVAULT - Multi-Pass Digital Wallet

PROJECT REPORT for 21CSC205P – DATABASE MANAGEMENT SYSTEMS

Submitted by

Saumye Singh [RA2311033010049]
Vineet Sahoo [RA2311033010053]

Under the Guidance of

Dr. S. Sadagopan

(Associate Professor, Department of Computational Intelligence)

In partial fulfilment of the requirements for the degree of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE ENGINEERING

WITH SPECIALIZATION IN SOFTWARE ENGINEERING



DEPARTMENT OF COMPUTATIONAL INTELLIGENCE
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
KATTANKULATHUR- 603 203
FEBRUARY 2025

Project Report: PassVault - Multi-Pass Digital Wallet : (2B Component)

Database Schema Documentation:

This document outlines the schema for a database designed to manage user information, profiles, passwords, transactions, and various features related to user accounts and security.

Relation Schema:

USERS (User_Id PK, User_Name, Email UNIQUE, Password)

USERPROFILE (Profile_Id PK, User_Id FK, Phone_No UNIQUE, Bio, Profile_Picture)

PASSWORDMANAGER (Password_Id PK, User_Id FK, Encrypted_Password, CreatedAt)

BACKUPRECOVERY (Backup_Id PK, User_Id FK, Backup_Date, Recovery_Status, Backup_Location)

BANK (Bank_Id PK, User_Id FK, BankName, Card_No UNIQUE, Card_Type, Expiry_Date)

TRANSACTIONS (Transaction_Id PK, User_Id FK, Transaction_Date, Transaction_Status)

NOTIFICATIONS (Notification_Id PK, User_Id FK, Message, Read_Status, Timestamp)

DASHBOARD (Dashboard_Id PK, User_Id UNIQUE FK) **FEATURES** (Feature_Id PK, Feature_Name UNIQUE)

MULTIDEVICEACCESS (Access_Id PK, Device_Id UNIQUE, Last_IP, Connected_Devices)

PASSBANKACCOUNT (Pass_Id PK, Pass_Type, Pass_Name UNIQUE, Status, Description)

QRSHARING (QRShare_Id PK, Pass_Id FK, User_Id FK, QRCode UNIQUE, CreatedAt, IsScanned)

PASSSHARING (Share_Id PK, SenderUser_Id FK, ReceiverUser_Id FK, Pass_Id FK, SharedAt, Status)

EXPIRATIONALERTS (Alert_Id PK, Pass_Id FK, User_Id FK, Expiration_Date, Status)

PASSSYNC (Sync_Id PK, User_Id FK, Device_Id, LastSyncAt) **USERPREFERENCES** (Preference_Id PK, User_Id FK, Category)

Tables:

USERS

1. **User_Id**: Primary Key
2. **User_Name**: Name of the user
3. **Email**: Unique email address of the user
4. **Password**: User's password

USERPROFILE

1. **Profile_Id**: Primary Key
2. **User_Id**: Foreign Key referencing USERS
3. **Phone_No**: Unique phone number
4. **Bio**: User's biography
5. **Profile_Picture**: URL or path to the profile picture

PASSWORDMANAGER

1. **Password_Id**: Primary Key
2. **User_Id**: Foreign Key referencing USERS
3. **Encrypted_Password**: Password stored in encrypted form
4. **CreatedAt**: Timestamp of when the password was created

BACKUPRECOVERY

1. **Backup_Id**: Primary Key
2. **User_Id**: Foreign Key referencing USERS
3. **Backup_Date**: Date of the backup
4. **Recovery_Status**: Status of the recovery process
5. **Backup_Location**: Location of the backup file

BANK

1. **Bank_Id**: Primary Key
2. **User_Id**: Foreign Key referencing USERS
3. **BankName**: Name of the bank
4. **Card_No**: Unique card number
5. **Card_Type**: Type of the card (e.g., Credit, Debit)
6. **Expiry_Date**: Expiration date of the card

TRANSACTIONS

1. **Transaction_Id:** Primary Key
2. **User_Id:** Foreign Key referencing USERS
3. **Transaction_Date:** Date of the transaction
4. **Transaction_Status:** Status of the transaction

NOTIFICATIONS

1. **Notification_Id:** Primary Key
2. **User_Id:** Foreign Key referencing USERS
3. **Message:** Notification message
4. **Read_Status:** Status indicating if the notification has been read
5. **Timestamp:** Time when the notification was sent

DASHBOARD

1. **Dashboard_Id:** Primary Key
2. **User_Id:** Unique Foreign Key referencing USERS

FEATURES

1. **Feature_Id:** Primary Key
2. **Feature_Name:** Unique name of the feature

MULTIDEVICEACCESS

1. **Access_Id:** Primary Key
2. **Device_Id:** Unique identifier for the device
3. **Last_IP:** Last known IP address
4. **Connected_Devices:** List of connected devices

PASSBANKACCOUNT

1. **Pass_Id:** Primary Key
2. **Pass_Type:** Type of pass
3. **Pass_Name:** Unique name of the pass
4. **Status:** Current status of the pass
5. **Description:** Description of the pass

QRSHARING

1. **QRShare_Id:** Primary Key

2. **Pass_Id**: Foreign Key referencing PASSBANKACCOUNT
3. **User_Id**: Foreign Key referencing USERS
4. **QRCode**: Unique QR code
5. **CreatedAt**: Timestamp of QR code creation
6. **IsScanned**: Status indicating if the QR code has been scanned

PASSSHARING

1. **Share_Id**: Primary Key
2. **SenderUser_Id**: Foreign Key referencing USERS
3. **ReceiverUser_Id**: Foreign Key referencing USERS
4. **Pass_Id**: Foreign Key referencing PASSBANKACCOUNT
5. **SharedAt**: Timestamp of when the pass was shared
6. **Status**: Status of the sharing process

EXPIRATIONALERTS

1. **Alert_Id**: Primary Key
2. **Pass_Id**: Foreign Key referencing PASSBANKACCOUNT
3. **User_Id**: Foreign Key referencing USERS
4. **Expiration_Date**: Date when the pass expires
5. **Status**: Current status of the alert

