UTD- Spring 2023
CS 4347-501 Database Systems
Database Project Description

Team Structure:

The project is a team project for students to learn how to become effective team players in a software project. Each team may have 3-5 students, and one student dedicates to the team leader. Each team member must contribute to all project deliverables.

Database Management System (DBMS)

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:

Hospital Data Management

Hospitals have unique data requirements. Not only do they have to maintain the medical records of their patients, but they also have to manage their staff and its multiple departments. You can solve the data-related problems of hospitals by creating a DBMS solution.

First, you should assign unique IDs to the patients and store the relevant information under the same. You'll have to add the patient's name, personal details, contact number, disease name, and the treatment the patient is going through. You'll also have to mention under which hospital department the patient is (such as cardiac, gastro, etc.).

After that, you should add information about the hospital's doctors. A doctor can treat multiple patients, and he/she would have a unique ID as well. Doctors would also be classified into different departments.

Patients would get admitted into rooms, so you'll need to add that information to your database too. Apart from that, there would be distinct rooms (ICUs and Operation Theaters) in the hospital. Then, you'd have to add the information of ward boys and nurses working in the hospital and assigned to different rooms.

You can start with a small hospital and expand it as you move on. Make sure that the data is easily understandable and accessible.

Also, the hospitals have a lot of information with them such as the patient's history, pharmacy, test results, number of beds, information about the helping staff, etc. All this data needs to be managed as they are crucial to the hospital's operations and helps in its smooth functioning. This database management helps in routine or emergency visits as well.

Important Note:

The above-provided descriptions of **Hospital Data Management are** not complete. Hence, it is up to each team to complete such description ns and build a somehow realistic system. In other words, this is an open-ended project, each team must be creative in developing a useful and practical system.

Functional Requirements:

An initial set of functional requirements for **Hospital Data Management** are listed below, you shouldthink of and write all other needed functional requirements for this project to be complete and practical.

Login Functional Requirements:

This is an initial set of login functional requirements; you may add more as needed.

1: The system will allow the user to log in.
2. The system will verify the username and password.
3. The system will not allow the user to log in with an invalid username or password.
4. The system will be able to remember usernames and passwords.
5. The system will allow users to create accounts.
6. The system will enable users to log out of their accounts

Browsing Functional Requirements:

You should provide at least 10 browsing functional requirements for the Hospital Data Management

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Administrator Functional requirements

You should provide at least 10 administration functional requirements for Hospital Data Management

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Project Phases and Deliverables Items

Phase 1 (Due on Sunday 02/05/2023): Requirements Analysis (20%)

System requirement specifications are due that include:

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

Phase 2 (Due on Sunday 03/05/2023): Conceptual and Logical Database Design (20%)

The following document is 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.
d) Interface requirements

Phase 3: (Due on Sunday 04/02/2023) Normalization and Database Implementation andTesting (20%)

The following tasks and documents are due for this phase

a) 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).
b) Show the implementation of tables in the target DBMS (snapshots of tables in DBMS)
c) SQL statements for database construction and data population
d) Additional queries and views (snapshots of query and view implementations)

Phase 4. (Project Demo: Select a time slot (20 minutes) from Monday 04/24/2023 -Wednesday 04/26/2023) Front-end application (20%)

For this phase, just demonstrate this application to the TA during the final demo.

The last part of this assignment is to write an application that users can use tocommunicate 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

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

a) A list of at least five alternative options is offered to the user. (An additionalalternative should be quit.)
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 pleasingthan 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, andother queries.

Phase 5: Final Complete Project Report (Due: Monday 05/01/2023) (20%)

Submit a well-written and complete report that includes the work that you have done in all theprevious phases (one through four), The Contents of the Final Project Report should include, but not be limited to the following sections:

1. **Cover page**
   Provide the title of the course, the title of the project, the name of the instructor, the names ofteam members, and the 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 withappropriate referential constraints. Give the SQL statements used to construct the schema. Listthe 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 of 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 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 nestqueries.
    Show the SQL statement for each of the defined queries and views, and its correspondingexecution results.
11. **User application interface**: describe how you build the system user interface and how usersuse your system. Give a list of functions that are offered by your system to the users. Explainhow 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, finalreport, 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, andexecutable files)

a README file (describing how to install and use your program)