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INTRODUCTION OF PROBLEM

The aim of the project is to develop a simple Library application with a centralized and personalized features.

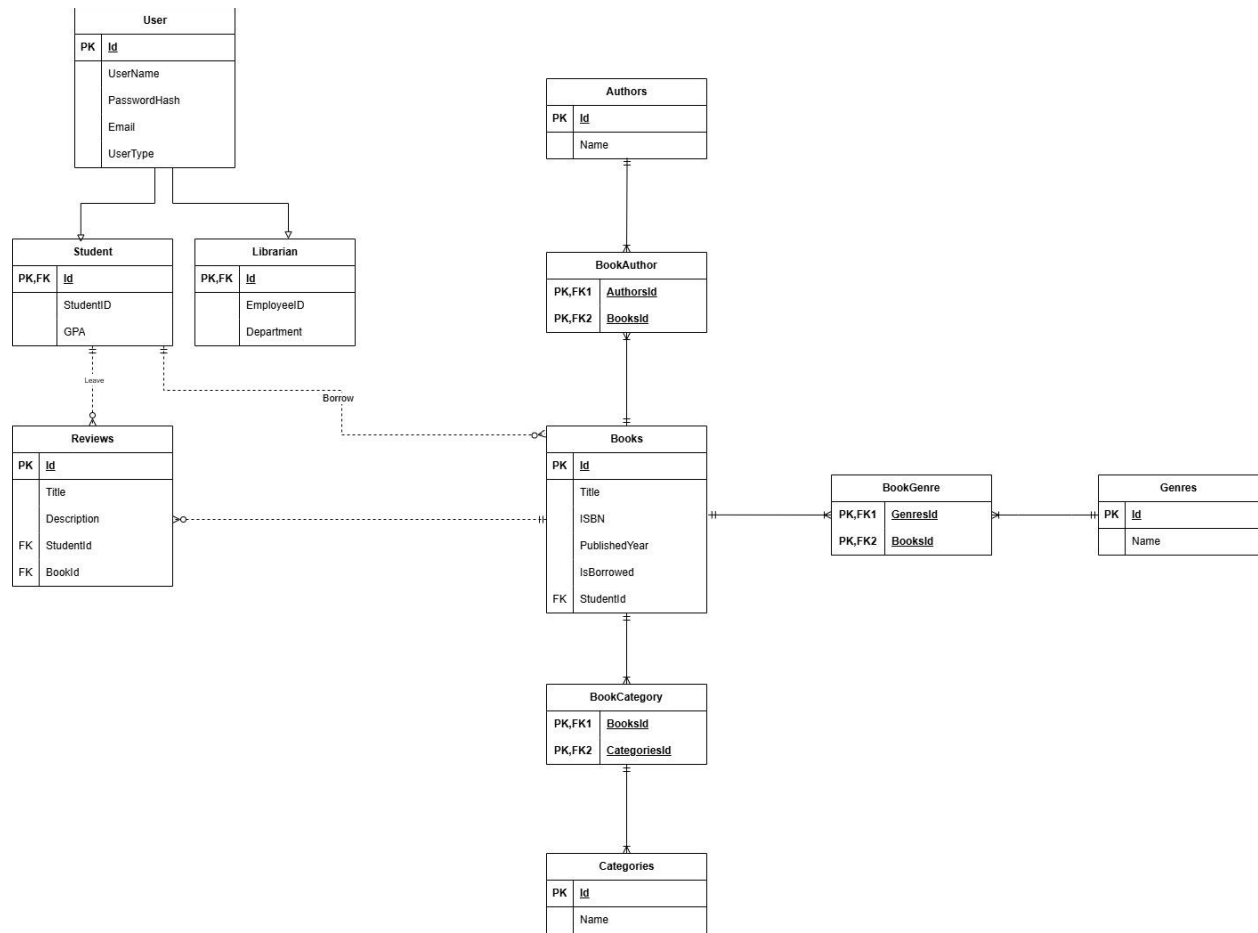Users roles are distinct with authentication and authorization processes.

Users can perform actions like adding,searching,updating ,deleting or borrowing of the books and adding and reviewing reviews , tailored to their roles.

