

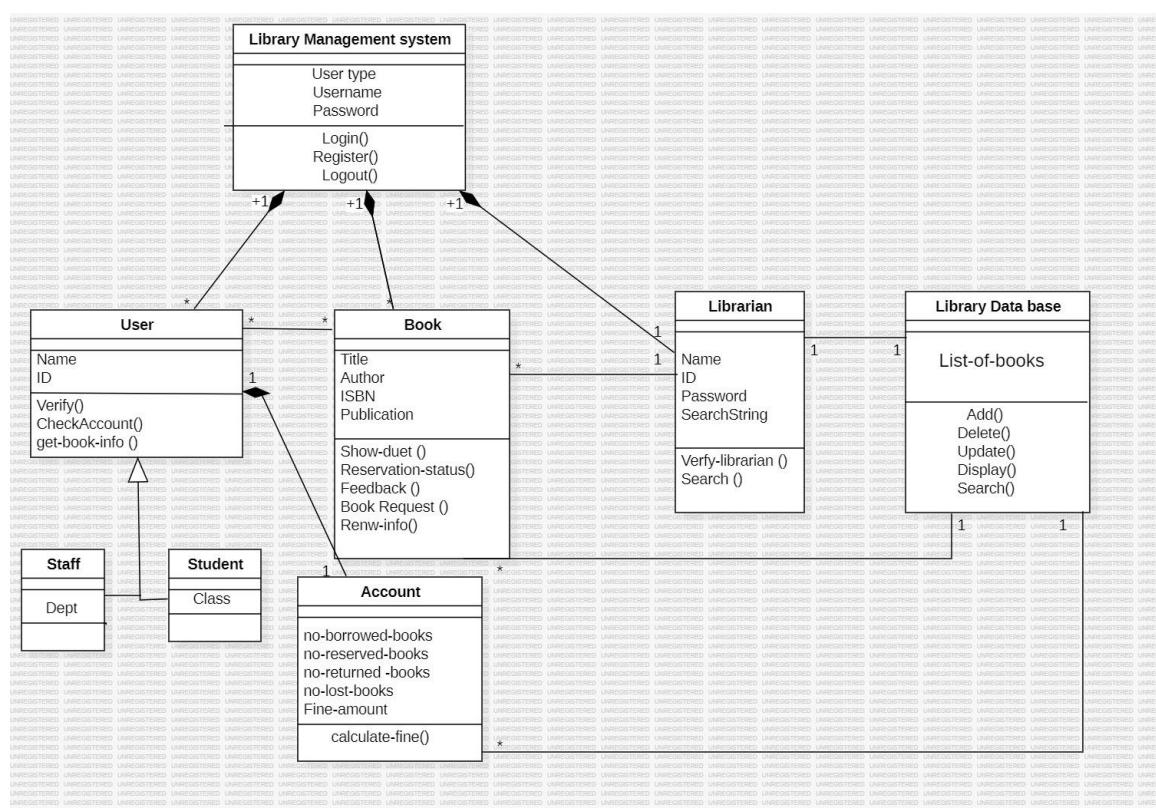
SE-401 (Practical's)

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CLASS DIAGRAM FOR LIBRARY MANAGEMENT SYSTEM



Procedure for Library Management System

1. User Registration and Login

- The system allows different user types (Student, Staff, Librarian).
- A user registers by providing username, password, and user type.

- c. Registered users can log in using valid credentials.
- d. The system verifies the user before granting access.
- e. Users can log out after completing their tasks.

2. User Verification and Account Checking

- a. After login, the system verifies the user account.
- b. Each user has a unique ID and name.
- c. The system checks the user's account status such as borrowed books, reserved books, and fines.
- d. Users can view book-related information through their account.

3. Book Management

- a. Each book contains details such as title, author, ISBN, and publication.
- b. The system shows due dates for borrowed books.
- c. Users can check reservation status of books.
- d. Users can request books and renew borrowed books.
- e. Users can also provide feedback for books.

4. Account Handling

- a. Every user is linked with an account.
- b. The account stores:
 - i. Number of borrowed books
 - ii. Number of reserved books
 - iii. Number of returned books
 - iv. Number of lost books
 - v. Fine amount
- c. The system automatically calculates fines if books are returned late or lost.

