420-921-VA

Teacher: Jaina Sheth

Database

Project Document

Vanier College

June 23, 2022

Read all the instructions carefully.

1 General Instructions

- All students will work in their chosen team. Each team will consist of 2-3 students.
- All team members must be involved throughout the project work, which means all of you should understand and be able to explain all aspects of the project.
- Each student will receive points based on their individual understanding of the project work. It's not necessary that all the team members get the same points.
- This project work must satisfy the expectation of originality.

2 Submission

2.1 Submission Deadlines

Deliverable	**Submission Date and Time**
D1	7th June, Tuesday before 11:59PM
D2	17th June, Friday before 11:59PM
D3	24th June, Friday before 11:59PM

2.2 Submission Instructions

- Before the submission date, you will be able to find respective submission blocks for all the Deliverables under Assignments section of Lea.
- All the deliverables must be submitted by one team member only. Student who submits will need to mention name of his/her team members while submitting, by adding a note to the submission on Lea.
- For **Deliverable 1** of the project, submit a single **.pdf file** named as **Deliverable1.pdf** containing all its components.
- For **Deliverable 2**, create a **.zip file** of the folder named **Deliverable2** containing the SQL scripts.
- For **Deliverable 3**, create a **.zip file** of the folder named **Deliverable3** containing the SQL script and the Project report.
- You must not submit files with extensions such as a **.rar**, **.tz**, **.7z**, **.sql**, **.txt**, **.doc** etc.
- If you submit a file other than what is specified, your submission will not be considered. Also, if you submit multiple files for the same work, only the last submitted work will be considered.

3 Project Deliverables:

1. **Deliverable 1:** Include the following in a word document. Once completed, save the document as **Deliverable1.pdf** and submit under the block created for **Deliverable 1** on Lea.

   (a) **Description:** A brief description of the scenario as per your understanding.

   (b) **Business rules or Assumptions:** List down the business rules you have identified and any reasonable assumptions you have made yourselves for the scenario.

   (c) **Conceptual Design - ERD:** Create an ERD which includes the entities, attributes, keys, connectivity, cardinality and participation constraints.

   (d) **Logical Design - Relational Schema:** Reduce the ERD to relational schema. You can either create a relational schema diagram **or**
   list down the relational schemas(which includes entity name, list of attributes and primary key) of the database along with a table listing down foreign keys, referenced relation and referencing relation.

   (e) **Normalization:** Analyze and identify the functional dependencies for each relation. Show the normalization process and normalize tables for each relation to 3NF (if applicable). List down any updates to Relational Schema you created before.

2. **Deliverable 2:** Include **"DDL_script.sql"** and **"DML_script.sql"** to a folder named **Deliverable2**. Compress this folder(create a **.zip** file) and submit under the block created for **Deliverable 2** on Lea.

   (a) **DDL**: Create a database with tables as per the Relational Schema using DDL statements. Accommodate all possible constraints and list down the ones you were unable to implement. Include all DDL statements in one single script file and save it as **"DDL_script.sql"**. Ideally, this script file, when run, should create the database and tables within the database without any errors.

   (b) **DML**: Using DML statements, populate the tables with reasonable amount of data records. Print content of each table once you finish populating the tables. Include all DML statements used to populate the tables in one single script file and save it as **"DML_script.sql"**. Ideally, this script file, when run, should insert data into tables within the database without any conflicts or errors and display all the records of all the tables.

3. **Deliverable 3:** Include **"Queries_script.sql"** and **"Project_report.pdf"** to a folder named **Deliverable3**. Compress this folder(create a **.zip** file) and submit under the block created for **Deliverable 3** on Lea.

   (a) Create a script file. List at least 10 reasonable query statements (as comments) in English. Add SQL statements to execute these queries and get the results. At least 5 queries among the 10 should be complex queries using system functions, aggregate functions, group by clause, and order by clause. Save this script file as **"Queries_script.sql"**.

