McGill School of Continuing Studies
Career and Professional Development

Certificate in Software Development
CCCS-330-781

Course Name:	Database Design & Business Application Development				
Course Number:	CCCS 330				
Course hours:	39	Course Weighting:	1-2-3	Number of Credits (Units):	3
Pre-requisite:	CCCS 300 Programming Techniques 1				

Khattar Daou, M.S., Ph.D. Technical Sciences
Microsoft Certified Trainer (MCT), Microsoft Office Specialist (MOS)
Enterprise Strategy Consultant
DATSCO – Software Development, Training, & Consulting
6687 Hamilton Street
Montreal, Quebec
H4E 3C6
Email: KDaou@DatscoTraining.com

Contact Information: **You are expected to communicate with me either through the email system within MyCourses, or using the instructor's McGill email address.**

Term Project

Deadline for submission: Class 13 (as per schedule)
Late submissions will not be accepted.

Student Name	Student ID

Purpose

To design and develop a database management system using recommended best practices covered in class. You will work to prepare final project based on a case problem. You should use all techniques covered in this course.
You will work in team, with **3-4 students per team**, for the term project database system. Students are expected to form their own teams and send me an email with the team member names.

Although one person can maintain a small database management system, larger systems require groups of people filling a variety of roles. Of course, the line between these roles can be blurred, and many aspects of database design require collaboration to solve a problem.

Project Update Meeting: at the end of each class, you'll have about 15 minutes to discuss your project.

Begin working with your team members in class 1. It's often helpful if someone volunteers to be the "leader". Another group member should volunteer to post the group's SUMMARY message. Some groups divide up the work and each student has a smaller task. Other groups have each member research and then they combine the best of the answers together. It's up to you.

How to be successful in the group work:

- Determine which group you are in.

- Decide in the next class how to divide the work. Decide who will post the summary response.

Task 1

In this task you will:

I. Create the Library database (see the Library Database Case Study at the end of this document)

II. Create tables in the Library Database

Create all the 9 tables for the Library Database:

1. **Member table,** defining the following column names with their respective data types. ***member_no, lastName, firstName, middelInitial, photograph***

2. **Adult table**, defining the column names with their respective data types. Make sure that the phone_no column allows null values. Make sure that all other columns do not allow null values. ***member_no, street, city, state, zip, phone_no, expr_date***

3. Create the rest of tables based on the business rules defined in this project. Create the Library diagram.

Task 2

In this Task you will:

I. Define and use DEFAULT and CHECK constraints to enforce domain integrity

II. Define and use PRIMARY KEY AND FOREIGN KEY constraint to enforce entity and referential integrity

Modify the following tables:

1. Create or modify the default constraint that makes WA (Washington) the default for the **state** column in the **adult** table.

2. Create a phone number constraint to the **adult** table.

3. Write and execute a statement that adds a constraint to the **due_date** column in the **loan** table. The value in the **due_date** column must be greater than or equal to the value in the **out_date** column (due_date >= out_date).

4. Create a PRIMARY KEY on the **item** table.

5. Create a PRIMARY KEY constraint on the **title** table.

6. Write a script that adds PRIMARY KEY constraints to the other tables in the Library database.

7. Create a FOREIGN KEY on the **item** table.

8. Write a script that adds FOREIGN KEY constraints to the other tables in the Library database.

Task 3

In this task you will

I. Use the Library database created and modified in the previous tasks.
II. Write scripts that join tables in the Library database
III. Use the GROUP BY and HAVING clauses to summarize data by groups
IV. Create Views

1. **Create a mailing list** of Library members that includes the members' full names and complete address information.

2. **Write and execute a query** on the title, item, and copy tables that returns the **isbn**, **copy_no**, **on_loan**, **title**, **translation**, and **cover**, and values for rows in the copy table with an ISBN of 1 (one), 500 (five hundred), or 1000 (thousand). Order the result by isbn column.

3. **Write and execute a query** to retrieve the member's **full name** and **member_no** from the **member** table and the **isbn** and **log_date** values from the **reservation** table for members 250, 341, 1675. Order the results by **member_no**. You should show information for these members, even if they have no books or reserve.

4. **Create a view and save it as adultwideView** that queries the **member** and **adult** tables. Lists the name & address for all adults.

5. **Create a view and save it as ChildwideView** that queries the **member**, **adult**, and **juvenile** tables. Lists the name & address for the juveniles.

6. **Create a view and save it as and CopywideView** that queries the **copy**, **title** and **item** tables. Lists complete information about each copy.

7. **Create a view and save it as LoanableView** that queries **CopywideView** (3-table join). Lists complete information about each copy marked as loanable (loanable = 'Y').

8. **Create a view and save it as OnshelfView** that queries **CopywideView** (3-table join). Lists complete information about each copy that is not currently on loan (on_loan ='N').

