

## 1,OVERVIEW

The project aim is to create library management system website with feature such as sign-up,login-in,feedback function , borrow and return books function,save and like books function .user can create account by filling in their name and email and phone number and password and confirm password.They can borrow books and reservation books in library management website and the website also can allow users search book and find this book if users like this book then their can like this book and follow this book in website additionally the website include admin panel so if users meet books be broken problem they can feedback to administrator.

## 2,REVISED BUSINESS RULES AND ASSUMPTIONS

- 1.The user should be able to create an account with the correct email address ,username,password,phone number. On every account , a unique identifier will be automatically generated to ease the user experience within the system
- 2.the user should be able to borrow books by search catalog and submit borrow books request.
- 3.the user should be able to comment books,admin can according to users comment to modify website.
- 4,the user need return books within the specified time.if user no return books so they will incur fine 1dollar.
5. the library management system operates 24hours. If user wanna borrow books and return books they can do it in every time.
6. Borrow\_name stores the full name of the person who physically borrowed the book.used to track who physically collected the book,especially for group or family account.
- 7, the user only borrow 5 books from library. When user already borrow 5 books then the user still borrow book that library management system can remind user said you can not borrow books.

- 8, a user can renew a book once if no other user has placed a reservation on that item.
- 9,A user can reserve a book or multimedia item if it is currently checked out.
- 10,reservation will expire after 3 days if the user does not pick up the item.
- 11,each book or multimedia item must have a unique catalog ID for inventory tracking
- 12, the library management system can record each user borrow books and return books
- 13, Users will need an internet connection to access the system for book reservations and renewals and other online service.
- 14, if users like this book,they can like this book and follow this book in website
- 15,reserved books are not renewable,members plan carefully before making reservations
16. the library management system be able to remind user return books.when user do not return books for long time , the system will remind user to return books.
- 17,system supports multilingual interfaces,members can choose preferred language easily.
- 18,online account access must be secure, members remember their login credentials safely.
- 19,daily system backups are mandatory, backup storage is reliable and protected.
- 20,the users wanna borrow a book they can find out it by search book\_name or book's author
- 21,borrowing history is tracked for 12 months, when borrow history is over12 months , the system can be automated updates borrow history .
- 22, users can reserve books through the reservation table, only available books can be reserve.
- 23,library operates 6 days a week and closes on public holiday.

24, the system automatically sends notifications via email about upcoming due dates, overdue books , and reservation availability.

25,library staff must verify ID when issuing a new membership, verification guidelines are standardized across all branches.

26,overdue notices are sent once a book exceeds the due date. Overdue notifications are sent daily until the issue is resolved.

27,books under repair are marked and approved before shelving. Donation review guidelines are clearly posted for staff.

28,users can opt into promotional notifications and newsletters. Users preferences for notifications are stored in their profile.

29,the library management system must display publishers and book name and book author .

30,Admins can manage users' accounts, admins are properly authenticated before making changes

31,users can comment on books ,only registered users can submit comments.

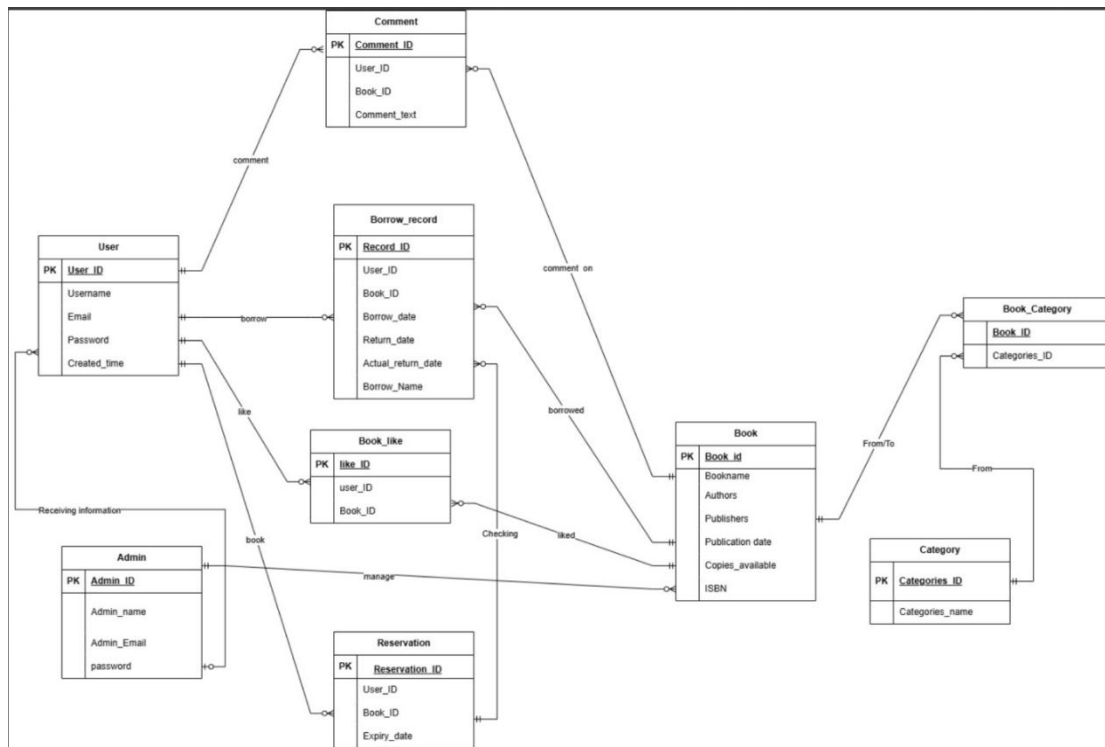
32,the user create account in library management system and the system will record when is the user create\_time

