RV COLLEGE OF ENGINEERING®
BENGALURU – 560059
(Autonomous Institution Affiliated to VTU, Belagavi)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

"Online Library Management System"

PROJECT REPORT
DATABASE DESIGN LAB(18CS53)
V SEMESTER

2021-2022

Submitted by

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CERTIFICATE

Certified that the **Mini-**Project work titled "Online library management system" has been carried out by Navnith Bharadwaj 1RV19CS098, Nikiram C 1RV19CS102, Perla Leela Charan 1RV19CS111**,** bonafide students of RV College of Engineering, Bengaluru, have submitted in partial fulfillment for the **Assessment of Course: DATABASE DESIGN PROJECT (18CS53)** during the year 2021-2022. It is certified that all corrections/suggestions indicated for the internal assessment have been incorporated in the report.

Faculty Incharge
Department of CSE,
RVCE., Bengaluru –59

Head of Department
Department of CSE,
RVCE, Bengaluru–59

DECLARATION

We, Navanith Bharadwaj 1RV19CS098, Nikiram C 1RV19CS102, Perla Leela Charan 1RV19CS111, the students of 5th Semester B.E., Department of Computer Science and Engineering, R.V. College of Engineering, Bengaluru hereby declare that the mini-project titled **"Online Library Management System"** has been carried out by us and submitted in partial fulfillment for the **Assessment of Course: DATABASE DESIGN PROJECT (18CS53)** during the year 2021-2022.

Place: Bengaluru **Signature Date:22-12-2021**

ACKNOWLEDGEMENT

Any achievement, be it scholastic or otherwise does not depend solely on the individual efforts but on the guidance, encouragement and cooperation of intellectuals, elders and friends. A number of personalities, in their own capacities have helped us in carrying out this project work. We would like to take this opportunity to thank them all.

I deeply express my sincere gratitude to my guide Poonam Ghuli**, Associate professor,** Department of CSE, RVCE, Bengaluru, for her able guidance, regular source of encouragement and assistance throughout this project

I would like to thank **Dr.Ramakanth Kumar P**, Head of Department, Computer Science & Engineering, R.V.C.E, Bengaluru, for his valuable suggestions and expert advice.

First and foremost I would like to thank **Dr. Subramanya K N**, Principal, R.V.C.E, Bengaluru, for his moral support towards completing my project work.

I thank my Parents, and all the Faculty members of the Department of Computer Science & Engineering for their constant support and encouragement.

Last, but not the least, I would like to thank my peers and friends who provided me with valuable suggestions to improve my project.

Abstract

Online Library Management System is a system which maintains the information about the books present in the library, their authors, the members of the library to whom books are issued, library staff and all. The system helps us to keep track of the books taken by the users. Our system can provide recommendations of books to a user based on what he is searching for. This is very difficult to organize manually.

Maintenance of all this information manually is a very complex task. Owing to the advancement of technology, organization of an Online Library becomes much simpler. The Online Library Management has been designed to computerize and automate the operations performed over the information about the members, book issues and returns and all other operations. This computerization of the library helps in many instances of its maintenance. It reduces the workload of management as most of the manual work done is reduced.

The system successfully helps to keep record of the books taken by the users for their own purpose. Our system can successfully give recommendations of books to a user based on what he is looking for on the website.

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GLOSSARY

Operating system- Windows 7 is used as the operating system as it is stable and supports more features and is more user friendly

Database MYSQL-MYSQL is used as database as it easy to maintain and retrieve records by simple queries which are in English language which are easy to understand and easy to write.

Development tools and Programming language- HTML is used to write the whole code and develop web pages with css, javascript for styling work and spring boot for server side scripting.

Chapter 1

Introduction

An online library management system can be a system that manages the knowledge of books in the library, their authors, librarians, distributed books, library staff, and everyone else. It's very difficult to organize this manually. Maintaining all this information manually can be a daunting task. Advances in technology have made it much easier to organize your online library. The online library management system is designed to computerize and automate the operations performed through the knowledge of members, the issuance and return of books, and all other operations. This computerization of the library often helps with its maintenance. Most of the manual work is reduced, which reduces the administrative workload[2].

1.1 Objective

Our objective is to create an online library management system which is designed to computerize and automate the operations performed through the knowledge of members, the issuance and return of books, and all other operations. This computerization of the library often helps with its maintenance. Most of the manual work is reduced, which reduces the administrative workload.

1.2 Scope

- Individually each member will have his account through which he can access the information he needs.
- Book details like authors, present available number of books ,reference books non-reference books will be available for the user.
- Issue dates and returns of each member are maintained separately and fine charged if there is any delay in returning the book.
- Administrator can add ,update the books.
- The system contains recommendation software which will give recommendation of best books to the students

1.3 Proposed System

In the proposed system we have almost all the above functionality along with following improvement

- Facility to download required books and read them online.
- The system will recommend the most popular books to the students depending on their search.
- Students and staff can report the issues and the problems will be looked after and staff can try to solve it as soon as possible.
- Anyone who has access to the library(especially Students) can give ratings on the books and the staff can decide which books can be added in order to increase the students interest and likewise if the ratings are too low the books can be remove

1.4 Societal Concern and Innovative Component

This website provides a computerized version of the library management system that benefits both students and library staff. The entire process of students finding books, staff writing reports, and trading books goes online. There is also a login option for students, who can log in to check the status of published books and request or suggest books. It has a faculty login function that allows faculty members to add lecture notes, make necessary suggestions to the library, and add information about workshops and events taking place in or near the university to the online bulletin board. increase. The facility has a future that will recommend the most popular books to the students depending on the book they are looking for in the library management system. This makes it interactive and easy to use and fills your project. The needs of each user were met in the best possible way.

