

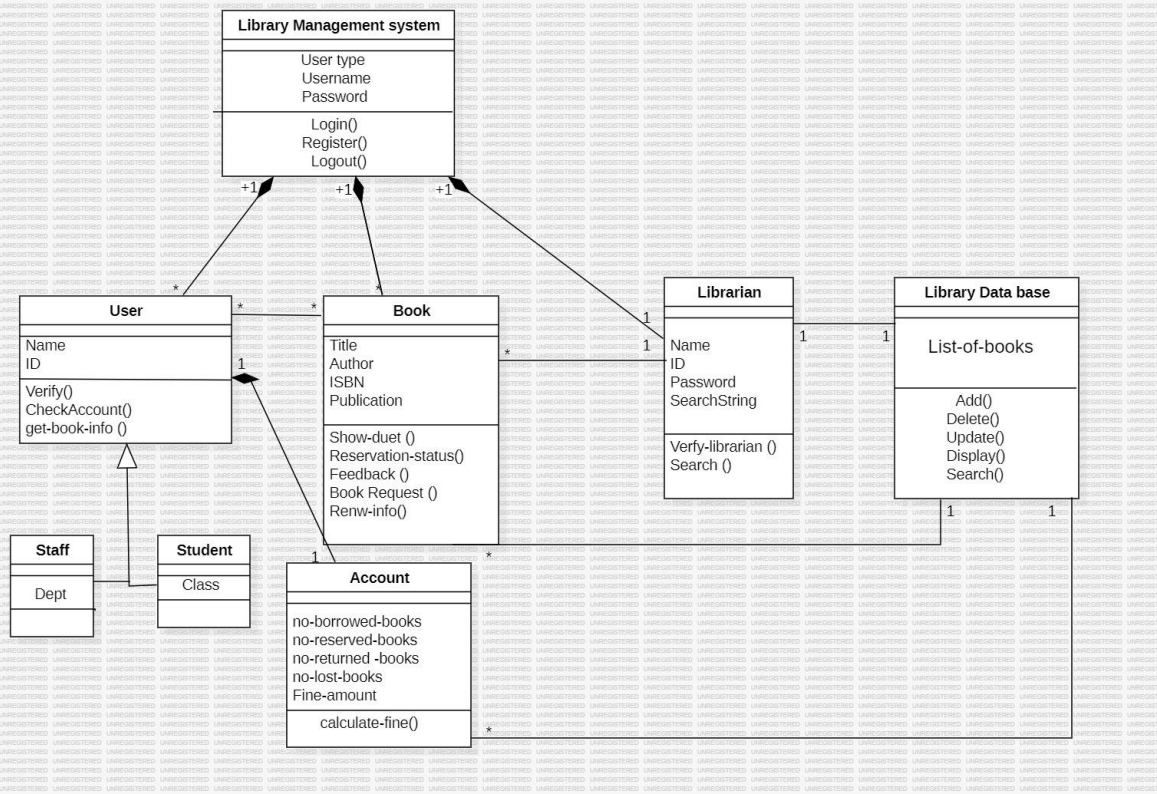
# SE-401 (Practical's)

**Name:** Muhammad Abdullah Naeem

**Class:** BS-CS (E1)

**AG No:** 2024-ag-6276

## CLASS DIAGRAM FOR LIBRARY MANAGEMENT SYSTEM



## Procedure for Library Management System

- 1. User Registration and Login**
  - a. The system allows different user types (Student, Staff, Librarian).
  - b. 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**