PASSSYNC

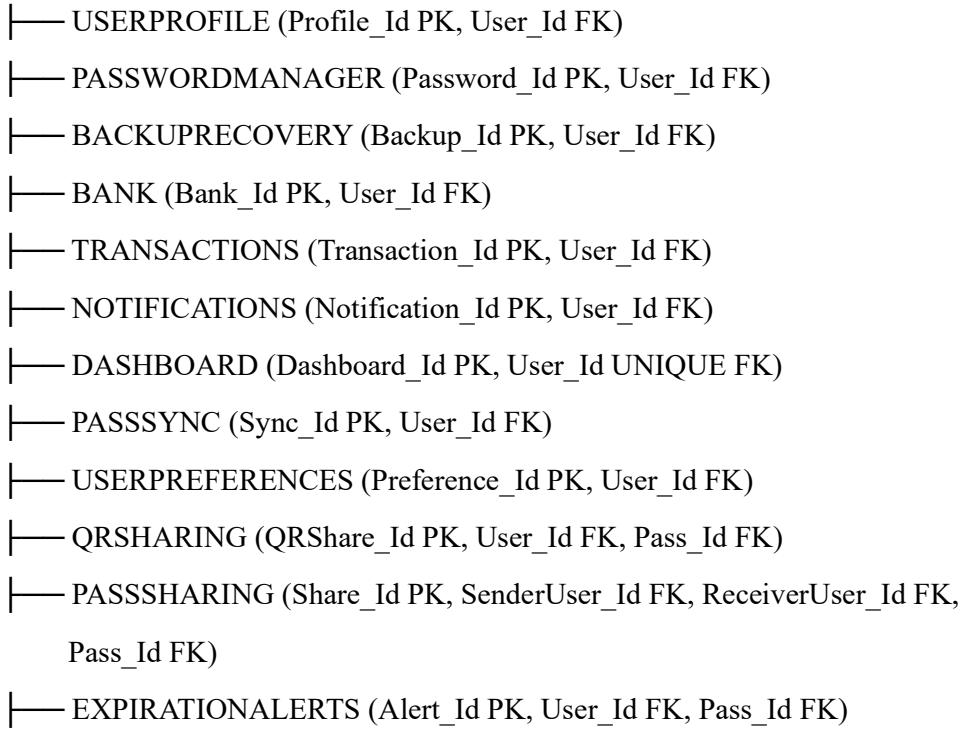
1. **Sync_Id**: Primary Key
2. **User_Id**: Foreign Key referencing USERS
3. **Device_Id**: Identifier for the device
4. **LastSyncAt**: Timestamp of the last synchronization

USERPREFERENCES

1. **Preference_Id**: Primary Key
2. **User_Id**: Foreign Key referencing USERS
3. **Category**: Category of the preference
4. This schema is designed to facilitate comprehensive management of user data, security features, and user interactions within the system.

Schema with Entity Relationship Illustrated:

1. USERS (User_Id PK)

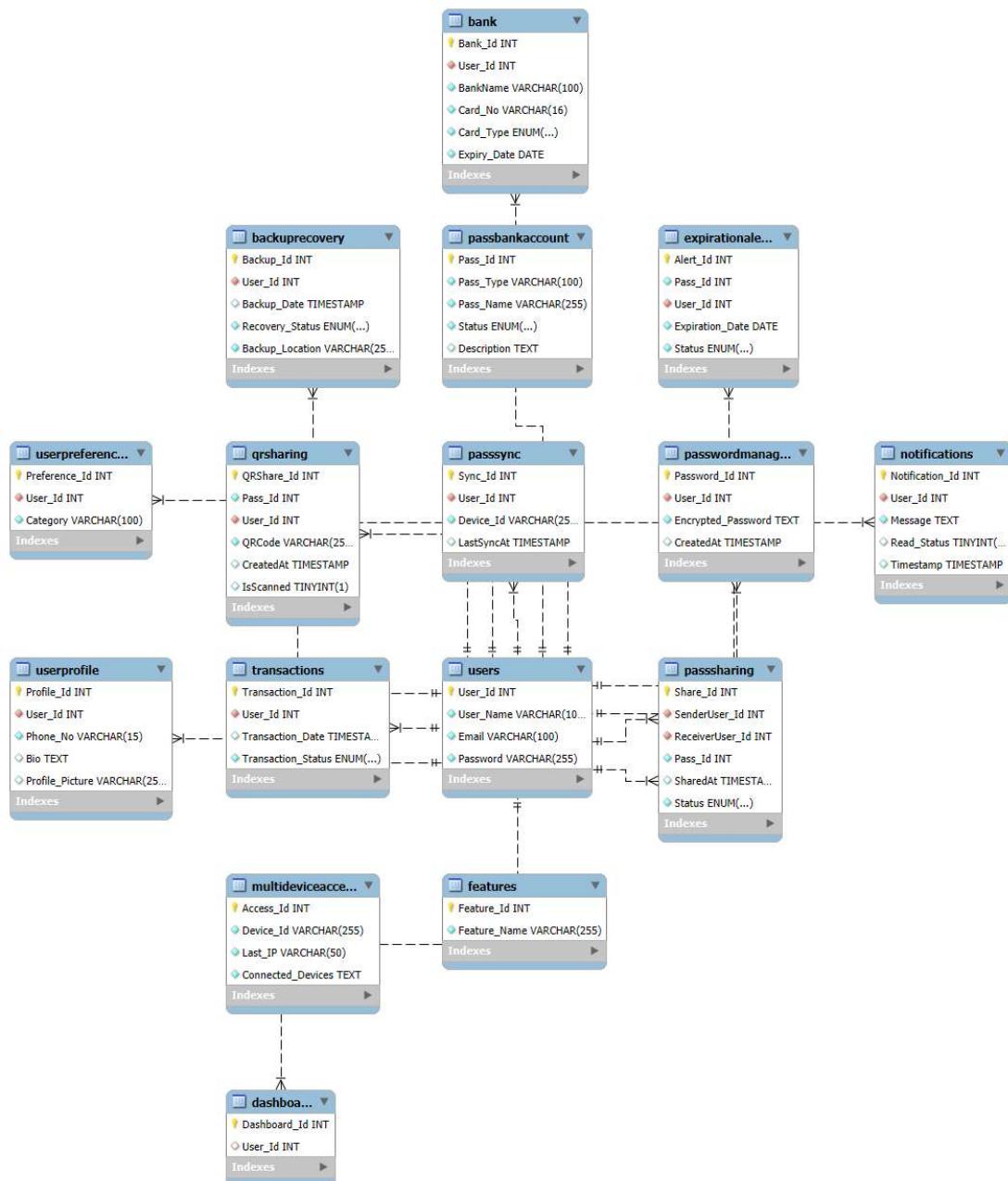


2. MULTIDEVICEACCESS (Access_Id PK, Device_Id UNIQUE)

3. FEATURES (Feature_Id PK, Feature_Name UNIQUE)

4. PASSBANKACCOUNT (Pass_Id PK, Pass_Type, Pass_Name UNIQUE)

Relation Schema Diagram:



SQL Commands Used:

- **Database Creation:**

- i) create database Passvault;
- ii) use passvault;

- **Table Creation**

- i) CREATE TABLE Users (

- User_Id INT PRIMARY KEY AUTO_INCREMENT,
 - User_Name VARCHAR(100) NOT NULL,
 - Email VARCHAR(100) UNIQUE NOT NULL CHECK (Email LIKE '%@%.%'),
 - Password VARCHAR(255) NOT NULL

-);

- ii) CREATE TABLE UserProfile (

- Profile_Id INT PRIMARY KEY AUTO_INCREMENT,
 - User_Id INT NOT NULL,
 - Phone_No VARCHAR(15) UNIQUE NOT NULL CHECK (Phone_No REGEXP '^[0-9]{10,15}\$'),
 - Bio TEXT,
 - Profile_Picture VARCHAR(255),
 - FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON DELETE CASCADE ON UPDATE CASCADE

-);

- iii) CREATE TABLE PasswordManager (

- Password_Id INT PRIMARY KEY AUTO_INCREMENT,
 - User_Id INT NOT NULL,
 - Encrypted_Password TEXT NOT NULL,
 - CreatedAt TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
 - FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON DELETE CASCADE ON UPDATE CASCADE

-);

