DBS211 – Final Project – 15%

# Background

Through the continual learning of database design, development, and implementation, this project will help the learner to engage with the design of the database through a topic of their own interest.

# Submissions

The submissions will include both a Word Document and several .SQL files for creating the database itself. Submissions will be made through group submission within Blackboard.

# Project Overview

Students will form groups of 3 and collaboratively choose a topic for which they will design and create a database with the perspective of use within a software application. The topic should choose with the thought that a software application, website, or mobile application will be created for the industry. The students will then design a basic database that will be used in the software application.

The scale of the database is to be kept small (6-10 tables), No 2 groups can choose the same topic.

A list of sample topics is provided at the end, for those lacking idea.

## Part 1 : Project Idea and Proposal

The first step is to choose a topic and get a basic idea of the requirements for the database. Each group will submit a word document, with cover page, that outlines their topic. The document should include the following sections:

#### Introduction

A brief paragraph summarizing the industry surrounding the topic of choice and some background information about your involvement with the topic and why it was the choice for your group

#### Problem Statement

A one or 2 sentence paragraph describing what the need is in the industry for your software application and/or the data storage behind the software. Why do we need a database?

#### Solution

A brief paragraph describing how your team will build a database to support the proposed software application.

#### Requirements

A point form list of the various requirements of the software that will require a database to support it. Think about data storage, required reporting, and user experience features that may require data to be stored.

Examples:

* user login/registration
* profile management
* like / dislikes
* how much money was made today?
* Inventory levels
* Customers, employees, products, orders
* Shopping carts
* Rating (rate a product up to 5 stars)
* Favorites

Your requirements should include **at least 4 items** that would be considered data reports, providing information to the business or organization that would allow them to make informed business decisions.

The submission will be a single MS Word document submitted through blackboard.

## Part 2 : Database Design (10 Points)

This milestone will include the design component of the project. Groups will progress through the data modelling and normalization processes in order to finalize a database design. Working within their group and in consultation with your professor, students will practice the processes learned in class to design a relational database.

**ERD**: Groups will create a UML Entity Relationship Diagram of their database design following the database modelling process. This design should then be checked to be compliant 3rd normal form through the normalization techniques learned in class.

**Data Dictionary**: Groups will produce a data dictionary for **each** of their designed tables. This data dictionary will include the same information as the ERD in table format in addition to data types, sizes, notes, and example data. A sample table is included below.

TABLE: **Employees**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column** | **Data Type** | **Size, Precision** | **Default** | **PK/FK** | **Required** | **Range** | **Sample Data** | **Notes** |
| EmployeeID | NUMBER | 4 |  | PK | Y | 1-9999 | 1234 | Autonumbered identity |
| firstName | String | 25 |  |  | Y |  | “Bob” |  |
| lastName | String | 25 |  |  | Y |  | “McKenzie” |  |
| phone | NUMBER | 11 |  |  | Y | 2000000000-9999999999 | 9055551212 | Assuming North American phone number |
| balanceOwing | NUMBER | 9,2 | 0.00 |  | Y | -10000 to 10000 | 345.65 | Monetary value |
| DOB | DATE |  |  |  | Y |  | 1972/05/16 | Date of Birth (YYYY/MM/DD) |

## Part 3 Database Scripting and Creation along with connectivity in visual studio 2022

## (10 Points)

Due – End of Week 13

This will be the final submission for the project and include everything previously completed, with corrections based on feedback, and include the scripts to create the database, populate the database with data, and produce some views to act as data reports for extracting information from the database for the business purposes.

### Deliverables

Groups will produce each of the following:

* **Creation Script**: A *single* SQL file providing the scripting to create all the tables, including all constraints and features as designed in the ERD and data dictionary.
* **Sample Data Script:** A single SQL file providing the scripting to insert sample data into all tables. The amount of data should be enough to allow adequate testing of an application build upon the designed database. Rule of Thumb: 20-30 rows per data tables and their associated bridge tables, and an appropriate number of rows in lookup tables.
* **Business Reports:** A single SQL file providing the scripting to create at least 4 VIEWS, that provide a report on the data that support the business, or organization, in making informed business decisions. Each report should have a paragraph writeup – in comment form, that explain the purpose of the report and how the business will benefit from having the report.

NOTE: All scripts should execute in their entirety without error for both the scenario where no existing tables or database objects exist, or where the scripts are being run on a database where the objects already exist, and the idea is that they are being overwritten.

### (Final) Submission

Groups will submit 4 documents

1. Main word document (with updates and changes made to reflect feedback and changes in the design made throughout the process)
2. Power Point Presentation – To Describe contribution of group Members / Problem statement / Project Description.
3. SQL Script File.
4. Business Reports – ER Diagram of each table, Normalization (3NF), screenshots of database connectivity and retrieve information from visual studio .
5. Create own Scenarios – Execute in SQL

**Sample Project:**

Online bookstore management scenario

"Readers' Haven" is an online bookstore that offers a wide selection of books for readers to explore and purchase. The store provides a user-friendly platform for customers to browse, order, and review books from various genres. The focus of "Readers' Haven" is to create a welcoming and engaging online environment for book lovers to discover their next literary adventure. The system is designed to handle book catalog management, order processing, inventory tracking, customer management, and review management.

Throughout the online bookstore management process, data is stored and organized in the various tables, ensuring efficient management of books, customers, orders, inventory, and reviews. This online bookstore allows customers to browse and purchase books from a wide selection. The store also manages customer orders, inventory, and book reviews.

