CEU 07502 Database Programming and Administration- 2024/2025

BENG 22 COE

4th December 2024

Assignment Submission Instructions

1. **Deadline and Submission Method**: Submit the assignment (on individual basis) through the Class Representative (CR) via email by **Friday, 31st January 2025, at 16:00 hrs**. *Late submissions Won't be accepted.*
2. **File Format**: Save file as PDF with your name and registration number, compress them into a single zipped folder, and submit this folder via the CR's email.
3. **Academic Integrity**: Copying from other students is strictly prohibited. Any instances of copying will result in a score of **0%** for the entire assignment.

Failure to follow these instructions will impact your grade

Assignment 04: Course Project (25 Marks)

Objective: This project will test your ability to apply the module's core concepts to a real-world scenario.

Title: Designing, Optimizing, and Securing a Database System

Project Description

You have been hired as a database administrator for a small E-commerce business. The company requires a new database system to handle customer orders, manage inventory, and ensure data security. Your task is to design, implement, and optimize this database system, demonstrating the use of SQL performance tuning, procedural programming (PL-SQL), backup and recovery strategies, database migration techniques, and system integration capabilities.

Project Requirements

1. **Database Design (5 Marks):**
    - Create a relational database schema with at least three tables: *Customers*, *Orders*, and *Products*.
    - Include primary and foreign keys to establish relationships.
2. **SQL Performance Tuning (5 Marks):**
    - Write optimized SQL queries to retrieve the following:
      a) The total sales per customer.
      b) The top three best-selling products.
    - Use indexing and other performance optimization techniques where applicable.

3. **Procedural Programming (5 Marks):**
    - Develop a PL-SQL stored procedure to process an order, including updating product inventory and recording the transaction in the *Orders* table.
    - Include error handling for scenarios such as insufficient stock.
4. **Backup and Recovery (4 Marks):**
    - Demonstrate the creation of a full database backup.
    - Simulate a data loss scenario and restore the database to its previous state.
5. **Database Security (3 Marks):**
    - Create roles and privileges for two types of users: *Admin* and *User*.
    - Ensure that *Admin* can perform all operations, while *User* can only view data and place orders.
6. **Systems Integration (3 Marks):**
    - Write a simple XML or JSON script to share product data (e.g., product ID, name, price, stock) with a third-party inventory system via an API.

Submission Requirements

Each student must submit:

1. SQL scripts for all tasks (schema creation, optimization, procedural logic, backup, and security).
2. A one-page summary explaining their project and key decisions made.
3. Presentation of your final work

Presentation Requirement

Each student must present their final work in a 10-minute session. They should:

1. Explain your assigned scenario and approach to the solution.
2. Demonstrate the database design and schema relationships.
3. Show how SQL queries and procedural logic meet the scenario's requirements.
4. Simulate backup and recovery processes for their database.
5. Present their integration script and describe how it facilitates data sharing.
6. Highlight challenges faced and how they were resolved.

Marking Criteria

- Completeness and functionality of the database design (5 Marks).
- Efficiency and correctness of optimized queries (5 Marks).
- Accuracy and robustness of the PL-SQL procedure (5 Marks).
- Effective implementation of backup and recovery (4 Marks).
- Proper configuration of roles and privileges for security (3 Marks).
- Successful integration via scripting (3 Marks).

**********_All the Best on your Final Exams_**********