Project Report

Fitness Club Membership Management

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1. Introduction

This project implements a relational database system for managing a fitness club.

It includes schema design, ER modeling, SQL implementation, advanced queries, transactions, indexing,

and backup/recovery strategy. PostgreSQL is used as the database engine.

2. System Overview

The system stores and processes information about:

• Members

• Membership plans

• Subscriptions

• Trainers

• Classes and schedules

• Attendance records

• Payments

• Locker assignments

3. ER Model

The database is structured around the following entities:

Member, MembershipPlan, Subscription, Trainer, Class, ClassSchedule, Attendance, Payment, LockerAssignment.

Key relationships include:

• Member – Subscription (1:N)

• MembershipPlan – Subscription (1:N)

• Subscription – Payment (1:N)

• Trainer – ClassSchedule (1:N)

• Class – ClassSchedule (1:N)

• ClassSchedule – Attendance (1:N)

• Member – Attendance (1:N)

• Member – LockerAssignment (1:1)

4. Database Implementation

All tables were implemented in PostgreSQL with:

• Primary and foreign keys

• CHECK and UNIQUE constraints

• Cascading rules

• Normalized structure

Files:

01_schema_creation.sql

02_sample_data.sql

03_basic_queries.sql

04_advanced_queries.sql

05_transactions_and_indexes.sql

06_views_and_functions.sql

5. SQL Queries

The project includes:

• Basic queries (selection, filtering, joins)

• Advanced analytical queries (CTE, window functions, aggregates)

6. Transactions and Indexing

Demonstrated:

• Multi■step transactions

• COMMIT / ROLLBACK

• Indexes for performance optimization

7. Views and Functions

Implemented reusable:

• Views for reporting and analytics

• SQL and PL/pgSQL functions

8. Backup and Recovery

Backup is performed using pg_dump.

Recovery is performed using pg_restore or psql depending on format.

9. Conclusion

The project provides a complete PostgreSQL database solution for managing fitness club operations, covering schema design, querying, transactions, optimization, and data protection.