- iv) CREATE TABLE BackupRecovery (

- Backup_Id INT PRIMARY KEY AUTO_INCREMENT,
 - User_Id INT NOT NULL,
 - Backup_Date TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
 - Recovery_Status ENUM('Pending', 'Completed') NOT NULL,
 - Backup_Location VARCHAR(255) NOT NULL,
 - FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON DELETE CASCADE ON UPDATE CASCADE

-);

v) CREATE TABLE Notifications (

```
Notification_Id INT PRIMARY KEY AUTO_INCREMENT,  
User_Id INT NOT NULL,  
Message TEXT NOT NULL,  
Read_Status BOOLEAN DEFAULT FALSE,  
Timestamp TIMESTAMP DEFAULT CURRENT_TIMESTAMP,  
FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON DELETE  
CASCADE ON UPDATE CASCADE  
);
```

vi) CREATE TABLE Transactions (

```
Transaction_Id INT PRIMARY KEY AUTO_INCREMENT,  
User_Id INT NOT NULL,  
Transaction_Date TIMESTAMP DEFAULT CURRENT_TIMESTAMP,  
Transaction_Status ENUM('Pending', 'Success', 'Failed') NOT NULL,  
FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON DELETE  
CASCADE ON UPDATE CASCADE  
);
```

vii) CREATE TABLE QRSharing (

```
QRShare_Id INT PRIMARY KEY AUTO_INCREMENT,  
Pass_Id INT NOT NULL,  
User_Id INT NOT NULL,  
QRCode VARCHAR(255) NOT NULL UNIQUE,  
CreatedAt TIMESTAMP DEFAULT CURRENT_TIMESTAMP,  
IsScanned BOOLEAN DEFAULT FALSE,  
FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON DELETE  
CASCADE ON UPDATE CASCADE  
);
```

viii) CREATE TABLE PassSharing (

```
Share_Id INT PRIMARY KEY AUTO_INCREMENT,  
SenderUser_Id INT NOT NULL,  
ReceiverUser_Id INT NOT NULL,  
Pass_Id INT NOT NULL,  
SharedAt TIMESTAMP DEFAULT CURRENT_TIMESTAMP,  
Status ENUM('Pending', 'Accepted', 'Rejected') NOT NULL,  
FOREIGN KEY (SenderUser_Id) REFERENCES Users(User_Id) ON DELETE  
CASCADE,  
FOREIGN KEY (ReceiverUser_Id) REFERENCES Users(User_Id) ON  
DELETE CASCADE  
);
```

ix) CREATE TABLE ExpirationAlerts (

```
Alert_Id INT PRIMARY KEY AUTO_INCREMENT,
Pass_Id INT NOT NULL,
User_Id INT NOT NULL,
Expiration_Date DATE NOT NULL CHECK (Expiration_Date > CURDATE()),
Status ENUM('Active', 'Expired') NOT NULL,
FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON
DELETE CASCADE
);
```

x) CREATE TABLE PassSync (

```
Sync_Id INT PRIMARY KEY AUTO_INCREMENT,
User_Id INT NOT NULL,
Device_Id VARCHAR(255) NOT NULL,
LastSyncAt TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON
DELETE CASCADE
);
```

xi) CREATE TABLE MultiDeviceAccess (

```
Access_Id INT PRIMARY KEY AUTO_INCREMENT,
Device_Id VARCHAR(255) NOT NULL UNIQUE,
Last_IP VARCHAR(50) NOT NULL,
Connected_Devices TEXT NOT NULL
);
```

xii) CREATE TABLE UserPreferences (

```
Preference_Id INT PRIMARY KEY AUTO_INCREMENT,
User_Id INT NOT NULL,
Category VARCHAR(100) NOT NULL,
FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON
DELETE CASCADE
);
```

xiii) CREATE TABLE Bank (

```
Bank_Id INT PRIMARY KEY AUTO_INCREMENT,
User_Id INT NOT NULL,
BankName VARCHAR(100) NOT NULL,
Card_No VARCHAR(16) UNIQUE NOT NULL CHECK (LENGTH(Card_No)
= 16),
Card_Type ENUM('Credit', 'Debit') NOT NULL,
Expiry_Date DATE NOT NULL CHECK (Expiry_Date > CURDATE()),
FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON
DELETE CASCADE
);
```

```

xiv) CREATE TABLE PassBankAccount (
    Pass_Id INT PRIMARY KEY AUTO_INCREMENT,
    Pass_Type VARCHAR(100) NOT NULL,
    Pass_Name VARCHAR(255) NOT NULL UNIQUE,
    Status ENUM('Active', 'Inactive') NOT NULL,
    Description TEXT
);

xv) CREATE TABLE Dashboard (
    Dashboard_Id INT PRIMARY KEY AUTO_INCREMENT,
    User_Id INT UNIQUE,
    FOREIGN KEY (User_Id) REFERENCES Users(User_Id) ON
    DELETE CASCADE
);

xvi) CREATE TABLE Features (
    Feature_Id INT PRIMARY KEY AUTO_INCREMENT,
    Feature_Name VARCHAR(255) NOT NULL UNIQUE
);

```

- **Inserting Records**

- i)** INSERT INTO Users (User_Name, Email, Password) VALUES ('Vineet Sahoo', 'vineet@example.com', 'hashedpassword1'), ('Saumye Singh', 'saumye@example.com', 'hashedpassword2'), ('Aarav Mehta', 'aarav@example.com', 'hashedpassword3'), ('Priya Sharma', 'priya@example.com', 'hashedpassword4'), ('Rohan Verma', 'rohan@example.com', 'hashedpassword5'), ('Ananya Roy', 'ananya@example.com', 'hashedpassword6'), ('Kunal Das', 'kunal@example.com', 'hashedpassword7'), ('Shreya Iyer', 'shreya@example.com', 'hashedpassword8'), ('Rahul Nair', 'rahul@example.com', 'hashedpassword9'), ('Neha Kapoor', 'neha@example.com', 'hashedpassword10'), ('Arjun Desai', 'arjun@example.com', 'hashedpassword11');
- ii)** INSERT INTO UserProfile (User_Id, Phone_No, Bio, Profile_Picture) VALUES (1, '9876543210', 'Tech enthusiast and developer', 'profile1.jpg'), (2, '8765432109', 'Cybersecurity researcher', 'profile2.jpg'), (3, '7654321098', 'AI and ML enthusiast', 'profile3.jpg'), (4, '6543210987', 'Love coding and open-source', 'profile4.jpg'), (5, '5432109876', 'Music lover and tech geek', 'profile5.jpg'), (6, '4321098765', 'Data science enthusiast', 'profile6.jpg'), (7, '3210987654', 'Finance and investment expert', 'profile7.jpg'), (8, '9102837465', 'Blockchain and Web3 Developer', 'profile8.jpg'), (9, '8293745610', 'Passionate about UI/UX design', 'profile9.jpg'), (10, '7382910564', 'Full Stack Developer', 'profile10.jpg'),