5. Student and Staff Classification

- a. Users are classified as Students or Staff.
- b. Student information includes class details.
- c. Staff information includes department details.
- d. Both inherit common properties from the User entity.

6. Librarian Functions

- a. Librarian logs in using librarian credentials.
- b. The system verifies librarian authority.
- c. Librarian can search books using search strings.
- d. Librarian manages book records in the database.

7. Library Database Operations

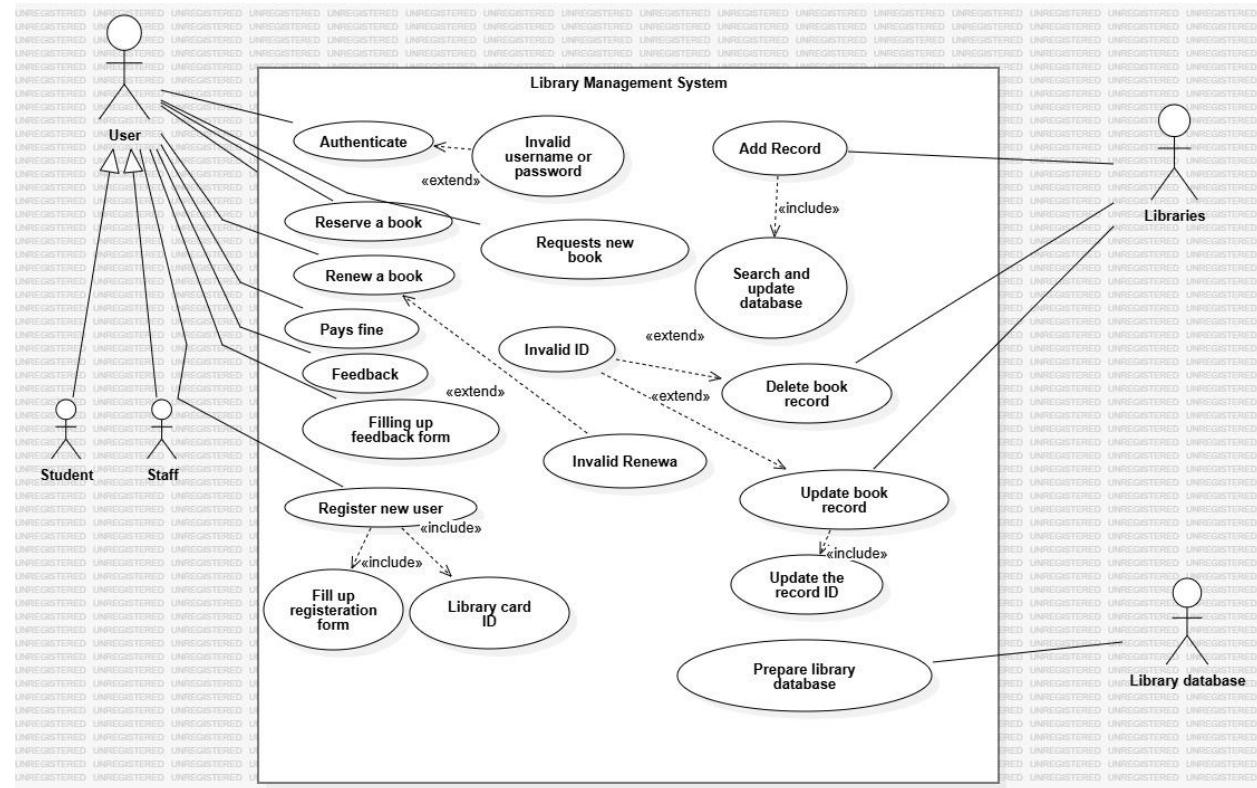
- a. The library database stores a list of all books.
- b. Librarian can:
 - i. Add new books

- ii. Delete existing books
 - iii. Update book details
 - iv. Display all books
 - v. Search for specific books
- c. All operations are reflected in the centralized database.

8. System Workflow

- a. Users interact with books through the system.
- b. Librarians control and manage the database.
- c. The system ensures secure access, proper record keeping, and fine calculation.
- d. This process ensures smooth and efficient library management.

