CS 6360 Database Design Programming Project #1:

Library Management System

Design Document

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1. Purpose:

The purpose of this project is to create a database host application that can interface with a backend SQL database to implement a library management system.

A librarian will use this application to help them facilitate functions necessary for managing and organizing library's. These functions include:

- Ability to search for any book and determine its availability
- Book loaning
  - Checking out
  - Checking in
- Ability to register new borrowers to the library
- Implementation of fines for late books

2. Overview Design:

Java was used as the programming language for this project, the native Java Swing library was used for GUI, and the backend database is MySQL.

This project had three major components or layers which include: Backend(Database: SQL), Library API, and GUI.

- **Backend:**

This program uses MySQL (mysql-8.0.11-winx64) for its database management.

- *Data Cleaning***:**

The initial population of 'book.csv' data had the following initial cleaning (using excel) steps:

The prerequisite conditions of this database is that all book titles must have at least one author.

1) Import data to excel using UTF-8 or Unicode
2) ISBN13 is kept as is
3) Title is kept as is
4) Clean Author: (In this order)

> The following normalizes all "." and "," data:

>> Replace all ". " to "." (execute twice)
>> Replace all "." to ". "
>> Repalce all " ," to ","
>> Replace all ", " to ","

Repalce all " ." to "."
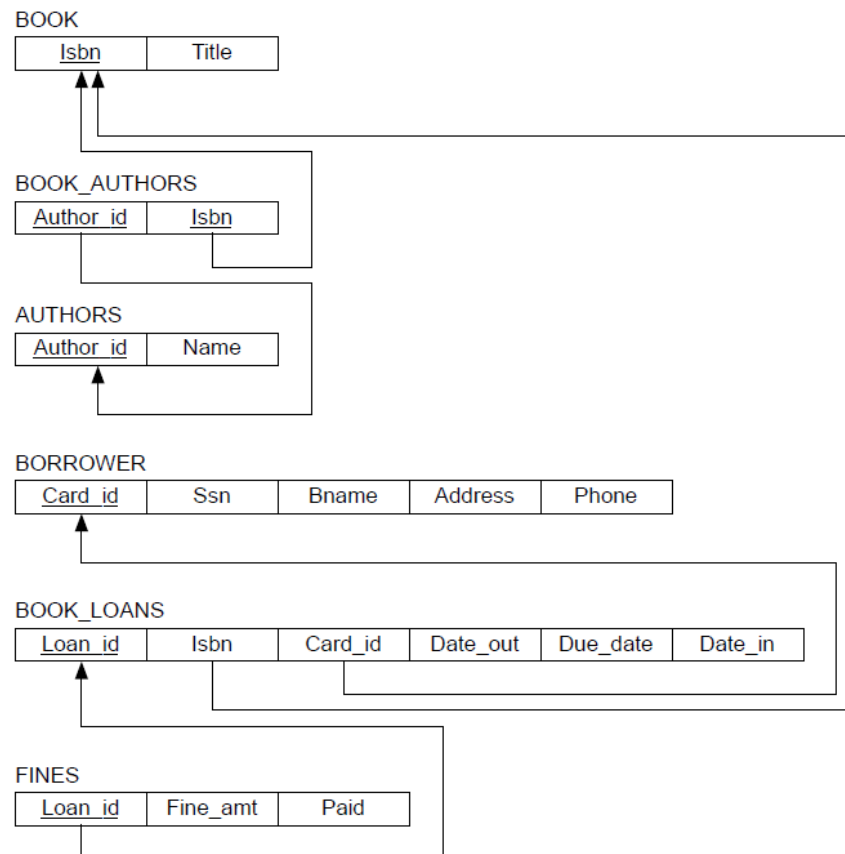Replace "Alexandre Dumas PÃ.. re" to "Alexandre Dumas PÃ..re"

Split Author column to 5 Author columns, delineated by commas

Fill all empty Author values to NULL

5) Delete all tuples with all Authors as NULL

- o *Library Schema:*

  The library schema used is the same as that provided in the project requirements sheet posted:

BOOK

Isbn	Title

BOOK_AUTHORS

Author_id	Isbn

AUTHORS

Author_id	Name

BORROWER

Card_id	Ssn	Bname	Address	Phone

BOOK_LOANS

Loan_id	Isbn	Card_id	Date_out	Due_date	Date_in

FINES

Loan_id	Fine_amt	Paid

- **Library API**

  This layer provides functions that can utilize the backend MySQL database and deliver data to the upper level GUI.

- **JAVA Swing GUI**

  This layer provides the librarian user the capabilities of a user friendly way to manage the database.

3. **Backend data assumptions:**

There still exists some noise in the data such as titles (Mr. DR. DDR.), non UTF-8 characters, and author's and their alias's treated as different unique authors. I chose not to deal with these issues when cleaning.

For alias' there was no way I could uniquely define each initial perfectly to the correct author. To make no interpretations with the data, I left those alone.

Non-supported java characters will show up as "?"