33,each book can belong to multiple categories. Book\_category manages many-to-many relationships correctly.

34comments must be moderated if reported. Admins can remove inappropriate comments after review.

35,borrow,reserve,like,and comment actions are logged with timestamps. All logs are retained securely for audit purposes.

3,ERD



#### 4,JUSTIFICATIONS OF ERD BASED ON BUSINESS RULES ASSUMPTIONS

##### BUSINESS RULES RELATED TO ENTITY USERS

BR1 The user should be able to create an account with the correct email address ,username,password,phone number.every and a unique identifier will be automatically generated to ease the user experience within the system

\*the part that declares 'email address and username and password and phone number ' justifies the email, username, password,phone number attributes

\* the part that declares 'a unique identifier will be automatically generated to ease the user experience within the system' justifies the existence of user\_id attributes

BR 32 the user create account in library management system and the system will record when is the user create\_time

\* The business rules above is the system can record each user create\_time,justifies the existence of create\_time.

BR18 online account access must be secure, members remember their login credentials safely.

\*Justifies the system's need for secure authentication and proper password handing

BR28 users can opt into promotional notifications and newsletters. Users preferences for notifications are stored in their profile.

\*Justifies relationship to system notifications.

BR2 the user should be able to borrow books by search catalog and submit borrow books request.

\*The part that declares the relationship between user table and borrow\_record table

## **The PK of the user entity is user\_id**

### **BUSINESS RULES RELATED TO ENTITY COMMENT**

BR3 .the user should be able to comment books,admin can according to users comment to modify website.

\*this business rule justifies Users should be able to comment on books they have read, because this encourages user engagement, gives them a voice in the

platform, and provides administrators with valuable feedback to improve the website based on user needs.

BR31 users can comment on books ,only registered users can submit comments.

\* The part that declares 'only registered users can submit comments' mean is administrator need gather comment user information and ensure who is feedback problem

BR34 comments must be moderated if reported. Admins can remove inappropriate comments after review.

\*justifies existence of comment\_text attributes .admin can moderated user comment and distinguish comment is inappropriate or not.

## **The PK of the user entity is comment\_id**

### BUSINESS RULES RELATION TO BORROW\_RECORD

BR4 the user need return books within the specified time.if user no return books so they will incur fine 1dollar

\*The part that declares why user need return book within the specified time ,justifies existence of return\_date and actual\_return\_date.

BR6 Borrow\_name stores the full name of the person who physically borrowed the book.used to track who physically collected the book,especially for group or family account.

\*the part that declares system can track who physically borrowed the book,justifies borrow\_name existence of borrow\_record.

BR7 the user only borrow 5 books from library. When user already borrow 5 books then the user still borrow book that library management system can remind user said you can not borrow books.

\*The part that declare user only can borrow 5 book from library.this rule justifies the use of the borrow\_record entity to track each borrow transaction using the attributes user\_id,book\_id,and borrow\_date

ER12 the library management system can record each user borrow books and return books

\*the part that declares every borrow and return action is tracked in the borrow\_record entity.borrow\_date,return\_date,and status ensure accurate tracking of borrowing,returning,and overdue books.

ER16 the library management system be able to remind user return books.when user do not return books for long time , the system will remind user to return books.

\*Borrowing\_record provides the due\_date,return\_date, and status to determine if a reminder is need.notification stores reminder messages and links them to the correct user.and this ensures that the system can automatically monitor and remind users who delay returning books.

ER21 ,borrowing history is tracked for 12 months, when borrow history is over12 months , the system can be automated updates borrow history .

\*this rule justifies the existence of borrow\_date, borrow\_date is used to determine the age of the borrowing history, the system automatically updates record older than 12 months.

## **The PK of the user entity is RECORD\_ID**

### BUSINESS RULES RELATED TO ENTITY BOOK\_LIKE

ER14, if users like this book, they can like this book and follow this book in website

\* This rule justifies the use of Like and Follow tables. The user\_id and book\_id fields record which user liked or followed which book. The like\_date and follow\_date fields store the time of each action. Each user can like or follow many books, and each book can be liked or followed by many users.

