

Database Fundamental

Project 2024

Weight 40%

Submission Deadline 26 November 2024

Introduction

This project is intended to assess students understanding of database design and implementation including Conceptual data modeling, logical & physical data modeling, Data Definition Language, and Structured Query language.

Students are required to develop a database system for a university office. This should include at a minimum data pertaining to:

- Courses at a variety of academic levels from level 6 – level 10
- Different departments for example School of Computing, School of Business etc.
- Student information both academic and personal
- Results of end of year exams
- Opening times
- Any other information you feel relevant to the university database system

Each relation should contain a minimum of 10 tuples. If you wish you can use a data generation tool like Mackaroo to generate data. (<https://www.mockaroo.com>). However ensure doing this will result in relevant data to the dataset.

Before designing any dataset you must fully read this document to ensure the questions asked can be answered using the relations you create.

Task One - Database Design (40% Total)

Clearly identify all relations to be included in the database.

1. Identify the relevant entities of the university dataset with their respective attributes, entity types (strong or weak) and primary keys. (8 Marks)
2. Clearly explain why each relation needs to be included (8 Marks)
3. Identify the relationships, cardinalities and participation constraints with supporting business rules and assumptions. (8 Marks)
4. Draw conceptual level ER diagram for the system depicting the entities, relationships, cardinalities, participation using your preferred ERD notation. (4 Marks)

5. Convert the entities of conceptual design into logical dataset and draw logical ERD. Use a logical layout of entities which is easily understood by any reader. (4 Marks)
6. Convert the entities of the logical design into physical model and draw physical level ERD. (4 Marks)
7. Convert the physical level ERD into relational model. Ensure that tables are in 3rd Normal Form. (4 Marks)

Task Two – Create & Populate the Database

Use DDL language to:

1. Create the database and all tables specified in the dataset (relational model) to meet the specifications identified in task one. Clearly document all DDL statements used in this process. (10 Marks)
2. Populate all database tables with the desired data to a minimum of 10 tuples per relation. Clearly document all DML statements used in this process (10 Marks)

Ideally this should be done in one full dump SQL statement. If this is done using different statements you may need to put them all together for final submission as the dataset will need to be reproduced by an examiner.

Task Three – Query The Dataset

Use MYSQL statements to query and modify the dataset as follows:

1. Change all students in year one of any course to year two. (2 Marks)
2. Modify the status of any student in year 4 of all courses to indicate that they have now completed the course. (2 Marks)
3. Delete all students who have outstanding fees which have not been paid for more than 6 months. (2 Marks)
4. Display the first name surname and grade of all students sorting the results so the highest grades are first. (2 Marks)
5. Add one new record to each table. (2 Marks)
6. Delete one record from all tables. (2 Marks)
7. Find the total number of days off for all staff, order this by least days off. (2 Marks)
8. Count how many students are doing a business course. (2 Marks)
9. Change the roll of all staff who have a job title Office worker to Administrator. (2 Marks)
10. Change all courses entitled PHD to Doctorial. (2 Marks)
11. Set the delivery method of all courses to online. (2 Marks)
12. Update the opening times of the university to say closed to visitors. (2 Marks)
13. Drop all information contained in the courses relation. (2 Marks)
14. Delete all courses from the database with an academic level of 6 or less. (2 Marks)
15. Set the university phone number to be 01-7654321. (2 Marks)
16. Set the dean of the university to be called Michael Dean. (2 Marks)

17. Show all staff members who have been working there for longer than 4 years. (2 Marks)
18. Show all courses that the university offers which run over 3 semesters and have a minimum of 20 participants per class. (2 Marks)
19. Identify how many students have the word road in their address. (1 Marks)
20. Create a view that will show the result of a query drawing information from three tables at once. (3 marks)

Submission checklist:

1. A pdf/word document containing the answers to each of the above questions. Please add all your answers including descriptions, MySQL Scripts and diagrams (ERD's, report charts or graphs in this file) for each of the questions where applicable.
2. An SQL script file that contains all the SQL statements used for part 2 and part 3. Each answer should have a clear label indicating the question number.

Submission guidelines

Each student must submit a report clearly identifying all processes involved in each of the above. This must include clearly labeled screenshots and a detailed narrative of the steps taken. Included in this report should be your ER Diagram.

A comprehensive list of MySQL statements must be provided in a .sql file

The SQL file must show clearly each statement used with comments explaining which question the statement relates to.

Reports must be to the correct academic standard properly presented and sufficiently referenced.