Chapter 2

Requirement Specification

A software requirements specification (SRS) is a description of a software system to be developed. The software requirements specification lays out functional and non-functional requirements, and it may include a set of use cases that describe user interactions that the software must be provided to the user for perfect interaction.

Software requirements specification establishes the basis for an agreement between customers and contractors or suppliers on how the software product should function (in a market-driven project, these roles may be played by the marketing and development divisions). Software requirements specification is a rigorous assessment of requirements before the more specific system design stages, and its goal is to reduce later redesign. It should also provide a realistic basis for estimating product costs, risks, and schedules[3].

2.1 Hardware Requirements

Intel core i5 2nd generation is used as a processor because it is fast than other processors and provide reliable and stable service and we can run our pc for longtime. By using this processor

We can keep on developing our project without any worries.

Ram 1 GB is used as it will provide fast reading and writing capabilities and will in turn support in processing.

2.2 Software Requirements

Operating system- Windows 7 is used as the operating system as it is stable and supports more features and is more user friendly

Database MYSQL-MYSQL is used as database as it easy to maintain and retrieve records by simple queries which are in English language which are easy to understand and easy to write.

Development tools and Programming language- HTML is used to write the whole code and develop web pages with css, javascript for styling work and spring boot for server side scripting.

2.3 Functional Requirements

1. USER LOGIN

Description of feature This feature is used by the user to login into the system. They are required to enter user id and password before they are allowed to enter the system.

- The user id and password will be verified and if invalid id is there user is allowed
- to not enter the system.
- user id is provided when they register
- The system must only allow users with valid id and password to enter the system.
- The system performs authorization process which decides what user level can
- access to.
- The user must be able to logout after they finished using the system.

2. REGISTER NEW USER

This feature can be performed by all users to register new users to create accounts.

- System must be able to verify information
- System must be able to delete information if information is wrong

3. REGISTER NEW BOOK

This feature allows to add new books to the library

- System must be able to verify information
- System must be able to enter a number of copies into the table.
- System must be able to not allow two books having the same book id.

4. SEARCH BOOK

This feature is found in the book maintenance part . we can search book based on book id , book name , publication or by author name.

- System must be able to search the database based on select search type System must
- be able to filter book based on keyword entered
- System must be able to show the filtered book in table view Functional
- requirements
- System should be able to add detailed information about events.
- System should be able to display information on notice board available in the
- homepage of site

Chapter 3

ER Diagram

An Entity Relationship (ER) Diagram is a type of flowchart that illustrates how “entities” such as people, objects or concepts relate to each other within a system. ER Diagrams are most often used to design or debug relational databases in the fields of software engineering, business information systems, education and research. Also known as ERDs or ER Models, they use a defined set of symbols such as rectangles, diamonds, ovals and connecting lines to depict the interconnectedness of entities, relationships and their attributes[4].

