INTEGRATED NILAM AND BOCHORD (i-NAB) MOBILE APPLICATION

LUQMAN BIN ABDUL LATIF

Bachelor of Computer Science
(Software Engineering) with Honours

UNIVERSITI MALAYSIA PAHANG

UNIVERSITI MALAYSIA PAHANG

DECLARATION OF THESIS AND COPYRIGHT

Author's Full Name : LUQMAN BIN ABDUL LATIF

Date of Birth

Title : INTEGRATED NILAM AND BOCHORD (i-NAB)

Academic Session : SEMESTER II ACADEMIC SESSION 2022/2023

I declare that this thesis is classified as:

☐	CONFIDENTIAL	(Contains confidential information under the Official Secret Act 1997)*
☐	RESTRICTED	(Contains restricted information as specified by the organization where research was done)*
☑	OPEN ACCESS	I agree that my thesis to be published as online open access (Full Text)

I acknowledge that Universiti Malaysia Pahang reserves the following rights:

1. The Thesis is the Property of Universiti Malaysia Pahang
2. The Library of Universiti Malaysia Pahang has the right to make copies of the thesis for the purpose of research only.
3. The Library has the right to make copies of the thesis for academic exchange.

Certified by:

_____
(Student's Signature)

Name : Luqman Bin Abdul Latif

Date: 10 February 2023

_____
(Supervisor's Signature)

Name : Associate Professor Ts Dr. Mazlina Binti Abdul Majid

Date: 10 February 2023

NOTE : * If the thesis is CONFIDENTIAL or RESTRICTED, please attach a thesis declaration letter.

THESIS DECLARATION LETTER (OPTIONAL)

Librarian,
Perpustakaan Universiti Malaysia Pahang,
Universiti Malaysia Pahang,
Lebuhraya Tun Razak,
26300, Gambang, Kuantan.

Dear Sir,

CLASSIFICATION OF THESIS AS RESTRICTED

Please be informed that the following thesis is classified as RESTRICTED for a period of three (3) years from the date of this letter. The reasons for this classification are as listed below.

Author's Name : LUQMAN BIN ABDUL LATIF
Thesis Title : Integrated Nilam And Bochord (i-NAB) Mobile Application

Reasons (i)

(ii)

(iii)

Thank you.

Yours faithfully,

(Supervisor's Signature)

Name : Associate Professor Ts Dr. Mazlina Binti Abdul Majid

Date: 10 February 2023

Stamp:

TS. DR. MAZLINA ABDUL MAJID
ASSOCIATE PROFESSOR
FACULTY OF COMPUTER SYSTEMS
& SOFTWARE ENGINEERING
UNIVERSITI MALAYSIA PAHANG
LEBUHRAYA TUN RAZAK, 26300 GAMBANG, KUANTAN
TEL: 09-549 2205 FAX: 09-549 2144

Note: This letter should be written by the supervisor, addressed to the Librarian, *Perpustakaan Universiti Malaysia Pahang* with its copy attached to the thesis.

اونيورسيتي مليسيا ڤهڠ
UNIVERSITI MALAYSIA PAHANG

SUPERVISOR'S DECLARATION

I/We* hereby declare that I/We* have checked this thesis and in my/our* opinion, this thesis is adequate in terms of scope and quality for the award of bachelor's degree in Computer Science (Software Engineering) with Honours.

(Supervisor's Signature)

Full Name : Associate Professor Ts Dr. Mazlina Binti Abdul Majid

Position : Associate Professor

Date : 10 February 2023

اونيۏرسيتي مليسيا ڤهڠ
UNIVERSITI MALAYSIA PAHANG

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

_____

(Student's Signature)

Full Name : Luqman Bin Abdul Latif
ID Number : CB19100
Date : 10 February 2023

INTEGRATED NILAM AND BOCHORD MOBILE APPLICATION (i-NAB)

LUQMAN BIN ABDUL LATIF

Thesis submitted in fulfillment of the requirements
for the award of the degree of
Bachelor of Computer Science (Software Engineering) with Honours

Faculty of Computing
UNIVERSITI MALAYSIA PAHANG

MARCH 2022

ACKNOWLEDGEMENTS

First and foremost, praises and thanks to God, the Almighty, for His showers of blessings every day throughout my research work and have made me capable of completing the research successfully. I would like to express my deep sense of thanks and sincere gratitude to my supervisor, Dr. Mazlina Binti Abdul Majid, for her patience, enthusiasm, motivation, and immense knowledge towards the mobile application development field. Her dedication and keen interest above all her overwhelming attitude to guide her students had also inspired me to realize that now I have found the way to pursue my dream to have careers in the mobile application development field. Her guidance has also helped me in all the time of research and writing of this thesis. I could have not imagined having a better supervisor for my Degree's Final Year Project thesis. Besides my supervisor, I would also love to thank my Academic Advisor, Dr. Siti Suhaila Binti Abdul Hamid for her support and kind words since my first semester in UMP under her guidance. Next, I like to thank the rest of the UMP lecturers, Sir Muhammad Zulfahmi Toh Bin Abdullah @ Toh Chin Lai, Dr. Al-Fahim Bin Mubarak Ali that have patiently guided me with a realistic approach for my research and taught me relevant skillset specifically programming skills to develop and accomplish my proposed solution. Finally, I would like to thank all my family members especially my mother, Sarah Binti Mohamad for believing in me and for the continuous encouragement throughout my research period. Her sincere love and care have brought me far through my life and giving me the strength to keep being successful today and in the future. Thank you for the mental, spiritual, and emotional support throughout my entire final year project.

