COMP508 DATABASE SYSTEM DESIGN

SEMESTER 2, 2024

Paired Assignment

Database Project   **50% of the final grade**

Due: 5:00 pm, 23rd Oct 2024

Part	Tasks	Marks
Part A	Entity Relationship Modelling and Logical Database Design ➢ *Tasks 1 and 2*	35
Part B	Database Implementation ➢ *Tasks 3 and 4*	35
Part C	Construct SQL Queries ➢ *Task 5*	30

1.   Introduction to Assignment Requirements

This assignment is designed to provide students with practical exposure to the stages involved in database development, including the development of entity relationship modelling, database design and implementation. It provides an opportunity for students to apply to a larger case study the database concepts discussed in class and practised in exercises.

A separate document on Canvas: Assignments – 'Case Study for Database Project', describes the case study in detail. Please read the case study carefully. Students may ask for additional clarification of the case study on the discussion board on Canvas.

This is a paired assignment. Pairs of students within the same lab stream should complete tasks together. However, you have the option to work independently with the approval of the Course leader.

The details of the three parts of the assignment and the tasks are specified in Section 2. Section 3 describes the submission details and dates. The marking scheme is in Section 4.

Expectations

The assignment includes 3 parts. Part A consists of Tasks 1 and 2. Part B is comprised of Tasks 3 and 4. Part C has task 5. Students are required to attempt **all the tasks**.

Tools & Templates

You must use **Oracle SQL Developer** and the specified CASE tool, **Visual Paradigm CE** version for this assignment**.**

Plagiarism

Plagiarism means borrowing from the work of another without indicating by referencing that the ideas expressed are not one's own.

Unauthorised Collaboration

Unauthorised collaboration means joint effort between students or students and others in preparing material submitted for assessment, except where this has been pre-approved by the paper programme. Students are encouraged to discuss matters covered in classes, but the expression of ideas and arguments must be the student's work.

ACADEMIC INTEGRITY GUIDELINES

AUT takes Academic Integrity very seriously and you are reminded that t**he following actions may be deemed to constitute a breach of the General Academic Regulations Part 7: Academic Discipline, Section 2 Dishonesty During Assessment or Course of Study**

- 2.1.1 copies from, or inappropriately communicates with another person
- 2.1.3 plagiarises the work of another person without indicating that the work is not the student's own – using the full work or partial work of another person without giving due credit to the original creator of that work
- 2.1.4 collaborates with others in the preparation of material, except where this has been approved as an assessment requirement.
- 2.1.5 resubmits previously submitted work without prior approval of the assessment board
- 2.1.6 using any other unfair means.

ADDITIONAL INFORMATION

- Your assessment responses must be your own work. You may be required to orally defend your responses to assessment questions.

2.   Assignment Parts and Tasks

Part A Entity Relationship Modelling and Logical Database Design (35 marks)

Task 1 Identify Entities & Develop Business Rules   [10 marks]

Identify all entities and relationships in the case study and develop a set of **business rules**. You should follow the syntax given below. Two rules must describe each relationship, one in each direction.

> Each ENTITY_1 *May/Must* Relationship_Verb_Phrase *number* ENTITY_2

Task 2 Construct a logical Entity Relationship Diagram (ERD)   [25 marks]

Based on the business rules developed in Task 1, construct a logical ERD for the case study using the Visual Paradigm tool.

- Identify all attributes in each entity, including all primary and foreign keys (transform any composite and multivalued attributes according to the rules of the relational model).
- Name all relationships (i.e. you must use verb phrases on both sides of each relationship)
- Identify the Cardinality and Participation for each relationship.
- Resolve all many-to-many (M:N) relationships.
- Describe any assumptions you have made in a text note on the diagram.

Please note: You don't need to identify data types in your ERD.

Part B Database Implementation (35 marks)

In this part, you should develop a database based on your logical ERD developed in Part A. You must populate the tables with realistic sample data.

Task 3 Create tables [25 marks]

Create the tables in Oracle.[1] Write SQL scripts defining each table. The table definitions should include

- All attributes with appropriate data types
- All appropriate constraints, such as primary key, foreign keys, and check statements (CHECK constraints).
- All constraints **must** be given names. Naming standards must be used.

Task 4 Populate data [10 marks]

Insert a small sample of realistic test data (5 –10 rows minimum) into each table. All test data must be meaningful to demonstrate your understanding of the data.

After creating all your tables (Task 3) and inserting data (Task 4), run the SQL SELECT statement below:

SELECT table_name FROM user_tables;

The statement will retrieve a list of all tables in your Oracle account (i.e., all tables you created this semester). Include the results of the SELECT statement in your assignment.

You must also include the following for each table in your database:

- SQL table creation script
- SQL insert script (used for inserting sample data)
- Evidence of Sample data - you must run "SELECT * FROM *table_name"* (where *table_name* is the table's name) for each table in Task 3 and include results of SELECT statements for each table.

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[1] You must use Oracle SQL Developer for Parts B and C.

