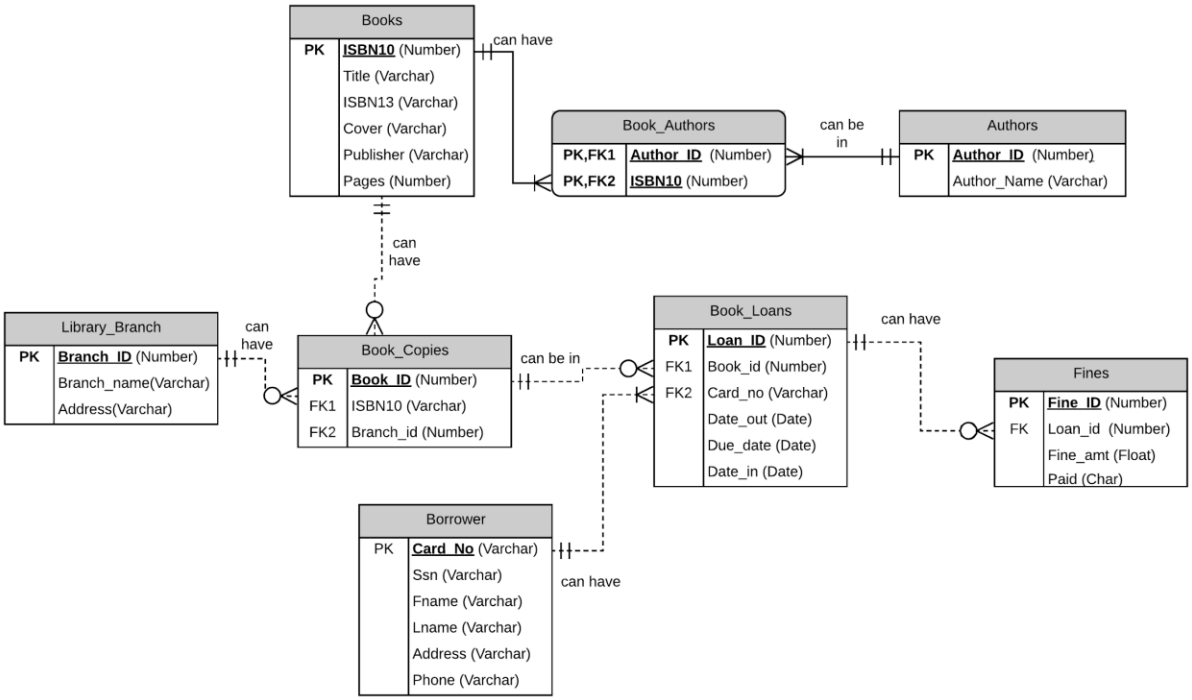
Design Document

Library Management Application

Entity Relationship Diagram:



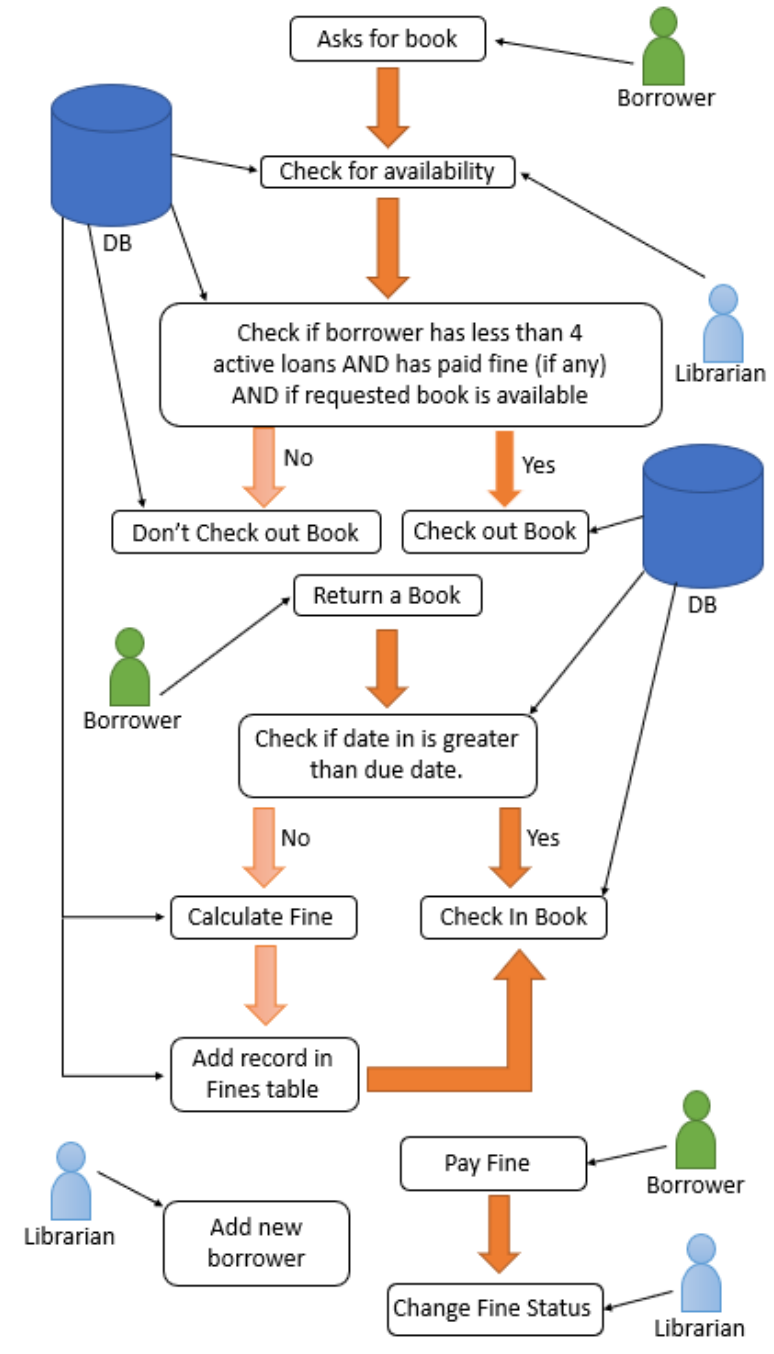
Short Description:

The Library Management application is used by the librarians the check out books and to check in books returned by the borrowers. In addition to checking out and checking in books, the librarian can use this app to check availability of the book in a particular library branch. Also a new borrower can be added to the list of borrowers by using this app. Fines generated as a result of late check ins can be accessed and updated by using this app. Reports related to fines like overdue books and fines for borrower are also features included in the app.

Assumptions

1. Even though each book has same title, each book copy has a unique isbn.
2. All borrowers have SSN.

System Architecture:



System Flow:

Check-Out:

1. A Borrower asks for a particular book in a branch.
2. Librarian checks if the book is available.
3. Librarian checks if that borrower has less than 4 active book loans AND has paid fine (if any) AND if requested book is available.
4. If yes, then the book is checked out.
5. Decrement the No of copies of the book by 1 from that library branch.

Check-In:

1. A Borrower returns the book.
2. System checks if the check in date is more than the due date or not.
    a. If yes, then a fine is calculated depending upon number of days late.
    b. A new record is inserted for that book loan in fines table.
3. If no, then the book is checked in.
4. Increment the No of copies of the book by 1 in that library branch.

Paying Fines:

1. Borrower pays fines for a specific book loan.
2. Librarian updates fine record for that specific book loan in the fines table.

Add a new borrower:

1. Librarian adds a new borrower to the library management database. The new borrower should have a unique SSN.

Design Decisions:

A) Entity Relationship Diagram was drawn.

B) Initial Data Load

1. All the 4 data files Library Branch, Source Books, Borrowers and Book Copies were converted to txt files.
2. The all the 4 txt files were loaded into the ORACLE APEX by using SQL Workshop > Utilities > Data Workshop > Text Data.

C) Tables Book_Loans, Fines, Authors, Book_Authors were created with no data.

D) Normalisation

1. Inserted all data from Source_Book table to Book table without Author column.
2. Split the author names from Source_Books into 5 columns and stored them in one table.
3. Created Temp_Author_Individuated.
4. Created TEMP_AUTHOR_WITH_ISBN.
5. Individuated Authors with their ISBN10's and inserted into TEMP_AUTHOR_INDIVIDUATED table from SOURCE_BOOK Table.
6. Pulled author_name column from TEMP_AUTHOR_INDIVIDUATED table - removed duplicate data, removed null value, sorted and inserted in AUTHOR table.

E) Added constraints like Foreign Keys, Unique and Primary Keys to all tables according to the ERD and requirements.

F) Populated Book_Loans table with random Date_Out, Due_Date and Date_In values.

G) Created Before Insert trigger on Book_Loans to check if borrower has less than 4 active book loans AND has paid fine (if any) AND if requested book is available.

H) Created After Update trigger on Book_Loans to check if date_in is greater than Due_Date so that, that particular record gets inserted into the fines table.

I) Created views for satisfying functionalities like Book Search and Availability and Overdue Books and Fines for borrowers.

J) Designed application by creating pages according the required functionality.

K) Created reports by using joins and views.