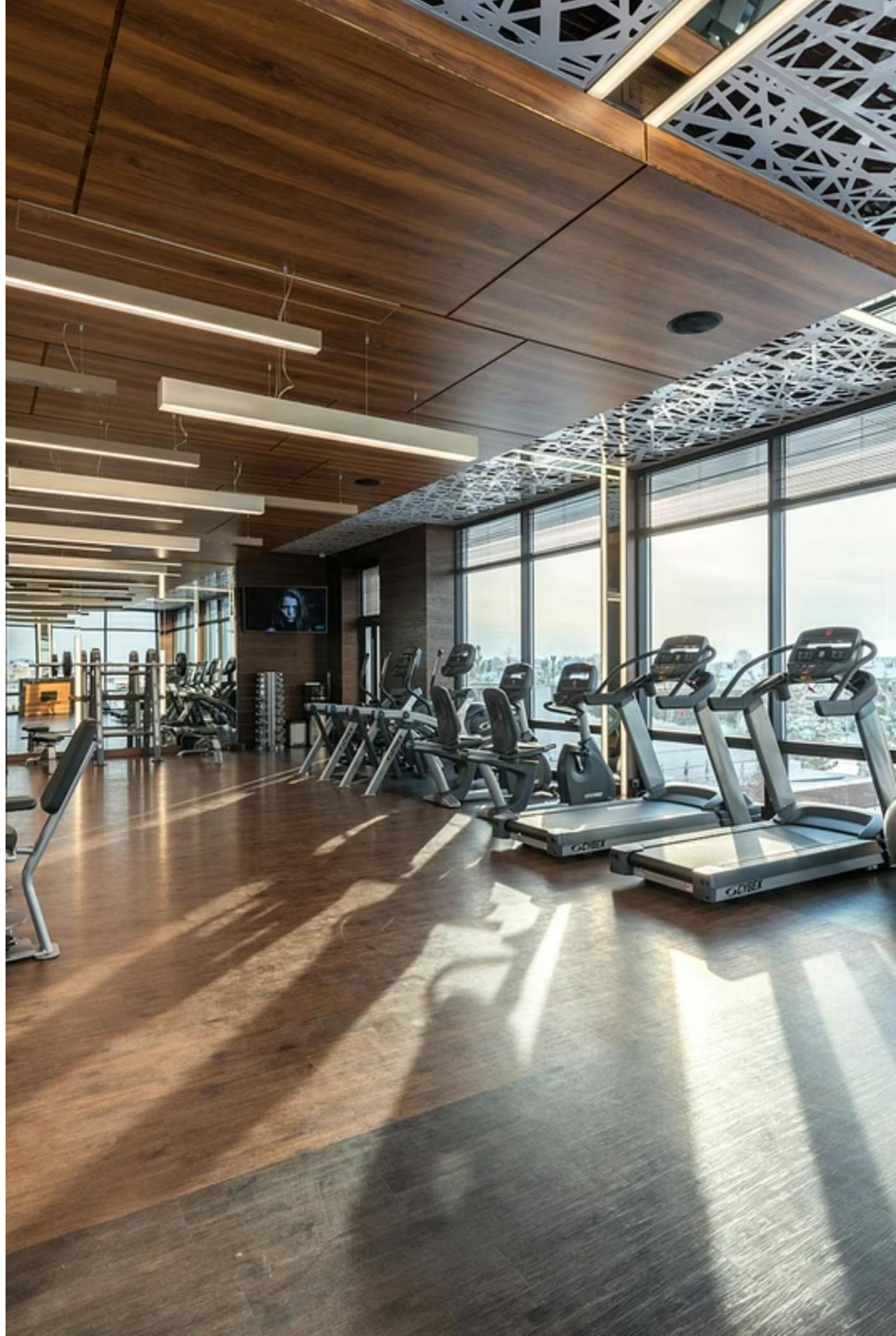
Fitness Club Membership Management

Database Project: Implementation of a relational database using PostgreSQL.



Project Overview: Fitness Club Database Development

Objective

Developed a relational database for comprehensive management of fitness club operations.

Scope of Functionality

Includes management of members, memberships, subscriptions, trainers, classes, attendance, payments, and locker assignments.

