Software Specification

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***Abstract*—Deliverable 1 outlines the requirement specification of the Software Engineering class project. This document introduces our project goal and outlines the requirements. Additionally, it is presented with context diagram, defining use cases and user stories for the implemention of the Information Capture and Dissemination Environment (ICDE) system.**

***Index Terms*—Collaborative-based filtering, Web crawler, Authentication, User Stories**

I. Problem Statement

In the current era of abundant information and a vast array of books spanning various genres, it poses a significant challenge for readers to find the ideal book tailored to their preferences [1,2]. Moreover, the complexity is compounded when attempting to locate the specific availability of a book. Furthermore, the sheer quantity of books available in the market makes it even more challenging to receive personalized recommendations that align with individual reading tastes.

To tackle these multifaceted challenges, we propose to develop a book recommendation platform, named "Bibliosphere," designed to help users in their quest to discover new books. This platform not only assists users in identifying their next literary adventure but also provides real-time information on the availability and pricing of books across various e-commerce platforms using a web crawler. The bibliosphere also offers the convenience of creating user accounts thereby allowing individuals to bookmark their favorite books and provide ratings. Users also have the option to recommend a book that is not currently listed in the database, allowing them to propose its inclusion to the administrator for database incorporation. Additionally, it elevates the user experience by delivering tailored book suggestions through a sophisticated hybrid deep learning model, combining elements of content-based [6,7,8,9] and collaborative-based filtering [3,4,5].

II. Project Objective

Our project aims to develop a user-friendly and comprehensive book recommendation system that makes use of user interactions and data analysis to facilitate easy book discovery and purchase for readers with diverse reading interests. The system will utilize machine learning models and web crawlers to deliver personalized book recommendations, creating a dynamic and engaging user experience within the literary community.

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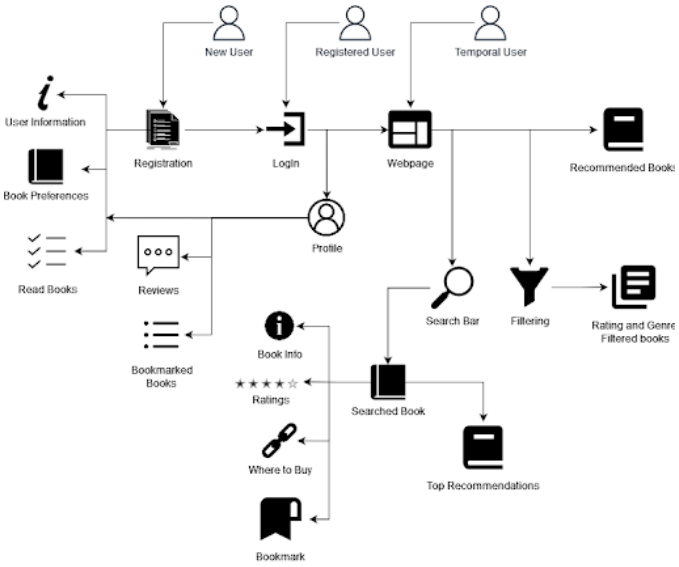

Fig. 1. System Context Diagram

III. Key Functionalities

- User Authentication and Authorization
- Personalized Recommendations based on rating and user interest
- Quick search feature
- Bookmarking feature
- Web crawler for finding purchase links
- Genre classification and categorization
- User Interaction and Engagement
- Database management

