Bilkent University

Department of Computer Engineering

Senior Design Project

Project Specifications Report

Project Name: BookClub

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1. Introduction

Reading is a fun and useful activity: we can learn new things by reading a scientific book or we can find ourselves in a totally new fictional world by reading a novel. Unfortunately, every beautiful thing comes with a price. Wouldn't it be nice to exchange our books with our friends' books, instead of paying? If we did that, we would have lessened the price of reading significantly. There are groups of people around the world who have noticed the advantages of book sharing. These people have formed book sharing groups, called book clubs.

The main aim of this project is to create a book trading platform which will serve as a universal "BookClub". The users of this mobile app will be able to exchange their used books with books of other users and they will also be able to buy second-hand books from other users by paying a reasonable price. The users will specify the books that they desire to give away or sell and the ones they want to read. Using this information, BookClub will match users with the owners of books they are looking for. While doing this, it will find the best possible match for a user by considering user locations, user ratings, book prices and some other attributes. Additionally, it will make personal suggestions to its users by trying to understand their taste of books.

This report includes a description for BookClub, in which it is possible to find the core features and usages of the application. The description will be followed by several constraints that our team and the application will follow. In this report, we addressed implementation, economic, time, social, ethical and sustainability constraints. Furthermore, there will be some information given about potential ethical and professional issues and their solutions. The report will then continue by describing the functional and non-functional requirements of the project respectively. Finally, there will be a list of sources that were referenced in the prior sections of the report.

1.1 Description

Let’s imagine a case where a user wants to read/buy a book, however, the book is either too pricey, not available in the local markets or worse - the book is only obtainable as a pirate version. In this situation, let’s think about what are the primary websites/applications the user will use to obtain the original version of the book for a more reasonable price.

First, they will search “buy [book name] cheap” in Google. Later, they will click the link leading to Amazon and observe that the book they want is second-hand, original and cheap. However, it is unknown whether the book will be shipped safely in a good condition. In this case, the user may not be satisfied and will search other websites/applications.

The user may take a look at online second-hand book markets such as ThriftBooks, BookFinder, etc [1], [2]. Nevertheless, although in these kinds of websites, the books are cheap, the shipping price is usually high and the sellers/owners are unreachable. Additionally, the location of the book is unspecified. At this point, the user may either buy the pirate version or not be able to obtain the original book at all. This is the problem which leads to black marketing, devaluation of the books and authors.

BookClub is an innovative mobile application which can be downloaded for free from Google Play Store. The main difference of BookClub from the similar applications/websites is that in this app, users can exchange the book they desire with a unique match/suggestion algorithm. The users log in/register to the app and create the lists of the books they can give away and the books they desire to obtain. Then, the user will get matched with other users. In this situation, by clicking the match screen, they will see the list of matches, the location of the books, the owners and their reviews. They can easily contact the user and arrange a meeting where they will be able to exchange books. This is an advantage for both sides since the users will be worried about neither the safety of the book nor its condition, due to viewing the owner’s review and reaching them. No shipment price, no worries about

the reliability of the other user, no pirate versions and no black market. Moreover, the users can sell their books in BookClub, yet, the price has a limit (not higher than the original book's price). There are also cases of not getting the best match, in this case, BookClub's innovative match & suggestion algorithm offers users new books that they may like, by analyzing their search history and their book wishlist. The suggestion algorithm works as following: assume a case where a user does not need any new book, but they have several books they would like to give away. In this scenario, BookClub analyzes the user's "giveaway" books and examines their preferences. Later, in the main screen, the user will constantly see the books similar to their likes.

Overall, BookClub is an innovative and accessible mobile app that will create an opportunity for book lovers to find new books or trade their books with a simpler method. The aim of the app is to ease book lovers' lives by creating a convenience for them to swap their original books or get them for a cheaper price. With the original and fast match/suggestion algorithm it will decrease both the black market sales and book piracy. At the same time, the app will provide the users the books they desire.

1.2 Constraints

1.2.1 Economic Constraints

- We will publish our application in Google Play Store so that it will be downloadable in the Android platform. In order to do this, we will have to pay a $25 fee.
- The libraries and APIs to be used will be free (e.g. Google Maps API, Android SDK, etc.).
- We will rent a server (VDS - Virtual Dedicated Server) which will be used for data storage, data manipulation and server-side computations. The cost of renting a server is approximately 50 TL per month.

- BookClub will be a freemium app. The app will be free to download, but the users will have to pay a price to remove limitations such as advertisements and exchange restraint.
- In order to download and use BookClub, users should have an Android device.

1.2.2 Implementation Constraints

- The system will have a server-side and a client-side in the form of an Android application.
- Version control will be done through GitHub [3].
- Java will be the main high-level programming language for the client-side application. Android SDK 26.1.1 will be used and the least Android version to support the app will be 5.0 (SDK 21).