USE CASE DIAGRAM FOR LIBRARY MANAGEMENT SYSTEM



Procedure for Library Management System (Use-Case Diagram)

1. User Authentication

- a. The user (Student or Staff) enters a username and password.
- b. The system authenticates the user.
- c. If credentials are incorrect, the system displays an *Invalid username or password* message.
- d. Only authenticated users are allowed to access library services.

2. User Registration

- a. New users register by filling out a registration form.
- b. The system generates a unique library card ID for each registered user.
- c. Successful registration allows the user to log in and use the system.

3. Book Reservation

- a. Authenticated users can search for available books.
- b. Users can reserve a book if it is available.
- c. The system verifies user ID before confirming the reservation.
- d. If the ID is invalid, an error message is shown.

4. Book Renewal

- a. Users can renew borrowed books before the due date.
- b. The system checks renewal eligibility.
- c. If renewal conditions are not met, an *Invalid Renewal* message is displayed.

5. Fine Payment

- a. Users can pay fines for late or lost books.
- b. The system calculates the fine amount based on overdue days.
- c. After successful payment, the user account is updated.

6. Feedback Submission

- a. Users can provide feedback about books or library services.
- b. The system allows users to fill out a feedback form.
- c. Submitted feedback is stored for review.

7. Request for New Book

- a. Users can request the addition of new books to the library.
- b. Requests are forwarded to the librarian for approval.

8. Librarian Record Management

- a. The librarian can add new book records to the system.
- b. Librarian can search and update existing records.
- c. Librarian can delete book records if required.

- d. While updating, the system includes record ID verification.

