

DBMS ASSIGNMENT 2

Date:19-12-2023

Domain: Travel Expense Management System

Description: A Travel Expense Management System (TEMS) ensures cost control, efficiency in approvals, and transparent expense tracking.

Relevance: This Travel Expense Management System is designed for company employees to systematically track and submit business-related trip expenses. With the inclusion of receipts, employees can efficiently present their expenditures to managers, and upon approval, the system ensures a streamlined reimbursement process, ensuring accurate and timely payment to the employee.

Tables & Attributes

1) Employee Table

EmployeeID (INT, Primary Key)

FirstName (VARCHAR)

LastName (VARCHAR)

Description: Stores employee details.

2) User Table

UserID (INT, Primary Key)

Username (VARCHAR)

Password (VARCHAR)

Email (VARCHAR)

Role (ENUM: Admin, Manager, User)

Description: Stores user authentication information.

3) UserRole Table

UserID (INT, Foreign Key referencing User.UserID)

Role (VARCHAR)

Description: Maps roles to users.

4) EmployeeUserMapping Table

EmployeeID (INT, Foreign Key referencing Employee.EmployeeID)

UserID (INT, Foreign Key referencing User.UserID)

Description: Maps employees to users.

5) ExpenseCode Table

ExpenseCode (VARCHAR, Primary Key)

ExpenseName (VARCHAR)

Description: Defines expense categories and codes.

6) ApprovalCode Table

ApprovalCode (VARCHAR, Primary Key)

CodeName (VARCHAR)

Description: Defines approval status codes.

7) Trip Table

TripID (INT, Primary Key)

UserID (INT, Foreign Key referencing User.UserID)

TripName (VARCHAR)

StartDate (DATE)

EndDate (DATE)

Destination (VARCHAR)

Description: Records details of business trips.

8) Expense Table

ExpenseID (INT, Primary Key)

TripID (INT, Foreign Key referencing Trip.TripID)

UserID (INT, Foreign Key referencing User.UserID)

ExpenseCode (VARCHAR, Foreign Key referencing ExpenseCode.ExpenseCode)

ExpenseDate (DATE)

Amount (DECIMAL)

Description (VARCHAR)

ReceiptImage (VARCHAR)

Description: Captures individual expenses incurred during trips.

9) Approval Table

ApprovalID (INT, Primary Key)

ExpenseID (INT, Foreign Key referencing Expense.ExpenseID)

ManagerID (INT, Foreign Key referencing User.UserID)

StatusID (VARCHAR, Foreign Key referencing ApprovalCode.ApprovalCode)

Comments (VARCHAR)

ApprovalDate (DATETIME)

Description: Records the approval process for each expense.

Database and Table MySQL Queries:

-- Create Database

CREATE DATABASE IF NOT EXISTS travel_expense_db;

USE travel_expense_db;

-- Create Employee Table

```
CREATE TABLE IF NOT EXISTS Employee ( EmployeeID INT PRIMARY KEY, FirstName  
VARCHAR(255), LastName VARCHAR(255) );
```

-- Create User Table

```
CREATE TABLE IF NOT EXISTS User ( UserID INT PRIMARY KEY, Username VARCHAR(255),  
Password VARCHAR(255), Email VARCHAR(255), Role ENUM('Admin', 'Manager', 'User'),  
UNIQUE KEY (Username) );
```

-- Create UserRole Table

```
CREATE TABLE IF NOT EXISTS UserRole ( UserID INT, Role VARCHAR(255), PRIMARY KEY (UserID,  
Role), FOREIGN KEY (UserID) REFERENCES User(UserID) );
```

-- Create EmployeeUserMapping Table

```
CREATE TABLE IF NOT EXISTS EmployeeUserMapping ( EmployeeID INT, UserID INT, PRIMARY  
KEY (EmployeeID, UserID), FOREIGN KEY (EmployeeID) REFERENCES Employee(EmployeeID),  
FOREIGN KEY (UserID) REFERENCES User(UserID) );
```

-- Create ExpenseCode Table

```
CREATE TABLE IF NOT EXISTS ExpenseCode ( ExpenseCode VARCHAR(255) PRIMARY KEY,  
ExpenseName VARCHAR(255) );
```

-- Create ApprovalCode Table

```
CREATE TABLE IF NOT EXISTS ApprovalCode ( ApprovalCode VARCHAR(255) PRIMARY KEY,  
CodeName VARCHAR(255) );
```

-- Create Trip Table

```
CREATE TABLE IF NOT EXISTS Trip ( TripID INT PRIMARY KEY, UserID INT, TripName  
VARCHAR(255), StartDate DATE, EndDate DATE, Destination VARCHAR(255), FOREIGN KEY  
(UserID) REFERENCES User(UserID) );
```

