UTD
CS 6360.003 Database Design
Database Project Description

Team Structure:

The project is a team project for students to learn how to become an effective team player in a software project. Each team may have 4-5 students (not 1, 2 or 3 and not 6), and one student dedicates as the team leader. Each team member must contribute to all project deliverables.

Database Management System:

You are allowed to use any DBMS that is free and available to you such as MySQl, and a database connector such as JDBC to connect your Java (or any other language) front end application to your MySQL database.

Project Narrative:

Consider an ONLINE_AUCTION database system in which members (buyers and sellers) participate in the sale of items. The data requirements for this system are summarized as follows:

- The online site has members, each of whom is identified by a unique member number and is described by an e-mail address, name, password, home address, and phone number.
- A member may be a buyer or a seller. A buyer has a shipping address recorded in the database. A seller has a bank account number and routing number recorded in the database.
- Items are placed by a seller for sale and are identified by a unique item number assigned by the system. Items are also described by an item title, a description, starting bid price, bidding increment, the start date of the auction, and the end date of the auction.
- Items are also categorized based on a fixed classification hierarchy (for example, a modem may be classified as COMPUTER→HARDWARE→MODEM).
- Buyers make bids for items they are interested in. Bid price and time of bid is recorded. The bidder at the end of the auction with the highest bid price is declared the winner and a transaction between buyer and seller may then proceed.
- The buyer and seller may record feedback regarding their completed transactions. Feedback contains a rating of the other party participating in the transaction (1-10) and a comment.

Functional Requirements:

An initial of set of functional requirements for the Online Auction database system are listed below, you should think of and write all other needed functional requirements for this project to be complete and practical.

Login Functional Requirements:

FR1. System will allow the user to login.
FR2. System will verify the username and password.
FR3. System will not allow user to login with invalid username or password.
FR4. System will be able to remember username and password.
FR5. System will allow users to create account.
FR6. System will enable users to logout of their accounts

FR7. System should allow sellers to have accounts where they will receive the customer orders and respond to them.

Browsing Functional Requirements:
FR8. System will allow user to search products that are available for auction and shall display the result.
FR9. System will allow the bidder to bid on desired product.
FR10. System will allow users to post the ad for product they want to sell.
FR11. System will allow users view their active bids (that are in progress).
FR12. System will allow user to view their expired bids.
FR13. System will allow the user to view their purchase history.

Administrator Functional requirements
F14. Admin can view all the products.
F15. Admin can control, delete and search any product.
F16. Admin can view the feedbacks sent from users.
F17. Admin can add categories in the database.
F18. Admin can view all the users
F19. Admin has the right to delete any users in case of violations of the website policies.
F20. Admin can view the contact messages.

Assumptions

In doing your project, you will need to make additional assumptions as well as identify the potential inconsistencies and resolve them. Any reasonable assumptions are fine, but they must be documented in your reports.

Project Phases

Phase 1 (Due on 09/10/2021): Requirements Analysis (15%)
A system requirement specifications is due that includes:

a) System description
b) Context diagram (system architecture)
c) Functional requirements (user's operational concepts)
d) Non-functional requirements (e.g., response time, maintainability)
e) Interface requirements

Phase 2 (Due on 10/08/2021): Conceptual and Logical Database Design (15%)
The following document are due for this phase

a) ER Diagram (including the description of the entities, attributes, keys, cardinality, and participation constraints)
b) Database Schema
c) List of business rules and integrity constraints of the database (optional)
d) Specify a set of functional dependencies for each relation presented then show the normalization process and normalized tables for each relation to 3NF (if applicable).

Phase 3: (Due on 10/29/2021) Database Implementation and Testing (25%)

The following tasks and document are due for this phase

a) Show the implementation of tables in the target DBMS (snapshots of tables in DBMS)
b) SQL statements for database construction and data population
c) Identify the functional dependencies of the database schema
d) Implementation and demonstration of the database system (snapshots of GUI)
e) Suggestions on database tuning in terms of index structures, database design, or queries. (optional)
f) Additional queries and views (snapshots of query and view implementations)

Phase 4. (Due on 11/19/2021) Front end application (25%)

The last part of this assignment is to write an application that users can use to communicate with your database. This application should be written in a programming language of your choice (such as Java) that uses a DB connecter (such as JDBC) to connect to your database to manipulate the proper data.

Your application program should consist of a continuous loop in which:

a) A list of alternative options is offered to the user.
b) The user selects an alternative.
c) The system prompts the user for appropriate input values.
d) The system accesses the database to perform the appropriate queries and/or modifications.
e) Data or an appropriate acknowledgment is returned to the user.

Both input and output in the application should be in a format more convenient and pleasing than raw interactive SQL. Please include some interesting queries or modifications, i.e., operations that require some of the more complex SQL constructs such as subqueries, aggregates, set operators, etc. As a general example, if your database is a campus applicant database, then your interface might include in its menu several useful queries on the database, with some queries performing statistical analysis requiring multiple levels of grouping, and other queries.

Note: Just demonstrate this application to the grader during the final demo.

Final Complete Project Demo: (Due: TBA) (10%)

Final Complete Project Report (10%) Due on 12/03/2021

The Contents of the Final Project Report

The project report should include, but not limit to the following sections:

1. **Cover page**
   Provide the title of the course, the title of the project, name of instructor, names of team members, and date.
2. **Table of contents**
   Show the contents of the report and their corresponding page number.
3. **Introduction**
   Provide a brief description of the project and the section organization of this report.
4. **System Requirements**
   Give the context diagram (system architecture diagram) of the database system.
   List the interface requirements of the system (or each subsystem).
   List the functional and non-functional requirements of the database system.

5. **Conceptual Design of the Database**
   The complete Entity-Relationship (ER) model of your database.
   The data dictionary and business rules (i.e., constraints) of your ER model.

6. **Logical Database Schema**
   Give the schema of the database which is restructured and translated from the ER diagram presented in the section "Conceptual Design of the Database". Show the schema with appropriate referential constraints. Give the SQL statements used to construct the schema. List the expected database operations and estimated data volumes.

7. **Functional Dependencies and Database Normalization**
   Identify and analyze the functional dependencies for each relation presented in the section "Logical Database Schema".
   Show the normalization process and normalized tables for each relation to 3NF (if applicable).
   Give the SQL statements for constructing the normalized table (if applicable).

8. **The Database System**
   Give a brief description about how to install and invoke your system.
   Provide the "screen dumps" showing how to use your system step by step.

9. **Suggestions on Database Tuning (optional)**
   Give the suggestions on tuning your database in terms of index structures, database design, and/or queries.

10. **Additional Queries and Views**
    Define at least **3 complex queries and/or 2 views**. In the queries and views, you must demonstrate the uses of aggregate operators, group by clause, order by clause , and nest queries.
    Show the SQL statement for each of the defined queries and views, and its corresponding execution results.

11. **User application interface**: describe how you build the system user interface and how users use your system. Give a list of functions that are offered by your system to the users. Explain how the functions are implemented in SQL.

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

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

14. **Appendix**
    An appendix gives the zip file containing the work products (including demo slides, final report, SQL scripts, and source code of the project).
    The zip file must have the following directories for all the teams:
    /doc (contain all documents and presentation slides)
    /project (contain all source code, test code, data, web pages, SQL scripts, library, and executable files)
    a README file (describing how to install and use your program)