Book-Share (BS) Apps using the Android System

A Latif¹, Marsujitullah², S M A Letsoin³ and J Budiasto⁴

¹Department of Information Systems, Faculty of Engineering, Musamus University, Merauke, Indonesia.
²Department of Informatics, Faculty of Engineering, Musamus University, Merauke, Indonesia.
³Engineering of Agricultural Technological Systems, Faculty Engineering, Czech University of Life Sciences (CULS), Prague, Czech Republic.
⁴Department of Information Systems, Faculty of Engineering, Musamus University, Merauke, Indonesia.

E-mail: agustan@unmus.ac.id

Abstract. Information technologies including information systems play an important role to support education systems specifically in remote area such as Papua. However, based on World’s most literate Nations (WMLN) study found that Indonesia is the second-least literate nation in the World. This study focuses on the empowering of open source android software to facilitate students or teachers to borrow, share or exchange books. The system consists of two modules, i.e. the Backend as a Service (BaaS) is obtained through firebase web service, and client android system. The findings may be helpful for both borrowers and owners using this application in selecting, borrowing, reviewing, applying, adding book profile, and viewing. To end this, the application also able in displaying maps and routes, private messages as well as notification.

Introduction

Sharing books is one of the important points in increasing literacy in the community, especially for students and teachers. This study focuses on creating Android-based software that can help students and teachers to borrow, to share or to exchange books for online fellow application users. Currently, daily transactions in the process of getting books for students and teachers are still done conventionally. It must be done directly by exchanging or accessing books to the nearest library to borrow or just to read book directly in the library.

Sharing books is the most basic form of sharing knowledge. But many people feel that sharing books manually is boring and it is not always convenient. In every new semester, many students are looking for the appropriate textbooks they want to use, because the price of textbooks is considered very expensive, so mostly of them choose to borrow from a library or buy used books [1]. Another study that reviews the latest literature on book sharing by focusing on sharing e-books, where the benefits are already widely known, studies used in high school libraries, exploring the limitations in...
viewing, printing, downloading and circulation of books lending techniques in the library are still very limited especially regarding limited licenses, proprietary software and file formats, digital rights management (DRM) and single-user business models adopted by many e-book vendors [2].

Literacy needs to be instilled early on, as shown by [3] that Indonesia is the second-least literate in a rank of 61 measurable nations. Therefore, creating a well design for reading a book from an early age is highly recommended. In a study whether the ability to read children (aged 5-6 years) by using applications by reading individually obtained the results of analysis of various responses including, children's behaviour in reading is strongly influenced by book content, things that are debated or told related to vocabulary. In addition, children's individual reading abilities are lower than reading together with friends. This finding highlights the importance of instilling reading into children as a group [4].

Digital text in multimedia applications, such as interactive application books that are found on iPod devices, are increasingly being used both at home and at school by young children [5][6]. Ease of use makes this technique much in demand by children, by simply touching the screen, reading an application book makes the reading experience easy, strategically the experience of reading a book can be done with a variety of information modes and features used in the application, thereby making a difference between technique of reading texts or reading traditionally by reading using the application features [7][8][9]. Besides the behaviour of reading a book using an application is very different because reading a book using digital files, touch screen and even using a mouse would be a very different reading experience [10].

Nowadays, traditional books in the form of printed paper have developed into e-book media on smart devices. Along with the development of digital technology, especially reading applications are increasingly being provided even across platforms, thus creating an increased usage experience, adding to the pleasing effects of multimedia technology [11]. In a study that combines the two departments into the acquisition of library development in the form of electronic books (e-books) becomes important to be reviewed. The results obtained from the process mapping to support the complexity in the department for staff to see the performance of their library, especially for e-books, obtained several process maps including: 1. e-book company orders; 2. Collection of corporate order e-books; 3. Electronic orders; 4. E-book on request; 5. Receiving e-book orders, and; 6. E-book subscription database [12]. Libraries that have e-book databases for classroom plus (EB +) in other studies utilize standard data and various e-book data vendor users provided in the library have fundamental problems namely metadata, standardization problems and workflows. The end result recommends providing vendor metadata to freeze data and use linked data technology to improve functionality and increase database usage [13].

Research Methodology
The software that constitute this system are defined below:

a) Google Maps API
The Google Maps API works to integrate the Google Maps system with the software created. In the implementation, Google Maps can also be adjusted to the needs of the application that has made. By getting values from two directions namely longitude and latitude, the result of Maps will be adjusted. All of these will appear in various devices such as smartphones, landscapes, drones and also the tool maps itself [14].

b) Application
The application is a system that is designed and arranged appropriately to produce the integrated information by using computers as support equipments.

c) Firebase Realtime Database
Firebase Realtime Database is a database that is hosted in the cloud. Data is stored as JSON and synchronized in realtime to each connected client. When you create cross-platform applications with
the Android SDK, iOS, and JavaScript, all clients will share a Realtime Database instance and receive the latest data updates automatically.

d) Android

Android is a Linux-based mobile device operating system which includes an operating system, middleware and applications. Some other understanding of android, namely, an open platform (open source) for developers (programmers) to create applications. It is not a programming language, but only provides an environment or run time environment called DVM (Dalvick Virtual Machine) which has been optimized for tools with a small memory system.

The methodology employed in this study is shown in Figure 1. Generally, relation database table that start from user 1 to user 4 are interrelated.

![Database Relations](image)

**Figure 1. Database Relations**

It can be described as, if user1 adds a book from the application, the book's data will be stored in the firebase realtime database, so other applications will also get the same update because it is connected to one database. Other users can see the books that were recently added to the catalogue in the main menu by user1. If one user such as user2 requests a loan for the book, the application will send a notification to user1 informing him that user2 is requesting a loan for the book. User1 can refuse or accept loans, he or she can view the borrower's previous history for consideration. User2 will also get a notification about the status of the loan confirmation received. To be able to retrieve books, User1 can provide books to be borrowed directly without intermediary applications so all of them can get to know the user who is borrowing the book.