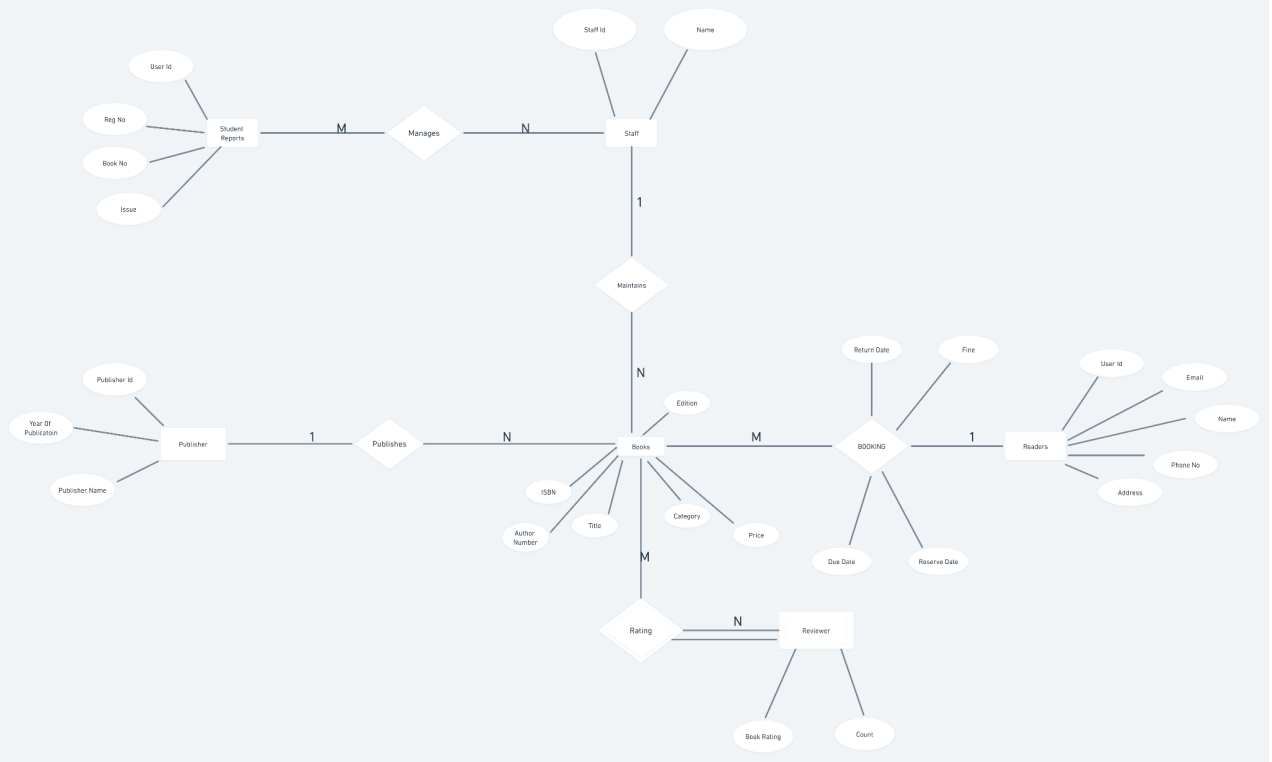

FIG 3.1-ER DIAGRAM OF E-LIBRARY

Entities

1. Books
2. Publisher
3. Readers
4. Reviewer(Weak entity)
5. Staff
6. Student Reports

Attributes

1. BOOKS(author number, isbn, title, edition, category, price, publisher id)
2. PUBLISHER(publisher id, year of publication, publisher name)
3. READERS(user id, email, name, phone no, address)
4. REVIEWER(book rating, count, isbn)
5. STAFF(name, staff id, isbn)
6. STUDENT REPORTS(user id, issue, book no, reg no)

Relations

1. Publishes - Relation between Publisher and Books, it is of 1:N relation from publisher to books since one publisher can publish many books and one book cannot be published by many publishers.
2. Rating - Relation between Books and Reviewer, it is of M:N relation with total participation of reviewer from books to reviewer since one book can be rated by many reviewers and many books can be rated by one reviewer.
3. Booking - Relation between Books and Readers, it is of M:1 relation between books and readers since many books can be booked by a single student and a single book cannot be booked by many students.
4. Maintains - Relation between Books and Staff, it is of 1:N relation from staff to books assuming a single staff maintains all the books.
5. Manages - Relation between Student Reports and Staff, it is of M:N relation from student reports to staff assuming many staffs manage many reports of the students.(All these relations are referred from the fig 3.1)

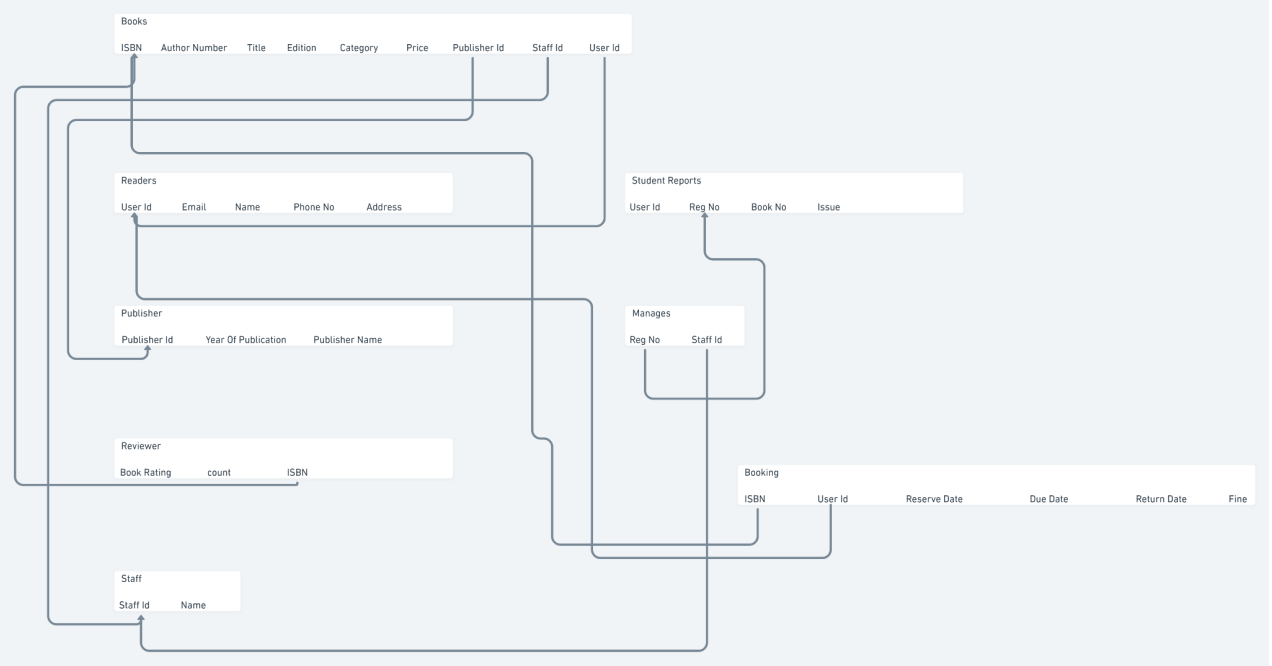

FIG 3.2-ENTITY RELATIONAL MAPPING OF E-LIBRARY

The ER diagram as shown in fig 3.2 is converted into a table with the help of relation mappings.