ABSTRACT

Integrated Nilam and Bochord (i-NAB) is a mobile application for Android user that is used for primary and secondary school students to digitalise the NILAM system which is currently being used in Malaysia as a manual system. This application is expected to help teachers in managing the NILAM system in a much easier and modern way. It is also hoped that this application could increase interest in reading among all the students in Malaysia. The problem statement of this project are students tends to lose their readability as they lack knowledge in book titles that can offer stories which suit their interest. Meanwhile, the teachers are facing huge problem to manage the NILAM system as manual whereas they are required to bring all their student's books to home for marking progress, before sending the books back to the respective student. So, this project aims to design and develop an online NILAM system that can provide easier marking and updating progress through online management. Students can also search and borrow books from the school's library that suit to their interest. The method that will be used for this project is Rapid Application Development (RAD). It consists of four stages which are the requirement planning stage, user design stage, rapid construction and feedback stage, and last, is finalized product/implementation stage. After completion of the system development, the client will be given User Acceptance Test (UAT) to make sure that all functions of this prototype worked out without any error, achieve the project objectives, and solve the identified problems.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

i-NAB	Integrated Nilam And Bochord
NILAM	Nadi Ilmu Amalan Membaca
UMP	Universiti Malaysia Pahang
PHP	Hypertext Preprocessor
HTML	Hypertext Markup Language
GUI	Graphical User Interface
API	Application Programming Interface
SDLC	System Development Life Cycle
RAD	Rapid Application Development
UAT	User Acceptance Testing

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

For the last few decades, we have been experiencing the exponential growth of information and entertainment being created in digital format. These resources are gaining importance particularly among the younger generation in Malaysia. This phenomenon may change the way people perceive reading and how printed materials are being utilized to facilitate reading. Reading is a very good habit that one needs to develop in life. Good books can inform, enlighten, and lead us in the right direction. According to Briggs (1987), a positive reading attitude is a motivational stimulus that encourages and assists learning, whereas a negative attitude will result in the opposite. Malaysians on average read 15 books a year, just slightly over one book a month. A 2014 interim report on the reading habit revealed that seven years earlier, Malaysians read only two books a year. The exact figure could be higher since reading materials are widely available in traditional and digital formats. E-books and e-papers make reading a breeze on smartphones, tablets and portable e-readers.

Although Malaysian's literacy rate stood at 94.94 per cent, according to the United Nations Educational, Scientific and Cultural Organisation's Institute for Statistics' Adult and Youth Literacy National Regional and Global Trends (1985-2015), still it needed to make sure that the future generation will keep on the reading habit. Teachers nowadays are tasked with a variety of responsibilities, including leading co-curricular activities and doing clerical and administrative duties. As a result, Information and Communication Technology (ICT) is a device or computer data processing that enables teachers to make better, more effective, and inclusive judgments without consulting principals, teachers, or senior teachers. By taking into account all of those issues and the importance of reading habit among Malaysian, the government has introduced "Program NILAM" to both primary and secondary school to cultivate reading culture in school. NILAM programme unifies all motivating reading activities in the classroom by providing appropriate acknowledgment.

1.2 PROBLEM STATEMENTS

Current NILAM programme works as students will be required to write a synopsis of a book, which teachers manually validate and grade. It is proved that manual NILAM system is time-consuming as we know that Malaysia Education Ministry has allocated 2 hours in Malay subject timetable per month needed to be use for NILAM activity. Students will be brought to the library and do the reading activities and fill up their NILAM books, meanwhile the teachers will validate and grade them. Obviously, the 2 hours allocated is insufficient for the marking progress, so the teachers need to carry all the class's NILAM books and bring it back to home to continue the validation. Sometimes there is also issues where the teachers prone to make errors like forget to update the total books read by students which will cause an unprecise grading. This leads to the first problem statement which is the current recording book procedure using manual NILAM system was time-consuming, decentralised, and prone to errors.

The second problem statement is lack of student interest in reading books although NILAM programme has been implemented at school since 1999. Some of the students are actually loves to read books, however they could not find books that suit their interest. It is because they cannot recognise their own preferred genre and their lack of knowledge in books title which led them to feel bored in reading. Searching books thoroughly at library is not in their wish list, so instead of finding books that suit their interest at library, they preferred to just pick any random books but then end up with giving up in reading activity.

The third problem statement is the high usage of paper in implementing NILAM programme. NILAM programme which is currently being implemented as a manual system are currently using a huge amount of paper usage for the NILAM books to being produced since the NILAM books need to be use at all school in Malaysia. It will cause a lot of problem to earth environmental effects without our realise. Deforestation is one of the bad activities that happen in order to produce all of these the paper. Our dream to have a green living life in the future could not come true.

1.3 OBJECTIVE

There are four objectives in this project which are:

1. To identify strengths and weaknesses in the existing NILAM mobile application.
2. To design an online NILAM mobile application for both primary and secondary school which can reduce the usage of paper in the worldwide and help teacher in managing NILAM programme.
3. To help student by determining their interest in books through the NILAM mobile application and help them to borrow it through online library system.
4. To evaluate functionality of Integrated Nilam and Bochord (i-NAB) mobile application prototype.

1.4 SCOPE

In order to achieve above objectives, this scope has been determined:

1. User - The user of this mobile application is students, teachers and school admin.
2. Development – The software that will be used to develop this application are Android Studio and Google Chrome browser.
3. Database - For the current time, the system will support SQL Lite for local and Firebase for cloud method.
4. Available function:

- Register and sign up to an account
- Students manage to scan book's barcode to auto fill up the books details and manage to type the books synopsis.
- The teachers are able to validate student's synopsis and grade them.
- Students can search books in their library database to borrow it from library through online.
- Students able to receive notification once they reach higher level in NILAM rank.

1.5 SIGNIFICANCE PROJECT

- The proposed project can be used to transform the existing manual NILAM program in National schools that uses books to record student's reading habits into a digitalized system

- The proposed project method can be used in national schools and schools that have NILAM program or similar program that encourages students to read and keep track of their reading habits.

- The proposed project can be used in School Libraries and National Libraries as a digitalized system to keep track user's record of borrowing and returning book's

- The proposed project can be used as a reference project to develop a library integrated system in the future.

1.6 REPORT ORGANIZATION

This project consists of five chapters. Chapter 1 consists of an overall overview of the project. In this chapter, the problem is identified. There is three existing problem that is under investigation. In addition, there are four objectives that have been defined by referring to the problem statement.

Chapter 2 consists of a literature review of the existing NILAM mobile application. In this chapter, the existing mobile applications are introduced and compared to analyse its pros and cons. Later on, the enhancement for the new application is being proposed. Lastly, in this chapter, we will discuss the proposed application advantages when being compared with the existing one.

Meanwhile, chapter 3 is about research methodology that is being used to develop this project. The technique and method for the development of the system are clearly being stated. It describes the phase that being followed depending on the chosen approach. A use case diagram is also being used to give wider view to the stakeholders on the project whole scheme apart from listing out all the hardware and software that is currently in operation of the application. Also, to deliver application implementation, Gantt Chart is being drew using Microsoft Excel.

