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# **Project Report on Software for Library Management**

Computer Science Project

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# Table of Contents

Introduction .....	3
Technologies used .....	3
Functional Requirements .....	3
Code .....	4
data.py .....	4
db.sql .....	12
gui.py .....	13
main.py .....	14

# Introduction

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Thus, we'll use the `mysql` module

## Technologies used

This project uses Python as the primary programming language for the frontend application. The project uses an MySQL database for the backend, for efficient data storage and retrieval.

## Functional Requirements

The following are the functional requirements for a library management system:

- To list and search books by criteria
- To add, remove and update books
- To view information about patrons
- To issue books and return books
- To view information about book issuance

# Code

The complete source code for the application as well as this document is accessible on the GitHub repository for the project: <https://github.com/dipamsen/LibraryManager>

## data.py

```
import os
from dotenv import load_dotenv
from tabulate import tabulate
import mysql.connector
from typing import Any

load_dotenv()

host = os.getenv("DATABASE_HOST")
user = os.getenv("DATABASE_USER")
pw = os.getenv("DATABASE_PASSWORD")

db = mysql.connector.connect(host=host, user=user, passwd=pw,
                             database="library")
cursor: Any = db.cursor()

# Raise error in SQL even though there is no error
def RaiseSQLError(query, values=None):
    cursor.execute(query, values)
    result = cursor.fetchall()
    if cursor.rowcount == 0:
        raise ValueError("No matching records found.")
    return result

# check for valid ISBN number
def ValidISBN(isbn):
    # Remove hyphens and spaces
    isbn = isbn.replace("-", "").replace(" ", "")

    # ISBN-10
    if len(isbn) == 10:
        if not isbn[-1].isdigit():
            return False
        if isbn[-1].upper() == "X":
            isbn_sum = (
                sum(int(digit) * (i + 1) for i, digit in
                    enumerate(isbn[:-1])) + 10
```

```

        )
    else:
        isbn_sum = sum(int(digit) * (i + 1) for i, digit in
enumerate(isbn))
        return isbn_sum % 11 == 0

# ISBN-13
elif len(isbn) == 13:
    if not isbn.isdigit():
        return False
    isbn_sum = sum(
        int(digit) * (1 if i % 2 == 0 else 3) for i, digit in
enumerate(isbn)
    )
    return isbn_sum % 10 == 0

return False

# Edit Books Table Functions
# Replace Books
def ReplaceBooks(oISBN, nquantity, nTITLE, nAUTHOR, nISBN):
    if ValidISBN(oISBN) == False:
        print("INVALID ISBN NUMBER!!")
        return 1
    try:
        deletebook = "DELETE FROM books WHERE ISBN= %s"
        cursor.execute(deletebook, (oISBN,))
        RaiseSQLError(deletebook, (oISBN,))
    except ValueError:
        db.rollback()
        return 1
    newbooks = "INSERT INTO books (quantity,title,author,isbn) VALUES(%s,
%s,%s,%s)"
    cursor.execute(newbooks, (nquantity, nTITLE, nAUTHOR, nISBN))
    db.commit()

# Add Books
def AddBooks(nquantity, nTITLE, nAUTHOR, nISBN):
    newbooks = "INSERT INTO books(quantity,title,author,isbn) VALUES(%s,
%s,%s,%s)"
    cursor.execute(newbooks, (nquantity, nTITLE, nAUTHOR, nISBN))
    db.commit()

# AddBooks(8,"Wuthering Winds","Samuel L.,"9237176749302")