9. **Create a view and save it as OnloanView** that queries the **loan**, **title**, and **member** tables. Lists the **member**, **title**, and **loan** information of a copy that is currently on loan.

10. **Create a view and save it as OverdueView** that queries OnloanView (3-table join.) Lists the **member**, **title**, and **loan** information of a copy on loan that is overdue (due_date

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< current date).

Task 4 Create Stored Procedures and Triggers

11. Generating Usage Reports – seven questions are listed at the end of this document to generate summary information for librarians.

Project Delivery

Everything you create should be based on coherent organization, conciseness, and clarity. You will hand in printouts and instructions on how to operate the system.

1. Save your database and other documents in a folder with your name and team members.
2. To compress a file/folder, right-click the file/folder, point to Sent To, and then select Compressed (Zipped) Folder.
3. Submit the zipped folder to your instructor via MyCourses services or on USB or DVD if the zipped folder is too big.

Library Database Case Study

Introduction

The Library Database Case Study provides an overview of the operations at the West Municipal Library, describes the daily library functions, and presents the database that was designed for the library.

Overview of Library Operations

Before a database for librarians and members was implemented, an interview was conducted with the librarians at the West Municipal Library to assess the library's business needs. The decisions that the database made during the design process are explained in the following sections.

Daily Library Functions

Many daily library functions exist. The following are some of the most important.

Uniquely Identifying Books

Some books may have the same title; therefore, titles cannot be used as a means of identification. Librarians call books ***items***. Items are identified by the /international Standard Book Number (ISBN). Books with the same title can have different ISBN numbers if they are in different languages and have different bindings (hard cover or soft cover).

Reserving Books

If a member wants a book that is out on loan, the book is placed on reserve for them. When the book arrives, a librarian must notify the member who has been waiting the longest. Members can have as many as four books on reserve at one time.

Determining Book Availability

Librarians must be able to determine how many copies of a book are out on loan at any given time and which books are on reserve.

A synopsis that ranges from one sentence to several pages exists for each title in the library. Librarians want to be able to access the synopses when members request information about books.

Enrolling Members

To become a library member, individuals must provide their mailing addresses and phone numbers. A librarian then issues the individual a numbered, machine-readable card. This card is good for one year.

Juveniles (individuals under age 18) can be members of the library, but an adult member must sign for them when they join. Therefore, a juvenile member’s card is good only until the associated adult member’s card expires. The only information that the library keeps on juvenile members is their name and date of birth. The library must be able to detect when juvenile members turn 18 and then must automatically convert the juvenile memberships to adult memberships.

A librarian must notify the member, a month before membership cards expire,

Checking Out Books

Books can be checked out for 14 days. Members are allowed to have only four books checked out at a time. If a book is overdue, members have one week before the library sends a notice to them.

Members bring books to the front desk after they locate the ones that they want to check out. A librarian then runs the members card through a machine that reads the card number magnetically. A screen displays information about the member’s account, such as name, address, phone number, and the card’s expiration date. Ideally, cards that have expired or are about to expire will be highlighted.

The screen also displays information about a member’s outstanding loans, including title, checkout date, and due date. This information is useful because it is presented in a chronological sequence, with the most overdue loan appearing first and the most recent loan appearing last. Highlighting also indicates loans that are overdue or are about to become overdue.

If a member’s account is in order, a librarian checks out the books. Librarians check out books by running a scanner down the book spines (The ISBN and the copy number are encoded on the spines). The ISBN, title, and the information then appear on the computer screen. If the books are not loanable, a warning message appears.

Checking In Books

When books are returned, librarians check them in by running a scanner down the book spines. The ISBN number, title, and author information then appear on the computer screen, as well as the member number and name and the book’s due date.

Occasionally, books are accidentally re-shelved before librarian check them in. if a member tries to check out a book that the database lists as checked out, librarians need to be able to access the checkout information, including the member's name, check out date, and due date. If a member presents a book to check out that is still officially checked out to another member, a message appears that alerts librarians that the book is already checked out. Then librarians can updated their records immediately by being forced to clear the previous loan before they continue with the checkout.

Generating Usage Reports

Occasionally, librarians must compile usage information, mostly for the Town Council or the Planning Commission. These groups usually want to know information, such as the volume of circulation, the popularity of various books, the reliability of return, and the average length of a borrowing term. Therefore, the librarians need to be able to prepare quick summaries of this information.

The types of questions that are frequently asked include the following:

1. How many loans did the library do last year?
2. What percentage of the membership borrowed at least one book?
3. What was the greatest number of books borrowed by any one individual?
4. What percentage of the books was loaned out at least once last year?
5. What percentage of all loans eventually becomes overdue?
6. What is the average length of a loan?
7. What are the library peak hours for loans?

The answers could be created as database objects: views, functions, stored procedures, or triggers.