**Scenario**

LibraryProject is a Java-based application which allows to add or remove books and manage the inventory. Members can search for books, borrow them, and return them. The app maintains borrowing history, enforces return deadlines, and calculates fines for late returns.

**Design Paradigm / Functionalities**

* Hierarchical user system (User, Member, Librarian)
* Library item classification (LibraryItem, Book, Magazine)
* Polymorphism with overridden displayDetails()
* Interface Borrowable for borrowable items
* Collections for storing users, items, records
* File I/O for saving/loading inventory
* Stream for filtering/searching
* Unit tests using JUnit

**Expected Output**

* Librarian: Manage inventory, view users
* Member: Search, borrow/return items, view history
* Text file logs for transactions and inventory
* Sorted lists of members or items

**Class Hierarchies**

**1. User Hierarchy:**

* User (abstract)
* Librarian
* Member (implements Comparable)

**2. Library Item Hierarchy:**

* LibraryItem (abstract, implements Borrowable)
* Book
* Magazine

**Interface - Borrowable**

public interface Borrowable {

void borrowItem(Member member);

void returnItem();

}

**Why:** This interface ensures that all library items (Book, Magazine) provide a mechanism to be borrowed and returned, allowing polymorphic handling of borrowable items.

**Runtime Polymorphism**

* Method displayDetails() is overridden in Librarian and Member
* Called via User reference for runtime polymorphism

**TextIO Usage**

**Class:** LibraryFileManager

* saveInventory(List items)
* loadInventory()

**Purpose:** Save current library state and track borrowing/return logs in .txt files.

**Comparable and Comparator**

* Member: compareTo() by total borrowed items
* LibraryItemComparator: compare by title/year

**Class Diagram**

Borrowable

+borrowItem()

+returnItem()

User

-username

-id

+displayDetails()

LibraryItem

-title

-yearPublished

Member

+caompareTo()

Librarian

Magazine

Book

**Part to do in Deriverable 2**

* User, Member, Librarian classes
* LibraryItem, Book, Magazine with Borrowable
* Member implements Comparable
* LibraryItemComparator class