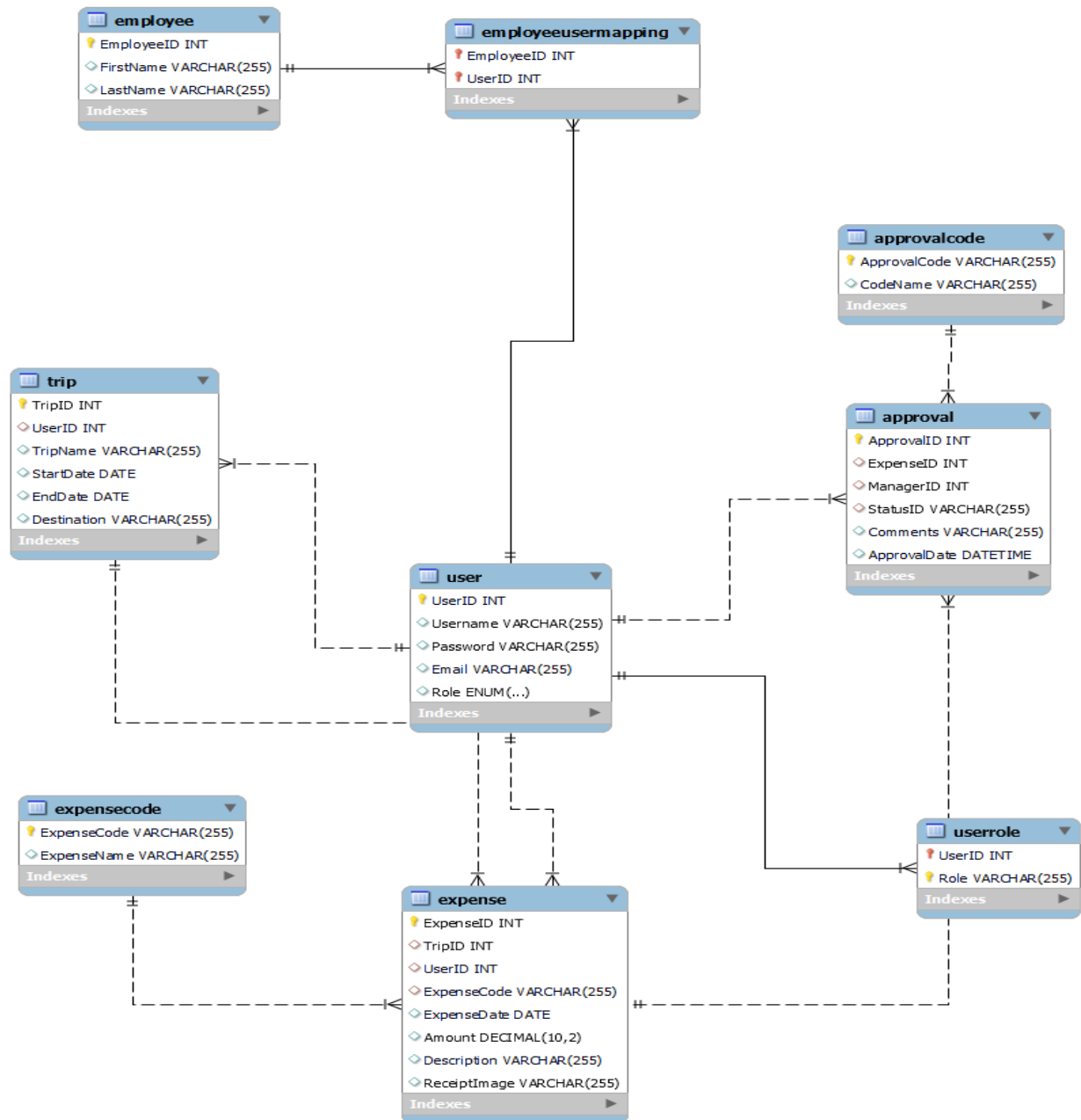
-- Create Expense Table

```
CREATE TABLE IF NOT EXISTS Expense ( ExpenseID INT PRIMARY KEY, TripID INT, UserID INT,  
ExpenseCode VARCHAR(255), ExpenseDate DATE, Amount DECIMAL(10, 2), Description  
VARCHAR(255), ReceiptImage VARCHAR(255), FOREIGN KEY (TripID) REFERENCES Trip(TripID),  
FOREIGN KEY (UserID) REFERENCES User(UserID), FOREIGN KEY (ExpenseCode) REFERENCES  
ExpenseCode(ExpenseCode) );
```

-- Create Approval Table

```
CREATE TABLE IF NOT EXISTS Approval ( ApprovalID INT PRIMARY KEY, ExpenseID INT,  
ManagerID INT, StatusID INT, Comments VARCHAR(255), ApprovalDate DATETIME, FOREIGN  
KEY (ExpenseID) REFERENCES Expense(ExpenseID), FOREIGN KEY (ManagerID) REFERENCES  
User(UserID), FOREIGN KEY (StatusID) REFERENCES ApprovalCode(ApprovalCode) );
```

ER diagram



Relationships:

1. User writes many Trips (One-to-Many)
2. Trip is associated with one User (Many-to-One)
3. Trip has many Expenses (One-to-Many)

4. Expense belongs to one Trip (Many-to-One)
5. Expense Category includes many Expenses (One-to-Many)
6. Expense undergoes one Approval Status (Many-to-One)
7. Approval is tied to one Expense (Many-to-One)
8. Approval is made by one User (Many-to-One)

NORMALISATION

All the tables are normalized up to 3nf.

APPLICATION WORKING

User Registration and Role Assignment:

Action: Admin registers users and assigns roles.

Workflow:

Admin enters user details and assigns roles (Admin, Manager, or User).

Data is inserted into the User table.

User roles are assigned and stored in the UserRole table.

Employee Mapping:

Action: Mapping employees to users.

Workflow:

Admin maps employees to users in the EmployeeUserMapping table.

Employee details are stored in the Employee table.

Expense Category Setup:

Action: Manager creates and defines expense categories.

Workflow:

Manager creates expense categories, and codes are stored in the ExpenseCode table.

Business Trip Planning:

Action: User plans a business trip.

Workflow:

User creates a new trip in the Trip table, specifying trip details.

Expenses associated with the trip are stored in the Expense table.

Expense Incurrence:

Action: User adds individual expenses incurred during the trip.

Workflow:

User adds expenses in the Expense table, linking them to the corresponding trip.

Expense Approval:

Action: Manager reviews and approves expenses.

Workflow:

Manager reviews expenses and updates the Approval table with approval status and comments.

Admin Oversight:

The admin can oversee the entire process, viewing reports and analytics across all users and trips.