The application will display information about the book that is registered to help users to obtain information on the latest books owned by other users. Thus, this is the communication process of borrowing and reading started. The use case diagram illustrates the functionality of the application, as displayed in Figure 2.
Figure 2. Context Diagram

Result and Discussion

Test result

Application interface functionality

a. Login: Users can choose to log in using an application account, or Google account. Users can also create a new account by pressing the create account button.

b. Academic Data Input: The academic data form is used to input relevant data about student academic data at the Musamus University which includes names, NPMs, faculties, majors and year of the year.

c. Add Book: in order to use the application, users must upload a book in the application. The data needed to complete in the book form are the cover photo of the book, the title of the book, the author of the book, the book publisher, the year of publication, the category of the book, relevant major or faculty, and also book review.

d. Main course: In the login process, if the email and password entered correctly, the main menu will appear. It consists of add book, profile, map; borrow list, my catalog, report problems, terms and conditions and logout. As shown in the figure below.

e. Book Catalog: The catalog form is used to display the books added by every users. The filling up of the catalogue form is done by completing cover, book title, the author and book review. On this form, book covers, book titles and book authors will be displayed when the email and password login process is entered correctly, then the main menu form will appear as shown below consisting of the add book menu, profile, folder, borrow list, my catalog, report problems, terms and conditions and logout.

f. Book Details: The Book Details Form is used to display advanced information from the book. Users can also apply for loans from this form.

g. Location map: This form is used to display the location of users' homes in their immediate vicinity. Users can also view profiles and routes to these locations. The picture below is the view of location map.
In determining the evaluation results which is applied to the application that have built, several steps such as the measurement method used in the questionnaire were used to provide a number of questions for and statements from the respondents by using a Likert scale. Likert scale was chosen because it can be simply and easily used to measure attitudes, opinions and perceptions of a person or a group of people about the social phenomena. Each answer choice given by the respondents is related to the assessment of the satisfaction quality. The score will be shown in the below table:
Table 1. Resume Total Score

| Answer     | Acronym | Score |
|------------|---------|-------|
| Very Good  | SB      | 5     |
| Good       | B       | 4     |
| Enough     | C       | 3     |
| Poor       | K       | 2     |
| Very Poor  | SK      | 1     |

The questionnaire results that have been obtained would be then recapitulated and calculated by using the interval formula, then it would be measured based on assessment characteristics of each variable. The results of the questionnaire calculation related to the evaluation of application application are described on the table bellow.

Table 2. Interval Calculation Results

| Question | SB | B | C | K | SK | Total |
|----------|----|---|---|---|----|-------|
| Question 1 | 50 | 28 | 9 |   |    | 87    |
| Question 2 | 55 | 28 | 6 |   |    | 89    |
| Question 3 | 60 | 24 | 6 |   |    | 90    |
| Question 4 | 40 | 36 | 6 | 2 |    | 84    |
| Question 5 | 45 | 32 | 9 |   |    | 86    |
| Question 6 | 30 | 32 | 12| 4 |    | 78    |
| Question 7 | 30 | 40 | 12|   |    | 82    |

Table 3. Resume Total Score

| No | Item Questions | Score |
|----|----------------|-------|
| 1  | Question 1     | 87    |
| 2  | Question 2     | 89    |
| 3  | Question 3     | 90    |
| 4  | Question 4     | 84    |
| 5  | Question 5     | 86    |
| 6  | Question 6     | 78    |
| 7  | Question 7     | 82    |
|    | Total Score    | 596   |

After analyzing the data using a means of determining the average value of each statement contained in the questionnaire, which previously determined the average value of the class interval in order to determine the characteristics of the assessment of the online exam information system. The formulas used in determining class intervals and mean values are.

\[
i = \frac{r}{k}
\]

(1)
i = Class interval
r = Range (Highest Scale − Lowest Scale)
k = Number of Classes

The following criteria for interpretation of scores based on intervals:
Table 4. Characteristics of Assessment

| Scale          | Rating Category |
|----------------|-----------------|
| 0% – 19.99%    | Very Poor       |
| 20% – 39.99%   | Less            |
| 40% – 59.99%   | Sufficient      |
| 60% – 79.99%   | Good            |
| 80% – 100%     | Very good       |

The recapitulation of the questionnaire calculation results is then determined in percentage with the following calculation

\[ index\% = \frac{\text{total score}}{\text{score ideal}} \times 100 \]  

\[ = \frac{596}{700} \times 100 \]  

\[ = 85.1\% \]

Based on the Likert calculation results on the Questionnaire, it obtained 85.1%. This value is suitable with the category "Very Good" on the characteristics of the assessment table. Obviously, this shows a positive indication that the information and the data can be received and can be run well.

Conclusion

Our findings support the hypothesis that Book-Share (BS) apps could be used as a valuable tool for borrowers and owners particularly in sharing, exchanging and borrowing books. It can be clearly seen from questionnaires were tested using the Likert methods found an accuracy rate of 85.1% and it is categorized in 80% to 100% of the scale range. We also use Blackbox testing that examines the functionality of a Book-Share (BS) apps including integration and user acceptance test. The Book-Share apps had designed based on android studio and firebase database that provide server-client services, it allows users searching the catalogue of the book which is have been added by owners. Moreover, this application can classify the book catalogue according to book details such as title, year, author, topic, interest and book review. The study also take advancement features of Google Maps API for borrowers and owners system, users can be able to view routes and maps of locations.

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