The discussion on the application implementation and result can be located in chapter 4. It specified how to build and execute the application by following specification provided. The application is then tested to ensure that it is built per the specification and that it is error-free. This section also contains the test case and the test outcome.

Lastly, chapter 5 discusses the conclusions that are gained from this project. It includes the research constraints and the future work of this application prototype.

CHAPTER 2

LITERATURE REVIEW

2.1 OVERVIEW

This chapter will cover a number of prior investigations undertaken by scholars involved in this effort. This research focuses on regional lighting management. For this study, articles and journals were gathered to outline the techniques and tools employed to execute the project. The techniques and components that may be employed in Integrated NILAM And Bochord (i-NAB) mobile application are also covered in this chapter.

2.2 PAST RESEARCH REVIEW

2.2.1 i-NILAM

Nor Azah Mansor and Ramlah Mailok presented Perceptions of usefulness and ease of use of i-NILAM System representatives and to determine whether perceptions of usefulness influence attitudes towards use and behavioural intentions to use. The i-NILAM system is a system that records the activities of Nadi Ilmu Amalan Membaca (NILAM) in schools. The Technology Acceptance Model has been adopted as a theoretical framework to determine whether it can help to explain actual individual behaviour using technology. This system will contribute to the management efficiency of the NILAM Program as teachers can access their student's total reading record and rank. Every time students borrow books from library, the system will add the total books read by students base on quantity of books borrowed. Students also not required to write the books summary as it will also be automatically inserted once the books are scanned during borrowing process at library. NILAM analysis for student in the school can also be done through the system. Teachers can also print NILAM certificate for their students using the website.

Figure 2.1 Homepage interface of i-NILAM

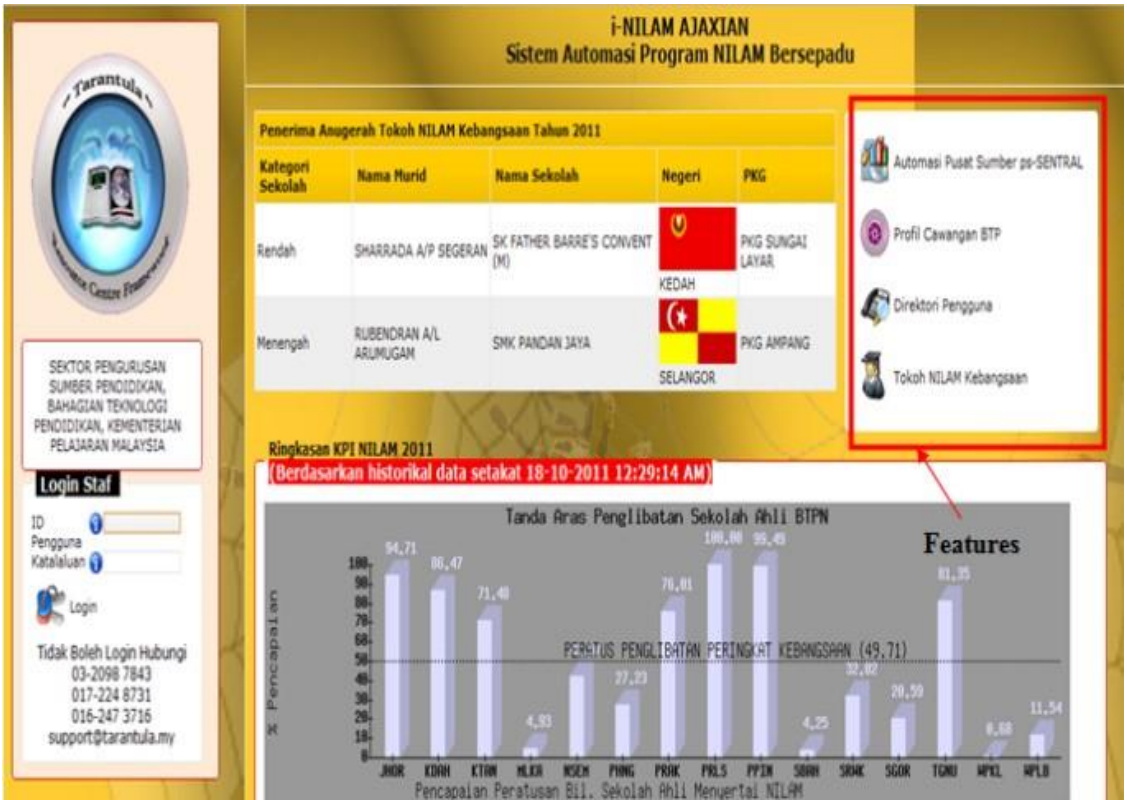
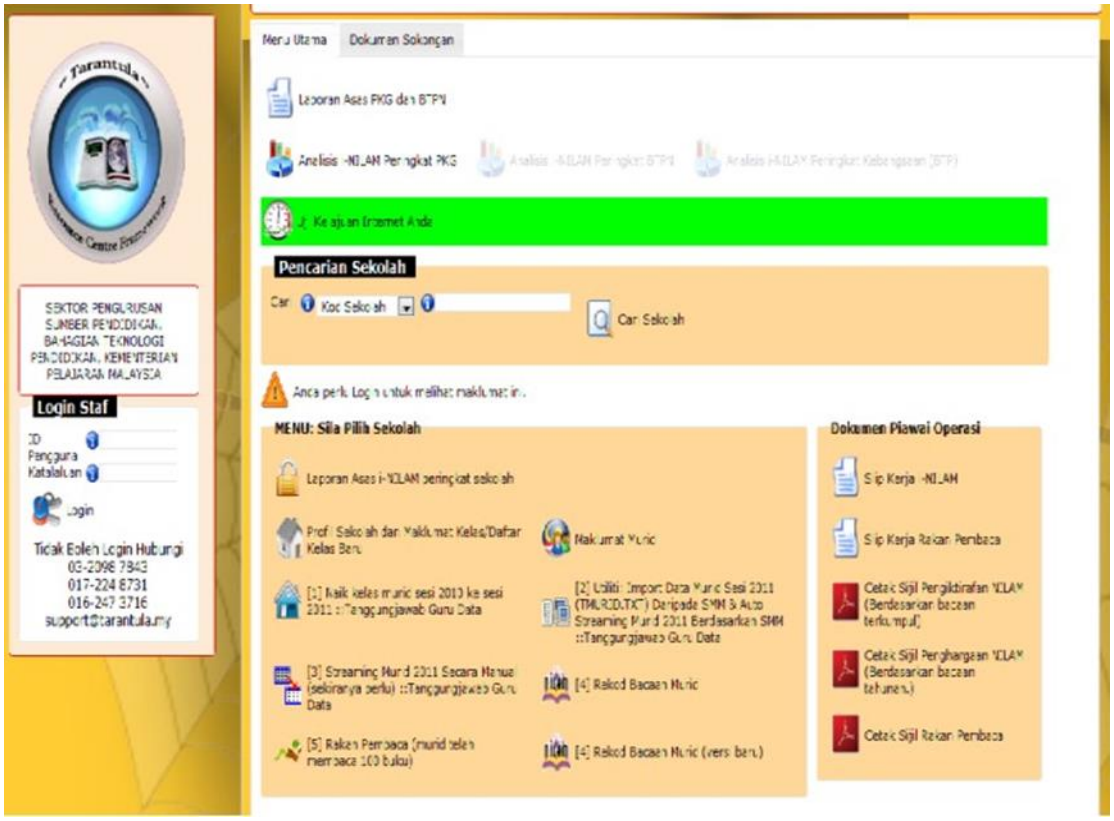


