CSI 3450: Database Design and Implementation

Project

Fall 2017

Due Date: 12/02/2017 (11:59 PM)

The main objective of this project is to provide a realistic experience in the conceptual design, logical design, implementation, operation, and maintenance of a relational database and associated applications. A real project of this sort would require a substantial development team working for several months (or more), which of course is not available with us. So, I have set up the minimum requirement based on which the grading will be performed. You must be able to complete the minimum requirement specified for full grade consideration. However, I strongly encourage you to go beyond this and such effort will be rewarded accordingly with extra points (maximum of 50 points, and will be relative based on other group performance).

Project Group Formation:

This project should be completed in group of maximum 3 students. There is no minimum bound, but I would suggest you to do in group. If any group consists of more than 4 students, then the project for that group will not be considered and a score of 0 will be awarded.

Project Description:

You are going to design a database for a Regal Airways (our arbitrary airlines company). Regal Airways is an international airline company, with flights operating in several hundred countries and serving billions of customers each year. The airline company has several types of aircrafts, each with with different capacity, mileage, routing range, different travel classes (like economy class, premium economy class business class, first class, family class), different types of services (like WiFi, battery charger and include some more services of your choice) and price. Being an international company, it has several branches all over the world, offering domestic as well as international flights. It also offers several discount schemes for its member customers, for children and people with disabilities. Furthermore, different aircraft will have different number of crew members (like air hostess, pilots, security personnel especially for international flights). Due to the quality of services offered by the airlines has received number of prestigious awards in the past.

Following are some business rules that needs to be considered in the design:

- Customers:
    - Customers are welcomed to the flight based upon flight availability.
    - All customers are required to submit valid contact details.
    - All customers must reserve a flight to travel. No on the gate sales are available.
    - Customers can buy tickets only at sales counter.
    - Full payments are necessary in-order to confirm a booking.
    - There can be several discounts schemes which can be claimed by customers & is given upon proper alignment with discount descriptions.
    - Customers must be penalized for cancellation.
        - How much charges they have to pay, depends when they are canceling the flights.

        - If it's before 10 hour of flight they need to pay 10% of sales and if it's within 10 hour of flight – 33.33% will be deducted from actual sales amount.
        - Customers can demand the cancellation & 100% refund of flight is cancelled due to technical reason, bad weather.
    - All customers are allowed up to 5 KG cargo free with each ticket.
    - Exceeding 5 KG causes the additional fees.
    - Each customer is eligible for $20,000 life insurance.
    - Wheel chairs & oxygen is available for special passengers.

- Employees
    - All employees must be dressed according to company dress code with an ID card, easily visible to guests.
    - Employees are expected to be presence on their seat within duty hours.
    - All employees are assigned to serve client based on first come first services.
    - Employees are hereby responsible for serving customers first, second their own jobs.
    - Employees are not allowed to take flight reservations within 10 hour of flight.

- There are different types of transactions takes place in Real Airways on day to day basis. These transactions include flight reservation, flight cancellation, passenger information, membership, schedule publishing and flight payments.
    - Customer should be able to make following transactions
        - Make new reservation
            - One-way
            - Round way
            - Multi way
        - Cancel an existing reservation
        - View the itinerary
        - Enroll for membership
        - Make payment via cash/debit/credit
    - Employee should be able to perform:
        - Reporting:
            - Get all customers who have seats reserved on a given flight.
            - Get all the details about the crew members on that flight.
            - Get all flights for a given airport.
            - View flight rooster, schedule.
            - Get all flights whose arrival and departure times are on time/delayed.
            - Calculate total sales for a given flight.
        - Administrative
            - Add/Delete a flight
            - Add a new airport
            - Update fare for flights
            - Update crew members for the flight

- Update departure/arrival time for the flight

- Any missing or relevant data can be assumed by the student in the design. However, all such assumptions have to be clearly specified.

Project Task:

There are several steps to this project. Although it is inevitable that you will need to go back and change things as you move along, it is desirable to do a very good job at each step in order to reduce the amount of work that winds up being re-done. Here is a set of stages to follow:

- ER design: Construct a good, complete ER design for the enterprise. Note that a good ER design includes careful choice of what things are entity sets and which are relationship sets, proper placement of attributes, use of generalization/specialization where appropriate, etc. A common error is to think relationally and then reverse-engineer the ER design. That approach often leads to hidden relationship sets encoded in common attributes between entity sets. Foreign keys are a relational concept; they are not a feature of ER designs. As you make decisions, include notes explaining the assumptions you made about the enterprise leading to those decisions. That will help you when you go back and reconsider your design. You also need to turn in some of those notes with your diagram to help me understand how you view this enterprise. There are many ER notations in use. I ask that you use the version which we have been practicing throughout the semester.
- Relational schema: The text gives a set of rules for generating a relational schema, including primary key and foreign-key constraints, directly from the ER design. There may be some data dependencies that were not captured in the ER design that may lead to some further normalization. Check for this, but for a good ER design there won't be many, if any. Once you have a conceptual version of your relational database schema, you need to generate a SQL DDL version of it. That means deciding on reasonable datatypes and getting the syntactic details of SQL right.
- Data generation and population of relations: You need to put data into your tables. Include enough data to make answers to your queries interesting and nontrivial for test purposes, but there is no need to create huge databases. To avoid a typing marathon for data generation, write a program to generate test data, or use data that you can find on the web.
- User Interface:
    - These interfaces can be built as
        - Web applications using Java applets or a scripting language.
        - A standalone Java application using Swing to create a GUI
        - Other GUI development tools you may know (but be sure they are platform independent, see note below)
        - Since this course is not a GUI course, I don't expect fancy GUI. But you must come up with simple Java program (as a interface) for user to write query.

Submission:

You have to submit:

- a complete <u>detailed</u> report for the project.
    - Project should include explanation of the code as well.

    - ER diagram
    - All your assumptions
- Source codes
    - Read me file
    - Code to populate the database
    - Code to insert data
    - Source code
- A presentation slide

You need to arrange time with TA to demonstrate the project and he will ensure that each of your project is running. It is your responsibilities to make an appropriate time with the TA after the due date (but within 7 days after the due date). So please do not wait for the last day to submit. The TA may be busy with other groups and he may not give you schedule, if he is extremely occupied. In that case, you will be graded 0 for the presentation and project demonstration part.

Marking schemes:

- User interface: 20 points
- ER design: 20 points
- Relational schemas: 10 points
- Data creations: 10 points
- Presentation + VIVA: 10 points
- Demonstration: 10 points
- Final report: 20 points

My suggestions:

- Start the work from day 1.
- When you go for final demonstration, TA may ask any questions to any members from the group. So, all the group member MUST know everything about the project.
- Populate the database. Failure to do so may lead TA to assume that your code is not working.

Remember:

- There will be no extension on due date.
- We (me and your TA) reserve the right to give extra points for exceptional solutions to parts of the project. We also reserve the right to deduct points in the unlikely event that we identify problems not covered by the items above.