
Software Requirements Specification

for

LitXchange

Version 1.0 approved

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Revision History

Name	Date	Reason For Changes	Version
LitXChange	13/3/2024	Initial Version	1.0

1. Introduction

1.1 Purpose

This Software Requirements Specification (SRS) document outlines the requirements for the development of LitXchange, a book exchange application aimed at facilitating local book exchanges among users. It defines the functionalities, features, and constraints of the software system, providing a comprehensive guide for stakeholders involved in its development and deployment.

1.2 Document Conventions

This document adheres to standard formatting and conventions for clarity and consistency. Requirements are prioritized based on their significance to the overall system, and each requirement statement is assigned its own priority for clarity and ease of reference.

1.3 Intended Audience and Reading Suggestions

The intended audience for this document includes developers, project managers, designers, testers, and other stakeholders involved in the software development lifecycle. For a comprehensive understanding, readers are encouraged to start with the overview sections, progressing to sections relevant to their roles and interests. Developers and technical team members may focus on detailed requirements and system architecture, while project managers and stakeholders may prioritize sections related to project scope, goals, and constraints.

1.4 Product Scope

LitXchange is a mobile application developed using Flutter and Firebase, designed to connect users within local communities for the purpose of exchanging books. The application enables users to create profiles, list books available for exchange, and browse through listings of books offered by others nearby.

The scope of LitXchange includes:

- User authentication and profile management
- Listing and browsing books available for exchange
- Coordination between users for book exchanges
- Integration with Firebase for backend services, including database management and cloud storage
- LitXchange aims to promote literacy, foster community engagement, and contribute to environmental sustainability by facilitating the sharing and exchange of books among individuals within local neighborhoods.

1.5 References

The document does not refer to any external files.

2. Overall Description

2.1 Product Perspective

LitXchange is a new, self-contained mobile application developed to facilitate local book exchanges among users. It is designed as a standalone product aimed at promoting literacy, fostering community engagement, and contributing to environmental sustainability by facilitating the sharing and exchange of books within local neighborhoods.

2.2 Product Functions

- User registration and authentication
- Profile creation
- Profile management
- Add Books
- View Available Books
- Book search
- Send swap request
- Accept swap request

Refer to the data flow diagrams in Appendix B for further details.

2.3 User Classes and Characteristics

In the context of the LitXchange application, user classes are aligned with distinct use cases, each reflecting specific user behaviors and requirements. Some of the users are listed below.

Book Seeker	This use case represents individuals who primarily utilize the LitXchange platform to search for and acquire books. Book Seekers typically engage with functionalities such as browsing available listings, searching for specific titles or genres, and initiating exchange requests. They prioritize ease of search, clear presentation of book details, and efficient communication with book owners.
Book Provider	Book Providers are users who list their available books on the LitXchange platform for exchange. They engage with functionalities such as adding books to their listings, managing their profile information, and responding to exchange requests. Book Providers value ease of listing, customization of their profile, and effective communication with potential exchange partners.

The users defined above will be utilizing the following use cases. These use cases are differentiated based on their frequency of interaction, functional preferences, and technical capabilities.

Use Case	Description	Priority	Pre Conditions	Post Conditions
Sign Up	Allows users to register on the LitXchange platform by creating a new account.	High	Users must not be logged into the LitXchange platform.	User's registration information is validated and stored securely in the system, and the user is logged into the platform.
Login	Allows registered users to log into the LitXchange platform.	High	User must not be logged into the LitXchange platform.	User's login credentials are validated, and the user is authenticated to access their account and the platform's functionalities.
Update Profile Information	Enables users to update their profile information.	Medium	User must be logged into the LitXchange platform.	User's profile information is successfully updated and reflected in the system.
View Book Listings	Allows users to view available books listed by other users.	Medium	User must be logged into the LitXchange platform.	User can browse through a list of available books and view detailed information about each listing.
Add a Book to Listing	Enables users to add a book to their listing for exchange.	High	User must be logged into the LitXchange platform.	The book is successfully added to the user's listing and

