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Mobile Application For SJK (C) Pei Hua

Kat Yi Yun[1], Suhaimi Abd Ishak[1*]

[1]Faculty Computer Science & Information Technology, Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat Johor, 86400, MALAYSIA

Abstract: Mobile application for Library SJK (C) Pei Hua is an Android based application that is developed to provide a platform for easy accessed of information by students through mobile application. The notification is not in the current system and user will tend to forget the deadline of returning book if they lost the receipt and does not know the exact date of returning book. At the end result of the project, librarians in SJK (C) Pei Hua, which is act as the administrator of this mobile application are able to manage the application in the administration site. Users are able to search books and may explore more information about the news and upcoming events that will held on SJK (C) Pei Hua. The system will show the reminder notification about the due date of returning books. Users are able to send messages or feedback to the administrator through the Contact Us form in this application.

Keywords: Mobile Application, Notification, Library

1. Introduction

Nowadays, in the era of information and technology, people tend to use computer and mobile phones. Information and books can be found easily at anywhere and at any time by surfing internet through mobile phone. Thus, mobile application is developed rapidly in these few years. Mobile application can be used in businesses, file management, entertainment and for contact family members and friends.

Sekolah Jenis Kebangsaan (C) Pei Hua is one of the primary schools in Seremban. It does not have an official website for library to display information and facilities in the library including updating of latest information and activities.

The aim of this project is to introduce a simple mobile application for Library SJK (C) Pei Hua for the school's students and teachers. This Mobile Application for Library SJK (C) Pei Hua is developed and designed to provide a platform for easy accessed of information by students through mobile application and provides services of library such as search for books, NILAM program module, send messages or feedback form, notepad module and receive reminder notifications.

1.1 Problem Statement

There are a few problems that arose while using the current library website. Firstly, students can only search the books through the website or went to library search for the books. Students had to go to the customer service counter at the main lobby of the library or go to the computer that have provides borrow system to borrow the book. Student's library card is needed in order to complete the borrowing process. Besides that, there is no mechanism in place to notify the students. Students will tend to forget the deadline of returning book if they lost the receipt that contains details of borrow book and does not know the exact date of returning book. Students may busy with others academic activities besides study. Sometimes, students will not remember the date that they had borrowed the book if they do not have a reminder and the time when they realize, it already passed the deadline of returning book. Thus, student will have to pay fines for late returning book. The fines will be charged based on the day count of late returning the book. Thirdly, NILAM module is not in the current system. The school is currently employing a manual procedure to capture books read by the students. Students need to write the complete NILAM report on the paper or booklet and pass up every week. They are required to write the report again if they lost the NILAM book.

1.2 Objectives

The goal of this final year project is to develop a library application in order to ensure the accessibility and feasibility of information to students for finding books in Library SJK (C) Pei Hua. In order to ensure the target of this project can be achieved, the objectives of developing Mobile Application for Library SJK (C) Pei Hua are needed. The objectives are:

1. To design a mobile application to cater the needs of teachers and students in managing library information at SJK (C) Pei Hua.

2. To develop a system of mobile application that provides service of library such as display book lists, NILAM report module, simple introduction of the school, vision and mission of the school and contact us module. The system will show on the reminder notification about the due date of returning books on the user's system interface.

3. To evaluate the proposed mobile application.

2. Literature Review

These days, mobile application for library is developing fast. People tend to use mobile devices to enhance their work. One application which has huge market potential is the library mobile application. The library of SJK (C) Pei Hua is currently using manual system and does not have official website for library. The borrow process is completed by scan the barcode of the book and student's library card. The details will be recorded inside the desktop at the lobby of library. It is important to have a mobile application to support the current system of the library in SJK (C) Pei Hua. This Mobile Application for Library SJK (C) Pei Hua is developed and designed to provide a platform for easy access of information by students through mobile application and provides services of library such as search books, writing NILAM report and sending the NILAM report. Hence, students can pass up their NILAM report through online at anywhere and anytime when students used the proposed application. With mobile application, user can just search the book's name through mobile application and does not need to search through the books through each bookshelf in the library. The users of the proposed system are students, librarian or teacher and administrator of this mobile application.