```

```

# Remove Books
def RemoveBooks(ISBN):
    if ValidISBN(ISBN) == False:
        print("INVALID ISBN NUMBER!!")
        return 1
    try:
        deletebook = "DELETE FROM books WHERE isbn= %s;"
        cursor.execute(deletebook, (ISBN,))
        RaiseSQLError(deletebook, (ISBN,))
    except ValueError:
        db.rollback()
        return 1
    db.commit()

# Searching Books
# By ISBN
def SearchBook_ISBN(ISBN):
    if ValidISBN(ISBN) == False:
        print("INVALID ISBN NUMBER!!")
        return 1
    try:
        SearchBook = "SELECT * FROM books WHERE isbn= %s;"
        RaiseSQLError(SearchBook, (ISBN,))
    except ValueError:
        db.rollback()
        return 1
    return cursor.execute(SearchBook, (ISBN,))

# By Author
def SearchBook_Author(Author):
    try:
        SearchBook = "SELECT * FROM books WHERE author LIKE %s"
        RaiseSQLError(SearchBook, ("% " + Author + "%",))
    except ValueError:
        db.rollback()
        return 1
    cursor.execute(SearchBook, ("% " + Author + "%",))
    return cursor.fetchall()

# By Title
def SearchBook_Title(Title):
    try:
        SearchBook = "SELECT * FROM books WHERE title LIKE %s"
        RaiseSQLError(SearchBook, ("% " + Title + "%",))
    except ValueError:
        db.rollback()

```

```

        return 1
    cursor.execute(SearchBook, ("% " + Title + "%",))
    return cursor.fetchall()

def Editbooks(ISBN):
    if ValidISBN(ISBN) == False:
        print("INVALID ISBN NUMBER!!")
        return 1
    Search = SearchBook_ISBN(ISBN)
    if Search == 1:
        return 1
    else:
        print("OPTIONS : ")
        print("(1) ---> ISBN number")
        print("(2) ---> Book Author")
        print("(3) ---> Book Title")
        print("(4) ---> Quantity")
        print("(5) ---> Remove book")
        option = int(input("Enter OPTION NUMBER of what you want to edit :
"))
        if option >= 1 and option <= 5:
            if option == 1:
                id = input("ENTER THE NEW ISBN NUMBER OF BOOK : ")
                if ISBN != id:
                    query = "UPDATE books SET isbn= %s WHERE isbn=%s"
                    cursor.execute(
                        query,
                        (
                            id,
                            ISBN,
                        ),
                    )
                    db.commit()
                else:
                    print("Failed to edit! Try again!")
                    db.rollback()
                    return 1
            elif option == 2:
                Author = input("ENTER THE NEW AUTHOR NAME OF THE BOOK : ")
                cursor.execute(
                    "UPDATE books SET author=%s WHERE isbn=%s",
                    (
                        Author,
                        ISBN,
                    ),
                )
                db.commit()
            elif option == 3:

```

```

        Title = input("ENTER THE NEW TITLE OF BOOK : ")
        cursor.execute(
            "UPDATE books SET title=%s WHERE isbn=%s",
            (
                Title,
                ISBN,
            ),
        )
        db.commit()
    elif option == 4:
        quantity = input("ENTER THE QUANTITY OF BOOK AVAILABLE : ")

        query = "UPDATE books SET quantity= %s WHERE isbn=%s"
        cursor.execute(
            query,
            (
                quantity,
                ISBN,
            ),
        )
        db.commit()
    elif option == 5:
        RemoveBooks(ISBN)

# Issue Books to Patron and updating the return status
def Issue_Books(ISBN, Unique_ID):
    if ValidISBN(ISBN) == False:
        print("INVALID ISBN NUMBER!!")
        return 1
    if SearchBook_ISBN(ISBN) == 1:
        print("ISBN number not found. Check and Try Again!")
        return 1
    if SearchPatron_ID(Unique_ID) == 1:
        print("Patron ID not found. Check and Try Again!")
        return 1
    query = "UPDATE books SET quantity = quantity - 1 WHERE isbn = %s AND
quantity >= 1"
    cursor.execute(query, (ISBN,))
    if cursor.rowcount == 1:
        db.commit()

        issue = "INSERT INTO issues (isbn, id, issue_date, return_date)
VALUES (%s, %s, CURDATE(), DATE(CURDATE() + 7))"
        cursor.execute(issue, (ISBN, Unique_ID))

        print("Book issued successfully!")

    returnstatus = "UPDATE patrons SET return_status = FALSE WHERE id