1. The cardinality ratio between publisher and books is 1:N, hence we will combine entity set books and relationship set publishes with the primary key of the entity set publisher.
2. The cardinality ratio between reviewer and books is M:N, hence we will have three tables, entity set reviewer, entity set books and relationship set rating.
3. The cardinality ratio between books and readers is M:1, hence we will have a table by combining entity set books and relationship set booking along with the primary key of the entity set readers and another table for the entity set readers.
4. The cardinality ratio between staff and books is 1:N, hence we will have a table by combining entity set books and relationship set maintains along with the primary key of the entity set staff and another table for the entity set staff.
5. The cardinality ratio between staff and staff reports is M:N, hence we will have three tables, entity set staff, entity set staff reports and relationship set manages. Hence, in total we will have 8 tables

Chapter 4

Detailed Design

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled. They can be used to analyze an existing system or model a new one[5].

4.1 DFD level 0

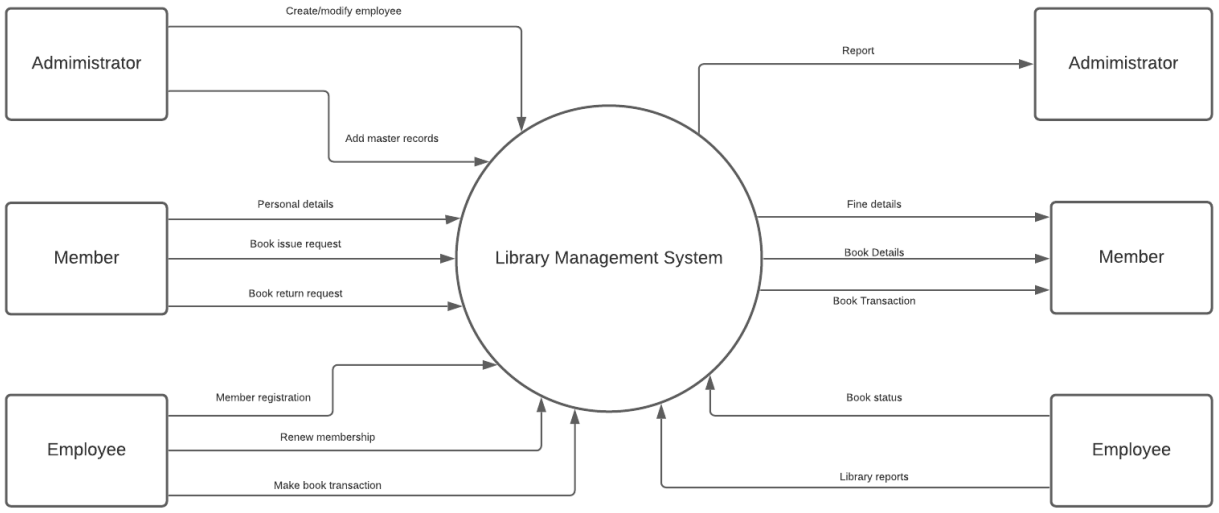

FIG 4.1-DFD LEVEL 0 OF E-LIBRARY

There are three eternal entities as referred from the fig 4.1: Administrator,Member and Employee.Administrator can create or modify employees.Members can add their personal details ,Request for new book and request to return the book.Employee will verify the member registration and add them to the database,they can renew membership for existing members and authenticate transactions.

After processing the requests, members will get back details like rating of the book, fine amount in case he returned the book late and all the transactions he made. Employees will provide the details of book status. If there are any issues provided by the users the reports will be sent to the administrator.