BUSINESS RULES

The business rules of the demo Library application is as follows ;

- In the system, user can exist in just 2 categories a Librarian and Student .
- Each User has a Id,Username, PasswordHash,Email,UserType.
- Librarian and Student have also some specific attributes which are written in the next business rules.
- Librarian information should additionally include EmployeeID and Department information .
- Student information should additionally include StudentID and GPA information.
- Only a student can register to the system.
- Books information should Include Title,ISBN,PublishedYear,IsBorrowed attributes
- Each Student can borrow many books but a book can be borrowed by only one student
- Reviews information should include Title,Description information
- Each Student can leave a review but a review can be left by only one student.
- A book can have many reviews but a review is about only one book.
- Authors info should include Id and Name attributes
- An Author can have many books and a book can have many authors.
- Genres info should include Id and Name attributes.
- A Genre can have many books and a book can have many genres.
- Categories info should include Id and Name attributes.
- A category can have many books and a book can have many categories.
- A student can borrow and list books and leave and list a review.
- A Librarian can add, update ,delete and list books as well as list reviews.

ENTITY RELATIONSHIP DIAGRAM CROW'S FOOT NOTATION

User

PK	Id
	UserName
	PasswordHash
	Email
	UserType

Authors

PK	Id
	Name

Student

PK,FK	Id
	StudentID
	GPA

Librarian

PK,FK	Id
	EmployeeID
	Department

BookAuthor

PK,FK1	AuthorsId
PK,FK2	BooksId

Leave

Borrow

Reviews

PK	Id
	Title
	Description
FK	StudentId
FK	BookId

Books

PK	Id
	Title
	ISBN
	PublishedYear
	IsBorrowed
FK	StudentId

BookGenre

PK,FK1	GenresId
PK,FK2	BooksId

Genres

PK	Id
	Name

BookCategory

PK,FK1	BooksId
PK,FK2	CategoriesId

Categories

PK	Id
	Name

TEXTUAL SCHEMA OF THE LIBRARY APPLICATIONS DATABASE

User(<u>Id:int</u> , UserName : varchar(100) , PasswordHash : Text , Email : varchar(150) , UserType : varchar(50)),

Student(<u>Id:int</u> , StudentId : varchar(50) , GPA:Numeric , <mark>Id:int</mark>),

Librarian (<u>Id:int</u> , EmployeeId : varchar(50) , Department : varchar(100) , <mark>Id:int</mark>),

Reviews (<u>Id:int</u> , Title : varchar(100) , Description : varchar(250) , <mark>StudentId:int,BookId:int</mark>),

Books (<u>Id:int</u> , Title : varchar(200) , ISBN : varchar(20) , PublishedYear : int , IsBorrowed : Boolean , <mark>StudentId:int</mark>),

Genres (<u>Id:int</u> , Name : varchar(50)),

Authors (<u>Id:int</u> , Name:varchar(50)),

Categories (<u>Id:int</u> , Name:varchar(50)),

BookAuthor (<mark><u>AuthorsId:int , BooksId:int</u></mark>),

BookGenre (<mark><u>GenresId:int , BooksId:int</u></mark>),

BookCategory (<mark><u>CategoriesId:int , BooksId:int</u></mark>)

Primary Key's are represented Underlined : <u>ID</u> ,

Foreign Key's are represented Highlighted : <mark>Foreign Key,</mark>

SEARCH OPERATION

Before searching anything:

ORIGINAL LIST

Books

Search Books

Search Books by Title

Search

Title	ISBN	Published Year	Authors	Genres	Categories	Borrowed By	Review	Action
The Hobbit	9780547928227	1937	Roland Goure	Mythic	TextBook	Emily	Leave Review	Borrowed
Brave New World	9780060850524	1932	Adrian Tomine	Fiction	BestSeller	Not Borrowed	Leave Review	Borrow
The Great Gatsby	9780743273565	1925	Khaled Hosseini	Novel, Non-Fiction	Reference	Alice	Leave Review	Borrowed
Moby Dick	9781853260087	1851	Mark Leslie	Biography	TextBook	Not Borrowed	Leave Review	Borrow
War and Peace	9780199232765	1869	Tolstoy	History	TextBook	Not Borrowed	Leave Review	Borrow
The Lord of the Rings	9780618640157	1954	Jodi Picoult	Mythic	TextBook	Amy	Leave Review	Borrowed
The Alchemist	9780061122415	1988	Roland Goure	Novel	BestSeller	Not Borrowed	Leave Review	Borrow
The Brothers Karamazov	9780374528379	1880	Colm Toibin	Western	Reference	Not Borrowed	Leave Review	Borrow
Anna Karenina	9780143035008	1877	Ayn Rand	Non-Fiction, Novel	Poetry	Beyza	Leave Review	Borrowed

