COMP3350 – Advanced Database

Assignment 1 – Database Design & Implementation

Trimester 2, 2024

Due Date June 13 (Thursday) at 5pm

Assignment 1 is due June 13 (Thursday) at 5pm. Each team will
- upload the assignment to Canvas by June 6 at 5pm,
- demonstrate the assignment to the tutor in the lab session on June 14.

Weighting

25% of course mark

Assignment Team

You need to attempt the assignment in a group of 3 members. Find fellow students in your tutorial group and enroll into a group via Canvas on or before May 17 5pm. Student who have not enrolled by May 17 5pm will be randomly assigned by lecturer to a group.

This assignment has 5 sections to it. Progress in each part for the group is monitored during tutorials. Note that all SQL scripts and code created in this assignment needs to be commented for readability (Marks will be deducted for uncommented, illegible code).

Assignment Background

LeisureAustralasia group operates a number of hotels and resorts throughout Australia (Brisbane, Cairns, Newcastle, Broome and Darwin) and Asia (Vietnam, Singapore, Thailand, Sri Lanka and India). They have had a number of IT systems that each hotel managed. Recently, the group has decided to invest in an integrated web-enabled central IT system to service all LeisureAustralasia's hotels and will be hosted on the cloud.

You are working for an IT company that has won the contract to supply this system. Your job is to design and implement the central database for hotel bookings, reservations and billing.

LeisureAustralasia group has a number of hotels and resorts that it manages. Each hotel has a hotel id (which is unique), name, address, country, phone number and a description.

Each hotel has facilities such as rooms, conference venues, swimming pools, gyms, restaurants, etc. Each facility has a unique facility id, name, description and status. The facilities are categorized to Facility types (e.g. standard room, family room, conference hall, swimming pool etc.). Each facility type has an id (unique), name, description and capacity.

Each hotel provides a number of services. For instance, Food & Meals, Accommodation, Event venues, Gym, Laundry, Entertainment, Site-Seeing Tours, Taxis, etc. Each service category has a unique code, name, description and type of service.

All services offered by the hotel and resort (called service items) needs to be maintained. Each service has an id (unique), name, description, restrictions, notes, comments, status, available times, base cost, base currency and capacity. Service items may use certain facility types in the hotel to offer the service. For instance, a buffet lunch is a service item offered at a restaurant (i.e. facility) in the hotel. The base cost is cost to the hotel to provide the service item and is determine to calculate profit/loss. The base currency is the currency used for the base cost. For instance, a room in Australian hotel will have a base currency is AUD while a room in an Indian hotel has a base currency in INR.

The services of the hotel is offered to guests as individual services or may be packaged as needed. There are a number of standard packages. For instance, a standard half-board package consists of a standard room for a single person per night with breakfast meal included. The marketing department of the group or front-office manager of the hotel can create customized promotions or holiday packages. For instance, a package deal may consist of "*a 7 night stay at Hotel Paradise for two in a standard room with breakfast and dinner meals provided for the cost of $999/-*".

Services and packages offered by the hotel are advertised. Advertised service/packages has an advertised price. The advertised price for the service may be seasonal. Therefore, each advertised service/package has an advertised price with a start date and an end date when the advertised price is valid and an employee that authorizes the advertised service/package.

Each advertised service/package has an id (unique), a name, description, one or more service items, a start date and end date when the package is offered, advertised price, advertised currency, inclusions, exclusions, status, grace period and employee authorizing the advertised service/package. Grace period in days is the time until which a service/package can be cancelled without any charge.

Customers can make a reservation for services/packages advertised by the hotel via online, phone or in person. A reservation has a reservation number (unique), a customer making the reservation, a list of all advertised services/packages booked under the reservation and payment information for the reservation. A 25% deposit is charged at time of reservation to the customer's credit or debit card.

For each package/service booked under the reservation, you need to keep track of the advertised service/package which the booking is coming under, quantity booked, start date, end date of the booking, facilities reserved for the booking (such as rooms etc.) and their start date/time and end date/time and guest details (name, address, contact number).

Guests once checked in may use other services (not under the booking) and charge them under the booking. For example, guests may order a bar drink under the booking and pay it at checkout time. The booking needs to keep track of all charges made under it. If the guest arrives on a package, services which are not included in the package are billed at the advertised rate for the period.

When checking out, the reservation needs to be fully paid. All payment information in settling the bill needs to be maintained. The manager and authorized personnel has the ability to provide a discount on the final bill. If a discount is provided, the discount amount and employee authorizing the discount is recorded. A discount of more than 25% needs the authorization from head office. The final bill for a reservation needs to include all charges under each booking, deposit information and all customer payments. The database should be able to generate this final bill.

Customer and guest information such as name, address, contact number and email needs to be maintained. If a reservation or a booking is cancelled after the grace period 25% of the amount due is charged and all facility bookings for the reservation is removed.