1.2.3 Time Constraints

- BookClub is an application that will have a huge amount of data in the backend. This data will be stored in the outer database. In order to make the app work faster with this amount of data, we need to decrease the runtime of the match and suggestion algorithm. To decrease the runtime, we have several steps:
    1. The database should be the inner one, rather than the outer. Why? Because it is easier for the app access the nearest database than the outer one. This way it will read and write the data much faster.
    2. The Match and Suggestion algorithm should not have an “insert query” inside. As it is known, insert queries (write) are slower than select queries (read). Thus, if there are too many insert queries inside the algorithm that is supposed work fast, the app will get freezed.
    3. The Match and Suggestion algorithm should have a runtime not slower than the existing fast match algorithms

such as Mean Squared Error or k-nearest neighbour algorithm.

1.2.4 Social Constraints

- In BookClub, users will not be able to use swear words in comments.
- After a match is accepted by both users, they will be able to chat with each other. It is up to the users to choose an appropriate trading place and date in these chats.

1.2.5 Ethical Constraints

- For BookClub, protecting user privacy is a very serious concern. User information will not be shared with any third party people.
- The app is loyal to the Code of Ethics [4].
- The users will have to register to the system in order to use it. To create an account, they will have to agree with BookClub's "Terms of End User Service". After creating their account, they can log in to the system by entering their username / e-mail address and password any time they want.
- We will store user passwords using encryption.

1.2.6 Sustainability Constraints

- Potential agreements and partnerships with other online book shopping platforms (e.g. Idefix) can have positive results for both sides. For instance, it can help us to extend our book dataset. In addition, our match algorithm can be useful for them in creating book suggestions for their users. We may also advertise some of their books on our platform.
- We are planning to collect anonymous user statistics. By analyzing them, we can enhance the accuracy of our match algorithm.
- If the users reject one of the match results or suggestions, we will want them to explain what they did not like and rate that

result/match. By this way, we can improve our match algorithm with respect to user feedback.

1.3 Professional and Ethical Issues

Since our app uses a suggestion & match algorithm that generates results by utilizing users' profiles, activities and interests; it requires and contains some sensitive data, especially from the users' perspectives. It can be seen as a serious ethical issue. Therefore, we give the prime importance to the privacy of our users' data such as location, email address, password, book interests, recent sales and search history. We will make sure that this data will stay safely in the BookClub server and will not be shared with any third party companies. Before we require private data from users, they need to agree to the Terms of End User Service. In these terms, users will be informed about what information they distribute, how we use it and whom we share it with.

From the professional perspective, we will make sure that every group member contributes equally to the project. We will apply each other's knowledge to fasten the production process and create a well implemented unique app. We will arrange meeting routines for every week to rapidly and constantly progress in the project. We will use Trello as scrum (a framework for managing product development) to share the work and to follow the development process [5], [6]. To keep track of the development stages, a distributed version control tool (such as GitHub) will be used and the codes will stay private.

2. Requirements

2.1 Functional Requirements

- The user can add the books he/she is willing to use as a trade material and specify whether it is for sale, for exchange or both.
- The user can make a list of books he/she would like to take or buy.

- The user can edit the list of books that they have listed for sale or exchange and that they wish to obtain.
- The user can change the preferred method of transaction, such as changing the condition from exchanging to selling.
- The user can set the prices of their books that are for sale.
- The user can search for books by filtering their titles, authors, prices, publishers, etc.
- The user can see their matched books.
- The user can see the books that were suggested to them by the system.
- The user can get into contact with another user that was matched for a trade after both sides approve the match.
- The user can rate and/or report another user, if they are matched.
- After the exchange is performed, both ends should submit the completion of the trade to BookClub.
- The user can write comments about the other user, if both of them approve that the book exchange is successfully performed.

2.2 Nonfunctional Requirements

2.2.1 Usability

- Since BookClub has the customer range from all ages and various groups of people, the application should have a user-friendly interface for all of these potential user types.
- The application should include an explicit user manual which consists of information about the usage of BookClub and the details about matching and suggesting.

2.2.2 Scalability

- As the number of people increments, the application should meet the increased number of users and their demands.

- The system should be powerful enough to be able to store the books that are newly added by the users.

2.2.3 Extensibility

- In our application, we will take the comments of the users into consideration to improve and modify the system according to the users' requests and views.
- Making updates and adding new features is necessary for an application to satisfy the demands of users.

2.2.4 Efficiency

- The system can have user intensity. The application should work efficiently regardless of the number of people using it.
- The system can have a high number of books, therefore, the application should match the users in the best way and as quick as possible.
- When a user is adding a book, the authenticity check time of the book should be minimized.

2.2.5 Reliability

- Match algorithm should prioritize the perfect matched book in the system with the user’s preference and give the accurate book match to the user.
- If there is no matched book for a user preference, match algorithm should give suggestions that are suitable with the user’s book taste.
- The application should not include any pirate books.
- The second-hand book’s price should not exceed the price of the first-hand book.

2.2.6 Availability

- BookClub should be available on Google Play Store.
- The system should be available for user access every time.

2.2.7 Security

- The system should protect the private information of the user such as location, email, password, recent sales and search history.

3. References

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[6] “What is Scrum? An Agile Framework for Completing Complex Projects - Scrum Alliance”. [Online]. Available: https://www.scrumalliance.org. [Accessed: 13 Oct, 2018].