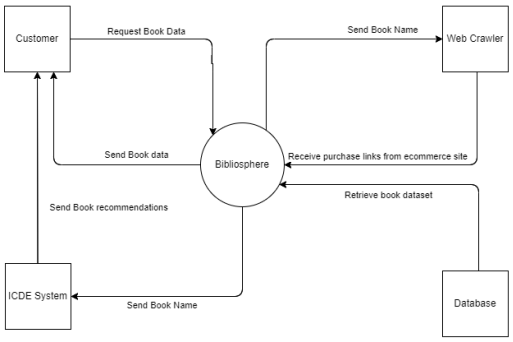

Fig. 2. Architecture of Bibliosphere

IV. Use-Cases

- User Authentication: Enable users to create accounts, log in, and manage their profiles. Implementing password encryption to protect user information.
  - Precondition: The user has not registered on the system before
  - Postcondition: The user's account has been created, allowing them to log in to the system
  - Actors: User, Bibliosphere system
- Personalized Book Recommendation: The system provides personalized book recommendations based on the user's reading history and preferences.
  - Precondition: The user has provided sufficient data through the reading activity and preferences.
  - Postcondition: The system displays a list of recommended books based on the user's interest
  - Actors: User, Recommendation System
- Book Search: Users can search for specific books through the search feature
  - Precondition: The user has a book title name in mind to search
  - Postcondition: The system displays relevant search results based on the user's query
  - Actors: User, System
- Bookmark management: Users can add or remove books from their bookmark list for future reading
  - Precondition: The user is logged in and has access to book details
  - Postcondition: The selected book is added or removed from the user's bookmark list
  - Actors: User, System
- Purchase link retrieval: The system uses a web crawler to find and display purchase links for a selected book from various bookstores or e-commerce sites.
  - Precondition: The users have selected a book for which purchase links are to be retrieved
  - Postcondition: The system displays valid purchase links for the selected book
  - Actors: User, Web crawler
- Book information retrieval: Users can access detailed descriptions about a specific book, including its title, genre, user rating and reviews.
  - Precondition: The user selects a book from the search or category list.
  - Postcondition: The system provides detailed information about the selected book.
  - Actors : User, System

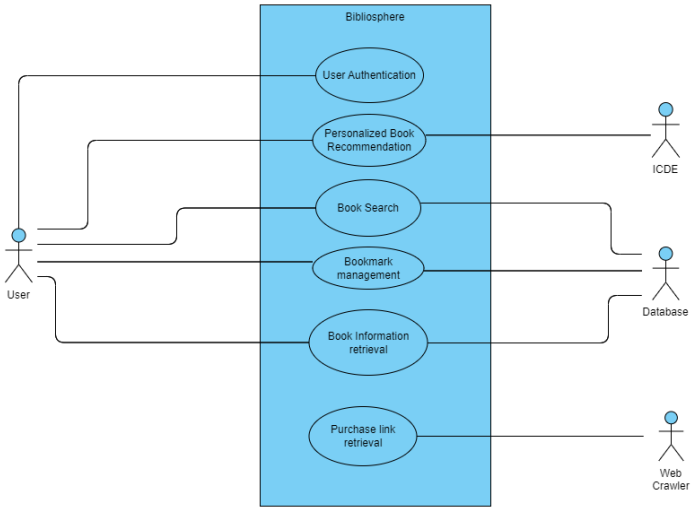

Fig. 3. Use-Case Diagram

V. User Stories

- User Registration
  - User Story Description: As a new user, I want to be able to register on the website by providing my basic information, such as name, email, and password, so that I can create a personalized account and access exclusive features.
  - Acceptance Criteria:
    - Registration Form: The registration form should include fields for the user's name, email, and password. The password field should support secure password criteria (e.g., minimum length, special characters). The form should have appropriate validation for email format.
    - Account Creation: Upon successful registration, a new user account should be created in the system.
    - Error Handling: Users should receive clear error messages for incomplete or incorrectly filled-out

