SCHOOL OF COMPUTING
COMP1350 S2 2024 – Group Assignment
Introduction to Database Design and Management - Database Design Assignment

Due: Sunday 22 September 2024 at 11.55 pm (End of first week of break)
(Worth 20% of your grade, marked out of 100)

Learning Outcomes

Upon successful completion of this assignment, you will be able to meet these learning outcomes of COMP1350.

1. Analyse data requirements and design and develop conceptual database models.
2. Implement system models into databases, design and create simple databases for business information systems and write programs to produce interactive queries.
3. Use data analysis and data modelling techniques and tools for introductory level database design and specification.

Portfolio/Job Applications

The work you produce from this assessment can be added to your Git or your personal collection of work that you could showcase in any database-related job applications in the future.

Case Background

Chocolate Nation is a Belgian chocolate museum that offers opportunities for hands-on events and tasting experiences to an exclusive audience. They are expanding to Australia, and the project manager has enlisted you as a database designer to create a database design (including designing the ERD, transforming, and creating the tables) and run some analysis for the Australian branch. Please note this is a hypothetical scenario, so please do not contact the museum.

Chocolate Nation provides different opportunities for visitors to explore the history of chocolates. There is a wide range of options for visitors to book during their visit to the museum. Every visitor must be registered and identified with a visitor identifier number. Other details of a visitor include the name, date of birth, and email.

Some events happen throughout the year. Every event is uniquely identified. Other details of the event include name, date, time, cost, and capacity. Events can be one-off or recurring. An event will make use of a maximum of one exhibit that the museum owns. A code identifies every exhibit. The details of the exhibit, such as the description and number of items, are stored. An exhibit may be made up of multiple exhibits. When making a booking for an event, the booking date and the number of people the booking is for are recorded as well. Events are run by multiple employees (one supervisor and multiple demonstrators, but at least one).

A visitor can also sign up for a tasting experience. Every experience offered is uniquely identified. Other details of the experience include name, duration, and cost. Experiences are offered every day. To schedule an experience, the visitor must make an appointment with an employee (who is an administrator) for a particular date and time. The appointment by itself doesn't cost anything, and a Zoom meeting ID is sent to the visitor. After the appointment, if the visitors want to proceed with the booking, a reservation for the experience is created. A reservation is made for an experience with three employees (who are all demonstrators) and for a visitor. Other details of the reservation, such as the employee making the reservation, the date of reservation, the experience date, time, the number of people, and the group's different dietary preferences (dairy-free, nut-allergy, etc), are stored. The demonstrators are booked for a certain number of minutes, which is also recorded.

Chocolate Nation records details of their employees, each identified by a unique identifier. Other details captured include the name, address, the department they work for and qualifications. Each employee can have only one direct manager. The department is identified with a unique identifier, and the department name is recorded. An employee (the head of the department) can head only one department, and every department has one employee who is the head of the department.

The products are identified by a unique identifier, and their name and description are recorded. Products can contain multiple ingredients; an ingredient can be used in many products. Each ingredient is identified by a unique identifier alongside the name and allergens. The amount and the unit of measurement of ingredients in every product are recorded as well. Every ingredient is sourced from a single supplier. Suppliers may change, and hence, the history of sourcing must be stored. The date range of the sourcing must be recorded for documentation and food safety reasons. The cost, quantity, and unit of measurement (for example, $5 for one kilo (or) $50 per 250 grams) is also recorded in the sourcing.

Visitors can sign up for one subscription from the range of subscriptions that Chocolate Nation offers. The name and cost of every subscription will be recorded. Every subscription has a set of packages that are ready for visitors to pick up. The identification number for the package is repeated for every subscription it is under. The name of the package is stored. A package is made up of multiple products. A product may belong to multiple packages.

Group Assignment

You are expected to work on this assignment as a group consisting of 4-5 members from the same practical class. The assignment is designed to be worked in a group of 2-3 members, and this means even if you lose group members, you should be complete the task with the rest of the team. You will be required to enrol in the group on iLearn in Week-4 or 5 in your practicals. Failure to do this will mean you will be assigned to random groups which may require you to be in groups with students from other classes.

Task Descriptions

Task 1- ER Diagram (40 marks)

Based on the business rules provided under the case background, you are expected to construct an ER diagram using a Crow's Foot notation. The ER diagram should include entities, attributes, and identifiers. You are also expected to name the relationships among entities and add the cardinality and constraints. You may choose to add attributes to the relationships (if there are any) or create an associative entity, when necessary.

