Library Management System - Documentation

1. Object-Oriented Analysis (OOA) Model

We applied the 4-step OOA model to design the Library Management System:

+ Objects: Book, Audiobook, Member

+ Attributes:

  - Book: title, author, isbn, available

  - Audiobook: duration, narrator

  - Member: name, id, borrowedBooks

+ Methods:

  - Book: borrow(), returnBook(), displayInfo()

  - Audiobook: borrow() [overridden]

  - Member: borrowBook(), returnBook(), displayInfo()

+ Inheritance: Audiobook inherits from Book. Member is independent.

2. Explanation of Class Design

- The Book class is the base class that contains common properties such as title, author, isbn, and availability.

- The Audiobook class inherits from the Book class, adding specific properties such as duration and narrator, and overriding the borrow() method to apply borrowing limits.

- The Member class manages user data, such as name, ID, and list of borrowed books.

- Inheritance is used to avoid code duplication and overriding methods in Audiobook.

3. Code Walkthrough

- Book::borrow(): Marks a book as borrowed and sets borrowing days to 14.

- Audiobook::borrow(): Overrides the borrow() method to set borrowing days to 7 instead.

- Member::borrowBook(): Allows borrowing up to 3 books, prevents borrowing unavailable books.

- Member::returnBook(): Returns a borrowed book and updates availability.

- Main Function: Creates sample objects (Book, Audiobook, Member), performs operations, and prints results to demonstrate system functionality.

4. Test Results

+ Example console output from running the program:

ISBN: 1192025

Duration: 90 mins

Narrator: Tai Huynh

Status: Borrowed

========== MEMBER INFO ==========

Member Name: Phong Giao Duc

ID: 1
Borrowed Books:

- C++ Inheritance

- C++ check LLM

C++ Inheritance has been returned.

Title: C++ Inheritance

Author: Huynh Xuan Phung

ISBN: 1092025

Status: Available

+ This demonstrates:
- Inheritance and method overriding work correctly.
- All works done

5. LLM Usage

I used chatGPT to clarify the role of **virtual** and **override** in C++. I then wrote and adapted the final code myself. The LLM was used only for guidance and explanation, not for generating majority of code/document.