2.1 Literature Review on Existing System

There are a few related application and system. For example, official website of UTHM Tunku Tun Aminah Library, UiTM Library mobile application, Overdrive, official portal of Sultan Abdul Samad Library UPM and official website of Tun Sri Lanang Library UKM. The official website of UTHM

Tunku Tun Aminah Library is a web-based information system which is used to display information and facilities in the library including the updating of latest information and activities [1]. Online resources such as pass year examination papers of various subject, e-newspaper and e-journal can be searched in this website.

UiTM Library is a mobile application that allows user to find e-resources, articles from UiTM Institutional Repositories and exam paper for UiTM students [2]. The borrow status of user and borrow history is shows in the application. Calendar, information on new arrival books, live cast, news and events are display in the application. UiTM Library is an android and IOS based mobile application. OverDrive is a mobile application that supports Android and IOS based. It allows user to borrow eBooks, audiobooks and video streaming from user's library. In OverDrive, there are more than 40000 libraries worldwide offer titles and it is available 24 hours per 7 days. User required to have a valid account with a participating library, school, or other institution [3].

The official portal of Sultan Abdul Samad Library UPM [4] is also a web-based information system which is used to display announcement, information and facilities in the library including the updating of latest information and activities of Library UPM. The users of this library portal are divided into 4 categories, which is staff, student, visitor and alumni. The official website of Tun Sri Lanang Library UKM [5] is a web-based information system which is used to display announcement, information and facilities in the library including the updating of latest information and activities of Library UKM. Students can go to mobile site by scanning the QR code display on the website with their smartphone. Besides that, student can ask question to librarian through WhatsApp mobile application.

The proposed application Mobile Application for Library SJK(C)Pei Hua, UiTM Library and OverDrive is web application whereas the official website of UTHM Tunku Tun Aminah Library is web-based. A mobile application act as an effective platform for easy accessed of information by students compared than website. The advantages of Official Website of UTHM Tunku Tun Aminah Library compare to others portal is the homepage of Official Website of UTHM Tunku Tun Aminah Library is more organized and well-displayed. Students can search information more easily. The organization of display and color of Official Website of UTHM Tunku Tun Aminah Library is more comfortable and eye-catching compare to others webpage. The disadvantage of Official Website of UTHM Tunku Tun Aminah Library as compared to official website of Tun Sri Lanang Library UKM it does not have service of ask librarian through WhatsApp mobile application. The proposed system will have NILAM module features and push notifications features which others system does not have in the current time.

3. Methodology

The software development methodology used in this project is Object-Oriented Software development (OOSD). OOSD, as a software process innovation, represents a fundamental shift in systems development, compared with other software development innovations such as programming languages and CASE tools [6] and is considered to be radically different from conventional systems development approaches [7], [8], [9], [10], [11]. Object-Oriented Software Development method is a practical method of developing a software system which focuses on the objects of a problem throughout development [12]. Object-Oriented Development combines data and the processes that act on the data into things called objects. Objects are members of a class, which means a collection of similar objects. Object-Oriented methodology provides easy transition to Object-Oriented programming languages, such as Java. It is a common technical approach that is used to collect data, analyzing, designing and planning in development of this Mobile Application for Library SJK (C) Pei Hua. There are total of five stages in planning development of this project, which are Object-Oriented Planning Phase, Object-Oriented Analyzing Phase, Object-Oriented Design Phase, Object-Oriented Implementation Phase and Object-Oriented Testing and Debugging Phase.

4. Analysis and Design

This section discusses about the analysis and design of this project. Section 4.1 presents system analysis and section 4.2 presents system design.

4.1 System Analysis

Figure 1 shows the use case diagram for mobile application for Library SJK (C) Pei Hua. There are two authorities which is users and administrator in making a preferred action in the proposed application. There are total of nine main use case for this application, which are Login, View Books, User Profile, NILAM module, Push Notifications, Contact Us, Notepad Activity, Logout and Manage Application. These use cases are the functionalities in the mobile application for Library SJK (C) Pei Hua. Besides that, user and administrator act as the actors for this application.