AFTER Searching:

Books

Search Books

War and

Search

Title	ISBN	Published Year	Authors	Genres	Categories	Borrowed By	Review	Action
War and Peace	9780199232765	1869	Tolstoy	History	TextBook	Not Borrowed	Leave Review	Borrow

Books

Search Books

The

Search

Title	ISBN	Published Year	Authors	Genres	Categories	Borrowed By	Review	Action
The Hobbit	9780547928227	1937	Roland Goure	Mythic	TextBook	Emily	Leave Review	Borrowed
The Great Gatsby	9780743273565	1925	Khaled Hosseini	Novel, Non-Fiction	Reference	Alice	Leave Review	Borrowed
The Lord of the Rings	9780618640157	1954	Jodi Picoult	Mythic	TextBook	Amy	Leave Review	Borrowed
The Alchemist	9780061122415	1988	Roland Goure	Novel	BestSeller	Not Borrowed	Leave Review	Borrow
The Brothers Karamazov	9780374528379	1880	Colm Toibin	Western	Reference	Not Borrowed	Leave Review	Borrow
The Grapes of Wrath	9780143039433	1939	Khaled Hosseini	History	BestSeller	Not Borrowed	Leave Review	Borrow
Wuthering Heights	9780141439556	1847	Mark Leslie	Fiction	Reference	Alice	Leave Review	Borrowed
The Divine Comedy	9780142437223	1320	Adrian Tomine	Western, Biography, Drama	Classics	Not Borrowed	Leave Review	Borrow
The Iliad	9780140445923	1872	Colm Toibin	Mythic	Classics	Amy	Leave Review	Borrowed
The Odyssey	9780140268867	1973	Ayn Rand	Biography	Classics	Not Borrowed	Leave Review	Borrow
The Art of War	9781590302255	2013	Matt Groening	Literature	Academic	Alisa	Leave Review	Borrowed

CREATE OPERATION

Create Book

Title

HELLOOOOOOOOO

ISBN

9722233336353

Published Year

1999

Is Borrowed? ☐

Authors
- ☐ Mark Leslie
- ☐ Kimberly Foottit
- ☑ Tolstoy
- ☐ Jodi Picoult
- ☐ Roland Goure
- ☐ Adrian Tomine
- ☐ Colm Toibin
- ☐ Ayn Rand
- ☐ Khaled Hosseini
- ☐ Matt Groening
- ☐ Chuck Palahniuk

Genres
- ☑ Romance
- ☐ Science

Genres
- ☑ Romance
- ☐ Science
- ☐ Biography
- ☐ Mythic
- ☐ Drama
- ☐ Fiction
- ☐ Non-Fiction
- ☐ Novel
- ☐ Western
- ☐ History
- ☐ Literature

Categories
- ☐ TextBook
- ☑ BestSeller
- ☐ Academic
- ☐ Poetry
- ☐ Reference
- ☐ Classics

[Create Book]

AFTER CREATION

Books
Search Books

Search Books by Title

[Search]

Title	ISBN	Published Year	Authors	Genres	Categories	Borrowed By	Action
The Hobbit And The HAM	9780547928227	2000	Kimberly Foottit, Khaled Hosseini	History, Western, Non-Fiction	Reference	Not Borrowed	Update Delete
HELLOOOOOOOOO	9722233336353	1999	Tolstoy	Romance	BestSeller	Not Borrowed	Update Delete
Brave New World	9780060850524	1932	Adrian Tomine	Fiction	BestSeller	Not Borrowed	Update Delete
The Great Gatsby	9780743273565	1925	Khaled Hosseini	Novel, Non-Fiction	Reference	Alice	Update Delete
Moby Dick	9781853260087	1851	Mark Leslie	Biography	TextBook	Not Borrowed	Update Delete
War and Peace	9780199232765	1869	Tolstoy	History	TextBook	Not Borrowed	Update Delete
The Lord of the Rings	9780618640157	1954	Jodi Picoult	Mythic	TextBook	Amy	Update Delete
The Alchemist	9780061122415	1988	Roland Goure	Novel	BestSeller	Not Borrowed	Update Delete

UPDATE OPERATION

Books

Search Books

Search Books by Title

Search

Title	ISBN	Published Year	Authors	Genres	Categories	Borrowed By	Action
The Hobbit	9780547928227	1937	Roland Goure	Mythic	TextBook	Emily	Update Delete
Brave New World	9780060850524	1932	Adrian Tomine	Fiction	BestSeller	Not Borrowed	Update Delete
The Great Gatsby	9780743273565	1925	Khaled Hosseini	Novel, Non-Fiction	Reference	Alice	Update Delete

