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LIBRARY MANAGEMENT SYSTEM
DATABASE MANAGEMENT (MSIS-618)

PRIYA PADHIYAR
UMASS-B
01882661

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EXECUTIVE SUMMARY

This report provides the processes which have been used to design and implement a database that can be useful to manage a library system. In addition, it also provides an overview upon the current working system at P&J Central Library of P&J Central College and the benefits of implementing database design to its current working situation.

CURRENT SYSTEM OF WORK

P&J Central library is a place that has a collection of books that are managed by its librarians. The main roles and responsibilities of these librarians for managing the library include:
- Collect and catalog all the books.
- Maintain library records and keep it updated.
- Perform regular Audits of the inventory.
- Oversee the issuance and returns of books.
- Maintain the record of collected fine.

Currently, all these recordings and bookkeeping's are done manually. It was noticed by P&J Central library authorities that recording manually is not only time consuming but also costly to later maintain and store securely. It was also noticed that chances of errors are high and more staff needs to be hired to cater to the increasing footfall at the library.

As an effective and efficient solution to all of the above it was decided to replace manual recordings and implement database system into the library. Hence, Library management system was developed and successfully employed by our Business Analyst team.

PROJECT AIM AND OBJECTIVE

- To eliminate the paper work in library.
- Manage library effectively as well as cost-effectively.
- To keep all the records safe and secured.

FUNCTIONALITY OF DATABSE

- To record every book transaction of issuance and returns accurately.
- To no more miss on collecting fines due to missing records.
- Quickly find the records of borrowers.
- Finding book availability made convenient for the librarians.
- Audits can be done more conveniently.
- Easy to have a count of total fines collected.
- Help in new book purchase decisions by conveniently showing total count of books under different categories.

CONCLUSION

This database is intended to automate the library activities such as recording new borrowers, giving books to the borrowers, maintaining records of all the books available at the library, books being returned to the library, current condition of the book issued etc. It also helps the librarians by providing information such as total copies available of each book, list of books that belong to a

particular category, when will the book be available if already issued currently, how much to fine the borrowers for later returns etc.

PROJECT DESCRIPTION

INTRODUCTION

P&J CENTRAL LIBRARY is one of the oldest buildings at the P&J Central College and serves students, faculty and researchers at their library. The library supports the campus's academic quests, providing resources and staff to guide constituents in the complex process of discovery and efficient use of informational materials.

Library relies on bookkeeping to manage records of all its books as well as of all its borrowers. Maintaining these records is time taking as well costly affair to later store them securely. Chances of records missing and errors in recordings are high.
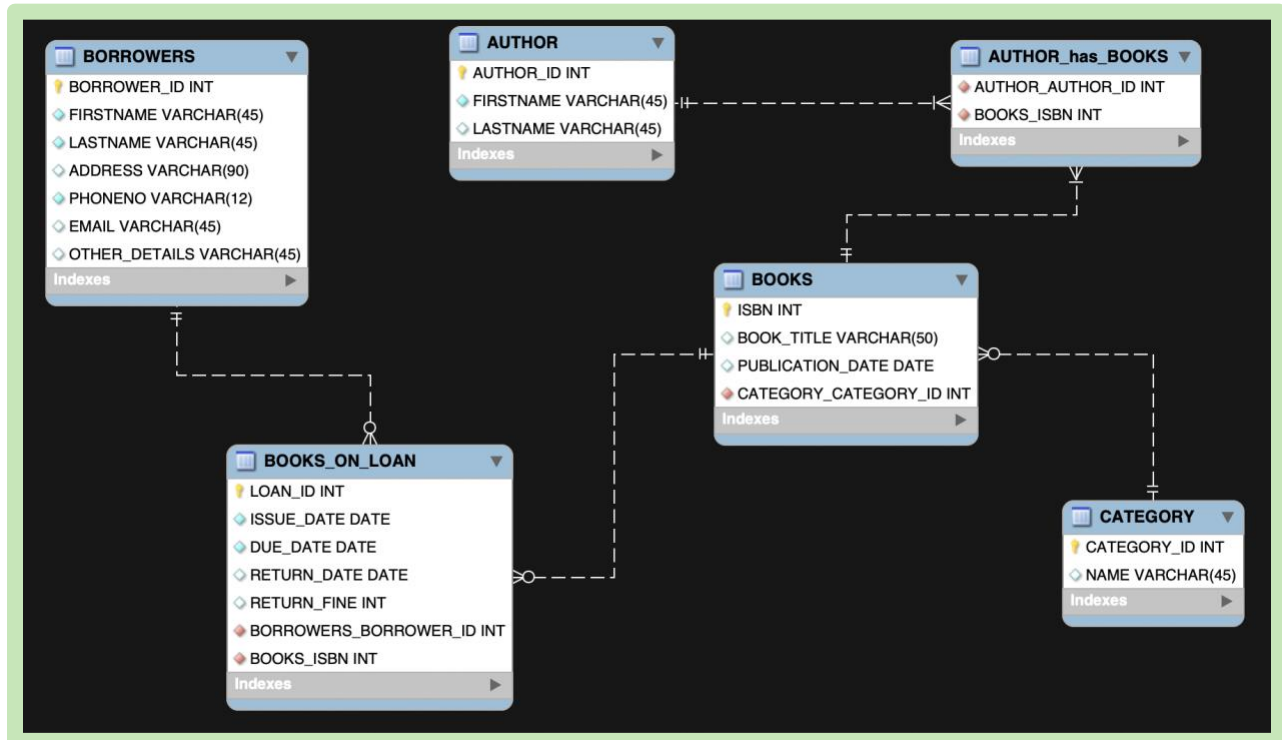
Library management system can help librarians keep track of all the books that are issued as well as returned, the condition of the book on issuance and return, the fine collected for returns after due date as well as a comprehensive list of all the books available in the library under different categories such as fiction, history, sci-fi etc. It can also help the management in making decisions regarding new purchases of the books by providing a total count of books under different categories, total count of books with same title as well as list of books most frequently borrowed or never issued at all.