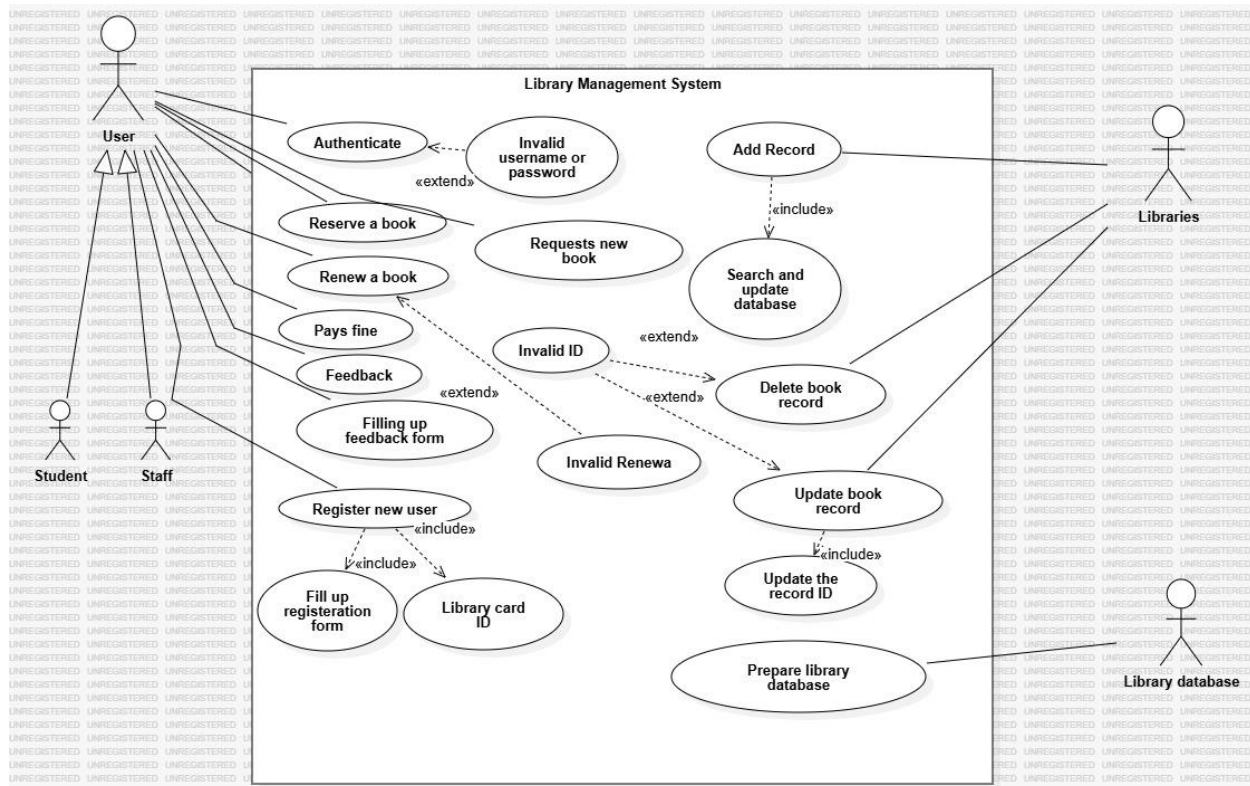
- a. The library database stores a list of all books.
- b. Librarian can:
  - i. Add new books

- 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.

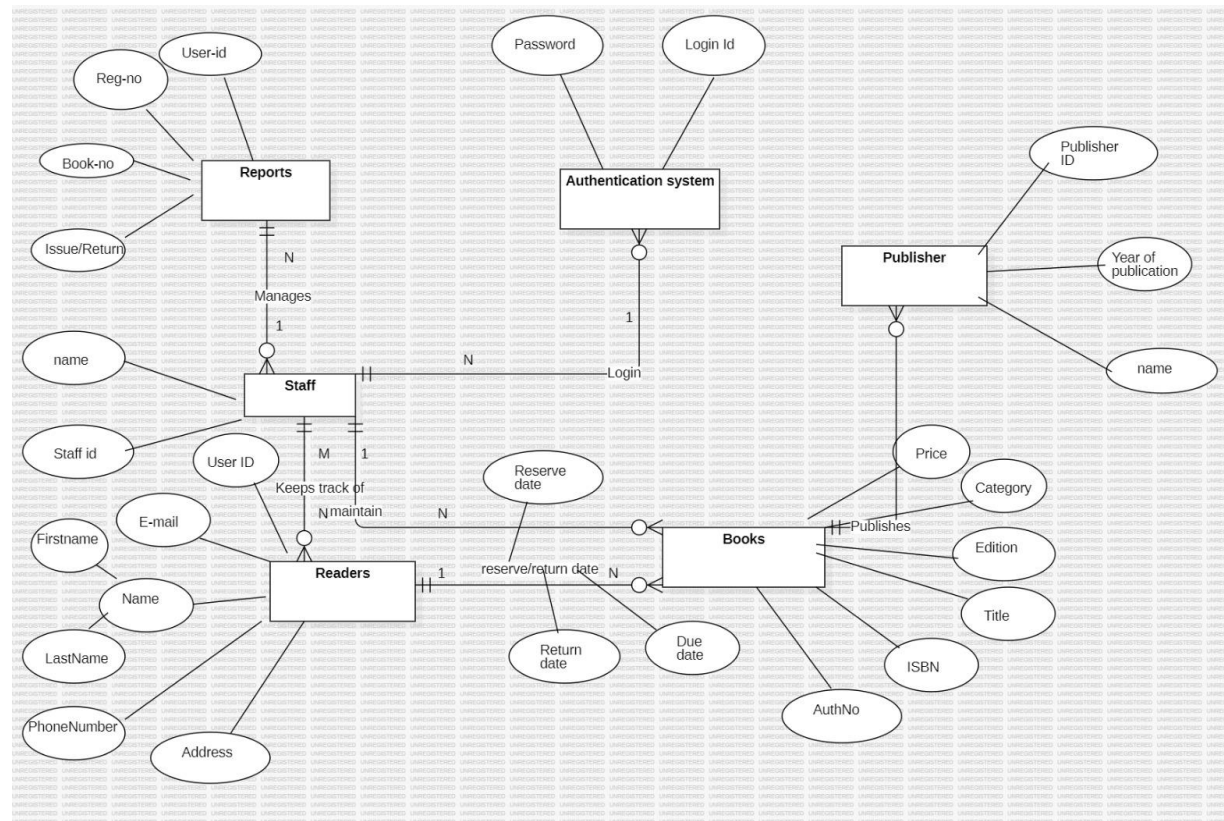
## 9. Database Management

- 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.

