Database Design Document (DBD)

Project: BudgetIQ
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1. Purpose

This document describes the database design for **BudgetIQ**, detailing tables, relationships, constraints, and indexes. It ensures secure, efficient, and reliable storage of user, transaction, goal, recurring, and authentication data.

2. Database Overview

- **Database Name:** `budgetiq_db`
- **Type:** Relational (MySQL)
- **ORM Framework:** JPA / Hibernate
- **Security:** JWT-based authentication and Two-Factor Authentication (2FA)

The database stores user data, expenses, incomes, goals, recurring transactions, authentication tokens, categories, and system metadata.

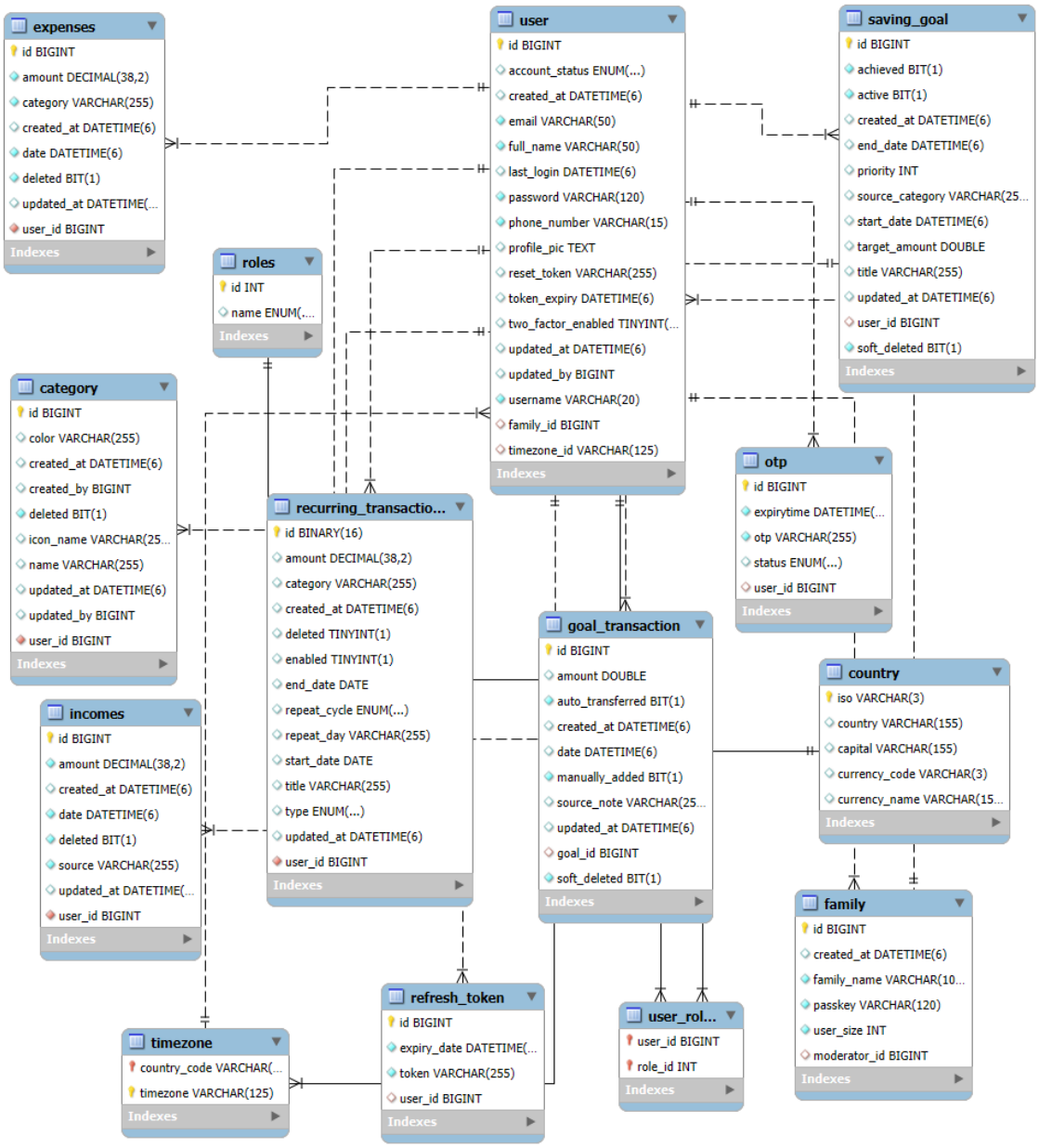
3. Entity-Relationship Overview

The main entities in the database are:

- **User:** Stores account info and settings
- **Roles:** User roles for access control

- **Expenses:** User expense records
- **Incomes:** User income records
- **Category:** Categories for transactions
- **Recurring Transactions:** Automated recurring entries
- **Goal Transaction:** Tracks savings applied toward goals
- **Saving Goal:** User-defined financial goals
- **OTP / Refresh Tokens:** Authentication support
- **Family / Country / Timezone:** User-related metadata

3.1 ER Diagram



4. Table Definitions

4.1 User Table

Field	Type	Description

id (PK)	BIGINT	Unique user ID
full_name	VARCHAR(50)	User's name
username	VARCHAR(20)	Login username
email	VARCHAR(50)	User email
password	VARCHAR(120)	Hashed password
phone_number	VARCHAR(15)	2FA verification
profile_pic	TEXT	Optional profile picture
two_factor_enabled	TINYINT(1)	2FA enabled flag