## **The PK of the user entity is like\_id**

### BUSINESS RULES RELATED TO ENTITY RESERVATION

ER8 a user can renew a book once if no other user has placed a reservation on that item.

\*This rule justifies the use of a **renewal** action in the system. A user is allowed to renew a book only if it is **not reserved by another user**. The system checks if the book\_id is not in the



reservation table for other users before allowing the renewal. This ensures that books in high demand are available to other users who may want to borrow them.

ER9 A user can reserve a book or multimedia item if it is currently checked out.

\*This rule justifies the **reservation** feature in the system. A user is allowed to **reserve** a book or multimedia item even if it is currently **checked out** by another user. The system will hold the item for the user when it is returned, ensuring they get the next opportunity to borrow it. This ensures that users can still get the items they want, even if they are temporarily unavailable.

ER10 reservation will expire after 3 days if the user does not pick up the item.

\*This rule justifies the use of reservation\_date and expiration\_date in the system. The reservation\_date records when the user reserves an item, and the expiration\_date is automatically set to 3 days after the reservation. If the user does not pick up the item within that period, the reservation will expire, allowing the item to be available for other users.

ER15 reserved books are not renewable, members plan carefully before making reservations

\*This rule justifies that **reserved books cannot be renewed**. Once a book is reserved, the system ensures that

it cannot be renewed by the user who has it. This encourages members to plan their reservations carefully, knowing that they won't have the option to extend the borrowing period. The system ensures this by preventing the renewal action for any reserved item.

## **The PK of the user entity is RESERVATION\_ID**

### **BUSINESS RULES RELATED TO ENTITY ADMIN**

ER 25, library staff must verify ID when issuing a new membership, verification guidelines are standardized across all branches.

\*This rule ensures that **staff members** are responsible for verifying the user's **ID** before issuing a new membership. The system also enforces **standardized verification guidelines** across all library branches to maintain consistency and security. Each **user** is issued one **membership** after their **ID** is verified by staff.

ER30 Admins can manage users' accounts, admins are properly authenticated before making changes

\*This rule justifies the relationship where **admins** are given permission to **create, update, or delete user accounts**. The system includes **authentication mechanisms** to verify the admin's identity before any account modifications are allowed.

This ensures **secure and authorized management** of user information.

BR34 comments must be moderated if reported. Admins can remove inappropriate comments after review.

\*This rule justifies that **each comment** can be **reported by users**, and once reported, it is **flagged for moderation**.

The **admin** reviews the comment and, if it's inappropriate, has the authority to **remove it**. This ensures the comment system stays respectful and moderated.

## **The PK of the user entity is ADMIN\_ID**

### **BUSINESS RULES RELATED TO ENTITY BOOK**

ER6Borrow\_name stores the full name of the person who physically borrowed the book. used to track who physically collected the book, especially for group or family account.

\*this justifies relationships with other tables like borrow\_record, reservation, book\_like, and book\_comment, where each action linked to a book includes a **timestamp**. This ensures all activities involving each book are **securely tracked** and **audit able**.

ER20, the users want to borrow a book they can find out it by search book\_name or book's author

\*The part that declares justifies that searching by **book name** or **author** improves accessibility, with the **Book Table** containing **book\_name** and **author** fields to enable efficient search and borrowing.

ER29, the library management system must display publishers and book name and book author .

\*the part that declares justifies that displaying **publishers**, **book name**, and **book author** enhances user experience, with the **Book Table** containing **book\_name**, **author**, and **publisher\_id** to provide relevant book information efficiently.

ER35, borrow, reserve, like, and comment actions are logged with timestamps. All logs are retained securely for audit purposes.

\*The part that declares justifies that logging borrow, reserve, like, and comment actions with timestamps ensures accountability and audit ability, with a Log Table storing **user\_id**, **action\_type**, **timestamp**, and **book\_id** securely for tracking all user activities.

**The PK of the user entity is BOOK\_ID**

BUSINESS RULES RELATED TO ENTITY BOOK\_category

ER33 each book can belong to multiple categories.  
Book\_category manages many-to-many relationships correctly.

\*the part that declares justifies that each book can belong to multiple categories to improve search and classification, with the **Book\_Category** table managing the many-to-many relationship between **Book Table** and **Category Table** using **book\_id** and **category\_id** as foreign keys.

**The PK of the user entity is BOOK\_ID and category\_id**

BUSINESS RULES RELATED TO ENTITY category

ER33 each book can belong to multiple categories.  
Book\_category manages many-to-many relationships correctly.

\*the part that declares justifies that each book can belong to multiple categories to improve search and classification, with the **Book\_Category** table managing the many-to-many relationship between **Book Table** and **Category Table** using **book\_id** and **category\_id** as foreign keys.

**The PK of the user entity is category\_id**