```



```

= %s"
    cursor.execute(returnstatus, (Unique_ID,))
    db.commit()
else:
    db.rollback()
    print(
        "BOOK ISSUE COULD NOT BE COMPLETED AS BOOK OUT OF STOCK!
\nPLEASE CHOOSE ANOTHER BOOK AND TRY AGAIN!"
    )
    return 1

def return_books(ISBN, Unique_ID):
    if ValidISBN(ISBN) == False:
        print("INVALID ISBN NUMBER!!")
        return 1
    if SearchBook_ISBN(ISBN) == 1:
        print("ISBN number not found. Check and Try Again!")
        return 1
    if SearchPatron_ID(Unique_ID) == 1:
        print("Patron ID not found. Check and Try Again!")
        return 1
    query = "UPDATE books SET quantity = quantity + 1 WHERE ISBN = %s"
    cursor.execute(query, (ISBN))
    db.commit()

    # TODO: update "returned" inside issues table
    print("Book returned successfully!")

def AddPatron(Unique_ID, Email, Patron_Name, Subscription_Date):
    newpatron = (
        "INSERT INTO patrons (id, email, name, subscription_date)
VALUES(%s,%s,%s,%s)"
    )
    cursor.execute(
        newpatron,
        (
            Unique_ID,
            Email,
            Patron_Name,
            Subscription_Date,
        ),
    )
    db.commit()

def RemovePatron(Unique_ID):
    try:

```

```

        delet Patron = "DELETE FROM patrons WHERE id= %s;"
        cursor.execute(delet Patron, (Unique_ID,))
        RaiseSQLError(delet Patron, (Unique_ID,))
    except ValueError:
        db.rollback()
        return 1
    db.commit()

def EditPatron(Unique_ID):
    Search = SearchPatron_ID(Unique_ID)
    if Search == 1:
        return 1
    else:
        print("OPTIONS : ")
        print("(1) ---> Patron ID number")
        print("(2) ---> Patron Email")
        print("(3) ---> Patron Name")
        print("(4) ---> RENEW Patron Subscription Date")
        print("(5) ---> Remove Patron")
        option = int(input("Enter OPTION NUMBER of what you want to edit :
"))
        if option >= 1 and option <= 5:
            if option == 1:
                id = input("ENTER THE NEW 8-DIGIT UNIQUE ID OF PATRON : ")
                if Unique_ID != id and len(id) == 8:
                    query = "UPDATE Patron SET Unique_ID= %s WHERE
Unique_ID=%s"
                    cursor.execute(
                        query,
                        (
                            id,
                            Unique_ID,
                        ),
                    )
                    db.commit()
                else:
                    print("Failed to edit! Try again!")
                    db.rollback()
                    return 1
            elif option == 2:
                Email = input("ENTER THE NEW EMAIL OF PATRON : ")
                if "@" in Email and "." in Email:
                    cursor.execute(
                        "UPDATE Patron SET Email= %s WHERE Unique_ID= %s",
                        (
                            Email,
                            Unique_ID,
                        ),
                    )

```

```

        )
        db.commit()
    else:
        print("Enter a VALID EMAIL and Try Again!")
        db.rollback()
        return 1
    elif option == 3:
        Name = input("ENTER THE NEW NAME OF PATRON : ")
        cursor.execute(
            "UPDATE patrons SET name= %s WHERE id= %s",
            (
                Name,
                Unique_ID,
            ),
        )
        db.commit()
    elif option == 4:
        query = "UPDATE patrons SET subscription_date=DATE(NOW())
WHERE id=%s"
        cursor.execute(query, (Unique_ID,))
        db.commit()
    elif option == 5:
        RemovePatron(Unique_ID)

def SearchPatron_ID(Unique_ID):
    try:
        SearchPatron = "SELECT * FROM patrons WHERE id= %s"
        RaiseSQLError(SearchPatron, (Unique_ID,))
    except ValueError:
        db.rollback()
        return 1
    return cursor.execute(SearchPatron, (Unique_ID,))

def SearchPatron_NAME(Patron_Name):
    try:
        SearchPatron = "SELECT * FROM patrons WHERE name LIKE %s"
        RaiseSQLError(SearchPatron, ("% " + Patron_Name + "%",))
    except ValueError:
        db.rollback()
        return 1
    cursor.execute(SearchPatron, ("% " + Patron_Name + "%",))
    return cursor.fetchall()

def Checkouts():
    query = "SELECT * FROM issues"
    cursor.execute(query)