Users need to login to the application by insert a valid email and password to authenticate them. Next, users can view the latest news and upcoming activities posted by Librarian of Library SJK (C) Pei Hua. User can view their profile by view the personal information of users, such as email, name and class. User can submit their weekly report of NILAM through NILAM program module. The NILAM report will be saved into the database. Besides that, user can submit the comments or questions in Contact Us form to the administrator or librarian of Library SJK (C) Pei Hua through the application. User will get notification when there are upcoming events held in Library SJK (C) Pei Hua and reminder on the due date to return the book that they had borrowed in the library. User can choose to logout from the application when they want to end the login session in the application.

Administrator need to login to the application in the admin login interface with a unique email and password before access to the account of admin. Admin cannot login to the user site as there will be a validation checking for security of the account. Administrator is allowed to manage the application by create, view, update and delete the information of the application. Administrator can view the report of NILAM submitted by students in the database. Moreover, administrator can receive and view the comments of Contact Us form that is submitted by user. The form can be opened in the email account of the administrator. Administrator can choose to logout from the application when they want to end the login session in the application.
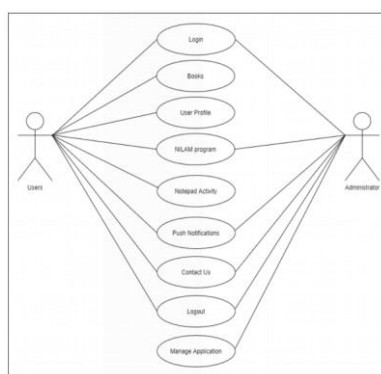

Figure 1: Use Case Diagram of proposed system

4.2 System Design

The main modules of the proposed system include login module, book interface module, NILAM module, Contact Us modules, notepad module, user profile module and logout module. System design is a process or phases that defines the interface, architecture and modules of a system to reach and achieve the requirement of components and architecture design of a system. System design includes interface design and database design. Figure 2 shows the System Architecture Design of proposed system.

In the login page, users need to fill in their email and password to login to their account while admin need to login to admin side by insert unique email and password. Login page will be display again when incorrect data of email or password is inserted. The main menu includes Books, User Profile, NILAM activity, Contact Us and Logout. User can click on the button to proceed to the page they want. In the books page, user can find for the book they want by scrolling through the list of books. Results of the list of books will be show.

In the Contact Us Page, user need to fill in details and comments before sending the Contact Us form. Notification on the news or new coming activities will be send by admin to user. The reminder
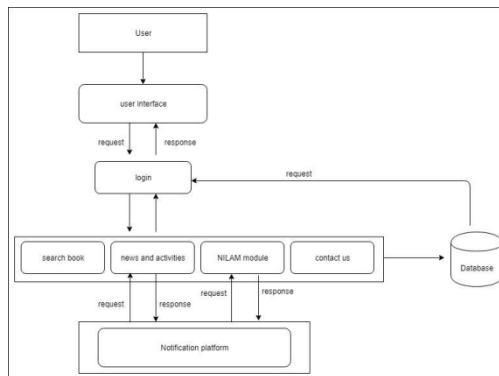
Figure 2: Architecture of the proposed system

of the date of return books will also be send by admin or librarian to user. User and admin are able to request logout form the application. The database will check validation of logout request. A result of logout will display when user or administrator is successfully logout.

5. Results and Discussion

Mobile Application for Library SJK (C) Pei Hua is developed by using Android Studio as a software for development of Android mobile application. Firebase is used as the back-end real-time database to store the data that is inserted in the proposed application. The mobile application for Library SJK (C) Pei Hua is connected to Firebase. The programming languages used in developing the proposed application is Java programming language and Extensible Markup Language (XML) in the Android Studio. Extensible Markup Language (XML) is a type of markup language that is similar to Hypertext Markup Language (HTML). Extensible Markup Language (XML) is used to design and edit the layout of the user interface in the application while the Java is an object-oriented programming language and human-readable languages that is used to compile all the codes and execute all the outputs by using Java Development Kit (JDK) in the Android Studio.