account_status	ENUM(...)	Active / Suspended / etc.
created_at	DATETIME	Account creation timestamp
updated_at	DATETIME	Last update timestamp
updated_by	BIGINT	ID of user who updated
reset_token	VARCHAR(255)	Password reset token
token_expiry	DATETIME	Token expiration timestamp
last_login	DATETIME	Last login timestamp
family_id	BIGINT	References Family
timezone_id	VARCHAR(125)	References Timezone

4.2 Roles Table

Field	Type	Description
id (PK)	INT	Role ID
name	ENUM(...)	Role name (Admin/User/etc.)

Relationships:

- Many-to-Many with User via `user_role` table

4.3 User_Role Table

Field	Type	Description
user_id (FK)	BIGINT	References User.id
role_id (FK)	INT	References Roles.id

4.4 Expenses Table

Field	Type	Description
id (PK)	BIGINT	Expense ID
user_id (FK)	BIGINT	References User.id
amount	DECIMAL(38,2)	Expense amount
category	VARCHAR(255)	Expense category
date	DATETIME	Expense date
created_at	DATETIME	Record created timestamp
updated_at	DATETIME	Last update timestamp
deleted	BIT(1)	Soft delete flag

4.5 Incomes Table

Field	Type	Description
id (PK)	BIGINT	Income ID
user_id (FK)	BIGINT	References User.id
amount	DECIMAL(38,2)	Income amount
source	VARCHAR(255)	Income source
date	DATETIME	Income date
created_at	DATETIME	Record creation timestamp
updated_at	DATETIME	Last update timestamp
deleted	BIT(1)	Soft delete flag

4.6 Category Table

Field	Type	Description
id (PK)	BIGINT	Category ID
user_id (FK)	BIGINT	Owner of category
name	VARCHAR(255)	Category name
icon_name	VARCHAR(255)	Icon for UI
color	VARCHAR(255)	Color for charts
created_at	DATETIME	Timestamp
updated_at	DATETIME	Timestamp
created_by	BIGINT	User who created
deleted	BIT(1)	Soft delete flag