				made available for exchange.
Search for Books	Allows users to search for books based on title, author, or genre.	High	User must be logged into the LitXchange platform.	User is presented with a list of relevant books matching the search criteria.
Send Exchange Request	Enables users to initiate an exchange request for a desired book.	High	User must be logged into the LitXchange platform.	The exchange request is sent to the owner of the selected book for consideration.
Accept Exchange Request	Allows users to accept or reject incoming exchange requests.	High	User must be logged into the LitXchange platform and have pending exchange requests.	If accepted, the exchange request is confirmed, and contact information is shared between users for further coordination.

2.4 Operating Environment

The LitXchange application operates on mobile devices running the Flutter framework and is compatible with Android and iOS platforms. It requires an internet connection for coordination between users. The application interfaces with Firebase for backend services, including database management and cloud storage. The table below summarizes this:

Sr No	Category	Environment for development
1.	Backend & Frontend	Flutter
2.	Database	Firebase
3.	IDE	Android Studio
4.	Version Control	Github

2.5 Design and Implementation Constraints

- **Technology Stack:** The application is developed using Flutter and Firebase, constraining the developers to use these specific technologies.
- **Security Considerations:** The application must comply with security standards to ensure the confidentiality and integrity of user data.
- **User Interface Guidelines:** The application design must adhere to established user interface style guides to ensure consistency and usability across platforms.

2.6 User Documentation

The following user documentation component will be delivered along with the software:

- Tutorial

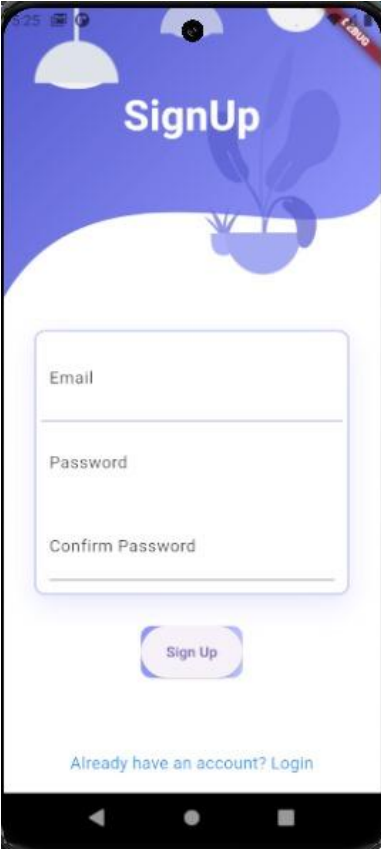
The documentation will be provided in digital formats accessible through the LitXchange application.