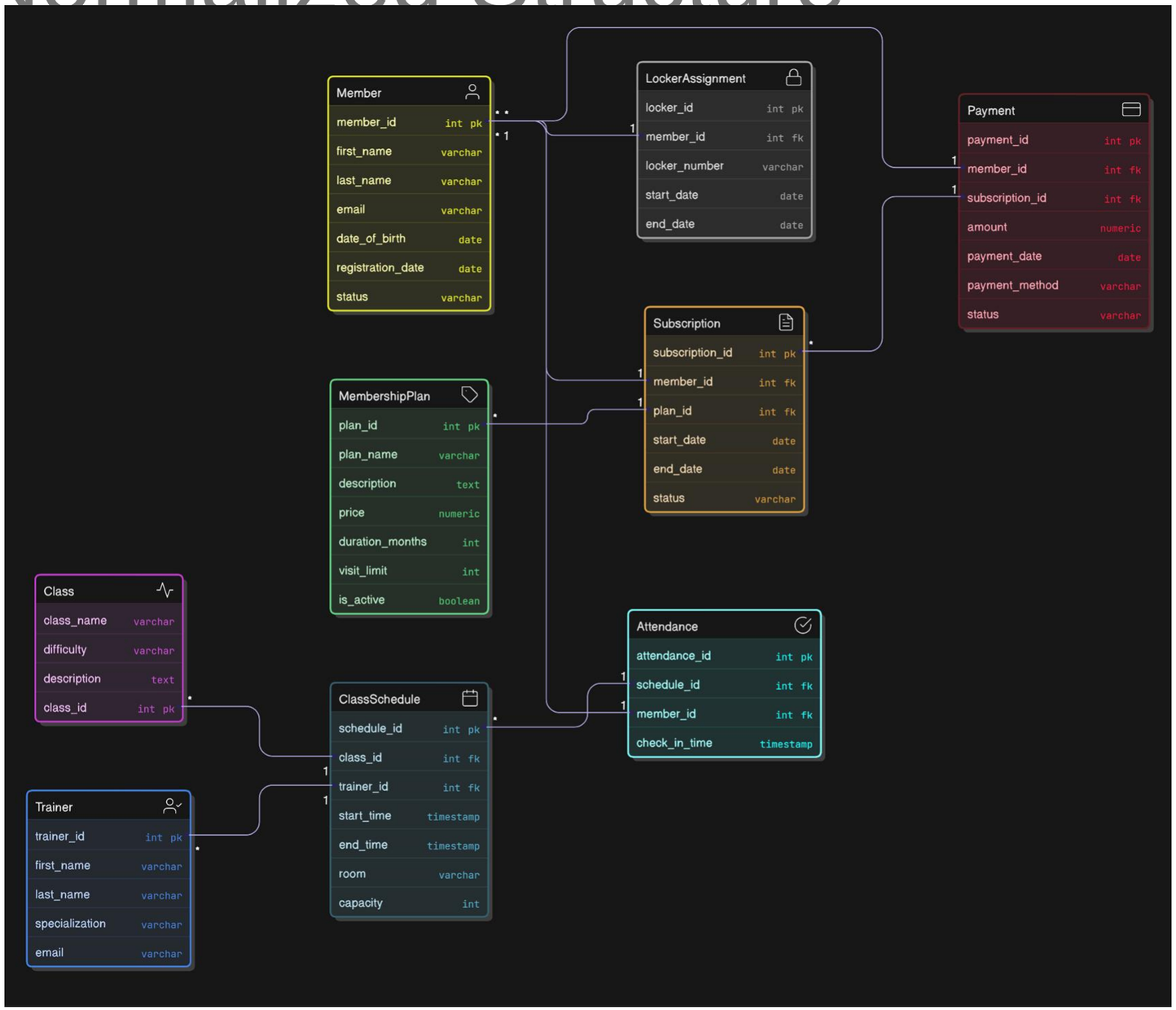
Implementation

All business logic is implemented directly using SQL for integrity and performance.

Database Schema: Normalized Structure

The system's foundation is a normalized relational schema, ensuring data integrity and minimizing redundancy.

Relationships between the 9 main tables are defined using primary and foreign keys.



Data Integrity Rules

A comprehensive set of integrity rules has been implemented to ensure data reliability.

- Primary Keys: Guarantee the uniqueness of records across all tables.
- Foreign Keys: Maintain referential integrity between related tables.
- Unique Constraints: Applied to fields such as email and locker assignments per member.

CHECK Constraints:

- Positive payment amounts.
- Valid date and time ranges.
- Positive class capacity.
- No duplicate attendance for a member within the same schedule.

Test Data and Its Significance

Realistic test data has been inserted to verify functionality and test queries.

Data Completeness

The data covers all entities and their relationships, ensuring comprehensive testing.

Meaningful Testing

Allows for meaningful testing of queries and transactions in conditions close to real-world scenarios.

Realism

The generated data simulates the behavior of a real fitness club for accurate performance evaluation.

Basic SQL Queries: Retrieving Core Information

Queries have been developed to extract key information about club operations.

1

List of Active Members

Retrieve a list of all members with active subscriptions.

2

Member Subscriptions and Plans

Information on each member's current plans and subscription status.

3

Class Schedule with Trainers

Full schedule of all classes, including information about the lead trainers.

4

Member Attendance History

Detailed record of each member's class attendance.

5

Payment History

Records of all payments made by each club member.

Advanced SQL Queries for Analysis

Using complex SQL constructs for in-depth data analysis and report generation.

Data Aggregation

- **Using `GROUP BY` and `HAVING` for statistical reports.**
- **Class occupancy and attendance statistics.**
- **Total payment amount for each member.**

Advanced Reporting

- **Reports based on Common Table Expressions (CTE) for complex logic.**
- **Window functions for ranking the most active members.**

Transactions: Ensuring Operational Integrity

Transactions ensure that multi-step operations are performed atomically, maintaining data integrity.

Start Transaction

`BEGIN`: **Initialization of an operation sequence.**

Create Member

`INSERT INTO Member ...`: **Adding a new member.**

Create Subscription

`INSERT INTO Subscription ...`: **Associating a member with a plan.**

Record Payment

`INSERT INTO Payment ...`: **Recording a financial transaction.**

Complete Transaction

`COMMIT`: **Confirming all changes if no errors occur.**

> **The `ROLLBACK` example demonstrates error handling and maintaining data consistency upon failure.**

Indexing: Performance Optimization

Indexes were strategically added to speed up frequently used queries and reports.

Member Fields

Member's email and last name for quick searches.

Subscriptions

Member and subscription status for tracking active memberships.

Schedule

Class start time for effective planning.

Foreign Keys

Keys for attendance and payments to speed up table joins.

Database Views

Views were created to simplify complex queries and provide personalized reports.

- Active Members: A list of members with active subscriptions.
- Active Subscriptions: Current and pending subscriptions.
- Class Occupancy Summary: Overview of class attendance.
- Trainer Schedule: Each trainer's availability.
- Payment Summaries: General information about financial inflows.
- Members Without Visits: For identifying inactive users.
- Expired Subscriptions: A list for renewal or deletion.

Question Time!

Thanks for attention!