(11, '6274930182', 'Cybersecurity and ethical hacking', 'profile11.jpg');

iii) INSERT INTO PasswordManager (User_Id, Encrypted_Password) VALUES
(1, 'encryptedpass1'),
(2, 'encryptedpass2'),
(3, 'encryptedpass3'),
(4, 'encryptedpass4'),
(5, 'encryptedpass5'),
(6, 'encryptedpass6'),
(7, 'encryptedpass7'),
(8, 'encryptedpass8'),
(9, 'encryptedpass9'),
(10, 'encryptedpass10'),
(11, 'encryptedpass11');

iv) INSERT INTO BackupRecovery (User_Id, Backup_Date, Recovery_Status, Backup_Location) VALUES
(1, '2025-03-01', 'Completed', 'Cloud Storage'),
(2, '2025-03-02', 'Pending', 'Local Backup'),
(3, '2025-03-03', 'Completed', 'Cloud Storage'),
(4, '2025-03-04', 'Pending', 'External HDD'),
(5, '2025-03-05', 'Completed', 'Local Backup'),
(6, '2025-03-06', 'Completed', 'Cloud Storage'),
(7, '2025-03-07', 'Pending', 'USB Drive'),
(8, '2025-03-08', 'Completed', 'Cloud Storage'),
(9, '2025-03-09', 'Completed', 'External HDD'),
(10, '2025-03-10', 'Pending', 'Local Backup'),
(11, '2025-03-11', 'Completed', 'Cloud Storage');

v) INSERT INTO Bank (User_Id, BankName, Card_No, Card_Type, Expiry_Date) VALUES
(1, 'HDFC Bank', '1234567812345678', 'Credit', '2027-12-01'),
(2, 'SBI Bank', '2345678923456789', 'Debit', '2026-09-15'),
(3, 'ICICI Bank', '3456789034567890', 'Credit', '2028-06-20'),
(4, 'Axis Bank', '4567890145678901', 'Debit', '2025-11-30'),
(5, 'Kotak Mahindra Bank', '5678901256789012', 'Credit', '2029-05-10'),
(6, 'Punjab National Bank', '6789012367890123', 'Debit', '2024-08-21'),
(7, 'Union Bank of India', '7890123478901234', 'Credit', '2027-01-15'),
(8, 'Canara Bank', '8901234589012345', 'Debit', '2026-04-05'),
(9, 'Bank of Baroda', '9012345690123456', 'Credit', '2028-03-18'),
(10, 'IndusInd Bank', '0123456701234567', 'Debit', '2025-10-27'),
(11, 'Yes Bank', '1111222233334444', 'Credit', '2027-07-13');

vi) INSERT INTO PassSharing (SenderUser_Id, ReceiverUser_Id, Pass_Id, SharedAt, Status) VALUES
(1, 2, 1, NOW(), 'Accepted'),
(2, 3, 2, NOW(), 'Pending'),
(3, 4, 3, NOW(), 'Rejected'),
(4, 5, 4, NOW(), 'Accepted'),
(5, 6, 5, NOW(), 'Pending'),
(6, 7, 6, NOW(), 'Rejected'),
(7, 8, 7, NOW(), 'Accepted'),
(8, 9, 8, NOW(), 'Pending'),
(9, 10, 9, NOW(), 'Accepted'),
(10, 11, 10, NOW(), 'Rejected'),
(11, 1, 11, NOW(), 'Accepted');

vii) INSERT INTO PassSync (User_Id, Device_Id, LastSyncAt) VALUES
(1, 'Device001', NOW()), (2, 'Device002', NOW()), (3, 'Device003', NOW()),
(4, 'Device004', NOW()), (5, 'Device005', NOW()), (6, 'Device006', NOW()),
(7, 'Device007', NOW()), (8, 'Device008', NOW()), (9, 'Device009', NOW()),
(10, 'Device010', NOW()), (11, 'Device011', NOW());

viii) INSERT INTO ExpirationAlerts (Pass_Id, User_Id, Expiration_Date, Status)
VALUES
(1, 1, '2025-04-10', 'Active'), (2, 2, '2025-03-15', 'Expired'),
(3, 3, '2025-06-01', 'Active'), (4, 4, '2025-07-20', 'Expired'),
(5, 5, '2025-08-11', 'Active'), (6, 6, '2025-09-05', 'Expired'),
(7, 7, '2025-10-01', 'Active'), (8, 8, '2025-11-12', 'Expired'),
(9, 9, '2025-12-25', 'Active'), (10, 10, '2026-01-30', 'Expired'),
(11, 11, '2026-02-15', 'Active');

ix) INSERT INTO Transactions (User_Id, Transaction_Date, Transaction_Status)
VALUES
(1, NOW(), 'Success'),
(2, NOW(), 'Pending'),
(3, NOW(), 'Failed'),
(4, NOW(), 'Success'),
(5, NOW(), 'Pending'),
(6, NOW(), 'Failed'),
(7, NOW(), 'Success'),
(8, NOW(), 'Success'),
(9, NOW(), 'Pending'),
(10, NOW(), 'Failed'),
(11, NOW(), 'Success');

x) INSERT INTO Notifications (User_Id, Message, Read_Status, Timestamp)
VALUES

(1, 'Your pass is expiring soon!', FALSE, NOW()),
(2, 'New security update available.', TRUE, NOW()),
(3, 'Pass shared successfully.', FALSE, NOW()),
(4, 'Your transaction was successful!', TRUE, NOW()),
(5, 'Backup completed successfully.', FALSE, NOW()),
(6, 'New device login detected.', TRUE, NOW()),
(7, 'Pass updated successfully.', FALSE, NOW()),
(8, 'Upcoming event reminder!', FALSE, NOW()),
(9, 'Discount coupon expires soon.', TRUE, NOW()),
(10, 'Password changed successfully.', FALSE, NOW()),
(11, 'Security alert: Unusual login detected.', TRUE, NOW());

xi) INSERT INTO Dashboard (User_Id) VALUES
(1), (2), (3), (4), (5), (6), (7), (8), (9), (10), (11);

xii) INSERT INTO Features (Feature_Name) VALUES

('QR Sharing'),
(('Pass Sharing'),
(('Multi-Device Access'),
(('Transaction History'),
(('Expiration Alerts'),
(('AI-Based Recommendations'),
(('Pass Sync'),
(('Data Backup & Recovery'),
(('Two-Factor Authentication'),
(('Personalized Offers'),
(('Analytics Dashboard');

xiii) INSERT INTO MultiDeviceAccess (Device_Id, Last_IP, Connected_Devices)
VALUES

('Device001', '192.168.1.10', 'Laptop, Mobile'),
(('Device002', '192.168.1.20', 'Mobile'),
(('Device003', '192.168.1.30', 'Tablet, Mobile'),
(('Device004', '192.168.1.40', 'Laptop, Tablet'),
(('Device005', '192.168.1.50', 'Smartwatch, Mobile'),
(('Device006', '192.168.1.60', 'Mobile, Smart TV'),
(('Device007', '192.168.1.70', 'Laptop, Mobile, Tablet'),
(('Device008', '192.168.1.80', 'Workstation, Mobile'),
(('Device009', '192.168.1.90', 'Laptop, Home Assistant'),
(('Device010', '192.168.2.10', 'Smartphone, Wearable'),
(('Device011', '192.168.2.20', 'Laptop, Smart Display');