Part C Construct SQL Queries   (30 marks)

Task 5 Construct SQL Queries [30 marks]

Identify **five** data retrieval requirements that would be used by the business described in the case study. Construct a SQL query to display the data for each requirement you have identified. So, you must construct five SQL queries in total. The queries must include a combination of the following SQL features:

- Use of restriction (WHERE clause), Arithmetic expressions, Concatenation of columns
- Use of comparison and logical operators
- Multiple tables join (e.g., Equijoin, Outer Join, and Self-join)
- Group functions (e.g., COUNT, SUM, AVG, MAX, MIN) and clauses (e.g., ORDER BY, GROUP BY, HAVING)

Note:

1. Your queries can combine the above features, which can be spread across the five queries, i.e., not all features need to be present in a single query. The design of each query should demonstrate your knowledge and application of SQL content covered in the course and your understanding of the correct usage of the various features and clauses of SQL. A simple '**select * from table_name**' will fetch you a mark of zero in this task.

2. There should be **no more than one query that involves a single table.**

3. An example of a query is given on the next page.

An example of a query from an Employee database is given below for your reference.[2]

- **Purpose of the query:**

  To search for staff with a specific qualification (e.g. BSc) and retrieve the following details (Staff Number, Staff Name (Concatenation of Last and First names) and their Qualification.

- **SQL SELECT query**

```
SELECT
        staff.staff_no, staff_fname|| ' ' || staff_lname "Staff Name", qual_type Qualification
FROM
        staff, qualification
WHERE
        qual_type = '&Qualification'
AND
        staff.staff_no = qualification.staff_no;
```

- **Output/Result of the query**

  Input for Qualification type variable = "BSC"

Staff No	Staff Name	Qualification
101	John Smith	BSc
212	Mike Bird	BSc
112	Susan Carr	BSc
117	David Cameron	BSc

For Part C, you must include the following (as shown above) for each SQL query statement:

- Description of the purpose of the query.
- SQL SELECT query
- The result of the query

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[2] Please note that this is an example from a different database that is not related to your assignment.

3.   Submission Instructions

You must submit a soft copy of your assignment on Canvas before the specified due date and time.

All Parts: Due Wednesday, 23rd October 2024, 5:00 pm

1. **Submit the following files**:
   - DCT's Group Assignment Cover Sheet (available for download from Canvas. Please also ensure you correctly write your lab tutor's name and tutorial day and time.
   - **A PDF** or **Word file** containing your work for all the Tasks in Parts A, B, and C and your student ID and name written on the document's first page. A JPG/PNG image should be used when capturing your ERD diagram. Use appropriate formatting options (e.g., transparent background, large fonts) to ensure the diagram is clear and readable.
   - **A Visual Paradigm file** containing the ERD for Part A.

   Please ensure that each of these files (the PDF or Word, and VP) is named clearly with the surnames of both members in your group: surname1_surname2.

Please note:

- **Only one submission per group: only one student in the pair should submit.**
- You must also complete a peer evaluation survey as per the details specified on Canvas.

4. Marking Scheme

Task	Marking Criteria	Max Mark
	Part A Entity Relationship Modelling and Logical Database Design	
Part A – Task 1	**Identify Entities & Develop Business Rules** • Cover all the essential requirements from the case study • Uses correct syntax for business rules	10
Part A – Task 2	**Construct a logical Entity Relationship Diagram** • Identify all attributes in each entity, including all primary and foreign keys • Mapping rules applied (any composite and multivalued attributes must be transformed). • Name all relationships using verb phrases • Identify Cardinality and Participation for each relationship. • Resolve all many-to-many (M:N) relationships. • Includes any assumptions, if any.	25
Part A Total		**35**
	Part B Database Implementation	
Part B – Task 3	**Oracle Table Creation Scripts for all tables in the database** • correct identification and definition of all attributes and relationships • includes the correct definition of all primary and foreign key constraints from the ERD • uses consistent naming conventions for all table and attribute names, constraints (constraints are named), and appropriate data types. • List of tables in your account	25
Part B – Task 4	**Oracle Insert Scripts for populating the tables in your database:** • Insert statements along with sample realistic test Data • the results of SELECT statements: you must run "SELECT * FROM *table_name*" (where *table_name* is the table's name) for each table in Task 3 and include the results of SELECT statements for each table.	10
Part B Total		**35**

Part C Construct SQL Queries		

Part C - Task 5	**Construct five SQL Queries:**
	
	Each query
	• Retrieves meaningful information to support the data and transaction requirements of the case study
	• each query is distinct and significantly different from the others
	• includes a description of the purpose of the query
	• Demonstrates knowledge and application of SQL content covered in the course (covers important SQL features, clauses, and functions)
	    a. Use of restriction (WHERE clause), Arithmetic expressions, Concatenation of columns
	    b. Use of comparison and logical operators
	    c. Multiple table joins (e.g. Equijoin, Outer-join, and Self-join)
	    d. Group functions (e.g., COUNT, SUM, AVG, MAX, MIN) and clauses (e.g., ORDER BY, GROUP BY, HAVING)
	• includes results (output rows)
	
	Note:
	• Your queries can combine the above features, which can be spread across the five queries, i.e., not all features need to be present in a single query. The design of each query should demonstrate your understanding of the correct usage of the various features and clauses of SQL.
	• A simple '**select * from table_name**' will fetch a zero mark.
	• There should be **no more than one query that involves a single table**
		30

Part C Total		**30**
Total of Parts A, B, and C		**100**