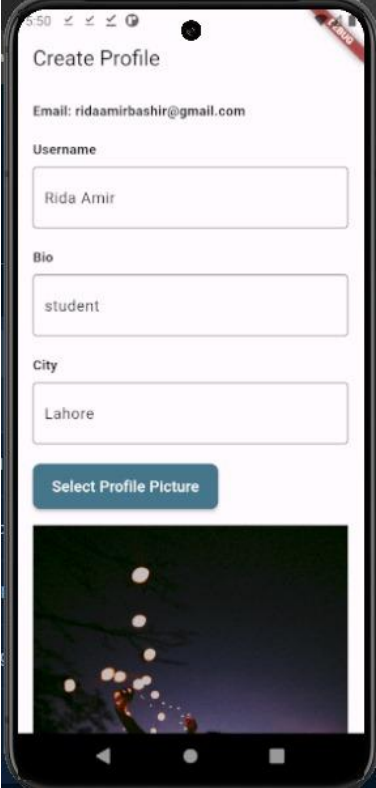

2.7 Assumptions and Dependencies


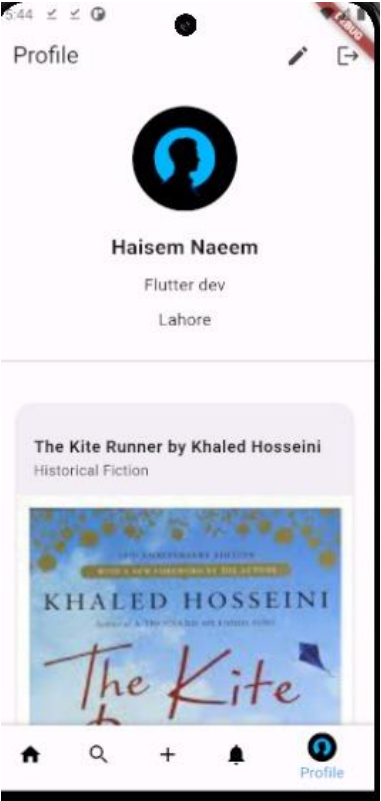
- **Third-party Services:** The project assumes continued availability and functionality of third-party services such as Firebase for backend services.
- **Development Environment:** The project assumes access to development tools and environments required for Flutter app development.
- **User Adoption:** The success of the project depends on user adoption and engagement within local communities for book exchanges.

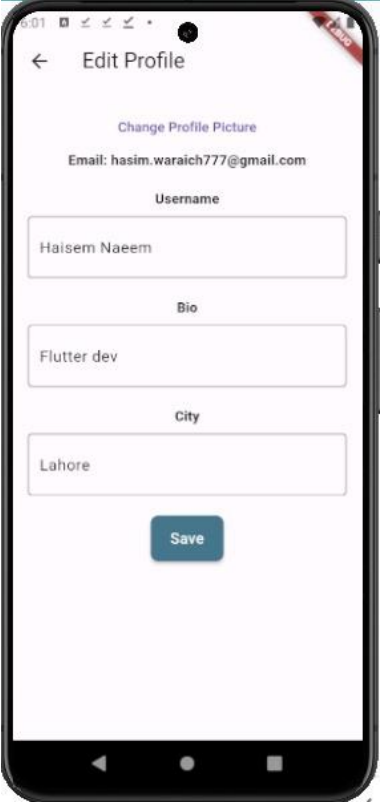
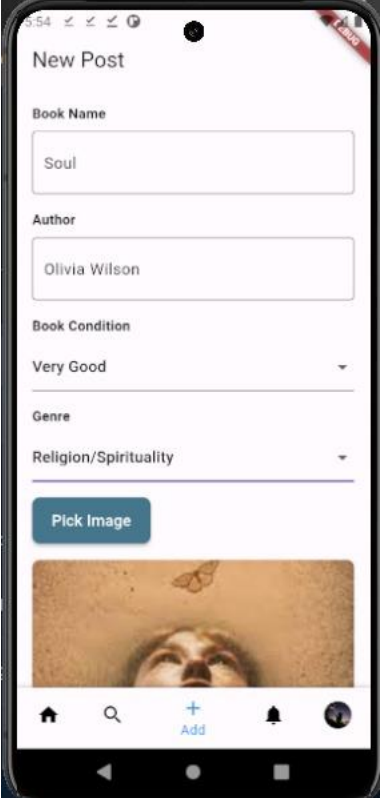
3. External Interface Requirements

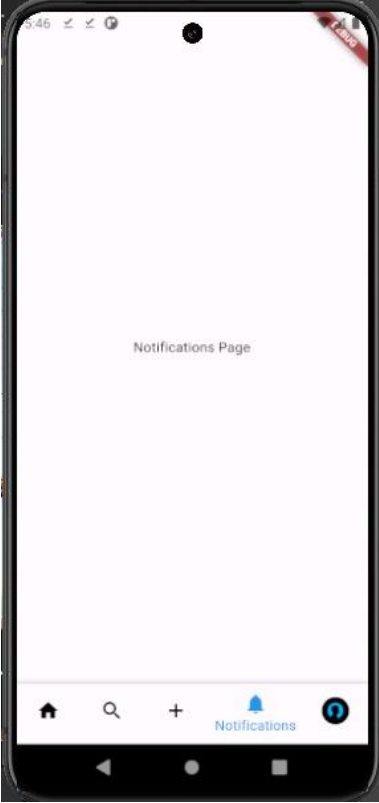

3.1 User Interfaces

Name	Description	Mockscreen
SignUp Screen	<p>Allows a new user to register</p> <ul style="list-style-type: none">• textbox for user to enter email and password• the user is registered once the email sent to the user for registration is verified• error message is displayed in case if account already exists• incase of successful registration,user is redirected to create user profile• provides a link to login page if the user is already registered	