Firebase is used as the back-end real-time database to store the data that is inserted in the proposed application. The mobile application for Library SJK (C) Pei Hua is connected to Firebase. There are two types of database in Firebase, which are the Realtime Database and Cloud Firestore. Build gradle is the scripts where user can automatized the tasks, such as building Android applications and testing of the applications. Build gradle can used to declare or stated the dependencies used to build the application.

5.1 Testing

Testing phase is important as it is one of the process to examine the functionality of the Mobile Application for Library SJK (C) Pei Hua after the application is fully developed and implemented.

Testing for every part need to be accomplished to keep away from any destructibility occurs and ensure the good functional of the application.

5.1.1 Functional Testing

Functional testing is carry out to validate if the application had reached or achieved the functional requirements. Functional testing is the process of quality assurance (QA) which is based on the test cases on the features and functionalities of the components in a software or application. Functional testing involved the examination on the interface of user, storage of database and also functions of the Mobile Application for Library SJK (C) Pei Hua. A few test plans are developed by perform an applicable test cases to inspect whether the application had met the functional requirements and the result has been established. There is also a comparison for the expected output with the actual output.

5.1.2 Test Plan

Test plan is required to examine whether the application has met the requirements. Table 1 shows the test category for both of the user side and admin side. Table 2 shows the security check list for proposed system.

Table 1: Test Category

Test Category	Description
1	Test the functionality of the system will store and manipulate the information of notepad activity. System must allow add, view, delete and edit.
2	Test the functionality of the system will store and manipulate the login details of user and administrator.
3	Test the functionality of the system will store and manipulate the user detail data.
4	Test the functionality of the system will store and manipulate the contact us form data.
5	Test the functionality of the system will store and manipulate the NILAM report data.

Table 2: Security check list for proposed system

No.	Description	Actual Results
1	Ensure the error message and direct indicate which part of the authentication data incorrect. For example, error message should show "incorrect password" or "incorrect username".	Pass
2	Enforce the password length inside the policy. For example, minimum six character and maximum sixteen.	Pass
3	Password should be obscured in the textbox.	Pass

5.2 User Acceptance Testing

The user acceptance form is made to evaluate the test cases for the proposed system and to determine whether the application is user friendly. Feedback from the user is important to ensure the functionality of the application and for the future improvement on the application. 20 respondents are involved in the user acceptance testing. The feedback from the respondents are collected for the analysis purposes. The result of user acceptance testing obtained is shown and illustrated in a form of graph. Table 3 shows the system interface evaluation's result whereas Table 4 shows the features of application evaluation's result.
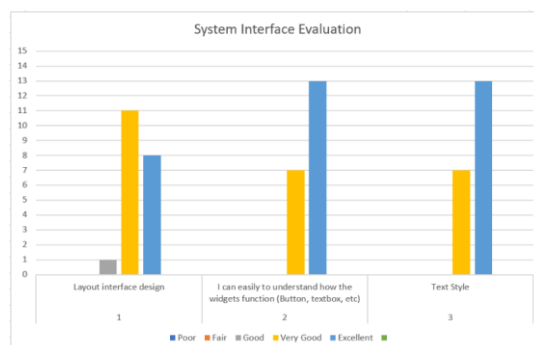
Table 3: System Interface Evaluation's result (Likert scale: 1-Poor, 2-Fair, 3-Good, 4-Very Good and 5-excellent)

No.	Features	Ranking					Total
		1	2	3	4	5	
1	Layout interface design	0	0	1	11	8	20
2	I can easily to understand how the widgets function (Button, textbox, etc)	0	0	0	7	13	20
3	Text Style	0	0	0	7	13	20

Table 4: Features of Application Evaluation's result (Likert scale: 1-Poor, 2-Fair, 3-Good, 4-Very Good and 5-excellent)

No.	Features	Ranking					Total
		1	2	3	4	5	
1	Login	0	0	0	5	15	20
2	Dashboard	0	0	0	13	7	20
3	View Books	0	1	2	10	7	20
4	Send NILAM report	0	0	0	8	12	20
5	Send Contact Us form	0	0	0	8	12	20
6	View User Profile	0	0	1	8	11	20
7	Push Notification	0	0	0	5	15	20
8	Add Note	0	1	2	7	10	20
9	Edit Note	0	0	0	8	12	20
10	Update Note	0	0	1	7	12	20
11	Delete Note	0	0	0	7	13	20
12	Logout	0	0	0	5	15	20