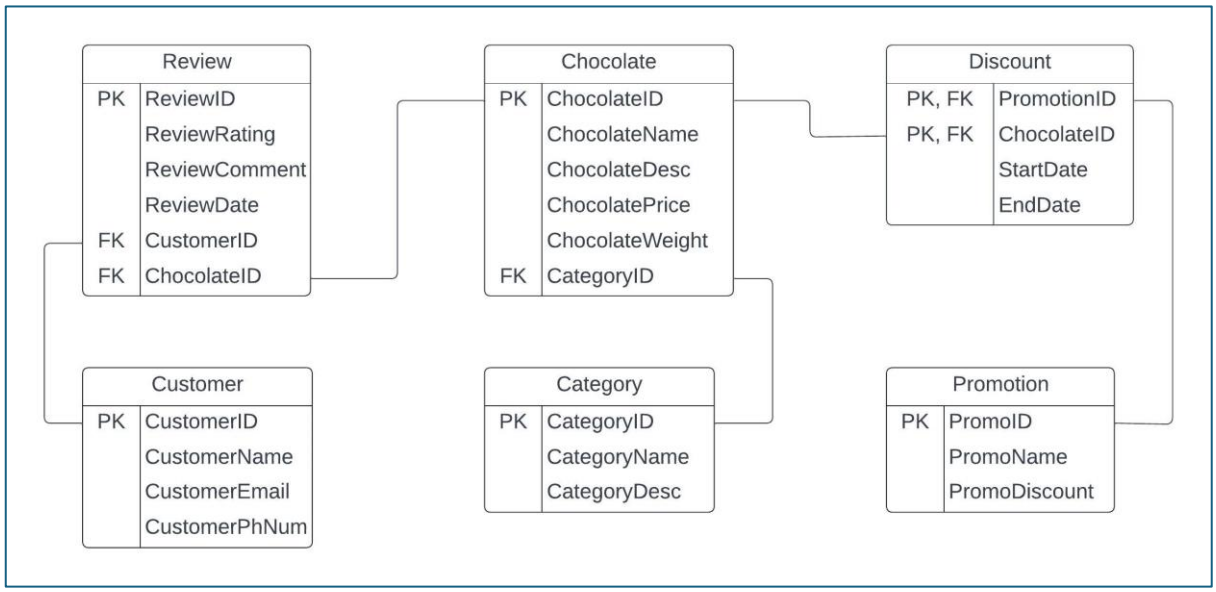
Task 2- Logical Transformation (30 marks)

Based on your ERD from Task 1, perform a logical transformation. You must include a step-by-step transformation and the final list of tables with primary and foreign keys denoted with (PK) and (FK). Please note, that if there are errors in the ER diagram, this will impact your marks in the transformation. However, the correctness of the process will be considered.

Task 3- SQL (30 marks)

One of the database engineers, Mr. Jon Snow, who was working on the database has quit and you have been also tasked with the responsibility of completing the creation of tables, inserting the data, and writing some queries for this task that they were hired to do. The schema for the tables is provided below. The schema represents a part of the online store for Chocolate Nation.

Schema



Question-A (10 marks)

Please download the SQL file provided in the folder and continue to work on it. Add the primary keys, foreign keys, and complete the DDL script including creating any tables that are missing in the script. You will also have to insert at least 5 records in every table. We have provided a sample insert statement for every table that Mr.Snow has already created.

Question-B (20 marks)

Formulate 4 SQL queries corresponding to the above tables and provide both the SQL query and the solution for each of the queries. Each query result should display at least 3 unique results for each of the following types of questions.

- Query 1: A query involving a single table with one condition.
- Query 2: A query involving a single table and two conditions. One of these conditions must use a wild card operator.
- Query 3: A query that joins at least two tables and uses an order by clause.
- Query 4: A query involving a single table with an aggregate and group by function.

What to Submit for the Assignment

- You have to submit across two links.
    - One PDF document (use the template) with all the answers for Task 1 and 2 included submitted using the Turnitin Link (as a group)
    - One SQL file (use the template) with all the answers to Task 3 submitted using the iLearn Link (as a group)
- You can submit many times up until the deadline (so get an early version in just in case). You need to rename the templates provide provided using this format (e.g., ClassNumber_GroupNumber.pdf and ClassNumber_GroupNumber.sql)
- It is your responsibility to make sure you have submitted the correct file. Failure to do so will incur penalties.

What to include in your report (as a PDF)

- To present your answers to these tasks, please use the template provided in the assignment folder (Tasks_1_2_Template.docx). You will need to convert your final work as a PDF before submitting.
- Fill out the details provided on the first page of the template. All group members student IDs and Names should be listed.
- For Task 1, attach the image in the document of the ER model you have created. You can use a tool of your choice to generate the diagram. Digital copies of hand-drawn diagrams will not be accepted.
- For Task 2, write the answers under the right space in the template. Steps must be clear with primary and foreign keys listed explicitly and a final table list provided.
- Assumptions: If you have any assumptions, please list them down in your report. (e.g., about relationships between entities in your ER Model). Please note only make assumptions if something is not clear. Assumptions will only be valid if they are not contradicting something which is given in the case study.
- If your images lack clarity, you will not be given any marks. Tutors can zoom in to check the diagram but should not have to deal with images that are blurry / fuzzy. Whatever is submitted is the final submission. So, please make sure your image is readable.

What to include in the script (.SQL)

- To present your answers to these tasks, please use the template provided in the assignment folder (Task3_Template.sql).
- Write your code in MySQL under the comments provided. This will be executed on MySQLWorkbench during marking. Fill out the details provided at the top in comments of the template. All group members' student IDs and names should be listed.

- Ensure that your script contains SQL code in the order of execution.
- Use proper indentation and spacing to enhance readability.
- Please note that markers may use their own dummy data to verify the operation of the SQL code.

Rubric

Please click on the links of the submission to see the rubric (will be added in by the end of Week-5). For ease, we have also uploaded a PDF file of the rubric in the Assignment folder.