xiv) INSERT INTO PassBankAccount (Pass_Type, Pass_Name, Status, Description) VALUES
(‘Loyalty Card’, ‘Amazon Prime Membership’, ‘Active’, ‘Amazon Prime Subscription’),
(‘Event Ticket’, ‘Concert Ticket’, ‘Active’, ‘VIP Pass for Music Concert’),
(‘Discount Coupon’, ‘50% Off Coupon’, ‘Inactive’, ‘Expired discount for electronics’),
(‘Membership Card’, ‘Gym Membership’, ‘Active’, ‘Annual membership for fitness center’),
(‘Subscription’, ‘Netflix Subscription’, ‘Active’, ‘Monthly Netflix plan’),
(‘Boarding Pass’, ‘Flight Ticket’, ‘Active’, ‘Boarding pass for international flight’),
(‘Gift Card’, ‘Amazon Gift Card’, ‘Inactive’, ‘Expired gift card.’),
(‘Gaming Pass’, ‘PlayStation Plus Membership’, ‘Active’, ‘Online gaming subscription’),
(‘Cinema Ticket’, ‘Movie Ticket’, ‘Active’, ‘3D Movie Experience’),
(‘Festival Pass’, ‘Tech Conference Entry’, ‘Active’, ‘Access to global tech event’),
(‘E-learning Pass’, ‘Udemy Subscription’, ‘Active’, ‘Premium access to courses’);

xv) INSERT INTO QRSharing (Pass_Id, User_Id, QRCode, CreatedAt, IsScanned)
VALUES
(1, 1, ‘QR123ABC’, NOW(), FALSE),
(2, 2, ‘QR456DEF’, NOW(), TRUE),
(3, 3, ‘QR789GHI’, NOW(), FALSE),
(4, 4, ‘QR101JKL’, NOW(), TRUE),
(5, 5, ‘QR112MNO’, NOW(), FALSE),
(6, 6, ‘QR134PQR’, NOW(), TRUE),
(7, 7, ‘QR156STU’, NOW(), FALSE),
(8, 8, ‘QR178VWX’, NOW(), TRUE),
(9, 9, ‘QR190YZA’, NOW(), FALSE),
(10, 10, ‘QR202BCD’, NOW(), TRUE),
(11, 11, ‘QR214EFG’, NOW(), FALSE);

xvi) INSERT INTO UserPreferences (User_Id, Category) VALUES
(1, ‘Technology’),
(2, ‘Finance’),
(3, ‘Travel’),
(4, ‘Health & Fitness’),
(5, ‘Entertainment’),
(6, ‘E-commerce’),
(7, ‘Education’),
(8, ‘Cybersecurity’),
(9, ‘Gaming’),
(10, ‘Productivity’),
(11, ‘Investment’);

- **Table Description**

- i) DESCRIBE backuprecovery;
- ii) DESCRIBE bank;
- iii) DESCRIBE dashboard;
- iv) DESCRIBE expirationalerts;
- v) DESCRIBE features;
- vi) DESCRIBE multideviceaccess;
- vii) DESCRIBE notifications;
- viii) DESCRIBE passbankaccount;
- ix) DESCRIBE passsharing;
- x) DESCRIBE passsync;
- xi) DESCRIBE passwordmanager;
- xii) DESCRIBE qrsharing;
- xiii) DESCRIBE transactions;
- xiv) DESCRIBE userpreferences;
- xv) DESCRIBE userprofile;
- xvi) DESCRIBE users;

- **Check Command and Table Retrieval**

- i) -- Check Users Table

SELECT * FROM Users;

- ii) -- Check UserProfile Table

SELECT * FROM UserProfile;

- iii) -- Check PasswordManager Table

SELECT * FROM PasswordManager;

- iv) -- Check BackupRecovery Table

SELECT * FROM BackupRecovery;

- v) -- Check Notifications Table

SELECT * FROM Notifications;

- vi) -- Check Transactions Table

SELECT * FROM Transactions;

vii) -- Check QRSharing Table
SELECT * FROM QRSharing;

viii) -- Check PassSharing Table
SELECT * FROM PassSharing;

ix) -- Check ExpirationAlerts Table
SELECT * FROM ExpirationAlerts;

x) -- Check PassSync Table
SELECT * FROM PassSync;

xi) -- Check MultiDeviceAccess Table
SELECT * FROM MultiDeviceAccess;

xii) -- Check UserPreferences Table
SELECT * FROM UserPreferences;

xiii) -- Check Bank Table
SELECT * FROM Bank;

xiv) -- Check PassBankAccount Table
SELECT * FROM PassBankAccount;

xv) -- Check Dashboard Table
SELECT * FROM Dashboard;

xvi) -- Check Features Table
SELECT * FROM Features;

- **Show All Tables**

show tables;

Screenshots of Table Records and Description:

i) Showing Records in Tables

```
mysql> -- Check Users Table
mysql> SELECT * FROM Users;
+-----+-----+-----+-----+
| User_Id | User_Name | Email | Password |
+-----+-----+-----+-----+
| 1 | Vineet Sahoo | vineet@example.com | hashedpassword1 |
| 2 | Saumye Singh | saumye@example.com | hashedpassword2 |
| 3 | Aarav Mehta | aarav@example.com | hashedpassword3 |
| 4 | Priya Sharma | priya@example.com | hashedpassword4 |
| 5 | Rohan Verma | rohan@example.com | hashedpassword5 |
| 6 | Ananya Roy | ananya@example.com | hashedpassword6 |
| 7 | Kunal Das | kunal@example.com | hashedpassword7 |
| 8 | Shreya Iyer | shreya@example.com | hashedpassword8 |
| 9 | Rahul Nair | rahul@example.com | hashedpassword9 |
| 10 | Neha Kapoor | neha@example.com | hashedpassword10 |
| 11 | Arjun Desai | arjun@example.com | hashedpassword11 |
+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql>
mysql> -- Check UserProfile Table
mysql> SELECT * FROM UserProfile;
+-----+-----+-----+-----+-----+
| Profile_Id | User_Id | Phone_No | Bio | Profile_Picture |
+-----+-----+-----+-----+
| 1 | 1 | 9876543210 | Tech enthusiast and developer | profile1.jpg |
| 2 | 2 | 8765432109 | Cybersecurity researcher | profile2.jpg |
| 3 | 3 | 7654321098 | AI and ML enthusiast | profile3.jpg |
| 4 | 4 | 6543210987 | Love coding and open-source | profile4.jpg |
| 5 | 5 | 5432109876 | Music lover and tech geek | profile5.jpg |
| 6 | 6 | 4321098765 | Data science enthusiast | profile6.jpg |
| 7 | 7 | 3210987654 | Finance and investment expert | profile7.jpg |
| 8 | 8 | 9102837465 | Blockchain and Web3 Developer | profile8.jpg |
| 9 | 9 | 8293745610 | Passionate about UI/UX design | profile9.jpg |
| 10 | 10 | 7382910564 | Full Stack Developer | profile10.jpg |
| 11 | 11 | 6274930182 | Cybersecurity and ethical hacking | profile11.jpg |
+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql> -- Check PasswordManager Table
mysql> SELECT * FROM PasswordManager;
+-----+-----+-----+-----+
| Password_Id | User_Id | Encrypted_Password | CreatedAt |
+-----+-----+-----+-----+
| 1 | 1 | encryptedpass1 | 2025-03-06 18:12:22 |
| 2 | 2 | encryptedpass2 | 2025-03-06 18:12:22 |
| 3 | 3 | encryptedpass3 | 2025-03-06 18:12:22 |
| 4 | 4 | encryptedpass4 | 2025-03-06 18:12:22 |
| 5 | 5 | encryptedpass5 | 2025-03-06 18:12:22 |
| 6 | 6 | encryptedpass6 | 2025-03-06 18:12:22 |
| 7 | 7 | encryptedpass7 | 2025-03-06 18:12:22 |
| 8 | 8 | encryptedpass8 | 2025-03-06 18:12:22 |
| 9 | 9 | encryptedpass9 | 2025-03-06 18:12:22 |
| 10 | 10 | encryptedpass10 | 2025-03-06 18:12:22 |
| 11 | 11 | encryptedpass11 | 2025-03-06 18:12:22 |
+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql>
mysql> -- Check BackupRecovery Table
mysql> SELECT * FROM BackupRecovery;
+-----+-----+-----+-----+-----+
| Backup_Id | User_Id | Backup_Date | Recovery_Status | Backup_Location |
+-----+-----+-----+-----+
| 1 | 1 | 2025-03-01 00:00:00 | Completed | Cloud Storage |
| 2 | 2 | 2025-03-02 00:00:00 | Pending | Local Backup |
| 3 | 3 | 2025-03-03 00:00:00 | Completed | Cloud Storage |
| 4 | 4 | 2025-03-04 00:00:00 | Pending | External HDD |
| 5 | 5 | 2025-03-05 00:00:00 | Completed | Local Backup |
| 6 | 6 | 2025-03-06 00:00:00 | Completed | Cloud Storage |
| 7 | 7 | 2025-03-07 00:00:00 | Pending | USB Drive |
| 8 | 8 | 2025-03-08 00:00:00 | Completed | Cloud Storage |
| 9 | 9 | 2025-03-09 00:00:00 | Completed | External HDD |
| 10 | 10 | 2025-03-10 00:00:00 | Pending | Local Backup |
| 11 | 11 | 2025-03-11 00:00:00 | Completed | Cloud Storage |
+-----+-----+-----+-----+
11 rows in set (0.00 sec)
```

```

mysql> -- Check Notifications Table
mysql> SELECT * FROM Notifications;
+-----+-----+-----+-----+
| Notification_Id | User_Id | Message | Read_Status | Timestamp |
+-----+-----+-----+-----+
| 1 | 1 | Your pass is expiring soon! | 0 | 2025-03-06 19:01:49 |
| 2 | 2 | New security update available. | 1 | 2025-03-06 19:01:49 |
| 3 | 3 | Pass shared successfully. | 0 | 2025-03-06 19:01:49 |
| 4 | 4 | Your transaction was successful. | 1 | 2025-03-06 19:01:49 |
| 5 | 5 | Backup completed successfully. | 0 | 2025-03-06 19:01:49 |
| 6 | 6 | New device login detected. | 1 | 2025-03-06 19:01:49 |
| 7 | 7 | Pass updated successfully. | 0 | 2025-03-06 19:01:49 |
| 8 | 8 | Upcoming event reminder! | 0 | 2025-03-06 19:01:49 |
| 9 | 9 | Discount coupon expires soon. | 1 | 2025-03-06 19:01:49 |
| 10 | 10 | Password changed successfully. | 0 | 2025-03-06 19:01:49 |
| 11 | 11 | Security alert: Unusual login detected. | 1 | 2025-03-06 19:01:49 |
+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql>
mysql> -- Check Transactions Table
mysql> SELECT * FROM Transactions;
+-----+-----+-----+-----+
| Transaction_Id | User_Id | Transaction_Date | Transaction_Status |
+-----+-----+-----+-----+
| 1 | 1 | 2025-03-06 19:01:38 | Success |
| 2 | 2 | 2025-03-06 19:01:38 | Pending |
| 3 | 3 | 2025-03-06 19:01:38 | Failed |
| 4 | 4 | 2025-03-06 19:01:38 | Success |
| 5 | 5 | 2025-03-06 19:01:38 | Pending |
| 6 | 6 | 2025-03-06 19:01:38 | Failed |
| 7 | 7 | 2025-03-06 19:01:38 | Success |
| 8 | 8 | 2025-03-06 19:01:38 | Success |
| 9 | 9 | 2025-03-06 19:01:38 | Pending |
| 10 | 10 | 2025-03-06 19:01:38 | Failed |
| 11 | 11 | 2025-03-06 19:01:38 | Success |
+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql> -- Check QRSharing Table
mysql> SELECT * FROM QRSharing;
+-----+-----+-----+-----+-----+-----+-----+
| QRShare_Id | Pass_Id | User_Id | QRCode | CreatedAt | IsScanned |
+-----+-----+-----+-----+-----+-----+
| 1 | 1 | 1 | QR123ABC | 2025-03-06 19:02:48 | 0 |
| 2 | 2 | 2 | QR456DEF | 2025-03-06 19:02:48 | 1 |
| 3 | 3 | 3 | QR789GHI | 2025-03-06 19:02:48 | 0 |
| 4 | 4 | 4 | QR101JKL | 2025-03-06 19:02:48 | 1 |
| 5 | 5 | 5 | QR112MNO | 2025-03-06 19:02:48 | 0 |
| 6 | 6 | 6 | QR134PQR | 2025-03-06 19:02:48 | 1 |
| 7 | 7 | 7 | QR156STU | 2025-03-06 19:02:48 | 0 |
| 8 | 8 | 8 | QR178VWX | 2025-03-06 19:02:48 | 1 |
| 9 | 9 | 9 | QR190YZA | 2025-03-06 19:02:48 | 0 |
| 10 | 10 | 10 | QR202BCD | 2025-03-06 19:02:48 | 1 |
| 11 | 11 | 11 | QR214EFG | 2025-03-06 19:02:48 | 0 |
+-----+-----+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql>
mysql> -- Check PassSharing Table
mysql> SELECT * FROM PassSharing;
+-----+-----+-----+-----+-----+-----+
| Share_Id | SenderUser_Id | ReceiverUser_Id | Pass_Id | SharedAt | Status |
+-----+-----+-----+-----+-----+-----+
| 1 | 1 | 2 | 1 | 2025-03-06 18:14:08 | Accepted |
| 2 | 2 | 3 | 2 | 2025-03-06 18:14:08 | Pending |
| 3 | 3 | 4 | 3 | 2025-03-06 18:14:08 | Rejected |
| 4 | 4 | 5 | 4 | 2025-03-06 18:14:08 | Accepted |
| 5 | 5 | 6 | 5 | 2025-03-06 18:14:08 | Pending |
| 6 | 6 | 7 | 6 | 2025-03-06 18:14:08 | Rejected |
| 7 | 7 | 8 | 7 | 2025-03-06 18:14:08 | Accepted |
| 8 | 8 | 9 | 8 | 2025-03-06 18:14:08 | Pending |
| 9 | 9 | 10 | 9 | 2025-03-06 18:14:08 | Accepted |
| 10 | 10 | 11 | 10 | 2025-03-06 18:14:08 | Rejected |
| 11 | 11 | 1 | 11 | 2025-03-06 18:14:08 | Accepted |
+-----+-----+-----+-----+-----+-----+
11 rows in set (0.00 sec)