BUSINESS REQUIREMENTS

The following set of requirements will be focused on while designing the library management system:

- Each book will have a unique identification number to identify it quickly.
- Any librarian will be able to search books by their title, author, category, ISBN as well as publication date.
- Any librarian will be able to retrieve information about the borrowers and book details as well as the count of books borrowed by them.
- The librarian will be able to reflect fines for books returned after due date.
- For Audit purposes librarians will be able to provide a sum number of total fines collected in particular period.
- The librarians will be able to register all the details regarding the Books, Borrowers, Books on loan, Authors, Genres of books.

DATABASE DESIGN: ER DIAGRAM

FOUNDATION OF ER DIAGRAM

The ER diagram depicts the various relationships between different entities considering the below rationales:

- There are several borrowers in the library and each borrower has a unique identification.
- Each borrower can borrow zero or many books on loan.
- Each book must be loaned to one borrower at a time.
- A book may be written by one or many authors together.
- An author may have written many books.
- Each book can be issued more than once or never at all.
- A book can fall under one or more categories.
- Each category may have zero books under it or many books.

- Each book has an ISBN, publication date and title to distinguish it.

NORMALIZATION

TABLE 1) BORROWERS

BORROWERS (<u>BORROWER_ID</u>, FIRSTNAME, LASTNAME, ADDRESS, PHONENO, EMAIL, OTHERDETAILS)

Functional Dependencies

BORROWER_ID → (FIRSTNAME, LASTNAME, ADDRESS, PHONENO, EMAIL, OTHERDETAILS)

This relation is already in BCNF because there is no functional dependency.

TABLE 2) BOOKS ON LOAN

BOOKS_ON_LOAN (<u>LOAN_ID</u>, ISSUE_DATE, DUE_DATE, RETURN_DATE, RETURN_FINE, BORROWERS_ID, ISBN)

Functional Dependencies

LOAN_ID → (ISSUE_DATE, DUE_DATE, RETURN_DATE, RETURN_FINE, BORROWER_ID, BOOKSISBN)

    WHERE BOOKS_ON_LOAN.BORROWERID must exist in BORROWERS.BORROWER_ID

    WHERE BOOKS_ON_LOAN.ISBN must exist in BOOKS.ISBN

This relation is now in BCNF because there is no functional dependency.

TABLE 3) AUTHOR

AUTHOR (<u>AUTHOR_ID</u>, FIRSTNAME, LASTNAME)

Functional Dependencies

AUTHOR_ID → (FIRSTNAME, LASTNAME)

This relation is already in BCNF because there is no functional dependency.

TABLE 4) BOOKS

BOOKS (ISBN, BOOK_TITLE, PUBLICATION_DATE, CATEGORY_ID)

Functional Dependencies

ISBN → (BOOK_TITLE, PUBLICATION_DATE)

WHERE BOOKS.CATEGORY_ID must exist in CATEGORY.CATEGORY_ID

This relation is now in BCNF because there is no functional dependency.

TABLE 5) CATEGORY

CATEGORY (CATEGORY_ID, NAME)

Functional Dependencies

CATEGORY_ID → (NAME)

It is already in BCNF because there is no functional dependency.

TABLE 6)

AUTHOR_HAS_BOOKS (AUTHOR_ID, ISBN)

It is already in BCNF because there is no functional dependency.

DATABASE IMPLEMENTATION

A Project_final.sql file has been uploaded on blackboard.

CONCLUSION

Database Management can be very well used in organizing similarly as manipulating information. Library Management system allows higher authorities to focus on the library department's functioning and conjointly allows librarians and users to maximize time utility and potency. They conjointly get to understand how well-maintained the record of issued books and fine assortment is, other than this management is additionally having the ability to trace the financial gain from fines thanks to late submissions of books.
Additionally, the librarians and also the management will get reports with numerous productive information. There will be reports on borrowing and returns, which might be engendered in numerous formats. Such reports will facilitate with ease within the decision-making procedure. It conjointly keeps the record of all suppliers and bookbinders. A well-organized library management system can enhance the potency of the library. this type of high-quality system ought to modify the librarians experience to supervise library resources in a very more practical way by saving time and energy. Thanks to the fast to implement and simple to line up database management system that needs solely borderline maintenance when installation and might be cheaper than hiring a lot of staff.