   (b) The Project Report should include the following sections:

      i. **Cover page:** Provide the title of the course, the title of the project, name of instructor, names of team members, and date.

      ii. **Table of contents:** Show the contents of the report and their corresponding page number.

      iii. **Introduction:** Provide a brief description of the database project (in general, not specific to the scenario you have selected) and the section organization of this report.

      iv. **Team Work Distribution:** Provide a table listing down the tasks performed throughout the project for each deliverable along with the name of the team member(s) who worked on that specific task. Please refer to the following table for the format and examples.

Tasks	Done by (Name of the Team member(s))
e.g. Writing description D1	abc
e.g. Listing down business rules D1	xyz
e.g. Listing down entities and attributes D1	def
e.g. Verifying list of entities and attributes D1	abc, xyz

      v. **Scenario Description:** Provide a brief description of the scenario you have selected to work on along with the assumptions you have identified and any reasonable assumptions you have made yourselves.

      vi. **Conceptual Design of the Database:** The complete Entity-Relationship (ER) model of your database. Also, make a table listing the entities involved in a relationship along with relationship labels and connectivity. (only the final version after all the revisions)

      vii. **Logical Database Schema:** Give the schema of the database which is re-structured and translated from the ER diagram you achieved from Conceptual Design of the Database. You can either create a relation schema diagram or list down the relation schemas(includes entity name, list of attributes and primary key) of the database along with a table listing down foreign keys, referenced relation and referencing relation. (only the final version after all the revisions)

      viii. **Functional Dependencies and Database Normalization:** List down the identified functional dependencies for each relation you achieved from Logical

Database Schema. Show the normalization process and normalized tables for each relation to 3NF (if applicable). List down any updates to Logical Database Schema. (only the final version after all the revisions)

ix. **Database Tables:** In a tabular format, list the attributes and constraints for each database table in the database. Include screenshots of each database table's first five records.

x. **Challenges and Suggestions for improvements:** Include any challenges faced during the project work. Include any suggestions stating how would you have make the project work better.

xi. **Conclusions and Future Work:** Give a conclusion or your feedback about this project work. Provide a brief description of possible future work.

xii. **References:** List the references or books used for this project.

4 Project Scenario

Car Rental System

- A company named **Car2Go** runs a car rental business and has several locations with different addresses (address includes street/rural route address, city, province, and postal code. Street/rural route address includes street/rural route number, street/rural route name).
- The car options they provide are are classified as subcompacts, compacts, sedans, or luxury. Each car has a particular make, model, year made, and color. Each car has a unique identification number and a unique license plate.
- The cars rented in a particular location may be returned to a different location (can have a different drop off location).
- For every car rented, the company keeps the odometer reading before it is rented and after it is returned. Also, the company rent the car with full tank and records the volume of gas in the tank when the car is returned, but they only indicate if the tank is empty, quarter full, half full, three quarters full, or full.
- The company tracks the date a car was rented and the car was returned.
- A customer can rent only one car at any given time. A customer can request a specific class (say sedan) while renting a car. If the company do not have the requested one in the stock, they may provide a higher-class car, but they will price it at the level the customer requested (as an free upgrade).
- Prices are different for each car class, but all cars in the same class are priced the same. Thus, the prices are based on class of the car and calculated per day.
- The drop-off charge only depends on the class of the rented car, and the duration in days (duration can be calculated from the date it was rented and the date it was returned - minimum value is 1), and promotion of the week (if there is any).
- For the customers, the company keeps record of their first & last name, mailing address, zero or more phone numbers, zero or more email addresses, and the driver's license number (unique license number for each customer). Mailing address has street address, city, province or state, postal code and country. Street address includes street number, street name and apartment/unit number if any. Phone number has country code, area code and local number. Email address has only one string, and no structure is assumed.
- For certain weeks in the year, the company has promotional rentals that are usually 50% of the regular rental price, but may be also of different percentage. The promotions always affect only a single class of car at a time – i.e. when the company has a promotion for subcompacts, during that week they do not have any promotions for compacts, sedans or luxury cars.

5 Points Distribution:

Components	**Weight out of 25**
Project Description, Business rules or Assumption	2
Conceptual Design - ERD	1
Logical Design - Relational Schema	1
Normalization	1
DDL	3
DML	5
Queries	5
Project Report	4.5
Language skills	2.5