```

```

mysql> -- Check ExpirationAlerts Table
mysql> SELECT * FROM ExpirationAlerts;
+-----+-----+-----+-----+-----+
| Alert_Id | Pass_Id | User_Id | Expiration_Date | Status |
+-----+-----+-----+-----+-----+
| 1 | 1 | 1 | 2025-04-10 | Active |
| 2 | 2 | 2 | 2025-03-15 | Expired |
| 3 | 3 | 3 | 2025-06-01 | Active |
| 4 | 4 | 4 | 2025-07-20 | Expired |
| 5 | 5 | 5 | 2025-08-11 | Active |
| 6 | 6 | 6 | 2025-09-05 | Expired |
| 7 | 7 | 7 | 2025-10-01 | Active |
| 8 | 8 | 8 | 2025-11-12 | Expired |
| 9 | 9 | 9 | 2025-12-25 | Active |
| 10 | 10 | 10 | 2026-01-30 | Expired |
| 11 | 11 | 11 | 2026-02-15 | Active |
+-----+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql>
mysql> -- Check PassSync Table
mysql> SELECT * FROM PassSync;
+-----+-----+-----+-----+
| Sync_Id | User_Id | Device_Id | LastSyncAt |
+-----+-----+-----+-----+
| 1 | 1 | Device001 | 2025-03-06 18:14:01 |
| 2 | 2 | Device002 | 2025-03-06 18:14:01 |
| 3 | 3 | Device003 | 2025-03-06 18:14:01 |
| 4 | 4 | Device004 | 2025-03-06 18:14:01 |
| 5 | 5 | Device005 | 2025-03-06 18:14:01 |
| 6 | 6 | Device006 | 2025-03-06 18:14:01 |
| 7 | 7 | Device007 | 2025-03-06 18:14:01 |
| 8 | 8 | Device008 | 2025-03-06 18:14:01 |
| 9 | 9 | Device009 | 2025-03-06 18:14:01 |
| 10 | 10 | Device010 | 2025-03-06 18:14:01 |
| 11 | 11 | Device011 | 2025-03-06 18:14:01 |
+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql> -- Check MultiDeviceAccess Table
mysql> SELECT * FROM MultiDeviceAccess;
+-----+-----+-----+-----+
| Access_Id | Device_Id | Last_IP | Connected_Devices |
+-----+-----+-----+-----+
| 1 | Device001 | 192.168.1.10 | Laptop, Mobile |
| 2 | Device002 | 192.168.1.20 | Mobile |
| 3 | Device003 | 192.168.1.30 | Tablet, Mobile |
| 4 | Device004 | 192.168.1.40 | Laptop, Tablet |
| 5 | Device005 | 192.168.1.50 | Smartwatch, Mobile |
| 6 | Device006 | 192.168.1.60 | Mobile, Smart TV |
| 7 | Device007 | 192.168.1.70 | Laptop, Mobile, Tablet |
| 8 | Device008 | 192.168.1.80 | Workstation, Mobile |
| 9 | Device009 | 192.168.1.90 | Laptop, Home Assistant |
| 10 | Device010 | 192.168.2.10 | Smartphone, Wearable |
| 11 | Device011 | 192.168.2.20 | Laptop, Smart Display |
+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql>
mysql> -- Check UserPreferences Table
mysql> SELECT * FROM UserPreferences;
+-----+-----+-----+
| Preference_Id | User_Id | Category |
+-----+-----+-----+
| 1 | 1 | Technology |
| 2 | 2 | Finance |
| 3 | 3 | Travel |
| 4 | 4 | Health & Fitness |
| 5 | 5 | Entertainment |
| 6 | 6 | E-commerce |
| 7 | 7 | Education |
| 8 | 8 | Cybersecurity |
| 9 | 9 | Gaming |
| 10 | 10 | Productivity |
| 11 | 11 | Investment |
+-----+-----+-----+
11 rows in set (0.00 sec)

```

```

mysql> -- Check Bank Table
mysql> SELECT * FROM Bank;
+-----+-----+-----+-----+-----+-----+
| Bank_Id | User_Id | BankName | Card_No | Card_Type | Expiry_Date |
+-----+-----+-----+-----+-----+-----+
| 1 | 1 | HDFC Bank | 1234567812345678 | Credit | 2027-12-01 |
| 2 | 2 | SBI Bank | 2345678923456789 | Debit | 2026-09-15 |
| 3 | 3 | ICICI Bank | 3456789034567890 | Credit | 2028-06-20 |
| 4 | 4 | Axis Bank | 4567890145678901 | Debit | 2025-11-30 |
| 5 | 5 | Kotak Bank | 5678901256789012 | Credit | 2029-05-10 |
| 6 | 6 | PNB | 6789012367890123 | Debit | 2024-08-21 |
| 7 | 7 | Union Bank | 7890123478901234 | Credit | 2027-01-15 |
| 8 | 8 | Canara Bank | 8901234589012345 | Debit | 2026-04-05 |
| 9 | 9 | Bank of Baroda | 9012345690123456 | Credit | 2028-03-18 |
| 10 | 10 | IndusInd Bank | 0123456701234567 | Debit | 2025-10-27 |
| 11 | 11 | Yes Bank | 1111222233334444 | Credit | 2027-07-13 |
+-----+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql>
mysql> -- Check PassBankAccount Table
mysql> SELECT * FROM PassBankAccount;
+-----+-----+-----+-----+-----+
| Pass_Id | Pass_Type | Pass_Name | Status | Description |
+-----+-----+-----+-----+-----+
| 1 | Loyalty Card | Amazon Prime Membership | Active | Amazon Prime Subscription |
| 2 | Event Ticket | Concert Ticket | Active | VIP Pass for Music Concert |
| 3 | Discount Coupon | 50% Off Coupon | Inactive | Expired discount for electronics |
| 4 | Membership Card | Gym Membership | Active | Annual membership for fitness center |
| 5 | Subscription | Netflix Subscription | Active | Monthly Netflix plan |
| 6 | Boarding Pass | Flight Ticket | Active | Boarding pass for international flight |
| 7 | Gift Card | Amazon Gift Card | Inactive | Expired gift card |
| 8 | Gaming Pass | PlayStation Plus Membership | Active | Online gaming subscription |
| 9 | Cinema Ticket | Movie Ticket | Active | 3D Movie Experience |
| 10 | Festival Pass | Tech Conference Entry | Active | Access to global tech event |
| 11 | E-learning Pass | Udemy Subscription | Active | Premium access to courses |
+-----+-----+-----+-----+-----+
11 rows in set (0.00 sec)

mysql> -- Check Dashboard Table
mysql> SELECT * FROM Dashboard;
+-----+-----+
| Dashboard_Id | User_Id |
+-----+-----+
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
+-----+-----+
11 rows in set (0.00 sec)

mysql>
mysql> -- Check Features Table
mysql> SELECT * FROM Features;
+-----+-----+
| Feature_Id | Feature_Name |
+-----+-----+
| 6 | AI-Based Recommendations |
| 11 | Analytics Dashboard |
| 8 | Data Backup & Recovery |
| 5 | Expiration Alerts |
| 3 | Multi-Device Access |
| 2 | Pass Sharing |
| 7 | Pass Sync |
| 10 | Personalized Offers |
| 1 | QR Sharing |
| 4 | Transaction History |
| 9 | Two-Factor Authentication |
+-----+-----+
11 rows in set (0.00 sec)

