Relational Database: Mini-Project

1. Introduction

This mini-project aims to assess your understanding of **database administration**, with a particular focus on **Oracle DBMS**.
You will design, implement, and administrate a complete database system based on a real-world domain of your choice.

The final deliverables include:

- A **10-minute presentation** during the last lab session
- A **complete SQL script** (sent by email or Mattermost)
- Screenshots demonstrating your SQL executions

This project grade will serve as the **practical work (TP) score** for the Database Administration module.

2. Project Requirements

2.1. Team Formation

- Work in groups of **up to 4 students**.
- Choose a real-world application domain (e.g., hospital system, library management, student portal, retail store, etc.).

3. Project Phases

Phase 1: Domain Selection & Introduction

Choose a domain that interests your group and is complex enough to justify a relational database.
In your presentation, clearly introduce:

- The real-world context
- The main entities involved
- The goals and functionalities of your system

Phase 2: Data Modeling

You must produce two essential models:

a) Conceptual Data Model

Represent:

- Entities
- Relationships
- Cardinalities
- Main attributes

b) Logical Data Model

Translate the Concoptual Model into Relational Schema:

- Tables
- Primary keys
- Foreign keys
- Constraints (UNIQUE, CHECK, NOT NULL, etc.)

Phase 3: Database Creation in Oracle

Using Oracle SQL, implement the schema designed in Phase 2.
Include:

- Table creation
- Constraints (PK, FK, CHECK, UNIQUE)
- Relationships

You may use SQL*Plus.

Phase 4: Users, Roles, and Privileges

Demonstrate database administration tasks by:

- Creating users
- Creating roles
- Assigning appropriate privileges (system and object privileges)
- Granting roles to users

Phase 5: Views, Indexes, and Sequences

Views:

Create views to simplify access to complex data or restrict user visibility.

Indexes:

Define indexes to optimize frequently executed queries.

Sequences:

Create sequences for generating unique identifiers (e.g., primary keys).

Phase 6: Data Insertion

Populate your database with meaningful test data:

- Insert records into all tables
- Use random, realistic, or manually created data
- Make sure the data respects constraints and relationships

Phase 7: SQL Queries & Testing

You must demonstrate various SQL operations with screenshots of **queries + execution results**.

Include:

a) DDL (Data Definition Language)

- Table creation
- User creation
- Role creation
- View creation

b) DML (Data Manipulation Language)

- At least **three UPDATE queries**
- Multiple INSERT statements
- At least **three data-modification queries** (e.g., INSERT/UPDATE/DELETE)

c) SELECT Queries

- Three simple SELECT queries
- Three queries with:
    - ORDER BY
    - GROUP BY
    - HAVING
- Three JOIN queries (e.g., INNER JOIN, LEFT JOIN, etc.)

You may include additional queries to demonstrate your mastery.

4. Final Deliverables

A. Presentation (10 minutes maximum)

Your presentation must include:

1. **Introduction**

    - Domain and context
    - Functional description
2. **Data Models** (ERD, Relational Model)
3. **Database Implementation**
    - Table creation
    - Constraints
4. **Users, Roles, Privileges**
5. **Views, Indexes, Sequences**
6. **Data inserted**
7. **SQL Demonstrations**
    - Screenshots and explanations
8. **Conclusion**
    - Summary of work
    - Difficulties and lessons learned

B. Code Submission

Send via email or Mattermost (jihed.hammami@horizon-university.tn):

- Complete SQL script (e.g., DDL, DML)
- Presentation file
- Any additional supporting documents

Deadline: will be announced later.

5. Project Purpose

This mini-project allows you to:

- Apply database administration concepts
- Work with Oracle in a real scenario
- Practice teamwork and technical communication
- Gain experience in modeling, implementation, and query optimization