4.7 Recurring_Transaction Table

Field	Type	Description
id (PK)	BINARY(16)	Unique recurring transaction ID
user_id (FK)	BIGINT	References User.id
title	VARCHAR(255)	Transaction title
amount	DECIMAL(38,2)	Transaction amount
type	ENUM(...)	Income / Expense
category	VARCHAR(255)	Optional category
start_date	DATE	Start of recurrence
end_date	DATE	End of recurrence
repeat_cycle	ENUM(...)	Daily / Weekly / Monthly
repeat_day	VARCHAR(255)	Specific day for recurrence
enabled	TINYINT(1)	Status flag
deleted	TINYINT(1)	Soft delete
created_at	DATETIME	Timestamp
updated_at	DATETIME	Timestamp

4.8 Saving_Goal Table

Field	Type	Description
id (PK)	BIGINT	Goal ID
user_id (FK)	BIGINT	References User.id
title	VARCHAR(255)	Goal name
target_amount	DOUBLE	Total goal
start_date	DATETIME	Goal start
end_date	DATETIME	Target end date
source_category	VARCHAR(255)	Where savings come from
priority	INT	Goal priority
active	BIT(1)	Active flag
achieved	BIT(1)	Completion status
updated_at	DATETIME	Timestamp
created_at	DATETIME	Timestamp
soft_deleted	BIT(1)	Soft delete

4.9 Goal_Transaction Table

Field	Type	Description
id (PK)	BIGINT	Transaction ID
goal_id (FK)	BIGINT	References Saving_Goal.id
amount	DOUBLE	Saved amount
auto_transferred	BIT(1)	Flag if auto-transferred from recurring
manually_added	BIT(1)	Manual entry flag
source_note	VARCHAR(255)	Optional description
date	DATETIME	Transaction date
created_at	DATETIME	Timestamp
updated_at	DATETIME	Timestamp
soft_deleted	BIT(1)	Soft delete

4.10 OTP Table

Field	Type	Description
id (PK)	BIGINT	OTP record ID
user_id (FK)	BIGINT	References User.id
otp	VARCHAR(255)	Generated OTP
expiry_time	DATETIME	Expiration timestamp
status	ENUM(...)	Pending / Verified / Expired

4.11 Refresh_Token Table

Field	Type	Description
id (PK)	BIGINT	Token ID
user_id (FK)	BIGINT	References User.id
token	VARCHAR(255)	JWT refresh token
expiry_date	DATETIME	Expiry timestamp

4.12 Family Table

Field	Type	Description
id (PK)	BIGINT	Family ID

family_name	VARCHAR(100)	Family group name
passkey	VARCHAR(120)	Security passkey for group
user_size	INT	Number of members
moderator_id	BIGINT	Admin user in family
created_at	DATETIME	Timestamp

4.13 Country Table

Field	Type	Description
iso	VARCHAR(3)	ISO code (PK)
country_name	VARCHAR(155)	Country full name
capital	VARCHAR(155)	Capital city
currency_code	VARCHAR(3)	Country currency
currency_name	VARCHAR(15)	Currency name

4.14 Timezone Table

Field	Type	Description
country_code	VARCHAR(3)	Country code (PK)
timezone	VARCHAR(125)	Timezone name

5. Relationships

- **User → Expenses, Incomes, Recurring_Transactions, Saving_Goal, Goal_Transaction, OTP, Refresh_Token** → 1:N
- **User ↔ Roles** → Many-to-Many via `User_Role`
- **Saving_Goal → Goal_Transaction** → 1:N
- **Category → Expenses / Incomes** → 1:N (user-specific categories)
- **Family → User** → 1:N
- **Country → Timezone** → 1:N

6. Indexing & Optimization

- Index on `user_id` in all transaction and goal tables
- Composite index on (`user_id`, `date`) in **Expenses/Incomes** for dashboards
- Index on `email` and `username` in **User** for login speed
- Foreign key constraints for referential integrity
- Soft delete flags used to maintain history without losing data

7. Security Considerations

- Passwords hashed using BCrypt
- 2FA for extra login security
- JWT-based authentication with refresh token support
- Soft-deleted records are not exposed in queries

8. Backup & Recovery

- Daily backups with 30-day retention
- Point-in-time recovery supported
- Future cloud backup integration planned