E-LIBRARY MANAGEMENT SYSTEM

BY IDEA INC

1. Project Overview

The E-Library System is a web-based application built using Java Servlets, JSP, and JavaBeans, designed to simplify online library management. It enables two types of users(Librarians and Members)
to perform tasks such as registering, logging in, managing books, and borrowing available books. The system stores data persistently using an Apache Derby (JavaDB) database, developed and run via NetBeans IDE with GlassFish Server.

2. Design Description

This system follows a simplified MVC architecture
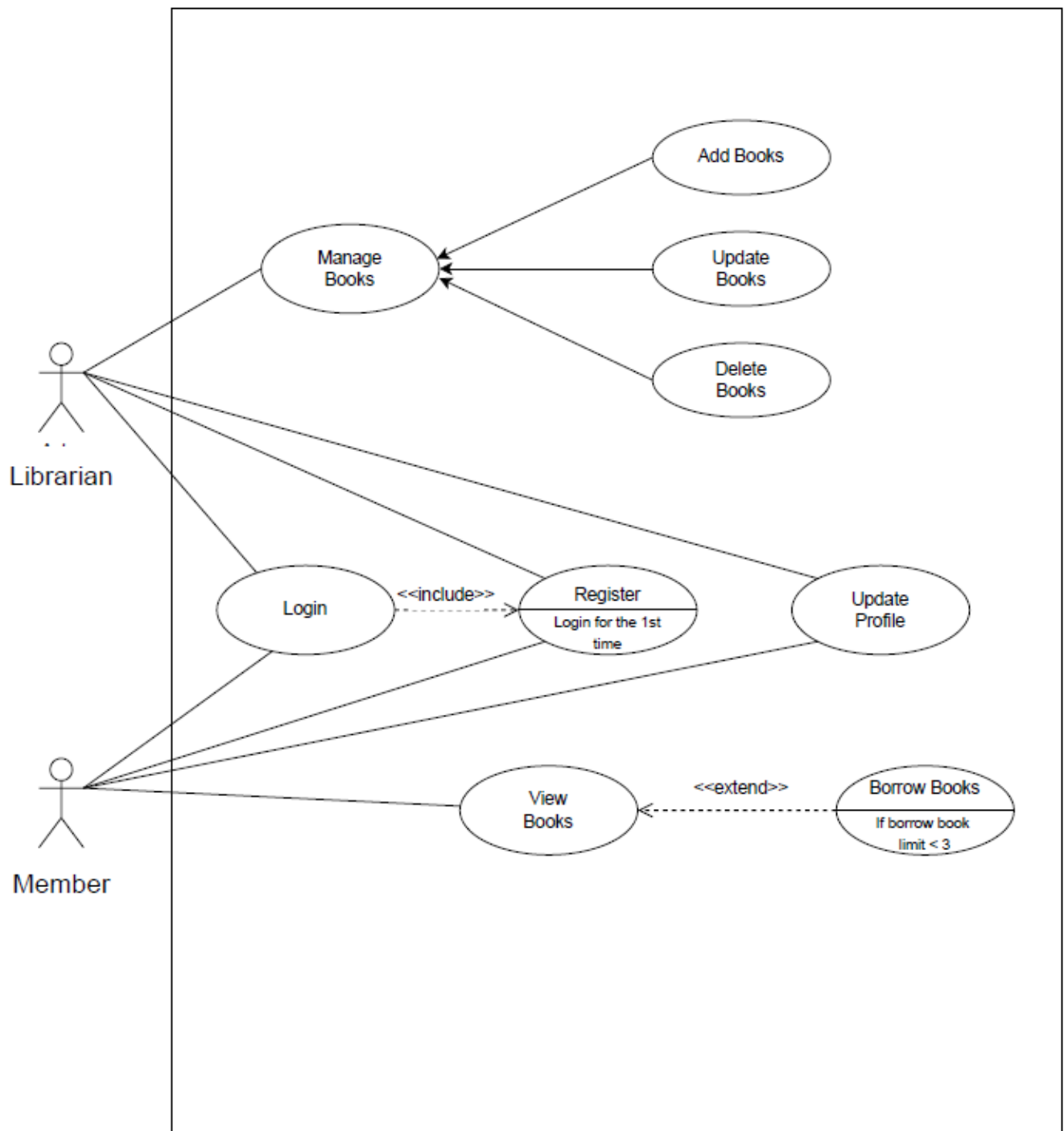
- Model (JavaBeans)
  - Book.java
  - BookDAO.java
  - BorrowDAO.java
  - Librarian.java
  - LibrarianDAO.java
  - Member.java
  - MemberDAO.java

- Controller (Servlets)

  - BorrowBookServlet.java
  - LibrarianBookServlet.java
  - LibrarianLoginServlet.java
  - LibrarianProfileServlet.java
  - LibrarianRegisterServlet.java
  - LogoutServlet.java
  - MemberLoginServlet.java
  - MemberRegisterServlet.java
  - MemberProfileServlet.java
  - ViewBooksServlet.java
  - MemberViewBooksServlet.java