```

```

# Fetch column names
columns = [desc[0] for desc in cursor.description]
# Fetch data
data = cursor.fetchall()
# Print tabulated data
print(tabulate(data, headers=columns, tablefmt="pretty"))

# Checkouts()

def Patron():
    query = "SELECT * FROM patrons"
    cursor.execute(query)
    columns = [desc[0] for desc in cursor.description]
    data = cursor.fetchall()
    print(tabulate(data, headers=columns, tablefmt="pretty"))

def GenerateBookReport():
    query = "SELECT * FROM books"
    cursor.execute(query)
    columns = [desc[0] for desc in cursor.description]
    data = cursor.fetchall()
    print(tabulate(data, headers=columns, tablefmt="pretty"))

Issue_Books("9780060838676", "dgiidgsd")

```

## db.sql

```

DROP DATABASE IF EXISTS library;

CREATE DATABASE library;

USE library;

CREATE TABLE books (
    isbn VARCHAR(13) NOT NULL PRIMARY KEY,
    title VARCHAR(50) NOT NULL,
    author VARCHAR(50) NOT NULL,
    quantity INT NOT NULL,
    genre ENUM("Fiction", "Non-Fiction") NOT NULL
);

INSERT INTO
    books (quantity, title, author, isbn)
VALUES
    (

```

```

        3,
        "The Sun Also Rises",
        "Ernest Hemingway",
        "9780743297332"
    ),
    (
        2,
        "To Kill A Mockingbird",
        "Harper Lee",
        "9780099549482"
    ),
    (
        2,
        "Their Eyes Were Watching God",
        "Zora Neale Hurston",
        "9780060838676"
    );

CREATE TABLE patrons (
    id CHAR(8) NOT NULL PRIMARY KEY,
    email VARCHAR(50) NOT NULL,
    name VARCHAR(30) NOT NULL,
    subscription_date DATE NOT NULL,
    return_status BOOL NOT NULL DEFAULT TRUE,
    CONSTRAINT id_length CHECK (LENGTH(TRIM(id)) = 8),
    CONSTRAINT valid_email CHECK (email LIKE '%@%.%')
);

CREATE TABLE issues (
    id INT NOT NULL PRIMARY KEY,
    book_isbn VARCHAR(13) NOT NULL,
    patron_id CHAR(8) NOT NULL,
    issue_date DATE NOT NULL,
    return_date DATE NOT NULL,
    returned BOOL NOT NULL DEFAULT FALSE,
    FOREIGN KEY (book_isbn) REFERENCES books(isbn),
    FOREIGN KEY (patron_id) REFERENCES patrons(id)
);

```

## gui.py

```

import tkinter as tk
import tkinter.font as tkFont

screens = []

def goto(screen):
    for i in screens:

```

```

        i.pack_forget()
    screen.pack()

app = tk.Tk()
font = tkFont.Font(family="Helvetica", size=12, weight="normal")
app.title("Library Management System")
app.geometry("500x500")
app.configure(bg="light blue")
app.option_add("*Font", font)

homescrn = tk.Frame(app)
homescrn.config(background="SystemWindow")
# homescrn.attributes("-transparent", True)
screens.append(homescrn)
homescrn.pack()

label = tk.Label(homescrn, text="Library Management System",
font=("Arial", 20))
label.pack(pady=10)

app.mainloop()

```

## main.py

```

# Library Manager
# Author: Dipam Sen and Arghya Kumar

print("Welcome to the Library Manager")

```