<p>Setup User Profile Screen</p>	<p>User is required to enter is information for user profile</p> <ul style="list-style-type: none">• takes input for username, city, bio and profile picture• saves this data to firebase for later user	
<p>Login Screen</p>	<p>Allows user to login into the application</p> <ul style="list-style-type: none">• text box for users to enter their username and password• redirected to home page on successful login• error message displayed for invalid credential• provides a link to sign up screen if user has not registered yet	

Home Screen	<p>The main screen users see upon launching the app.</p> <ul style="list-style-type: none"> List of available books with details (title, author, genre, condition, image) and an option to initiate a swap request. Navigation bar for accessing Profile, Notifications, and Search and Add Book Page. 	
User Profile Screen	<p>Allows users to view and manage their profile information and view listed books.</p> <ul style="list-style-type: none"> Profile picture and username display. User's city, bio, and listed books. Edit profile button for updating personal information. Logout button to allow user to logout 	

Edit Profile Screen	<p>Allows users to update personal information including:</p> <ul style="list-style-type: none"> • username • city • bio • profile picture <p>User should not be allowed to update email address. It will be displayed only.</p>	
Add Book Screen	<p>Form for users to add new books to their listings for exchange.</p> <ul style="list-style-type: none"> • Form fields for entering book details (Book Name, author, genre, condition, image upload). • Submit button to add the book to listings. 	

<p>Notifications Screen</p>	<p>Displays incoming swap requests and other notifications.</p> <ul style="list-style-type: none"> List of swap requests from other users. Option to accept or reject swap requests. 	
<p>Search Screen</p>	<p>Allows users to search for relevant book listing by user name, author name and book name</p> <ul style="list-style-type: none"> text field for user to enter desired search keywords List of posts displaying search results similar to home screen if no keyword is enter, all posts are displayed 	

3.2 Hardware Interfaces

The LitXchange application is designed to run on android mobile devices running Flutter framework. The application will utilize standard mobile device communication protocols for data transfer over the internet.

For the stakeholders, who are the end users of the LitXchange application, the hardware requirements are minimal since the application is designed for mobile devices. The following are recommended specifications for users' devices:

- **Device Type:** Any Android device running Android OS.
- **Processor:** Minimum 1.5 GHz quad-core processor or higher.
- **RAM:** At least 2 GB RAM for smooth performance.
- **Storage:** Adequate storage space for installing the application and storing book images.
- **Internet Connection:** Required for exchanging data with the Firebase backend.

For the server-side hosting of the LitXchange application, where the backend services are hosted, the requirements will depend on the expected user load and data storage needs. Following are required:

- **Server Type:** Cloud-based hosting is recommended for scalability and ease of management.
- **Processor:** Multi-core processor for handling concurrent user requests.
- **RAM:** At least 4 GB RAM for smooth operation.
- **Storage:** Depending on the expected number of users and book listings, a minimum of 50 GB storage.
- **Operating System:** The server should support the requirements of the Firebase backend services.
- **Internet Connection:** High-speed internet connection for data transfer and communication with users' devices.

3.3 Software Interfaces

The software requirements for stakeholders are as follows:

- **Operating System:** Android OS.
- **Mobile Application:** LitXchange mobile app installed.
- **Internet Connection:** Required for accessing the app and exchanging data with the Firebase backend.
- **Email Client:** Needed for email verification during registration.

