Fidenz Technologies - Advanced Relational Database Design and Optimization | Level 02

Areas Covered	1. Views 2. Transactions 3. Database security 4. Stored procedures 5. Database functions
Duration	**Learning:** 16h (2 Working Days) **Development:** 8h (1 Working Days)

Additional Requirements:

1. Database Views:
    - Create a database view that displays the top-selling products based on the total number of units sold.
    - The view should include the product's ID, name, description, and the total number of units sold.
2. Database Functions:
    - Create a function that calculates the average price of products within a specific category.
    - The function should accept the category ID as a parameter and return the average price.
3. Database Procedures:
    - Create a procedure that generates a monthly sales report.
    - The procedure should calculate the total sales for each month and display the results.
4. Database Optimization:
    - Implement appropriate indexing strategies to improve the performance of queries on the products, customers, and orders tables.
    - Optimize the database schema and query execution plans to minimize resource usage and maximize efficiency.
5. Database Security:
    - Implement user authentication and authorization mechanisms to control access to the database.
    - Define appropriate user roles and permissions to restrict data manipulation operations based on user privileges.
6. Database Transactions:
    - Utilize transactions to ensure the atomicity, consistency, isolation, and durability of database operations.

Your deliverables:

1. Logical Entity-Relationship Diagram (ERD) with crow's foot notation:
    - Create an ERD that represents the entities, relationships, and attributes of the database.
    - Clearly indicate primary keys, foreign keys
2. Relational Schema:
    - Based on your ERD, create a relational schema that includes the tables, their attributes, primary keys, foreign keys and constraints (Physical ER)
    - Specify the data types for each attribute.
3. SQL Statements:
    - Write SQL statements to create the necessary tables with the appropriate data types and constraints.
    - Implement the database views, functions, and procedures according to the given requirements.
    - Include sample data for at least two records in each table.
4. Database Optimization and Security:
    - Provide a detailed explanation of the optimization techniques implemented in your database design.
    - Describe the security measures implemented to ensure data protection and user access control.
5. Database Transactions:
    - Describe the use of transactions to guarantee the atomicity, consistency, isolation, and durability of database operations.

Below things will be taken into consideration when evaluating the assignment:

- Requirement coverage.
- Use of best practices.
- Code quality and style.
- Proper use of available database features and concepts.

Submission Guidelines:

Submit your assignment as a document or PDF file. Include your ERD, relational schema, SQL statements, optimization and security explanations, sample data, encoding techniques, and transaction explanations. Make sure to provide clear and concise explanations, and ensure the readability of your submission.

Note: You can use any relational database management system (RDBMS) of your choice (e.g., MySQL, PostgreSQL, SQL Server) to implement and test your database design.