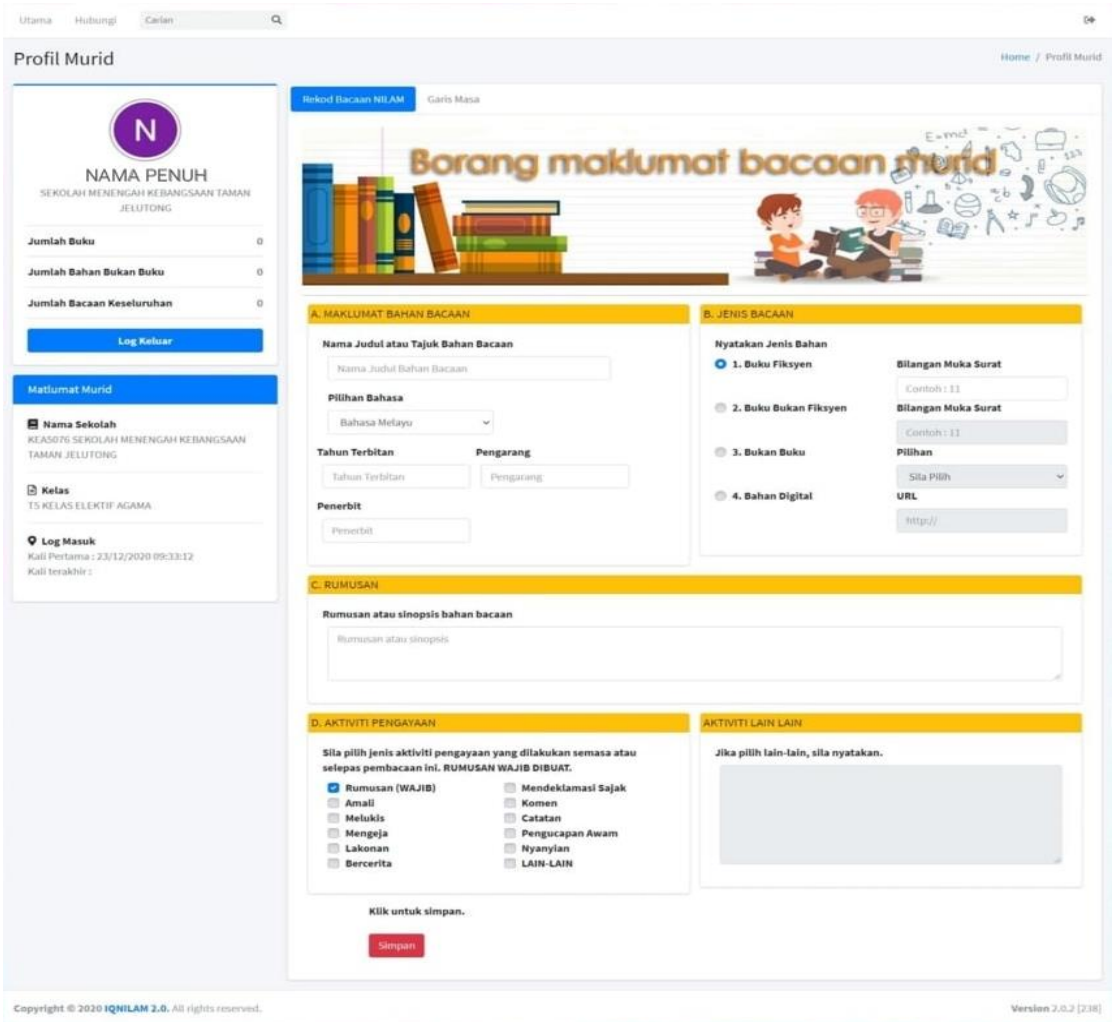
Figure 2.2 Main menu interface of i-NILAM



2.2.2 IQ-NILAM

IQ-NILAM is a book reading tracker that helps teacher to monitor student's reading progress throughout the NILAM programme. For the system deployment, it is deployed in web application type and can be accessed only school student and teacher through the official website of IQ-NILAM. The main feature of this system is to allow student to key in their reading material details which could be books, article or news. Meanwhile, a teacher could view the student progress base on their total number of readings. Figure 2.3 below show the student profile page where the student information will be showed at the sidebar. Student can also key in their reading material details at the "Rekod Bacaan NILAM" section. Through the system also, student required to insert the summary for book that they read for the evaluation progress by teacher.

Figure 2.3 Homepage interface of IQ-NILAM



2.2.3 SRK Convent St. Francis official website

The official website of the SRK Convent St. Francis has been evolving in step with the advancement of national education. The library at SRK Convent St. Francis has been a driving force in the pursuit of academic achievement. In this school, students are learning about culture and discovering new things. This school has a reading programme. The examination was carried out with the goal of realising not just among students but also among teachers and administrators. The relevance of a reading culture for parents. Any type of users including students, teachers and parents can access for the program of reading assessment without requiring login session. Users can also view award ranking and sorting list for NILAM programme through the website.