The software requirements for Hosting are:

- **Framework:** Flutter Framework is used for front-end development, providing the UI components and interaction.
- **Database:** Firebase Firestore Database is the backend database service for storing user profiles, book listings, and swap requests.

- **Backend Services:** Firebase Authentication is used for user authentication and authorization.
- **Operating System:** The application is designed for Android OS compatibility.

3.4 Communications Interfaces

The LitXchange application will be available for download. Email will be used for user authentication, notifications, and communication between users. Sending emails will be done through SMTP server. For push notifications, Firebase Cloud Messaging (FCM) will be used to notify users of new swap requests, updates, and important information. Moreover, for data transfer, HTTPS will be used to ensure secure and efficient data transfer between the client (app) and server (Firebase).

4. System Features

4.1 User Registration and Authentication

4.1.1 Description and Priority

This feature allows users to register on the platform by creating a profile and authenticating themselves securely via email. It is of high priority as it forms the basis for user interaction and ensures the security of user data.

4.1.2 Stimulus/Response Sequences

- User navigates to the registration page.
- User enters required details such as name, email, and password.
- System validates the entered information via email.
- If valid, the system creates a new user account and redirects the user to the create user profile page.
- If invalid, appropriate error messages are displayed, prompting the user to correct the information.

4.1.3 Functional Requirements

- **REQ-1:** The system shall provide a user registration form with fields for name, email, and password and confirm password.
- **REQ-2:** The system shall validate the entered email to ensure its uniqueness in the database.
- **REQ-3:** Passwords must meet predefined complexity requirements (e.g., minimum length).
- **REQ-4:** Upon successful registration, the system shall store user information securely in the database.
- **REQ-5:** The system shall provide a login interface for registered users.

4.2 Profile Creation

4.2.1 Description and Priority

This feature enables users to create their profiles, by adding personal information. It is of medium priority as it enhances user engagement and customization.

4.2.2 Stimulus/Response Sequences

- User is redirected to create a profile page after signup where he enters his personal information, such as username, city, bio and profile picture.
- On submitting the information, user is redirected to home page
- System saves the information and reflects changes in the user's profile.

4.2.3 Functional Requirements

- **REQ-6:** The system shall display create user profile section upon sign up where users provide their personal information to create their profile.

4.3 Profile Management

4.3.1 Description and Priority

This feature enables users to manage their profiles, by updating personal information. It is of medium priority as it enhances user engagement and customization.

4.3.2 Stimulus/Response Sequences

- User logs in to their account.
- User navigates to the profile section.
- User updates personal information, such as username, city, bio and profile picture.
- System saves the updated information and reflects changes in the user's profile.

4.3.3 Functional Requirements

- **REQ-7:** The system shall provide a profile section where users can view and edit their personal information.
- **REQ-8:** The system also displays the posts the user has made in the profile section.

4.4 Add Books

4.4.1 Description and Priority

This feature allows users to list the books they have available for exchange. It is of high priority as it constitutes the core functionality of the application.

4.4.2 Stimulus/Response Sequences

- User navigates to the "**Add Book**" section.
- User enters book details such as title, author, genre, condition, and an image of the book .
- System validates the entered information.
- Upon successful validation, the system adds the book to the user's listing.

4.4.3 Functional Requirements

- **REQ-9:** The system shall provide a form for users to add new books to their listings.
- **REQ-10:** Users shall be able to specify book details including title, author, genre, condition, and image of book cover..
- **REQ-11:** The system shall validate book details to ensure completeness and accuracy.

4.5 View Available Books

4.5.1 Description and Priority

This feature enables users to explore books listed by other users on the app. It holds high priority as it serves as the fundamental functionality for book exchanges on the platform.

4.5.2 Stimulus/Response Sequences

- Users can easily access a list of books posted by other users directly from the home page.
- Each post includes the name of the book, author, genre, condition and a picture.

4.5.3 Functional Requirements

- **REQ-12:** The system shall prominently display books listed by other users on the home page, ensuring easy access to available listings.