4.2 DFD level 1

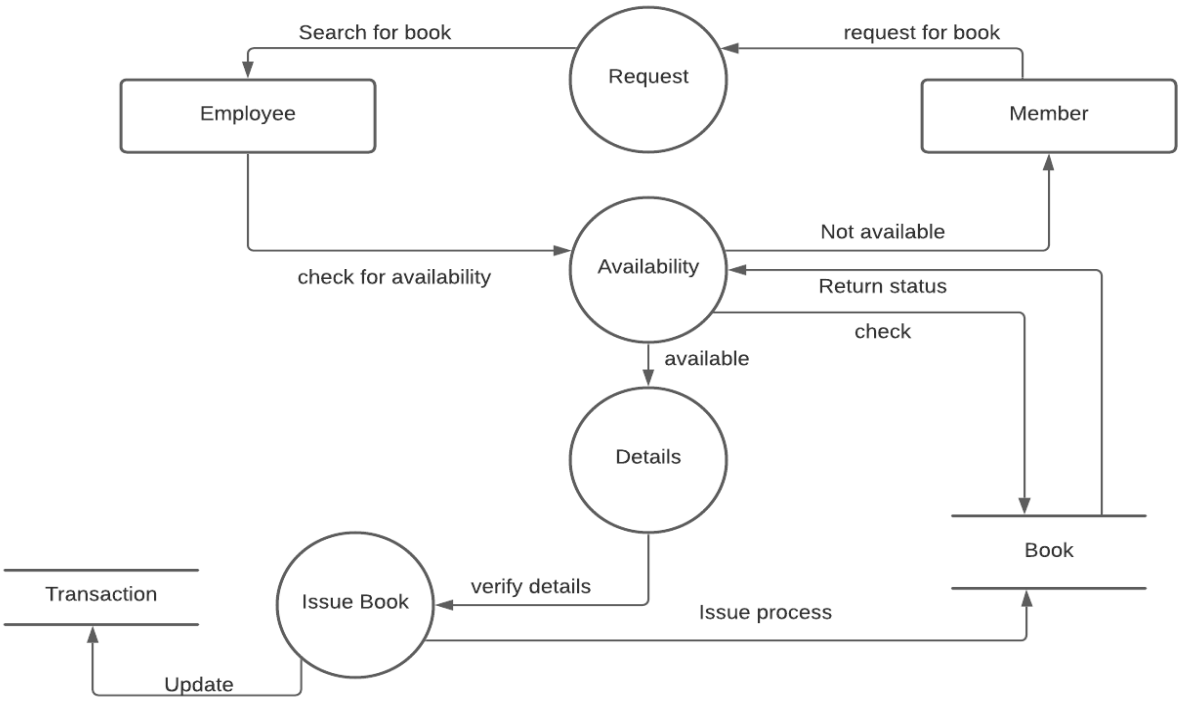

FIG 4.2-DFD LEVEL 1 OF E-LIBRARY

There are four processes:

1.Request:When a member requests for a book it will send a request to check for the availability.

2.Availability: This process will check for the availability of the requested book, if it is available it will send a request to check if the member has a subscription.If not this will send back a message to the member that the book is not available.

3.Details: This will verify the details of the member and send the request to the issue book.

4.Issue Book: This process will update the Transaction in the transaction database and Issue the book and update the availability of the books.

Chapter 5

Relational Schema and Normalization

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled. They can be used to analyze an existing system or model a new one.

5.1 Relational Schema

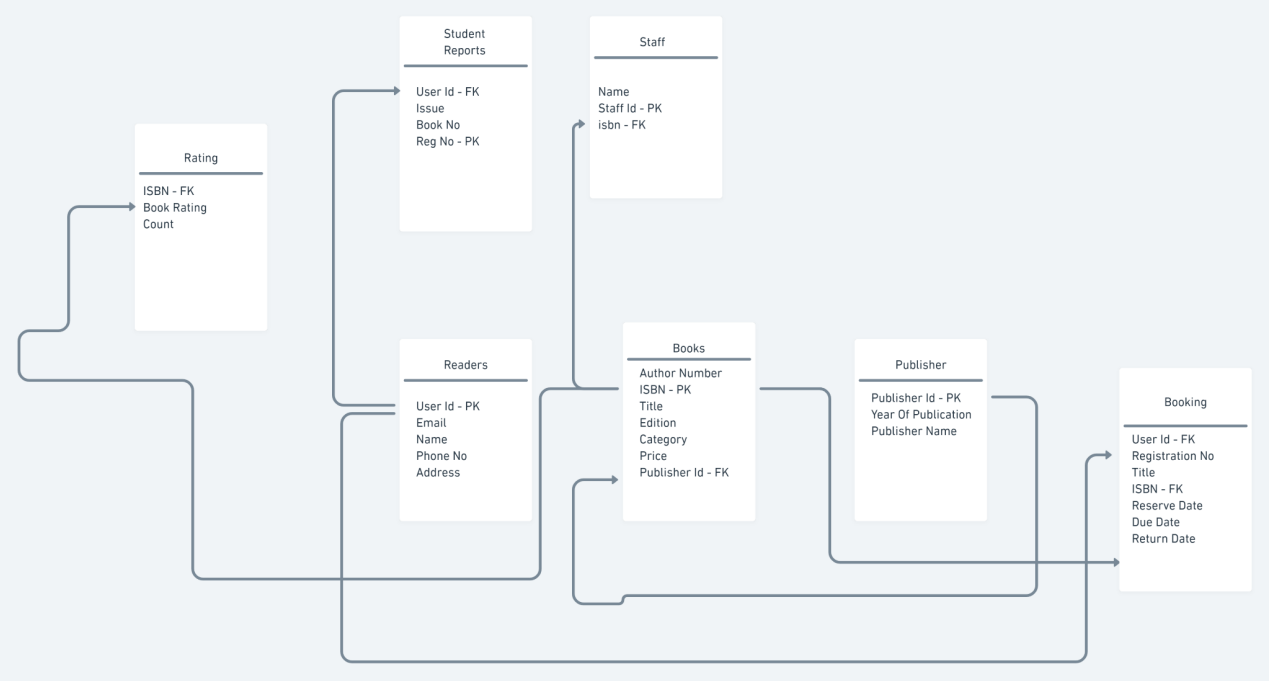

FIG 5.1-RELATIONAL SCHEMA OF E-LIBRARY

The ER diagram as shown in fig5, is converted into a table with the help of relation mappings.

1. The cardinality ratio between publisher and books is 1:N, hence we will combine entity set books and relationship set publishes with the primary key of the entity set publisher.
2. The cardinality ratio between reviewer and books is M:N, hence we will have three tables, entity set reviewer, entity set books and relationship set rating.
3. The cardinality ratio between books and readers is M:1, hence we will have a table by combining entity set books and relationship set booking along with the primary key of the entity set readers and another table for the entity set readers.
4. The cardinality ratio between staff and books is 1:N, hence we will have a table by combining entity set books and relationship set maintains along with the primary key of the entity set staff and another table for the entity set staff.