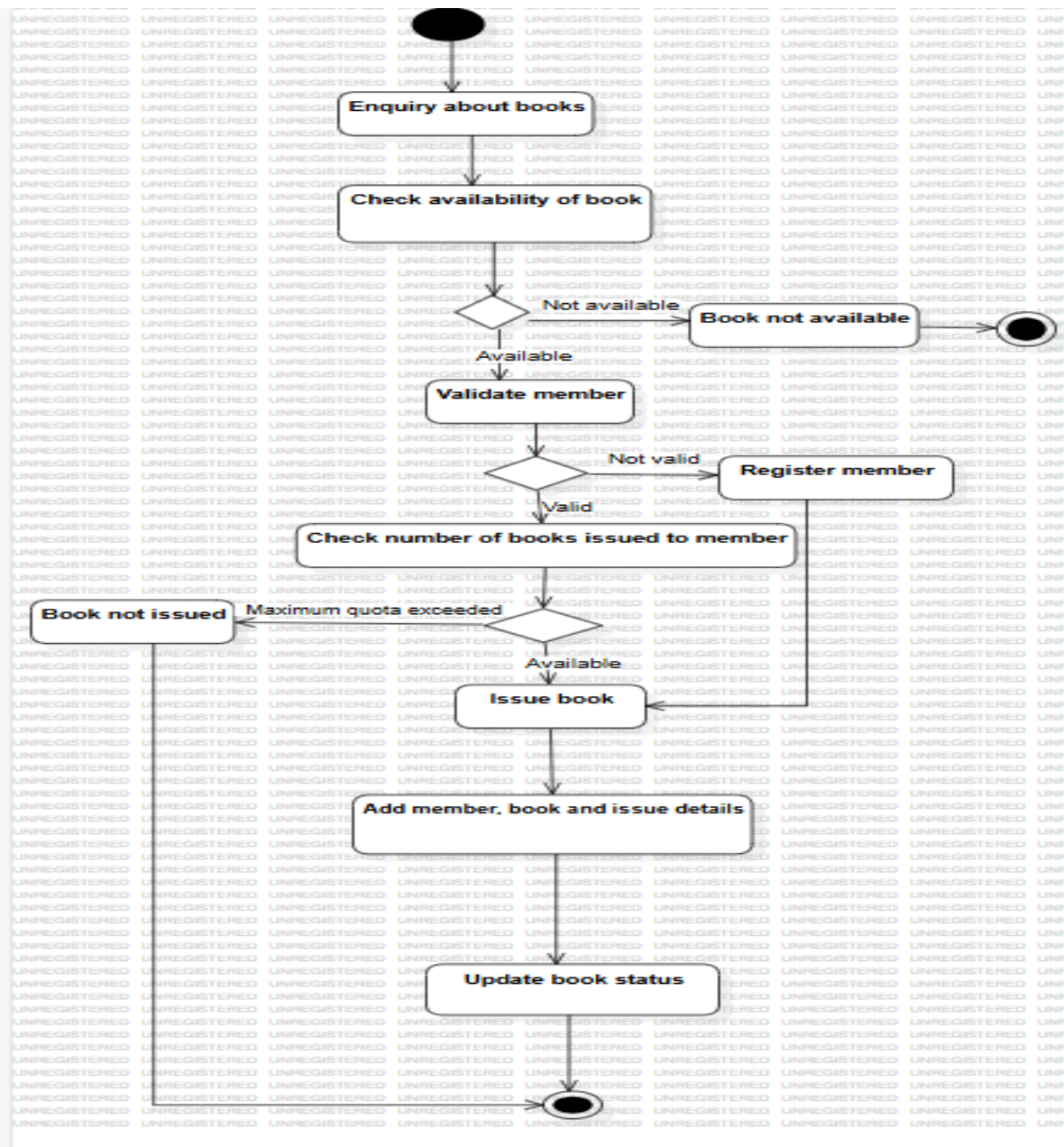
## 5. Publisher Details

- 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 LIBRARY MANAGEMENT SYSTEM**





## Procedure (Activity Diagram – Library Book Issue)

### 1. Start / Enquiry

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

### 2. Check Book Availability

- The system checks the **availability of the requested book**.
- 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.