Figure 2.4 Homepage interface of SRK Convent Francis official website

Figure 2.5 NILAM section interface of SRK Convent Francis official website

Figure 2.6 Student Award interface for SRK Convent Francis official website

2.3 COMPARISON BETWEEN EXISTING APPLICATION AND NEW APPLICATION

In this section, the existing application is being compared to highlight their advantages and disadvantages. By making such comparison, we can take the advantages to become strengths and disadvantages to avoid repeated mistake on the new application. We make a comparison of the existing application with the new application that we intended to develop. Such comparisons are to make sure that we could build a better and best software by analyzing how previous software deliver their application to the user and how they manage to capture the satisfaction of the people who used their system. The features that will be compared in the below table are user interface, interoperability, platform, programming language, type of service, target users, secure access, reading assessment product profiling, expert profiling, process of generating assessment report, system advantages and system disadvantages.

No.	Features	i-NILAM	IQ-NILAM	SRK. Convent St. Francis website
1.	User Interface	Not attractive and not user friendly	The interface is well organized and user friendly	The interface is user friendly but not attractive
2.	Interoperability	Web-based	Mobile application and Web-based	Web-based
3.	Platform	Windows, Linux and Mac OS	Android, IOS, Windows, Linux and Mac OS	Windows, Linux and Mac OS
4.	Programming Language	HTML, PHP, CSS	JAVA, HTML, PHP, CSS	HTML, PHP, CSS
5.	Type of Service	Education	Education	Education
6.	Target users	Teachers, students	Teachers, students	Any type of user
7.	Secure Access	Secure HTTPS access	Secure HTTPS access	Secure HTTPS access
8.	Reading assessment product profiling	Available for school that registered the system.	Available for school that registered the system.	Not available as only information about NILAM and school library system is shown without online reading assessment
9.	Expert profiling	The Home of Tarantula with cooperation Sektor Pengurusan Literasi Teknologi Pendidikan Kementerian Pelajaran Malaysia.	Ustaz Studio with cooperation Sektor Pengurusan Literasi Teknologi Pendidikan Kementerian Pelajaran Malaysia.	The detail of expert profiling is not available in this portal but involve cooperation from Jabatan Pendidikan Negeri Sabah.
10.	Process of generating assessment report	Can be generate by teacher in the system through section i-nilam-panduan kemaskini rekod bacaan murid	Can be generate by teacher in the system through teacher evaluation section	Not available

11.	Advantages	1. Online reading assessment is available 2. Student did not have to insert their own book summary. 3. System will automatically update the total books read by student once they borrow books from library. 4. Teachers may generate assessment report	1. Online reading assessment is available 2. Both teachers and students have access into the system 3. Teachers may evaluate book summary write by student through the system 4. Teachers may generate assessment report 5. System is easy to be managed by users 6. Both students and teachers may view student's reading progress	1. Any user may enter the system as there is no login session 2. Provide information about school library and NILAM programme in detailed through the website
11.	Disadvantages	1. Students can cheat their reading progress as they just borrow books from library without read it. 2. Only teachers can view student's reading progress as students do not have access to enter the system 3. System is hard to be manage by users	1. Students need to insert their own book summary	1. Reading assessment is not available 2. Both teachers and students cannot view students reading progress as the system do not keep track on student reading record 3. System is easy to be use by users

Table 2.1 Comparison between Existing Application and New Application

2.4 CHAPTER SUMMARY

In conclusion, some advantages and disadvantages could be highlighted on the existing system. From the comparison that has been made, enhancement towards the new application could be better. To the new application is targeted to be mobile application because it is convenient to be used by user anywhere and anytime. The user interface needs to be user friendly to give usability and familiarity. Next, by looking from three existing application, we can clearly see that online reading assessment is compulsory to be include in the proposed application as NILAM programme itself is a reading assessment. Students are also should enter their own book summary as the NILAM programme initial ideas to increase reading activities among students. If book summary is auto generated when books are being scanned, then the system will be non-transparent. Furthermore, the teacher's evaluation report will also be not worth. However, QR Code scan can still be implemented for the proposed applications as the scanning progress can be used for updating the book's details such as title, number of pages and book's author automatically into the system database. So, it can facilitate students as they will not be required to enter book's details every time they want to update their NILAM progress.

Then, for the information needed to be display in the application is the student and teacher's basic details as students may view who are evaluating them, meanwhile teachers may view the students that they are evaluating. In order to achieve it, the proposed application should own student and teacher's dashboard and profile. Lastly, both students and teachers should be allowed to view students NILAM progress as it can inspire students to increase their total books read by time to time, meanwhile teachers may encourage those students with low total books read if teachers are allowed to view students' progress.

Lastly, the new application should be easy to understand by user to make them find it is useful and easy to be manage.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

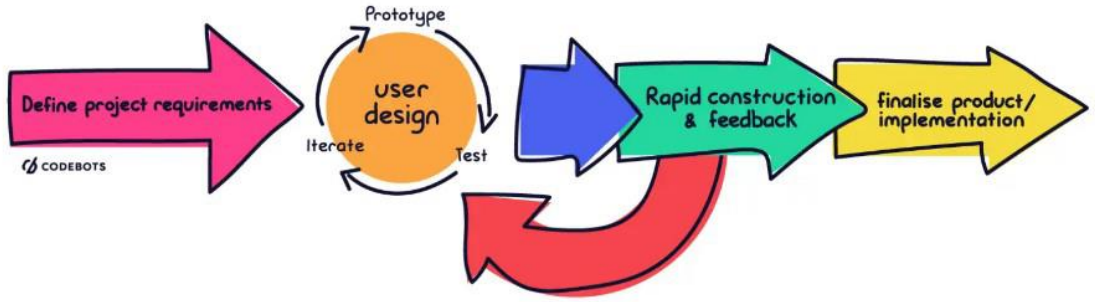
Software Development Life Cycle (SDLC) is a methodology to define the software process in a place to create a premium and high-quality software product. It provides an organization coherent and well-structured flow phases to assist them in the software products to be delivered to the end-user quickly with good quality. SDLC activity anchored with phases such as Requirement Analysis, Planning, Software Design, Software Development, Testing, and Deployment. An example of traditionally SDLC model is the Waterfall model whereas the in-demand are Agile model, Spiral model, Iterative Model, V-Shaped Model, and Big Bang Model.