5. The cardinality ratio between staff and staff reports is M:N, hence we will have three tables, entity set staff, entity set staff reports and relationship set manages. Hence, in total we will have 8 tables

5.2 Normalization

Normalization is the process of minimizing redundancy from a relation or set of relations. Redundancy in relation may cause insertion, deletion, and update anomalies. So, it helps to minimize the redundancy in relations. Normal forms are used to eliminate or reduce redundancy in database tables.

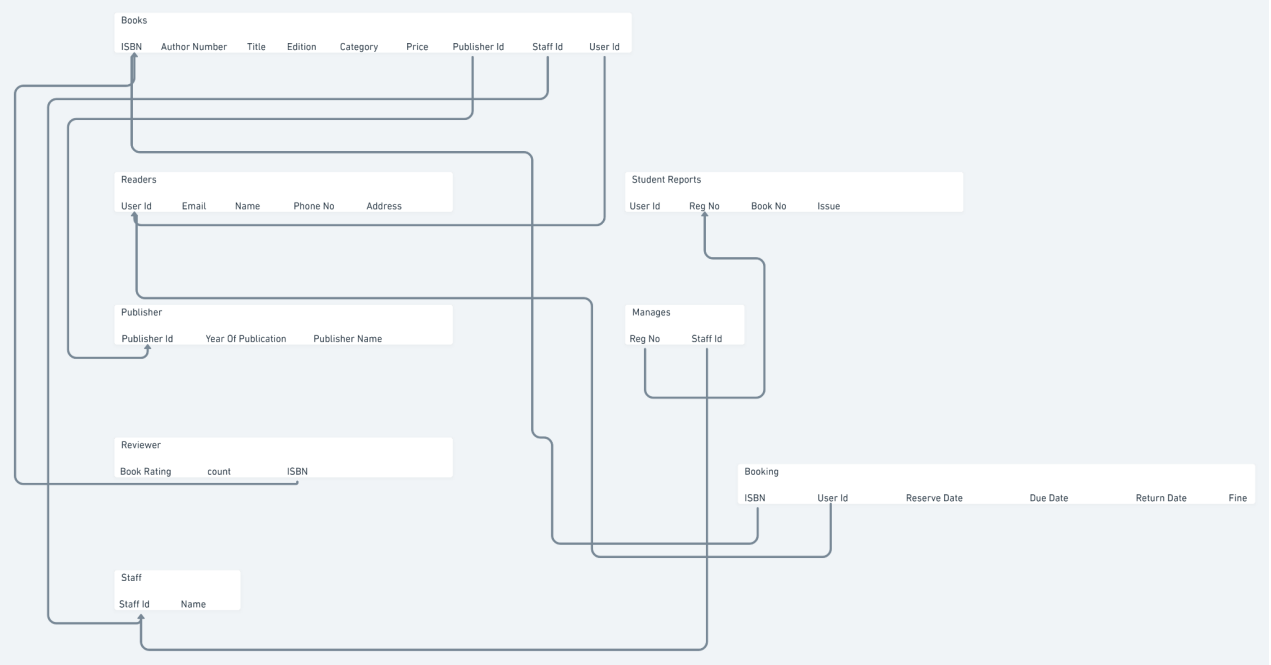

FIG 5.2-RELATIONAL SCHEMA OF E-LIBRARY

1. First Normal Form(NF1)

   The above table is already in NF1 form, since it does not contain any composite or multi-valued attributes. Every attribute in the relation is atomic/single valued attribute,

   For example, in the relation table STUDENT REPORTS, all its columns/attributes are of atomic type, no single attribute has multiple values for a single instance(similarly for all the remaining relation tables). Hence the tables are already in NF1 form.

2. Second Normal Form(NF2)

   The present table does not contain any partial dependency, hence it is in second normal form. Partial dependency is defined as, If the proper subset of candidate key determines non-prime attribute.

   For example, in the relation table PUBLISHER, the candidate key is {PUBLISHER ID}

and non primary attributes are {YEAR OF PUBLICATION, PUBLISHER NAME}. These two non primary attributes are not dependent on the candidate key(similarly for all the remaining relation tables). Hence the tables are already in NF2 form

3. Third Normal Form(NF3)

   The relation does not contain any transitive dependency for non-prime attributes. Consider the relation table STAFF, the functional dependency present is {STAFF ID -> NAME}, hence there is no transitive dependency(similarly for all the remaining relation tables). Hence the table is in NF3.

Chapter 6

NoSQL Component

NoSQL databases (aka "not only SQL") are non-tabular databases and store data differently than relational tables. NoSQL databases come in a variety of types based on their data model. The main types are document, key-value, wide-column, and graph. They provide flexible schemas and scale easily with large amounts of data and high user loads.

Each NoSQL database has its own unique features. At a high level, many NoSQL databases have the following features:

- Flexible schemas
- Horizontal scaling
- Fast queries due to the data model
- Ease of use for developers

For the innovative component, we are providing recommendations of books featured to the students. For this system, we are planning to store the required data of the recommended books in the NoSQL database.We are using mongodb for NoSQL part to store the rating of the user.
The data obtained from the user is stored in json format which is then connected to the machine learning model for the recommender system.