- View (JSP)
  - add_book.jsp
  - edit_book.jsp
  - index.jsp
  - librarian_dashboard.jsp
  - librarian_login.jsp
  - librarian_profile.jsp
  - librarian_register.jsp
  - member_dashboard.jsp
  - member_login.jsp
  - member_profile.jsp
  - MemberRegister.jsp
  - update_member.jsp
  - view_books.jsp
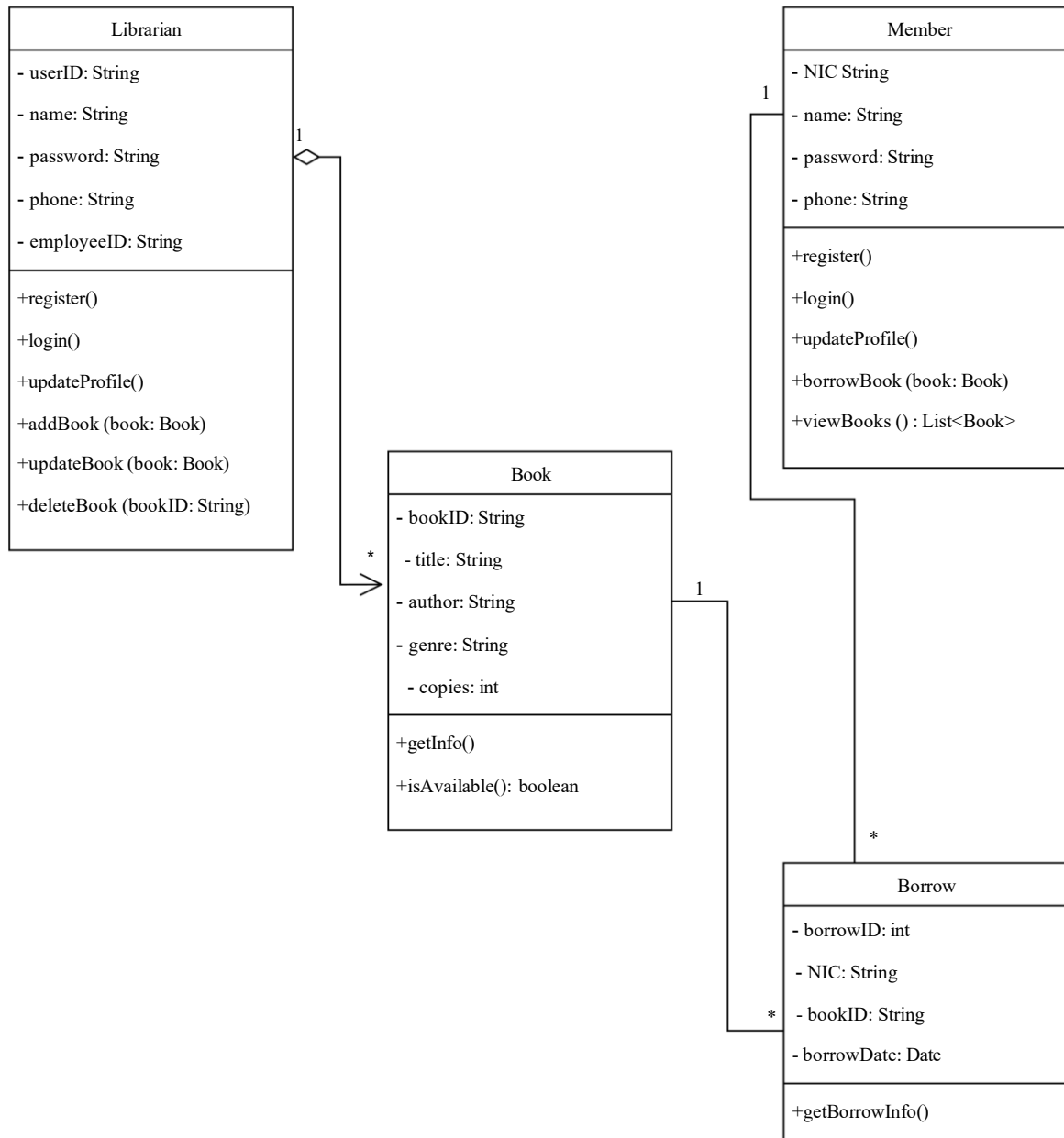 - view_books_member.jsp

- Utility Class
  - DBUtil.java

3. Use Case Diagram

E-Libraray System

4. Class Diagram

Class Diagram for E-Libraray System

Librarian

- userID: String
- name: String
- password: String
- phone: String
- employeeID: String

+register()
+login()
+updateProfile()
+addBook (book: Book)
+updateBook (book: Book)
+deleteBook (bookID: String)

Member

- NIC String
- name: String
- password: String
- phone: String

+register()
+login()
+updateProfile()
+borrowBook (book: Book)
+viewBooks () : List<Book>

Book

- bookID: String
- title: String
- author: String
- genre: String
- copies: int

+getInfo()
+isAvailable(): boolean

Borrow

- borrowID: int
- NIC: String
- bookID: String
- borrowDate: Date

+getBorrowInfo()

5. Assumptions

- Each librarian is identified uniquely by a userID
- Each member is uniquely identified by a NIC
- Book IDs must be unique during book entry
- A member may borrow up to 3 books at a time
- A book can only be borrowed if copies are available
- Librarians are responsible for book inventory management (Add/Update/Delete)

6. Challenges Faced

- Database Integration - Managing Derby's strict foreign key rules during testing and table resets

- SQL Errors - Faced SQL syntax errors when referencing missing fields/tables; resolved through schema reviews

- Form Routing -Aligning JSP form actions with the correct servlet mappings in web.xml

- Session Management (Handled login sessions manually using HttpSession)

- Business Logic Enforcement - Enforcing the 3-book borrowing limit programmatically within servlet logic

7. Technologies Used

- Java 8+
- JSP & Java Servlets
- Apache Derby (JavaDB)
- NetBeans IDE 22
- GlassFish Server
- HTML/CSS (Basic styling)

8. Conclusion

This E-Library System project provided practical experience in building web-based applications using Java Servlets and JSP. It successfully demonstrates the use of JavaBeans, MVC patterns, and Derby database integration. The system supports both librarians and members with essential functionality, and the project has strengthened our understanding of web development concepts in real-world use cases.

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