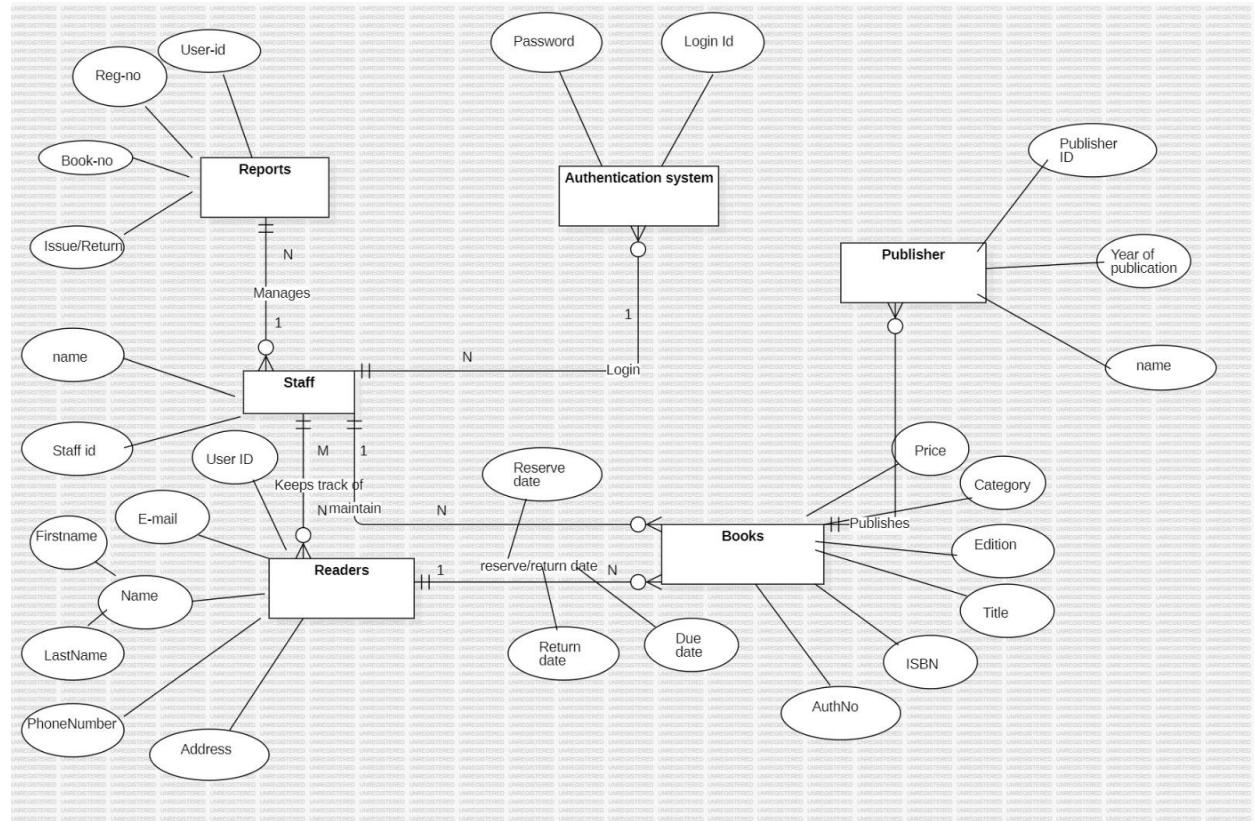
9. Database Management

- The library database stores all book records.
- The librarian prepares and maintains the database.
- All updates, deletions, and additions are reflected in real time.

10. System Error Handling

- The system handles invalid inputs such as:
 - Invalid username or password
 - Invalid user ID
 - Invalid renewal request
- Appropriate error messages are displayed to guide users.

ER DIAGRAM OF LIBRARY MANAGEMENT SYSTEM



Procedure for Library Management System (ER Diagram)

1. User Authentication

- a. The authentication system manages login details.
- b. Users provide **Login ID** and **Password** to access the system.
- c. The system verifies credentials before allowing further operations.
- d. Successful authentication enables access to library services.

2. Staff Management

- a. Staff entity stores staff details such as:
 - i. Staff ID
 - ii. Name
 - iii. Email
 - iv. User ID
- b. Staff members manage reports and maintain reader records.
- c. One staff member can manage multiple reports.

3. Readers Information Handling

- a. Readers entity stores personal details:
 - i. User ID
 - ii. First name and last name
 - iii. Email
 - iv. Phone number
 - v. Address
- b. Each reader is uniquely identified by User ID.
- c. Readers interact with books for issue and return operations.

4. Book Management

- a. Books entity contains book-related information:
 - i. ISBN
 - ii. Title
 - iii. Edition
 - iv. Category
 - v. Price
 - vi. Author number
- b. Each book is uniquely identified by its ISBN.
- c. Books can be issued, reserved, and returned by readers.

5. Publisher Details

- a. Publisher entity stores publisher information:
 - i. Publisher ID

- ii. Name
- iii. Year of publication
- b. A publisher can publish multiple books.
- c. Each book is published by one publisher.

6. Book Reservation and Return

- a. Readers can reserve or return books.
- b. Reservation details include:
 - i. Reserve date
 - ii. Due date
 - iii. Return date
- c. These attributes help track book availability and overdue returns.

7. Reports Generation

- a. Reports entity records:
 - i. User ID
 - ii. Registration number
 - iii. Book number
 - iv. Issue/Return status
- b. Reports help track book transactions.
- c. Staff members manage and maintain these reports.