```

ii) Showing Table Description

```
mysql> DESCRIBE Users;
+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| User_Id | int | NO | PRI | NULL | auto_increment |
| User_Name | varchar(100) | NO | NULL |
| Email | varchar(100) | NO | UNI | NULL |
| Password | varchar(255) | NO | NULL |
+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> DESCRIBE UserProfile;
+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| Profile_Id | int | NO | PRI | NULL | auto_increment |
| User_Id | int | NO | MUL | NULL |
| Phone_No | varchar(15) | NO | UNI | NULL |
| Bio | text | YES | NULL |
| Profile_Picture | varchar(255) | YES | NULL |
+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> DESCRIBE PasswordManager;
+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| Password_Id | int | NO | PRI | NULL | auto_increment |
| User_Id | int | NO | MUL | NULL |
| Encrypted_Password | text | NO | NULL |
| CreatedAt | timestamp | YES | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> DESCRIBE BackupRecovery;
+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| Backup_Id | int | NO | PRI | NULL | auto_increment |
| User_Id | int | NO | MUL | NULL |
| Backup_Date | timestamp | YES | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
| Recovery_Status | enum('Pending','Completed') | NO | NULL |
| Backup_Location | varchar(255) | NO | NULL |
+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> DESCRIBE Notifications;
+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| Notification_Id | int | NO | PRI | NULL | auto_increment |
| User_Id | int | NO | MUL | NULL |
| Message | text | NO | NULL |
| Read_Status | tinyint(1) | YES | 0 |
| Timestamp | timestamp | YES | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> DESCRIBE Transactions;
+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+
| Transaction_Id | int | NO | PRI | NULL | auto_increment |
| User_Id | int | NO | MUL | NULL |
| Transaction_Date | timestamp | YES | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
| Transaction_Status | enum('Pending','Success','Failed') | NO | NULL |
+-----+-----+-----+-----+
4 rows in set (0.00 sec)
```

```

mysql> DESCRIBE QRSharing;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| QRShare_Id | int | NO | PRI | NULL | auto_increment |
| Pass_Id | int | NO | MUL | NULL | |
| User_Id | int | NO | MUL | NULL | |
| QRCode | varchar(255) | NO | UNI | NULL | |
| CreatedAt | timestamp | YES | | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
| IsScanned | tinyint(1) | YES | | 0 | |
+-----+-----+-----+-----+-----+-----+
6 rows in set (0.00 sec)

mysql> DESCRIBE PassSharing;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Share_Id | int | NO | PRI | NULL | auto_increment |
| SenderUser_Id | int | NO | MUL | NULL | |
| ReceiverUser_Id | int | NO | MUL | NULL | |
| Pass_Id | int | NO | | NULL | |
| SharedAt | timestamp | YES | | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
| Status | enum('Pending','Accepted','Rejected') | NO | | NULL | |
+-----+-----+-----+-----+-----+-----+
6 rows in set (0.00 sec)

mysql> DESCRIBE ExpirationAlerts;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Alert_Id | int | NO | PRI | NULL | auto_increment |
| Pass_Id | int | NO | MUL | NULL | |
| User_Id | int | NO | MUL | NULL | |
| Expiration_Date | date | NO | | NULL | |
| Status | enum('Active','Expired') | NO | | NULL | |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> DESCRIBE PassSync;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Sync_Id | int | NO | PRI | NULL | auto_increment |
| User_Id | int | NO | MUL | NULL | |
| Device_Id | varchar(255) | NO | | NULL | |
| LastSyncAt | timestamp | YES | | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> DESCRIBE MultiDeviceAccess;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Access_Id | int | NO | PRI | NULL | auto_increment |
| Device_Id | varchar(255) | NO | UNI | NULL | |
| Last_IP | varchar(50) | NO | | NULL | |
| Connected_Devices | text | NO | | NULL | |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)

mysql> DESCRIBE UserPreferences;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Preference_Id | int | NO | PRI | NULL | auto_increment |
| User_Id | int | NO | MUL | NULL | |
| Category | varchar(100) | NO | | NULL | |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)

```

Conversion of ER Model to Relational Schema:

The Entity-Relationship (ER) Model is a high-level conceptual data model used for designing databases, while the Relational Schema represents the logical structure of the database in a tabular format. Converting an ER model into a relational schema involves systematically transforming entities, relationships, and attributes into tables while ensuring data integrity and normalization.

Five Rules for Conversion

1. Mapping Strong Entities to Tables

- Each strong entity in the ER model is converted into a separate table.
- The primary key (PK) of the entity becomes the primary key of the table.
- All attributes of the entity become columns in the table.

Example:

- ER Model: STUDENT (Student_ID, Name, Age, Address)
- Relational Schema: STUDENT (Student_ID PK, Name, Age, Address)

2. Mapping Weak Entities to Tables

- A weak entity depends on a strong entity and does not have a sufficient primary key.
- A table is created for the weak entity, including:
 - The primary key of the strong entity (as a foreign key).
 - Its own attributes.
 - A composite primary key (if needed).

Example:

- ER Model: DEPENDENT (Dependent_ID, Name, Relationship, Employee_ID FK)
- Relational Schema: DEPENDENT (Dependent_ID PK, Name, Relationship, Employee_ID FK)

3. Mapping Relationships to Tables

- One-to-One (1:1) Relationship:
 - The foreign key (FK) can be added to either of the participating entity tables.
- One-to-Many (1:M) Relationship:
 - The foreign key is placed in the table representing the "many" side.

- Many-to-Many (M:N) Relationship:
 - A separate table is created for the relationship.
 - The table contains foreign keys referring to both participating entities.

Example:

- ER Model: STUDENT (Student_ID) -< ENROLLMENT >- (Course_ID)
COURSE
- Relational Schema:
 - ENROLLMENT (Student_ID FK, Course_ID FK, Enrollment_Date, PRIMARY KEY (Student_ID, Course_ID))

4. Mapping Multi-Valued Attributes

- Multi-valued attributes cannot be stored in a single column.
- A separate table is created with:
 - A foreign key referring to the main entity.
 - The multi-valued attribute as a column.
 - A composite primary key if needed.

Example:

- ER Model: EMPLOYEE (Employee_ID, Name, {Phone_Numbers})
- Relational Schema:
 - EMPLOYEE (Employee_ID PK, Name)
 - EMPLOYEE_PHONE (Employee_ID FK, Phone_Number, PRIMARY KEY (Employee_ID, Phone_Number))

5. Mapping Generalization and Specialization

- Generalization: A higher-level entity (superclass) groups multiple lower-level entities (subclasses).
- Specialization: A higher-level entity is divided into multiple specialized lower-level entities.
- Mapping approaches:
 - Single Table Strategy (One Table for All Entities)
 - Multiple Table Strategy (Separate Tables for Superclass and Subclasses)
 - Hybrid Strategy (Partial Table for Superclass and Separate Tables for Subclasses)

Example:

- ER Model: PERSON (Person_ID, Name) → EMPLOYEE (Salary), STUDENT (GPA)
- Relational Schema:
 - PERSON (Person_ID PK, Name, Type)
 - EMPLOYEE (Person_ID FK, Salary)
 - STUDENT (Person_ID FK, GPA)

This approach maintains **data consistency**, reduces redundancy, and allows seamless **data retrieval and manipulation** in relational databases.