fields. In case of a registration failure (e.g., duplicate email), users should be notified.
    - User Access: After successful registration and email verification, users should be able to log in using their registered email and password.
- User Login
  - User Story Description: As a registered user, I want the ability to log in to the website using my email and password, allowing me to access my personalized account and view my recent activity.
  - Acceptance Criteria:
    - Login Page: The login page needs to include labeled input fields for the email and password. It should also provide a "Forgot Password" link for users who need to reset their passwords.
    - Authentication: When users enter an incorrect email or password, they should receive an error message. If there are five consecutive failed login attempts, the user account should be temporarily locked, and the user should receive a notification.
    - Successful Login: Once successfully logged in, users should be automatically redirected to their personalized account page.
    - Security: Passwords should adhere to minimum complexity requirements, such as a specified minimum length and a combination of letters and numbers.
- Temporary User Book Discovery
  - User Story Description: As a temporary user visiting the webpage, I want to easily search for a particular book of interest or explore top-rated recommendations so that I can quickly find a compelling book to read without the need to create an account.
  - Acceptance Criteria:
    - The homepage should have a search bar for quick book searches.
    - The search functionality should provide relevant results based on book titles, authors, or keywords.
    - Users should have the option to explore top-rated book recommendations without being logged in.
  - Dependencies:
    - Availability of a book database with information for search functionality.
    - Associated rating system for generating recommendations.
- Book Search Functionality
  - User Story Description: As a user, I want to utilize the search bar to quickly find a particular book, view information about where to purchase it, and receive recommendations for similar books.
  - Acceptance Criteria:
    - The homepage should have a search bar.
    - The users should be able to type the title or keywords of a book into the search bar.
    - The search results page should display relevant books matching the search query.
    - Users should be able to click on a search result to access the detailed information about the selected book.
- Bookmarks
  - User Story Description: As a registered user, I want the ability to bookmark books that I like, so that I can easily revisit my favorite books.
  - Acceptance Criteria:
    - The user should see a "Bookmark" button/icon next to each displayed book.
    - Clicking the "Bookmark" button should add the book to the user's list of bookmarked books.
    - The user should be able to view their list of bookmarked books in a dedicated section in their account profile.
    - The user should have the option to remove a bookmarked book from their list.
    - Bookmarks should persist even after the user logs out and logs back in.
  - Dependencies:
    - User authentication and account management features must be implemented.
    - The webpage must have a database to store and retrieve user's bookmark data.
- Genre and Rating Filtering
  - User Story Description: As a user seeking personalized book recommendations, I want the ability to filter displayed recommendations based on genre and ratings, so that I can easily discover books that match my preferences.
  - Acceptance Criteria:
    - The user should see a filter option that allows selection of one or more genres.
    - The user should see a filter option that allows selection of a minimum rating.
    - Upon selecting filter criteria, the displayed book recommendations should match the selected genres and meet the specified rating.
  - Dependencies:
    - Depends on the availability of a database with genre and rating information for each book.
- Sentiment-Driven Book Recommendations
  - User Story Description: As a user with specific book preferences, I want to receive personalized book recommendations based on my reading history. Additionally, I am interested in exploring recommendations from other users with similar book preferences, so that I can discover new books that align with my preferences and with readers who share similar interests.
  - Acceptance Criteria:

    - The system should analyze the user's reading history to generate personalized book recommendations.
    - Sentiment-related recommendations should consider positive reviews from users with similar book preferences.
  - Dependencies:
    - Requires access to the user's reading history data.
    - Depends on the implementation of sentiment analysis algorithms for book reviews.
- Book Review Feature
  - User Story Description: As a user who has read a particular book, I want the ability to share my review for the book. This will allow me to express my opinions and give insights to the community of readers interested in the same book.
  - Acceptance Criteria:
    - There should be a "Write a Review" option visible on the book details page for users who have read the book.
    - The review form should include fields for a title, review, and a rating (e.g., on a scale of 1 to 5 stars).
    - Users should be able to submit the review form, and the system should store the review along with the user's information and the book's details.
    - Reviews should be able to be sorted by the most recent or rating value.
  - Dependencies:
    - Depends on the existence of user authentication.
- Detailed Book Information View
  - User Story Description: As a user, I want to access detailed information about a book when I select one. This includes essential details such as the title, author, and a brief overview, enabling me to quickly gather key information about the book I'm interested in.
  - Acceptance Criteria:
    - When a user selects a specific book, the system should display the book's title.
    - The author's name should be visible.
    - An overview of the book's content should be presented to the user.
  - Dependencies:
    - Availability of a database or data source containing book information.
- Ebook Availability Locator
  - User Story Description: As a user interested in a particular book, I want the ability to view a list of places where the ebook is available for purchase.
  - Acceptance Criteria:
    - The book detail view should include a section titled "Availability."
    - In the "Availability" section, a list of platforms (e.g., Amazon) should be displayed.
    - Each platform in the list should have a clickable link that directs the user to the specific page where the ebook is available.
  - Dependencies:
    - Availability information may depend on the book's publication status and agreements with ebook distributors.