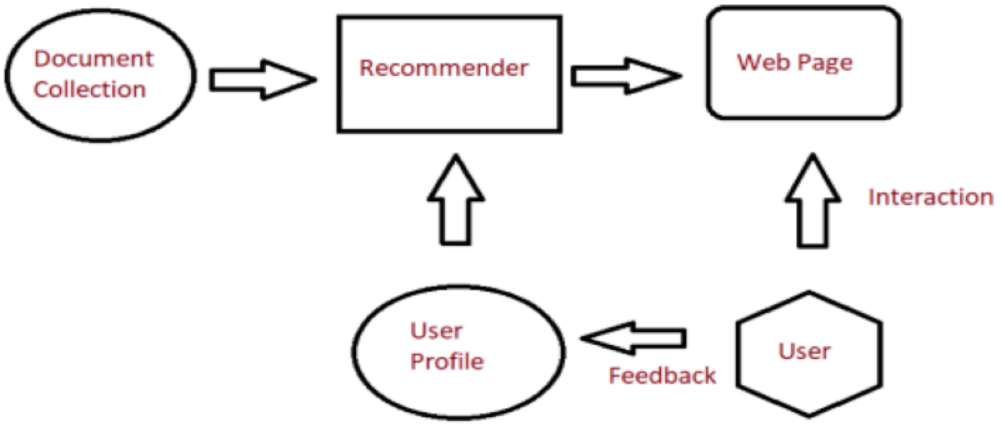

FIG 6.1-RECOMMENDER SYSTEM OF E-LIBRARY

Chapter 7

Conclusion and Future Enhancement

To conclude, our project can be used by many colleges or library departments instead of using traditional libraries which is a tedious task. The system is very simple and very easy to use. It also recommends the most popular/best books to the students when they are searching for the books and this data is stored in the NoSQL database.

Our project can be further enhanced by providing a feature of sentimental analysis on the comments commented by the various students on various books.

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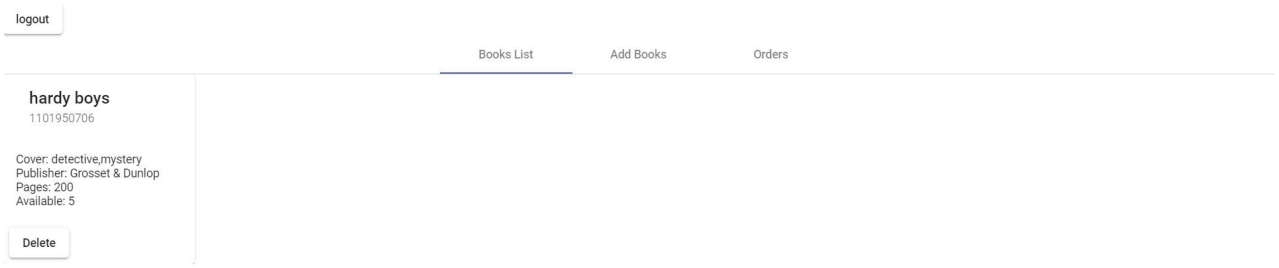
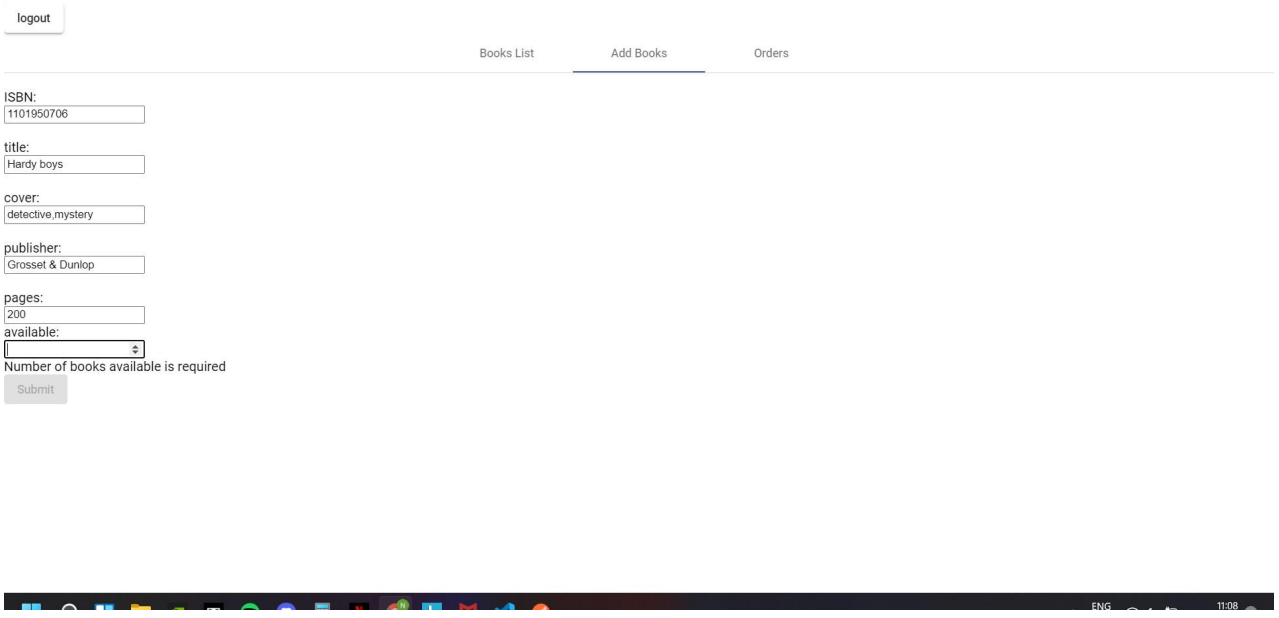
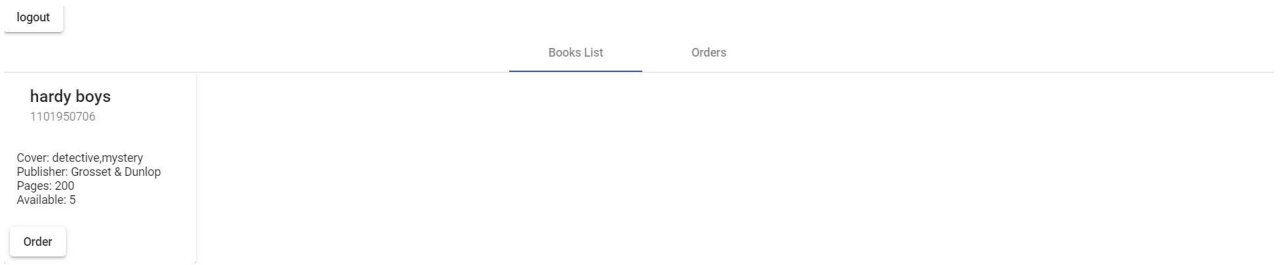
4. https://www.lucidchart.com/pages/er-diagrams
5. https://en.wikipedia.org/wiki/Data-flow_diagram