In this chapter, the flow of methodology to develop mobile application for Integrated NILAM And Bochord (i-NAB) is being explained. The methodology that has been chosen is Rapid Application Development (RAD). RAD is a methodology that emphasized frequent iteration and constant feedback to develop the application or system quickly. Using the Rapid Application Development (RAD) method carried out in research presents NitroGen which is an independent platform tool provides a set of integrated capabilities that can be consumed to build cellular solution aimed at reducing development and maintenance costs (Subhiyakto et. Al, 2019). Subhiyakto suggested that the meeting schedule development project that they were working on using RAD is targeted to reduce development and maintenance costs. In fine, RAD is one of the popular software development methodologies that employ various tools and techniques to quickly produce minimally coded software applications

3.2 METHODOLOGY

As mentioned previously, the chosen SDLC model to carry out this Integrated NILAM And Bochord (i-NAB) project is Rapid Application Development (RAD). Figure 3.1 below shows the activity that involve in RAD. The cycle of RAD can be categorized into four parts which are Define Project Requirements, Prototype, Rapid Construction and Feedback Gathering, and lastly, implementation (finalize product).

Figure 3.1 Rapid Application Development Methodology Phases



3.2.1 Define Project Requirements

The first step of RAD is defining the requirements of the project by interviewing what stakeholders need. Requirements that usually being defined are project goals, expectations, timelines, and budget. The process to collect information about the requirement of a system-to be is called requirement elicitation. Elicitation produces information that is used in other Requirements Engineering (RE) activities, the aim of which is to produce a requirements specification, which, in turn, will inform the engineering and development of the system (Burnay, 2019). The stakeholder for this project are school's students, teachers and admin. Whereas, requirement techniques that are being used to gather system's requirements are by interviewing such as setting up meetings, phone calls, emails, or distribute the form. The project's objectives were established using issue statements extracted from the existing digitalised Nilam in Malaysia. The requirement that has been gathered need to be documented to have a clear understanding on the software to be developed.

The mentioned document in this phase is Software Requirement Specification (SRS) and Software Design Document (SDD). Bring up by M. Asif (2019), "… SRS describes all the requirements system which must have for success. These requirements are typically illustrating features of underdevelopment system. These features not only describe its functional requirements FR but also its non-functional requirements NFR (p.36164). Soon after, SDD is being produced to map out the product design and overall architecture. Besides, according to Jayasuriya et al. (2019, p.710), "Documenting architecture is critical since it is important that the design is not misunderstood. Failure to do so could result in developing software that does not meet the goals and requirements of the project". In fine, SRS and SDD serve as inputs for the following next stage to be executed.

3.2.2 User Design

The initial models and prototypes are developed during the User Design phase. This phase aims to quickly produce a working design to give a demonstration to the client. This prototype will be subject to changes until it meets the client's needs. At the end of this phase, a finalized product will be introduced. In addition, this phase not only depends on evaluating abstract documentation, but it is also relying more on the user involvement, testing, and live system feedback. Consistent feedback and fast delivery of the product lead to the reduction of errors and debugging because the chance for it to be discovered earlier is high. The benefit of this step is that software becomes more robust, fewer chances to error-prone, and will have better structured for future design

3.2.3 Rapid Construction and Feedback

Rapid construction is where application coding, system testing, and unit integration occurs, converting prototype and beta systems into a working model. The objective of Rapid Construction and Feedback phase is to finish element by element of configuration of the proposed framework. Another objective of this phase to be added is to create and test the product that exist based on the proposed framework. Then, to produce a framework that will work at an adequate level of execution. The design of the proposed system that is firstly, detailed at UD stage, is completed in the RC stage. Lastly, programming application that are going to be executed is being developed and tested.

3.2.4 Finalized Product/Implementation

The final phase of rapid application development is where all the technical debt accrued in early prototyping, optimising implementation to improve stability and maintainability to finalise the product for launch. Finalize Product/Implementation consists of activities to integrate new system into the business. Its objectives are to install the system in the production operation with unimportant disruption of typical business movement, increase the adequacy of the framework to support planned business activities and to take into consideration any possible future improvement.

3.2.5 Project Management Framework

The Project Formulation Framework in Table 3.1 is derived from the RAD model of each phase, which includes the activities involve and the deliverables.

PHASES	ACTIVITIES	DELIVERABLES
Define Project Requirement	• Identify the system requirements • Collect the Nilam dataset	• System Requirements • Dataset (Nilam parameters: book summary, evaluation process)
User Design	• Design context diagram • Design use case diagram • Design flowchart • Design activity diagram • Design prototype	• Context diagram • Use case diagram • Flowchart • Activity diagram • Prototype
Rapid Construction and Feedback	• Identify software and hardware specifications • Develop Mobile Application • Connect to database • Conduct app functionality test	• Early working model of mobile application • Test result

Finalized product/ Implementation	• Release project in real-world environment	• Fully functional mobile application

Table 3.2 Project Management Framework

3.3 PROJECT REQUIREMENTS

3.3.1 Functional Requirements

Functional requirements specify how a system should operate and what a software system should accomplish. It specifies a software system's or module's function. A set of inputs to the system under test is compared against the system's output to determine its functionality. Table 3.2 below shows the functional requirements for Integrated Nilam And Bochord (i-NAB) mobile application

Module	Requirement Descriptions
Manage Profile	• Students, teachers and library admin are able to view, add or delete their profile details.
Update NILAM	• Students are able to update their NILAM progress by scanning book's barcode and enter the summary
Manage NILAM evaluation	• Teachers can evaluate students' NILAM book summary • System will allow teachers to generate report on each evaluation for students' reference
Manage Classroom	• Teachers are able to create classroom and add their students into it
Search and Borrow Books	• System will allow students to search and borrow books from the school library
Manage Borrow Request	• Library admin can accept or reject the borrow request from students • System will allow library admin to generate report on each accepted borrow request.

Table 3.2 Functional requirements list

3.3.2 Non-Functional Requirements

Non-functional requirements are characteristics that describe how a system should operate. The non-functional requirement focuses on "what a system should be" rather than "what a system should do." They're usually created from functional requirements based on feedback from customers and other stakeholders. Non-functional requirements such as performance, portability, and usability, specify the quality aspects of the system to be constructed. Table 3.3 below shows the list of non-functional requirements for Integrated Nilam And Bochord (i-NAB) mobile application

Non-functional Requirements	**Requirement Descriptions**
Environment	• The application should be able to access 24 hours per day
Speed	• The application should be able to redirect in less than 10 seconds on per tap
Security	• The application will not grant access for account registration until user creates a strong password • The application grant access to account when user enter correct username and password during login session
Usability	• The application interface should be user friendly as user can easily understand the system features
Compatibility	• The application should be functioning well in both android and iOS device
Portability	• The application should be run effectively on any model of smart phones

Table 3.3 Non-functional requirements list

3.3.3 Constraints and Limitations

• The system requires internet connection to access.