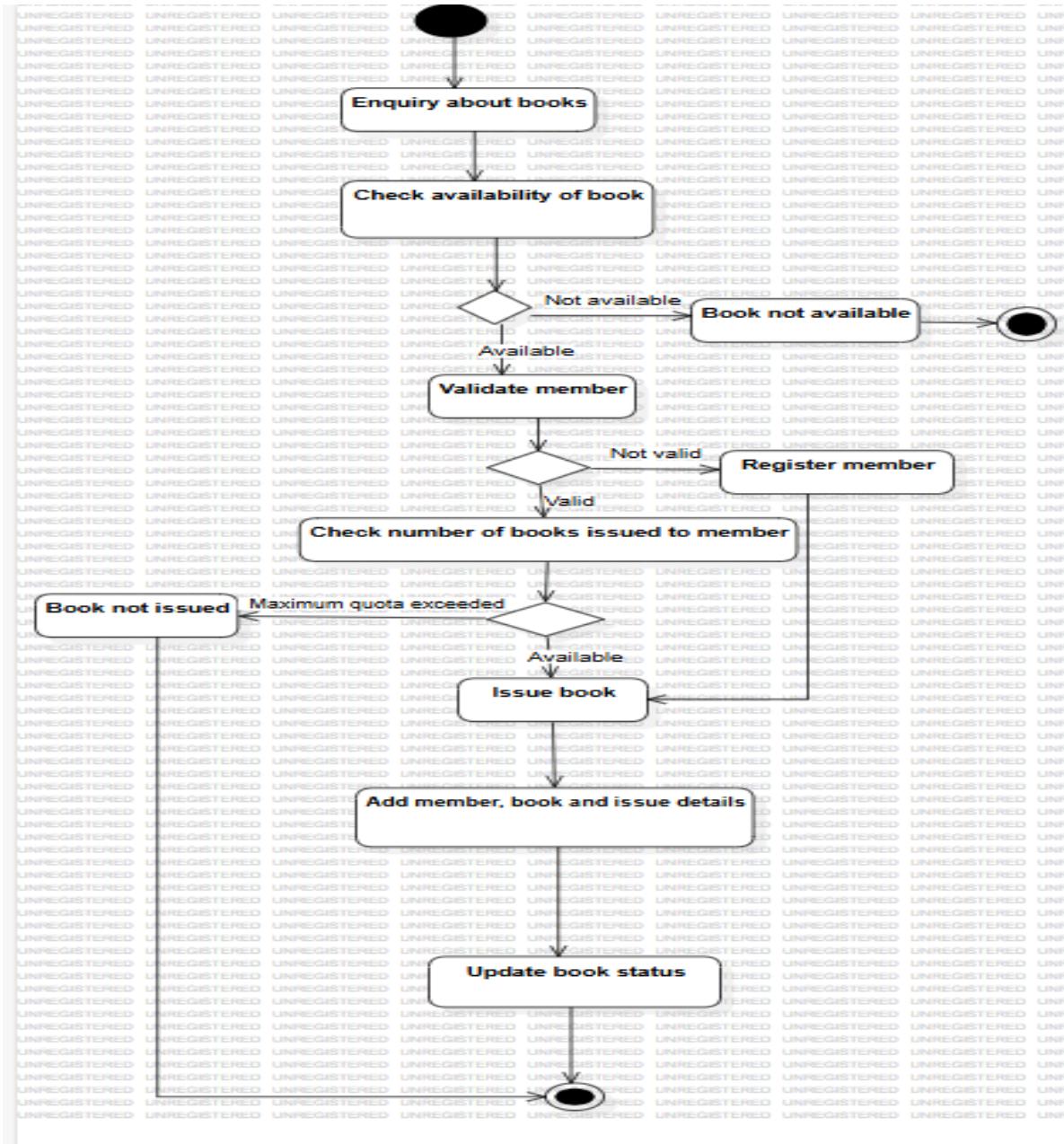
8. Relationship Management

- a. Staff manages reports (one-to-many relationship).
- b. Readers reserve and return books (many-to-many relationship).
- c. Publishers publish books (one-to-many relationship).
- d. Authentication system connects users to secure login access.

9. Database Integrity

- a. Primary keys ensure unique identification of entities.
- b. Relationships maintain data consistency.
- c. The system ensures accurate tracking of users, books, and transactions.

ACTIVITY DIAGRAM OF LIBRBRY MANAGEMENT SYSTEM



Procedure (Activity Diagram – Library Book Issue)

1. Start / Enquiry

- a. The process starts when a user makes an **enquiry about books** in the library.

2. Check Book Availability

- a. The system checks the **availability of the requested book**.
- b. **If the book is not available**, the system displays “**Book not available**” and the process ends.

- c. **If available**, the process continues.

3. Validate Member

- a. The system verifies whether the user is a **valid library member**.
- b. **If the member is not valid**, the system performs **Register Member** activity, then continues.
- c. **If valid**, it moves to the next step.

4. Check Member's Issued Books Limit

- a. The system checks the **number of books already issued** to that member.
- b. **If maximum quota is exceeded**, it shows "**Maximum quota exceeded / Book not issued**" and the process ends.
- c. **If quota is not exceeded**, the member is allowed to issue the book.

5. Issue Book

- a. The system performs the **Issue book** activity.

6. Store Issue Details

- a. The system **adds member details, book details, and issue information** into records (issue entry).

7. Update Book Status

- a. The system updates the **book status** (e.g., Available → Issued).

8. End

- a. The process ends after successful issuing and status update.