Section 1: Conceptual DB Design (10 marks)
Based on the business requirements, develop a conceptual database design using EER model. Your lecturer and tutor will act as the client and you can speak to him to clarify any questions regarding the requirements.

Section 2: EER – Relational Mapping & Normalisation (2 marks)
The EER diagram designed in section 1 needs to be mapped to a relational schema and normalised.

The relational model needs to be described in DBDL format. Sample DBDL format is given in the below:

> **ISBN** (id, number, itemNo)
> **Primary Key** id
> **Alternate Key** number
> **Foreign Key** itemNo **references** Book(itemNo)
> **ON UPDATE CASCADE, ON DELETE CASCADE**

DBDL format is provided in your text – Database Systems – A Practical Approach to Design, Implementation, and Management – 5th Edition.

Section 3: Database Implementation – Database Script (3 marks)
Create a T-SQL script for the database design in section 2. You will create a database with all the necessary tables and constraints: primary key, foreign key, not null, unique and check constraints. The database must be populated with sufficient and meaningful records for evaluation purpose.

Save this SQL script as *CreateDB.sql*.

Section 4: Stored Procedures (10 marks)
Implement the following stored procedures. Ensure that each stored procedure is tested with appropriate sample data. Error handling needs to be implemented and appropriate warnings and error messages are generated. Test cases should be saved in a separate test script. Note that marks are allocated for testing and well-documented code.

You may implement the stored procedures either as T-SQL or CLR stored procedures.

(1) Create a Package	
Procedure name	usp_createPackage
Functionality	Creates a service package
Input Parameters	• Package name – Name of the package • Service Item List – A table-valued parameter consisting of list of service items and quantity of each • Description – Description of each package • Valid period start date – The start date of the package • Valid period end date – The end date of the package • Advertised price – Price of package • Advertised currency – Currency for the advertised price • Employee – Employee authorizing the package
Output Parameters	• Advertised package id – Id of the newly created package
SQL script	createPackage.sql
Test script	test_createPackage.sql

(2) Make a Reservation	
Procedure name	usp_makeReservation
Functionality	Make a reservation. Ensure that a reservation does not exceed available capacity at a hotel at any given time. If there aren't sufficient capacity available for the reservation an error is raised with an appropriate error message and the entire reservation is cancelled. Appropriate bookings of facilities for the specified period needs to be saved in the database at the time of saving a valid reservation. The total amount due and deposit due needs to be calculated for the reservation. The deposit amount due is 25% of total amount due.

Input Parameters	• Customer details – Details of customer making the reservation
	  ▪ customer name – name of customer
	  ▪ address – address of customer
	  ▪ phone number – phone number of customer
	  ▪ email – email of the customer
	• List of services/packages reserved – A table valued parameter with each row consisting of service or package id, quantity, start date and end date of each service/package.
	• Guest list – A list of guests if provided (name, address, contact number and email)

Output Parameters	Reservation id – id of the created reservation
SQL script	makeReservation.sql
Test script	test_makeReservation.sql

Section 5: ORM (2 bonus marks)
Implement a Form that allows for a hotel employee to make a phone reservation for a customer.

Your form needs interact with the database using an ORM framework (e.g. Java Hibernate, Microsoft Entity Framework, etc.). You should call *usp_makeReservation* stored procedure implemented in Section 4.

You need to test your form with valid and invalid data and ensure appropriate error messages are generated for incorrect input.

Submission Requirements
Soft copy submission is via Canvas.
1. Each group needs to submit a zip file which contains the following items:
    o   Database documentation.
    o   SQL Script files
    o   ORM files (if any)

2. Each group needs to submit sections 1-2 as a PDF file to TurnItIn via Canvas.
3. Each group needs to submit sections 3-5 as a PDF file to TurnItIn via Canvas.
4. Each group member needs to fill the *Assignment 1: Self and Peer Review* quiz.

The **database documentation** must contain the following sections (in the order specified):
1. Assumptions: Assumptions made by your group with respect to the business requirements
2. ERD: The ERD must show all the entities, attributes and relationships.
3. Database Schema: The logical model must show all the tables, columns, column types, null/not null constraints, primary keys and foreign keys

The **SQL script** files to be included are listed below.

Section	SQL scripts
Database	createDB.sql
Stored Procedures	createPackage.sql test_createPackage.sql makeReservation.sql test_makeReservation.sql

Progress Monitoring
Each groups need to show progress of their assignment during the tutorial sessions. Each member of group needs to attend these tutorial sessions.

Section	Progress
Sections 1	Week 3
Sections 2 and 3	Week 4
Sections 4 and 5	Week 5

Demonstration

All groups need to demonstrate their database implementation. Group demonstration for Assignment 1 will be held during Week 6 **_tutorial sessions_**. Each member's contribution will be evaluated individually during demonstrations. Failure to attend the demonstration can result in a zero grade for the assignment.