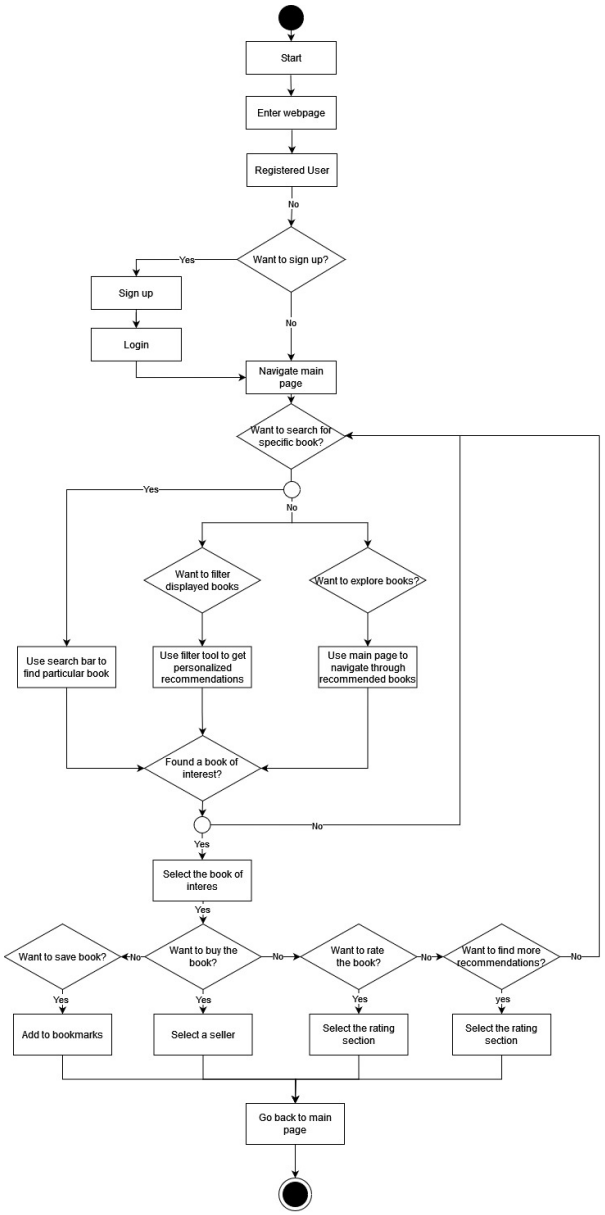

Fig. 4. Activity Diagram

VI. Requirement Specification

- User Registration
  - Create the data model
  - Create a database

  - Regex for password, multiple login check
  - Check how to store user's history
- User login
  - Fetch and verify the user's credentials.
  - Lock or disable after three attempts.
  - Create a homepage layout for the user after successful login.
- Temporary user book discovery
  - Generate Random suggestions
  - Search based on genre or title and recommend book on the same.
- Book search functionality
  - Search based on present search filter and user's history.
  - Filter for search conditions according to user history or vice versa.
- Bookmarks
  - Store link to the books detailed view
  - Store the title
  - Display short preview
- Genre and Rating Filtering
  - Filter based on genre
  - Filter based on rating.
- Sentiment driven book recommendations
  - Add like/dislike feature
  - Based on like/dislike recommend appropriate books.
- Book review Feature
  - Store comments and star ratings
  - Display average ratings of the book.
- Detailed Book Information View
  - Display description/summary
  - Genres
  - Rating
  - Reviews
  - Show option to bookmark
  - Show book availability on various e-commerce sites/stores
- Ebook availability Locator
  - Search the purchase links using a webcrawler.
  - Attach the links to the current webpage

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