Appendix

Snapshots



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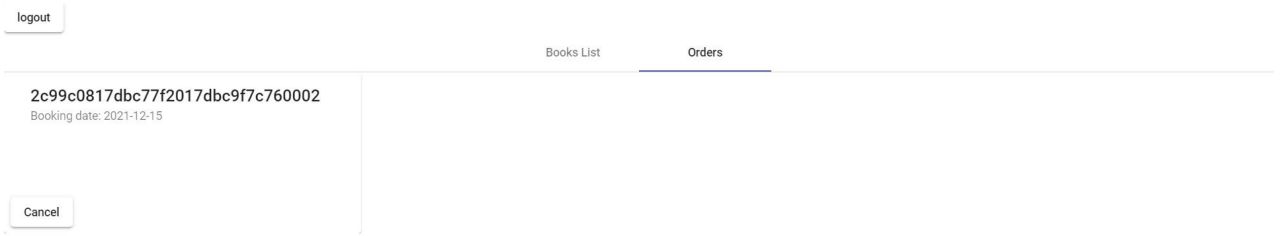
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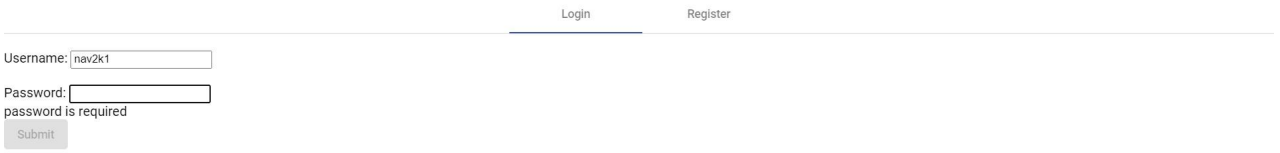
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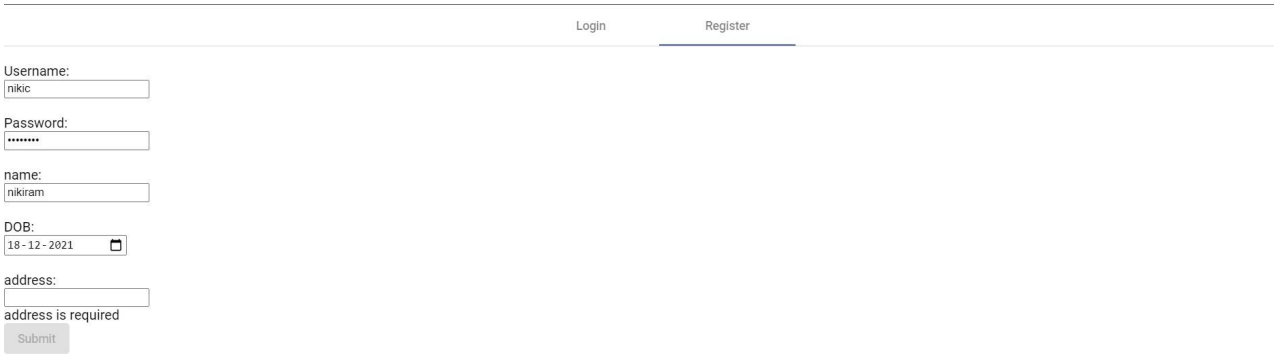

Source Code-

https://drive.google.com/drive/folders/1Fiu3jlrz4g74cGvLsqg3dORhUvLTwe4S?usp=sharing