4.6 Book Search

4.6.1 Description and Priority

This feature enables users to search for specific titles, genres, or authors. It holds medium priority.

4.6.2 Stimulus/Response Sequences

- Users utilize the search bar to look for books by entering keywords such as title, author, or genre.
- The system promptly presents relevant search results based on the user's query, enabling efficient book discovery.
- Upon finding a desired book listing, the user decides to initiate an exchange.

4.6.3 Functional Requirements

- **REQ-13:** Users shall be provided with a search functionality allowing them to find books based on title, author, or genre.
- **REQ-14:** Search results shall be presented in a user-friendly and organized manner, showcasing relevant book listings with clear information.

4.7 Send Swap Requests

4.7.1 Description and Priority

This feature enables users to manage the exchange process by sending exchange requests to other users. It holds high priority as it serves as the fundamental functionality for book exchanges on the platform.

4.7.2 Stimulus/Response Sequences

- Users can easily access a list of books posted by other users directly from the home page.
- Upon finding a desired book, the user decides to initiate an exchange.
- The user initiates an exchange offer by sending a swap request.

4.7.3 Functional Requirements

- **REQ-15:** Users shall select a book from the home page to send a swap request.
- **REQ-16:** The system shall notify the owner of the book of incoming exchange offers.

4.8 Accept Requests

4.8.1 Description and Priority

This feature enables users to manage the exchange process by viewing their exchange requests and accepting the one which suits them the most. It holds high priority as it serves as the fundamental functionality for book exchanges on the platform.

4.8.2 Stimulus/Response Sequences

- Users can easily access a list of exchange requests posted by other users directly from the notifications page.
- The user is redirected to the profile of the user sending the request once he views the request.
- The user selects a book of his choice from that user's profile to exchange.
- If a book is selected, email addresses of both users are shared with each other for further contact.
- Otherwise the request is rejected.

4.8.3 Functional Requirements

- **REQ-17:** The system shall display a list of swap requests.
- **REQ-18:** The user shall select a book to exchange from the sending user's profile.
- **REQ-19:** The system should display the contact information of both users to each other once the offer is accepted for further coordination.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

- **Response Time** The application shall respond to user inputs within 5 seconds under normal operating conditions.
- **Concurrent Users:** The system shall support up to 1,000 concurrent users without significant degradation in performance.
- **Load Time:** The initial load time of the application on devices shall not exceed 10 seconds on a standard broadband connection.

5.2 Safety Requirements

- **Data Privacy:** Personal user data, including email addresses and location information, shall be stored securely and not shared with third parties without explicit user consent.
- **Content Moderation:** The system shall implement content moderation to prevent the exchange or display of illegal or inappropriate material.

5.3 Security Requirements

- **Authentication:** Users must be authenticated to access their personal accounts, with support for multi-factor authentication for enhanced security.
- **Data Encryption:** All sensitive data, including user credentials and personal information, shall be encrypted both in transit and at rest.
- **Access Control:** Users shall only have access to modify their own listings and account information. Administrative users will have broader access to manage content and user accounts.

5.4 Software Quality Attributes

- **Usability:** The application shall offer an intuitive and user-friendly interface, ensuring ease of navigation and accessibility for users with varying levels of technical proficiency.
- **Reliability:** The system shall have an uptime of 99.5%, with scheduled maintenance performed during low-usage hours to minimize disruption.
- **Scalability:** The application architecture shall be scalable to accommodate growing numbers of users and listings without requiring significant redesign.

5.5 Business Rules

- **Content Ownership:** Users retain ownership of the content they post but grant the platform a license to display and distribute this content.
- **Transaction Conduct:** While the platform facilitates book exchanges, transactions are ultimately agreements between users. The platform is not responsible for the condition of items or fulfillment of trades.

6. Other Requirements

6.1 Environmental Requirements

- **Cross-Platform Support:** The application shall be accessible on both iOS and Android devices, as well as through a web interface, ensuring wide accessibility.
- **Internationalization:** Initially available in English, the system shall be designed to support localization for additional languages to cater to a global user base.

