RDBMS Project - CSE 4508

Group: Maximum 4 members
RDBMS Technology: Any (Postgres, Oracle, MySQL, etc). NoSQL is not allowed.

1. Minimum Requirements for All Projects

A. Database Design Requirements

You must submit:

- Problem definition
- Detailed ER Diagram (**10–15 entities expected**)
- Relational schema mapping
- Normalization decisions (up to 3NF minimally; justify denormalization cases)

B. SQL Requirements

You must implement:

- **10+ complex SQL queries**, including:
    - multi-table joins
    - nested subqueries
    - rollup/cube (if appropriate)
    - grouping sets (if appropriate)
    - analytical/reporting queries (must have at least 5)
- At least **2 Views**
- At least **2 Indexing strategies**

C. Procedural SQL Requirements (PL/SQL/T-SQL)

Your system must contain a minimum of the following:

- **3 Stored Functions**
- **3 Stored Procedures**
- **3 Triggers**
    - At least one BEFORE and one AFTER
    - At least one multi-row/complex trigger
- **Cursor usage OR bulk operation**
- **Exception handling** in procedural logic
- Normalization
- **Transactionally consistent operations**
    - commit / rollback
    - deadlock/race condition demonstration (optional but bonus)

D. System Functionality Requirements

Your system should demonstrate:

- Managing multi-step business workflows
- Validations using constraints and triggers
- An audit table updated via triggers
- Role-based access scenarios (admin/user)
- At least one advanced feature (choose any):
    - partitioning
    - object-relational types
    - JSON columns + queries

- scheduled jobs/events

E. Documentation Requirements

Each group must submit a **detailed project report** containing:

1. System description (1–2 pages)
2. ER diagram + schema
3. Description of tables, constraints, triggers, and procedures
4. Explanation of key SQL queries
5. Screenshots of important operations
6. Query optimization steps and reasoning for indexing
7. Reflection on team roles and contributions

2. Project Timeline & Presentations (Three Total)

A. Presentation 1 — Project Proposal (Week 3)

Time: 6 minutes
Deliverables:

- Problem domain
- Draft ER Diagram (at least 8 entities)
- Initial schema outline
- Initial list of expected procedures, triggers, major SQL queries
- Team roles defined
- DBMS choice

You will be evaluated on:

- Complexity
- Feasibility
- Clarity of design
- Understanding of the database-intensive nature

B. Presentation 2 — Mid-Semester Progress (Week 8)

Time: 10 minutes
Deliverables:

- Final ER Diagram
- 50% of the schema implemented
- At least 1 procedure + 1 function + 1 trigger completed
- 5–7 SQL queries completed
- Sample data entry + partial workflow demo
- Problems faced and plan ahead

You will be evaluated on:

- Technical progress
- Schema correctness
- Soundness of procedural code
- Handling of constraints and relationships

C. Presentation 3 — Final Presentation (Week 13)

Time: 12–15 minutes
Deliverables:

- Full working database system
- Demonstration of:
    - stored procedures (multi-step logic)
    - stored functions (computations)
    - triggers (audit, validation, automation)
    - transactional behavior
    - concurrency considerations
    - indexing
    - complex SQL queries and analytics
- Final documentation
- Q&A with instructor

Evaluation focus:

- Database complexity
- Code quality
- Correctness & performance
- System robustness
- Presentation clarity and division of roles

3. Expectations from a High-Quality Project

- Non-trivial workflows (multi-table, multi-step transactions)
- Trigger logic reflecting real business rules
- Large dataset loading (not 5–10 rows only)
- Performance reasoning (indexing, query plan comparison)
- Clear ER design with proper cardinalities and constraints
- Code modularity and good naming conventions
- Proper error handling and logging
- Clean, functional demo of every requirement