Update Book

Title
The Hobbit And The HAM

ISBN
9780547928227

Published Year
2000

Is Borrowed
No

Genres
- ☐ Romance
- ☐ Science
- ☐ Biography
- ☐ Mythic
- ☐ Drama
- ☐ Fiction
- ☑ Non-Fiction
- ☐ Novel
- ☑ Western
- ☑ History
- ☐ Literature

Authors
- ☐ Mark Leslie
- ☑ Kimberly Foottit
- ☐ Tolstoy
- ☐ Jodi Picoult
- ☐ Roland Goure
- ☐ Adrian Tomine
- ☐ Colm Toibin
- ☐ Ayn Rand
- ☑ Khaled Hosseini
- ☐ Matt Groening

(second column)
- ☐ Biography
- ☐ Mythic
- ☐ Drama
- ☐ Fiction
- ☑ Non-Fiction
- ☐ Novel
- ☑ Western
- ☑ History
- ☐ Literature

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- ☐ Roland Goure
- ☐ Adrian Tomine
- ☐ Colm Toibin
- ☐ Ayn Rand
- ☑ Khaled Hosseini
- ☐ Matt Groening
- ☐ Chuck Palahniuk

Categories
- ☐ TextBook
- ☐ BestSeller
- ☐ Academic
- ☐ Poetry
- ☑ Reference
- ☐ Classics

Update Book   Cancel

Books

Search Books

Search Books by Title

Search

Title	ISBN	Published Year	Authors	Genres	Categories	Borrowed By	Action
The Hobbit And The HAM	9780547928227	2000	Kimberly Foottit, Khaled Hosseini	History, Western, Non-Fiction	Reference	Not Borrowed	Update Delete
HELLOOOOOOOOO	9722233336353	1999	Tolstoy	Romance	BestSeller	Not Borrowed	Update Delete
Brave New World	9780060850524	1932	Adrian Tomine	Fiction	BestSeller	Not Borrowed	Update Delete

DELETE OPERATION

1984	9780451524935	1949	Matt Groening	Novel, Non-Fiction	Classics, BestSeller	Not Borrowed	Update Delete
The Apple Of My Eye	9726422336353	2007	Kimberly Foottit	Science	BestSeller	Not Borrowed	Update Delete
BEzua skss	9716433236353	2003	Khaled Hosseini	Mythic	Academic	Not Borrowed	Update Delete
BEYZA	9726422236390	2009	Jodi Picoult	Novel	Poetry	Not Borrowed	Update Delete
MERY MERY	0780743674564	2009	Chuck Palahniuk	Mythic	Academic	Not Borrowed	Update Delete

Delete Book

Are you sure you want to delete the following book?

BEzua skss

ISBN: 9716433236353

Published Year: 2003

Is Borrowed: False

Delete   Cancel

Rest Is Easy	9720453556534	2004	Ayn Rand	Novel	Academic	Not Borrowed	Update Delete
Game Of Thrones	9236433336354	1999	Mark Leslie, Roland Goure	Literature	Reference	Not Borrowed	Update Delete
HopeFul	9236433336352	2009	Tolstoy, Khaled Hosseini, Matt Groening	Literature, Science	Classics, BestSeller	Not Borrowed	Update Delete
POGY	9726433330053	2005	Kimberly Foottit, Tolstoy	History	Poetry, TextBook	Not Borrowed	Update Delete
Paradise	8780743674565	2004	Mark Leslie, Kimberly Foottit, Tolstoy	Romance	BestSeller, Reference	Not Borrowed	Update Delete
Pride and Prejudice	9780141439518	1813	Kimberly Foottit, Tolstoy, Adrian Tomine	History, Fiction, Mythic, Biography, Science	Classics, Poetry, Academic, TextBook	Not Borrowed	Update Delete
1984	9780451524935	1949	Matt Groening	Novel, Non-Fiction	Classics, BestSeller	Not Borrowed	Update Delete
The Apple Of My Eye	9726422336353	2007	Kimberly Foottit	Science	BestSeller	Not Borrowed	Update Delete
BEYZA	9726422226390	2009	Jodi Picoult	Novel	Poetry	Not Borrowed	Update Delete
MERY MERY	0780743674564	2009	Chuck Palahniuk	Mythic	Academic	Not Borrowed	Update Delete