• The system shall only be access as mobile application.

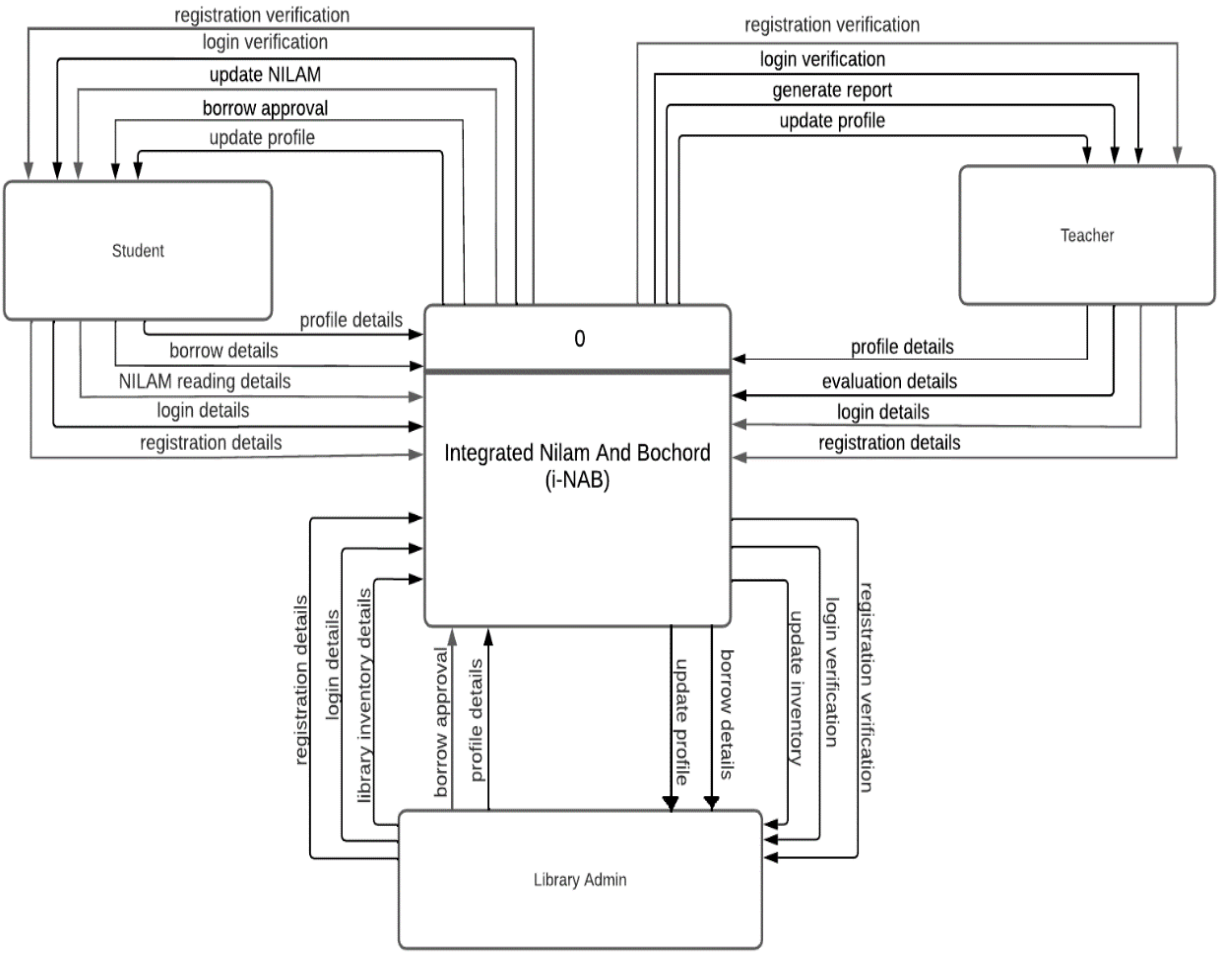
• The system can only be used by user in English language.

3.4 PROPOSED DESIGN

3.4.1 Context Diagram

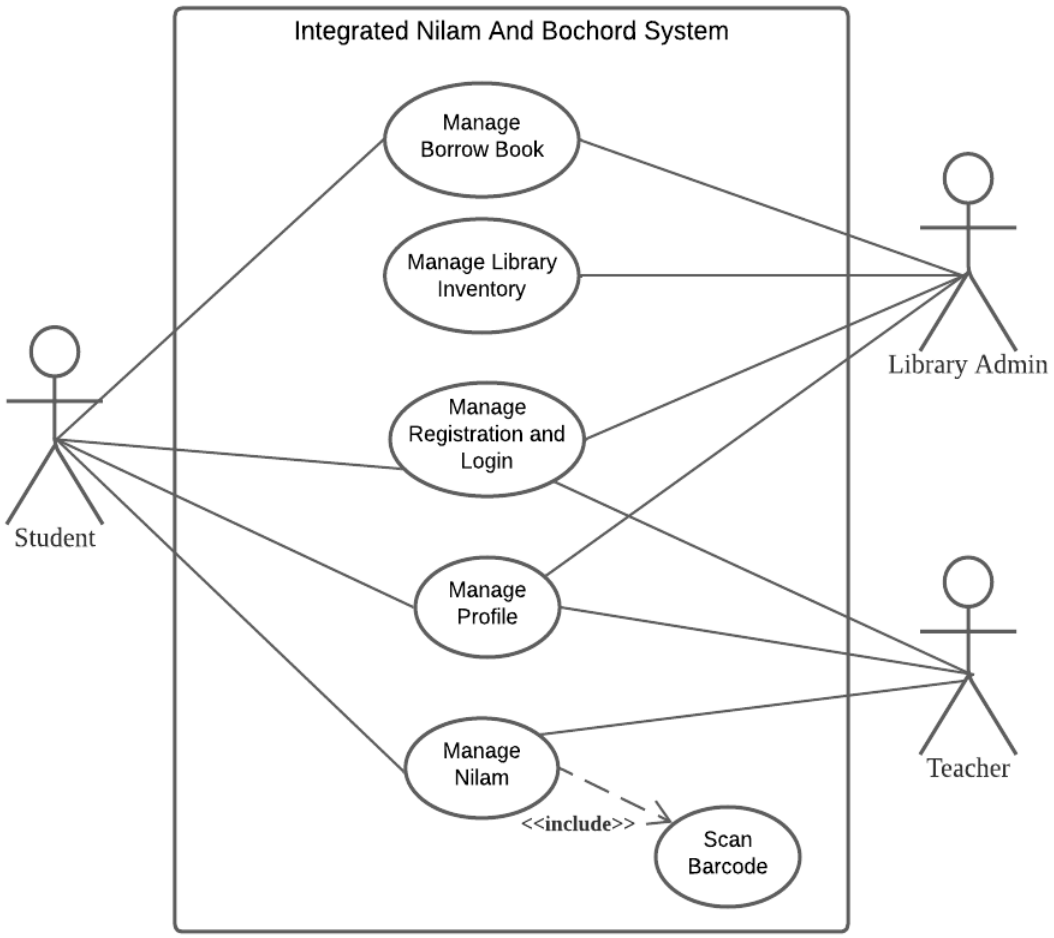
The figure below shows the Context Diagram of the Integrated Nilam And Bochord (i-NAB). The diagram explains the relationships between the i-NAB application with other external entities which are the student, teacher and library admin.