6.2 Legal Requirements

- **Copyright and Intellectual Property:** The application shall enforce respect for copyright and intellectual property laws, requiring users to only list books they legally own.
- **Data Protection and Privacy:** The system shall comply with GDPR, CCPA, and other relevant data protection regulations, ensuring user data is handled legally and ethically.

6.3 Ethical Requirements

- **Community Guidelines:** The application shall promote a respectful and positive community environment, with clear guidelines against harassment, discrimination, and abuse.
- **Transparency:** The platform shall be transparent about how user data is used and provide users with control over their personal information.

Appendix A: Glossary

LitXchange: The mobile application discussed in this SRS, designed to facilitate local book exchanges among users.

Firebase: A platform developed by Google for creating mobile and web applications. It provides tools for tracking analytics, reporting and fixing app crashes, creating marketing and product experiment.

Flutter: An open-source UI software development kit created by Google. Used for developing applications for Android, iOS, Linux, Mac, Windows, Google Fuchsia, and the web from a single codebase.

Authentication: The process of verifying the identity of a user before granting access to the system.

Backend Services: Server-side services that provide database management, user authentication, and other essential functions for the application.

Book Provider: A user who lists their available books on the LitXchange platform for exchange.

Book Seeker: A user who utilizes the LitXchange platform to search for and acquire books.

Cloud Storage: A service model in which data is transmitted and stored on remote storage systems, where it is maintained, managed, and backed up, and made available to users over a network (typically the internet).

Database Management: The process of defining, manipulating, retrieving, and managing data in databases.

Frontend: The part of a computer system or application that interacts with the user, displaying data and accepting input.

GDPR (General Data Protection Regulation): A regulation in EU law on data protection and privacy in the European Union and the European Economic Area. It also addresses the transfer of personal data outside the EU and EEA areas.

IDE (Integrated Development Environment): A software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of a source code editor, build automation tools, and a debugger.

Interlaced: A technique in computer graphics and web design for displaying images by drawing every other line or row in an image sequentially.

PNG (Portable Network Graphics): An image format used to store pictures on the web and other applications.