The results obtained from Table 3 and Table 4 are presents in the form of bar chart and the bar chart is shown in Figure 3 and Figure 4. The Figure 3 and Figure 4 shows the user acceptance testing's results based on the system interface evaluation and the features of application evaluation of the Mobile Application for Library SJK (C) Pei Hua. There are a few of the respondents have giving some recommendations on ways to improve the style or design of user interface and functionality of the application. Based on the results obtained, it may be generally concluded that most of the respondents are consider as satisfied with the features and the design of the user interface of the Mobile Application for Library SJK (C) Pei Hua.

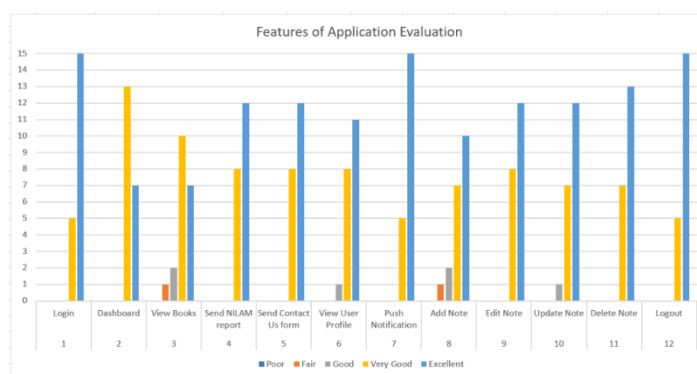**Figure 3: The System Interface Evaluation's Result**

Figure 4: The Features of Application Evaluation's Result

6. Conclusion

The achievements of a project is based on whether an application that is developed had meet its own objective. The Mobile Application for Library SJK (C) Pei Hua has been successfully developed and achieved the objectives that are stated in the section 1 which is to design a platform of easy accessed of information for students and teacher through mobile application. It can provide a platform that is easy to use for students and teacher. In addition, it can engage the relationship between the students and the teachers with the school library.

The Mobile Application for Library SJK (C) Pei Hua contains login module that can enables user to access into their account with function of authorization and authentication for security purposes. User can view their user profile in the user profile module. In the dashboard module, which is the homepage of the proposed application, user can choose different types of content that they are interested in for further activities. For example, books module, contact us module, NILAM module, notepad activity module, and about module, user profile module and notification module were provided in this application. Thus, user are able to find for the information that they want and they can finish and pass up their NILAM report through the proposed application in anywhere and at any time as long as the user have a stable internet connection.

Besides that, admin of the Mobile Application for Library SJK (C) Pei Hua and librarian of the school are allows to add and update the information as a record and for future management purposes into the database. Admin and librarian are also allows to send a new notifications to users on the activities and news of the library. Next, admin and librarian are allows to send reminder notification about the date of returning books to users. With this, user will not tend to forget to return books or late returning books because of does not remember the exact date of returning the books..

The limitations of the proposed application includes there is no function of searching bar for user to search for the books that they want to find or interested, the users is unable to edit their user profile and the time taken for retrieving data to be shown on the screen may be slow due to the connection of the internet and the phone or device's memory storage.

For the future works, there are some improvements can be done to improve the functionality of the Mobile Application for Library SJK (C) Pei Hua. The function of searching with a searching bar should be added to the application in order for users to search for the books that they are interested in.

Next, the user profile should be added with edit function. This could let users to update their basic information from time to time. In addition, the size for the data and image to retrieve should be minimize. This could save time and rise the speed of retrieving the data from database and display the data on the screen.

In conclusion, the achievements of the project, limitations of the project and future works are discussed in this section. There are still a few limitations existed on the Mobile Application for Library

SJK (C) Pei Hua although this application has been successfully developed and has achieved the objectives and reached the scope of user requirements. For future works, there are some improvements can be done to improve the functionality of the Mobile Application for Library SJK (C) Pei Hua.

Acknowledgement

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