See some of the online bookstore specification, business rules, and policies:

* Customers can create accounts on the online store by providing their name and email address. Each customer is assigned a unique customer ID.
* The system maintains a catalog of books, including their titles, authors, genres, publishers, and prices. Each book is identified by a unique book ID.
* Customers can browse the book catalog and add books to their cart for purchase. The system keeps track of the quantity of each book available in different store locations using the store inventory table. Multiple different books can be available for sale in different stores.
* When a customer places an order, a new order is created with a unique order ID. The order includes the customer ID, book ID(s) for the books ordered, the quantity of each book, and the order date. An order, however, is associated with only one customer.
* The system updates the store inventory by reducing the quantity of the ordered books. If the quantity reaches zero, it indicates that the book is out of stock.
* Customers can provide book reviews by assigning a rating (on a scale of 1 to 5) and adding a review text for any number of books. Each review is associated with a unique review ID, the book ID being reviewed, the customer ID who provided the review, the rating, and the review text. Each review is associated with one customer.

Include the following in your project document:

* The ERD
* Define all PKs and FKs
* Fix any many-to-many (M: N) relationships using a bridge entity

**Orders Table:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Order ID** | **Customer ID** | **Customer Name** | **Customer Address** | **Book ID** | **Book Title** | **Qnty** | **Order Date** |
| 1 | 1001 | John Doe | 123 Main Street | 1 | The Great Gatsby | 2 | 2022-05-10 |
| 1 | 1001 | John Doe | 123 Main Street | 3 | To Kill a Mockingbird | 1 | 2022-05-10 |
| 2 | 1002 | Jane Smith | 456 Elm Avenue | 2 | Pride and Prejudice | 1 | 2022-06-15 |
| 2 | 1002 | Jane Smith | 456 Elm Avenue | 4 | 1984 | 3 | 2022-06-15 |
| 3 | 1003 | Bob Johnson | 789 Oak Street | 1 | The Great Gatsby | 2 | 2022-07-20 |
| 3 | 1003 | Bob Johnson | 789 Oak Street | 2 | Pride and Prejudice | 2 | 2022-07-20 |
| 3 | 1003 | Bob Johnson | 789 Oak Street | 3 | To Kill a Mockingbird | 1 | 2022-07-20 |

**Books Table:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Book ID** | **Title** | **Author ID** | **Author Name** | **Genre ID** | **Genre** | **Publisher ID** | **Publisher Name** | **Price** |
| 1 | The Great Gatsby | 1 | F. Scott Fitzgerald | 1 | Fiction | 1 | Scribner | 10.00 |
| 2 | Pride and Prejudice | 2 | Jane Austen | 2 | Romance | 2 | Penguin Classics | 8.00 |
| 3 | To Kill a Mockingbird | 3 | Harper Lee | 2 3 | Romance Mystery | 3 | HarperCollins | 12.00 |
| 4 | 1984 | 4 | George Orwell | 1 | Fiction | 4 | Signet Classic | 9.00 |
| 5 | The Catcher in the Rye | 5 2 | J.D. Salinger  Jane Austen | 1 | Fiction | 5 | Little, Brown | 11.00 |

**Store Book Inventory Table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Store ID** | **Store Name** | **Location** | **Book ID** | **Book Title** | **Quantity** |
| 1 | Book Haven | 209 Yonge Street | 1 | The Great Gatsby | 10 |
| 1 | Book Haven | 209 Yonge Street | 2 | Pride and Prejudice | 5 |
| 1 | Book Haven | 209 Yonge Street | 3 | To Kill a Mockingbird | 3 |
| 2 | Bookworm Emporium | 101 Holmes Avenue | 1 | The Great Gatsby | 8 |
| 2 | Bookworm Emporium | 101 Holmes Avenue | 3 | To Kill a Mockingbird | 6 |
| 3 | The Reading Nook | 454 Dufferin Street | 2 | Pride and Prejudice | 4 |
| 3 | The Reading Nook | 454 Dufferin Street | 3 | To Kill a Mockingbird | 2 |
| 3 | The Reading Nook | 454 Dufferin Street | 4 | 1984 | 10 |
| 3 | The Reading Nook | 454 Dufferin Street | 5 | The Catcher in the Rye | 7 |

**Book Reviews Table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review ID** | **Book ID** | **Customer ID** | **Rating** | **Review Text** |
| 1 | 1 | 1001 | 4.5 | Great book! |
| 2 | 2 | 1002 | 5 | Highly recommended |
| 3 | 3 | 1003 | 3.5 | Average read |
| 4 | 1 | 1002 | 4 | Interesting! |

**Database IMPLEMENTATION**

In your SQL file, write the SQL statements to:

1. Create a database named DBS211\_P2\_YourGroupNo.
2. Create the tables of your relational database model. Specify the PK, FK, and other necessary constraints.
3. Show a screenshot of the database relationships of all the tables you have created.

**Enter Data**

Enter the data from the samples shown in the given tables in Part II. Include all *INSERT* queries in your SQL file.

**Select Data**

For the following questions, include:

1. The **SQL command** in the .SQL file
2. An image of the output result in the project document (The Word document).
3. **The number of rows** affected in .SQL file.
4. List all books with ratings less than or equal to 4 in the Book Haven store. Display book ID, title, author name, and the rating for each book.
5. Display the store ID and name of stores that do have the book “To Kill a Mockingbird” in their inventory.
6. Display author’s ID, author’s name who have books with the Romance genre.
7. For each customer, calculate the total amount that the customer has paid to purchase books. Display customer ID, name, and total amount for each customer.