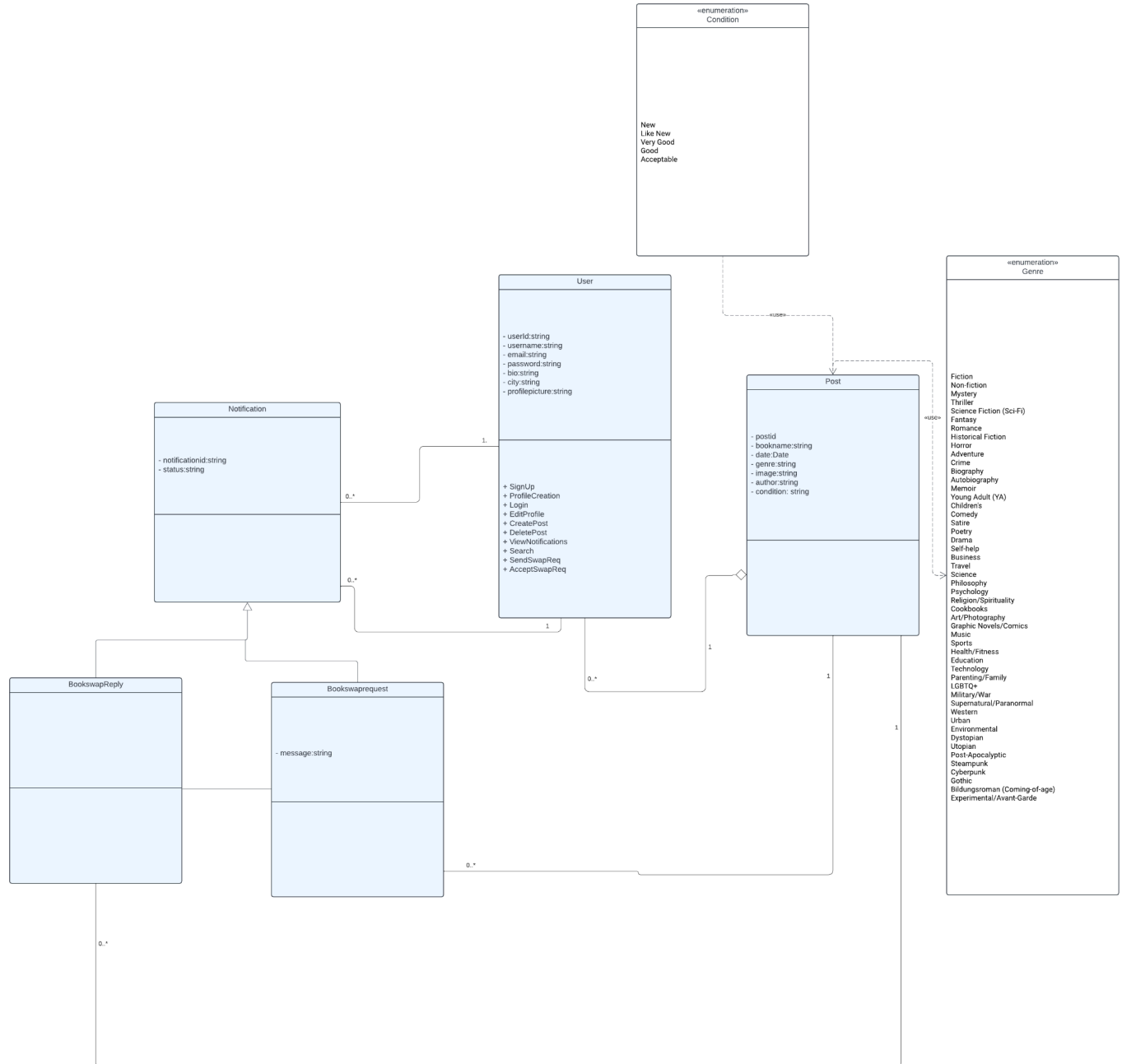
Swap Request: A request sent by one user to another for the purpose of exchanging books.

User Interface (UI): The space where interactions between humans and machines occur. The goal of UI design is to make the user's interaction as simple and efficient as possible.

Version Control: A system that records changes to a file or set of files over time so that you can recall specific versions later.

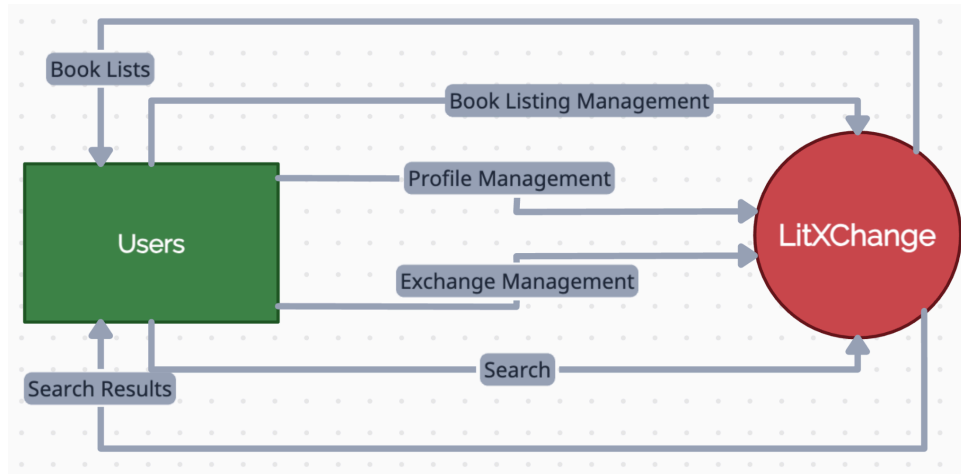
Appendix B: Analysis Models

Class Diagram



Data Flow Diagram

- Level 0



- Level 1

