University of Ottawa

Faculty of Engineering
School of Electrical Engineering and Computer Science

Course Project

Course CSI2132	Databases I
Academic year	2022-23
Semester	Winter
Instructor	Wail Mardini
Prepared by	Verena Kantere
Announced	10.02.2023
Submission of 1st deliverable	06.03.2023
Submission of 2nd deliverable	07.04.2023

Groups of 2-3 students may submit common project deliverables.

e-Hotels

Five of the most well-known hotel chains, with hotels in more than 14 different locations in North America, have decided to collaborate and develop an application that will allow their customers to easily book rooms in their hotels, seeing room availability in real time. You are requested to develop the application that allows the above.

For every hotel chain we need to know the address of its central offices, the number of its hotels, contact email addresses and phone numbers. The hotels of hotel chains are categorized (e.g. 1-star up to 5-star). For each hotel we need to know the number of rooms, the address of the hotel and contact email and phone numbers for this hotel. For the rooms in a hotel, we need to know their price, all amenities (e.g. TV, air condition, fridge etc), the capacity of the room (e.g. single, double etc), if they have sea view or mountain view, if they can be extended (e.g. adding one more bed) and if there are any problems/damages in the room. For customers we need to store their full name, address and SSN/SIN, the date of their registration into our system. For employees of the hotels, we need to store their full name, address and SSN/SIN. The employees may have various roles/positions in a hotel. Every hotel needs to have a manager. The customers can search for and book rooms through the online application for specific dates. When they check-in the hotel, their room booking is transformed to renting and they can also pay for this renting. The employee that does the check-in for a customer is responsible for

transforming the room booking to renting. A customer may present physically at a hotel without a booking and directly ask for a room. In this case the employee at the hotel can do the renting of the room right away without prior booking. We need to store in the database the history of both bookings and rentings (archives), but we do not need to store the history of payments. Information about an old (archived) room booking/renting must exist in the database, even if information about the room itself does not exist in the database anymore. We should be able to delete from our database hotel chains, hotels and rooms. We cannot have in the database information about a room without having in the database the information about the corresponding hotel (i.e. the hotel in which the room belongs too). In the same way, we cannot have in the database information about a hotel without having in the database the information about the corresponding hotel chain (i.e. the hotel chain in which the hotel belongs too).

You are requested to do the following:
1. (10%) Create the ER diagram that corresponds to the above description.
2. (8%) Create the relational database schema that corresponds to your ER diagram.
3. (7%) Define the necessary constraints that will ensure the correctness of the database to be created according to your relational database schema. These are primary keys, referential integrity constraints, domain constraints and user-defined constraints.
4. (10%) Implement the database according to your relational database schema and the constraints that you have defined.
5. (5%) Insert in your database data for each one of the 5 hotel chains. Each one of them has at least 8 hotels, which belong to at least 3 categories. Two of the hotels at least should be in the same area. Each hotel should have at least 5 rooms of different capacity.
6. (10%) Create the necessary SQL modifications (use queries and triggers): Your database should allow insert, delete and update operations of data in your database according to the referential integrity constraints that you have defined. Give the SQL code for at least 4 queries and 2 triggers of your choice in your report.
7. (10%) Implement at least three indexes on the relations of your database and justify why you have chosen these indexes: explain what type of queries and data updates you are expecting on your database and how these indexes are useful to accelerate querying of the database.
8. (30%) Design and implement an appropriate User Interface, through which a user will be able to see the available rooms by giving different, multiple and combinations of criteria in order to choose the room that he/she is interested in and book it or rent it. These criteria should be: the dates (start, end) of booking or renting, the room capacity, the area, the hotel chain, the category of the hotel, the total number of rooms in the hotel, the price of the rooms. The user should be able to see the available choices when he/she changes the value of any of these criteria. The User Interface should allow the insert/delete/update of all information related to customers, employees, hotels and rooms. The user can be either a customer (who will use the interface in order to search for rooms and do bookings) or a hotel employee (who will use the interface to either turn a booking to renting when a customer checks in the hotel, or do directly a renting when a customer presents physically to the hotel). An employee should be able to insert a customer payment for a renting through the interface. The User Interface should be user friendly, meaning that the user is not required to know SQL. All information should be presented to the user through appropriately designed forms. Whenever necessary you should use appropriate elements, like drop-down lists, radio buttons etc.
   Note: If you decide not to implement the User Interface as described above, but you implement directly on the DBMS the described modifications and queries, you will still receive 40% of the grade of this requirement, i.e. 12% of the total grade of the project instead of 30%.
9. (10%) The user should be able to see also two specific Views. You have to implement the views as SQL views. View 1: the first view is the number of available rooms per area. View 2: the second view is the capacity of all the rooms of a specific hotel.

DELIVERABLES

1ˢᵗ Deliverable
Please submit a report that includes your answers to requirements 1-3 of the above list. Thus, your report should include the following:
1. The ER diagram. Please include a brief justification.
2. The relational database schema. Please include a brief justification.
3. The constraints that you have defined. Please include a brief justification for each constraint.

2ⁿᵈ Deliverable
Please submit a .zip file that includes the following:
1. A report that includes the following:
    a. The DBMS and the programming languages that you have used in your implementation of the application.
    b. Specific steps to guide someone to install your applications
    c. A list with the DDLs that create your database
2. Your SQL code that supports all the functionalities in your application
3. All the code that is necessary for running your application
4. A recorded presentation.

For the development of your application we suggest that you use the following: PostgreSQL/MySQL for the implementation of the database, Apache Tomcat for client-server communication, PHP or Java for the server side of the application and HTML for the client side of the application. Nevertheless, you are allowed to choose other technologies, too.

Please upload your deliverables in the course page by the dates given at the beginning of this document. Each group will be required to record a presentation of 20-30 minutes. please note that a more detailed requirement for the presentations will be announced a few weeks before the second deliverable.