



NYU – TANDON SCHOOL OF ENGINEERING
CS-GY 6083 - B, FALL 2023
Principles of Database Systems

Project Part 1: 100 points with 15% weight

In this first part of the project, you will focus on designing a suitable relational schema that can be used to store the data in the system. In the second part of the project, you will then build a web-accessible frontend that will allow users to use the service via their browsers. Both parts of the project need to be done in teams of three students. Note that the second part of the project is built on top of this first part so you cannot skip this project part 1. You will not be allowed to change your team partner in project part 2.

Project Guidelines: In this first part of the project, you will design the relational database (using Oracle Data Modeler) that stores all the data about business cases detailed below. You should use your own database system (preferably MySQL) on your laptop or an internet-accessible server. Following is the business case and a list of steps for this part of the project. Note that in this first part, you will only deal with the database side of this project - a suitable web interface will be designed in the second project.

Business Case:

WOW (World on Wheels) is a car rental company. WOW has many locations at various airports, towns, and cities in the United States. With growth of the business and to efficiently manage its business, WOW intends to convert its file system base data management to sophisticated centralized database system. The business team of WOW has provided the following details and rules about the business.

- a) Each office location of WOW maintains various classes of rental vehicles. Each vehicle is identified by Make, Model, Year, VIN (Vehicle Identification Number), and License Plate number.

- b) Each location has various classes of vehicle such as small car, mid-size car, luxury car, SUV, Premium SUV, Mini Van, Station Wagon etc. Each class has its own rental rate per day of the rental service and fees for over mileage. (if rental service exceeds odometer limits/day). For example, a rental car service of a mid-size car has daily rate of service as \$40/day and over mileage fees as \$2/mile. If a customer has rental service for 2 days, and odometer limit of 500 miles/day. So rental service has a limitation of a total of 1000 miles. If this rental service has used 1050 miles, then customer will be charged as $2\text{days} \times \$40 + \2×50 extra miles, totaling to \$180.
- c) WOW has customers of types of Individual or Corporate. WOW maintains a list of their customers with Customer's Full Address, Email address, and Phone number. WOW keeps only one address of each customer.
- d) For Individual customer WOW stores Customer Full Name, Driver License Number, Insurance Company Name and Insurance Policy Number. At present, WOW does not provide vehicle insurance to their customers for car rental service and customers need to bring his/her own insurance.
- e) For Corporate customers, WOW maintains details of Name and Registration number of the corporation, and Employee ID of the customer who rents the car on a corporate account.
- f) WOW occasionally mails discount coupons to their customers and also mails such discount coupons to neighborhood residents. WOW provides discounts to their individual customers who bring in such a coupon at the time of renting a vehicle. Such discount coupons carry validity dates and percentage of discount offered, for example 5% discount valid from 10/01/2020 to 10/31/2020.
- g) WOW provides discounts to corporate customers on fixed corporate discount set for affiliated corporate companies and that discount differs from corporation to corporation. Such discount is offered to corporate customers irrespective of date of rental service.
- h) WOW provides only one type of discount (individual discount coupon or corporate discount) at a time for the rental service and does not allow both discounts for the same rental service.
- i) For each rental service, WOW records Pickup Location, Drop off Location, Pickup Date, Drop off Date, Start Odometer, End Odometer, Daily Odometer Limit for the rental service. Some rental services have unlimited mileage options.
- j) For each rental service provided, WOW raises(generates) an invoice with Invoice Date, and Invoice Amount when the vehicle is returned. You will need to create a database trigger to calculate invoice amount when vehicle is returned.
- k) WOW allows customers to pay an invoice using multiple methods (credit/debit/gift card) and stores multiple records for each payment made against an invoice, WOW stores Payment Date, Payment Method, and Card Number for each payment.
- l) For each rental office location, WOW keeps records of its Full Address, and Phone Number

For this business requirements, identify appropriate entities relationship among entities, attributes of each entity and their datatype- size-constraints. Design and implement a centralized relational database system that collects relevant data for WOW.

Submission:

Submit the following deliverables towards project part 1 assignment.

- a) Create a logical E-R model for database schema with appropriate relationships amongst them. **Submit screenshot.**
- b) Create a relational model, depicting all entities, attributes (name, type, size, and mandatory/optional, primary key), relationships (foreign keys). **Submit screenshot.**
- c) State assumptions (if any) you have made other than stated in business case.
- d) DDL code, as generated from the relational model. **Submit DDL code.**
- e) Trigger code for generating invoice. **Submit Trigger code.**
- f) Apply necessary CHECK constraints to apply defined business rules to enforce data consistency. **Submit CHECK constraints DDL code.**
- g) Populate meaningful sample data for all entities (10 to 15 records for parent tables, 20 to 25 records for child tables). **Submit DML code.**
- h) List total number of records populated for each entity (just record counts, not full data set). **Submit COUNT (*) query and result for each table.**
- i) Write data dictionary queries that detail all tables, columns-datatype-size-mandatory/optional, constraints, and attribute comments of schema objects. **Submit data dictionary queries and screenshots of their corresponding results.**

Your submission should be a single PDF document (Times New Roman fonts, 12pts, single spacing) with all screenshots inserted within in. On the cover page clearly state course, section, submission date, student names and Ids on title page. Only one of the team members need to submit. There should be a table of content page after the cover page. This project document must be submitted to Brightspace class assignment section only. Any email submission will be rejected.

===== END OF THE PROJECT PART 1 DOCUMENT =====