Figure 3.2 Context Diagram



3.4.2 Use Case Diagram

Figure 3.3 Use Case Diagram



The figure above shows the use case diagram for Integrated Nilam And Bochord (i-NAB) mobile application. 5 main modules are involved which are Manage Registration and Login, Manage Profile, Manage Nilam, Manage Borrow Book and Manage Library Inventory and 1 sub module involved which is Scan barcode. Manage Registration and Login is module that can be access by student, teacher and library admin to create account and login into system. Manage Profile also can be access by all 3 types of users in order to edit their profile details. Manage Nilam can be access by student and teacher where student may update their progress and scan the book's barcode to get the book's detail generated through the module while teacher may evaluate the progress and generate the evaluation report. Manage Borrow Book can be access by student and library admin where student may request for borrow book while library admin can manage the request. Manage library inventory can be access by teacher to audit the library books' inventory.

3.4.3 Use Case Description

3.4.3.1 Manage Registration and Login

Use Case ID	i-NAB-001
Use Case Name	Manage Registration and Login
Brief Description	This use case is for users which are the student, teacher and library admin to register a new account or login into the existed one.
Actor	Student, Teacher and Library Admin
Pre-Conditions	None
Basic Flow	**STUDENT, TEACHER AND LIBRARY ADMIN** 1. Use case start when user enter the "Registration and Login module" 2. System display login interface. [**A1**: Register Account] 3. User enter login details 4. System validate data entered by user. [**E1**: Invalid data] 5. User successfully login into system 6. Use case end
Alternative Flow	**STUDENT, TEACHER AND LIBRARY ADMIN** **A1:** User create new account 1. User tap <<Create Account>> button 2. System query request status from database and display to user 3. User enter registration details 4. User tap <<Submit Registration>> button 5. System save registration details into database 6. Use case continue with step 2 in basic flow
Exception Flow	**E1:** Invalid data 1. System indicates the fields that were entered incorrectly 2. Continue step 2 in the basic flow
Post-Conditions	User already login into system
Constraints	None

Table 3.4 Manage Registration and Login use case description

3.4.3.2 Manage Profile

Use Case ID	i-NAB-002
Use Case Name	Manage Profile
Brief Description	This use case is for the users which are the students, teachers and library admin to view, add or delete their profile details.
Actor	Student, Teacher and Library Admin
Pre-Conditions	Users already signed up into an account through sign up session
Basic Flow	**STUDENT, TEACHER AND LIBRARY ADMIN** 1. Use case start when user enter the "Manage Profile module" 2. User tap <<Profile>> button 3. System query request status from database and display to user [SRSREQ-101] 4. User view all the details in their profile page 5. User tap <<Update Profile>> button 6. User add profile details in the page [**A1:** Add Profile details] [SRSREQ-102] 7. User edit profile details in the page [**A2:** Edit Profile details] [SRSREQ-103] 8. User delete profile details in the page [**A3:** Delete Profile details] [SRS-REQ-104] 9. User tap <<Save>> button after made changes [SRS-REQ-105] 10. System will save updated details into database 11. Use case end
Alternative Flow	**STUDENT, TEACHER AND LIBRARY ADMIN** **A1:** Add user details 1. User tap <<Add Profile details>> button. 2. System will retrieve data from database 3. User add details in profile 4. Use case continue with step 9 in basic flow **A1:** Edit user details 1. User tap <<Edit Profile details>> button.

	2. System will retrieve data from database 3. User edit profile details 4. Use case continue with step 9 in basic flow **A3:** Delete user details 1. User tap <<Delete Profile details>> button. 2. System will retrieve data from database 3. User delete profile details 4. Use case continue with step 9 in basic flow
Exception Flow	None
Post-Conditions	User already viewed or updated their profile
Constraints	None

Table 3.5 Manage Profile use case description

3.4.3.3 Manage Nilam

Use Case ID	i-NAB-003
Use Case Name	Manage Nilam
Brief Description	This use case is for users which are the student to involve in updating their NILAM progress and teacher to evaluate the progress
Actor	Student and Teacher
Pre-Conditions	Users already login into system
Basic Flow	**STUDENT** 1. Use case start when user enter the "Manage NILAM module" 2. User scan book's barcode 3. System retrieves book's data from database and display 4. User enter book's summary 5. User tap <<Submit NILAM>> button 6. System save progress into database 7. Use case end **TEACHER** 1. Use case start when user enter the "Manage NILAM module" 2. User evaluate book's summary 3. User tap <<reject>> button to reject book's summary [**A1**: Approve summary] 4. User tap <<generate report>> button to generate evaluation report 5. System save activites details into database 6. Use case end
Alternative Flow	**TEACHER** **A1:** Approve summary 1. User tap <<approve>> button to approve book's summary 2. User update total number books read by student 3. Use case continue with step 4 in basic flow
Exception Flow	None
Post-Conditions	User already submit NILAM progress or generate NILAM evaluation report
Constraints	None

Table 3.6 Manage Nilam use case description

3.4.3.4 Manage Borrow Book

Use Case ID	i-NAB-004
Use Case Name	Manage Borrow Book
Brief Description	This use case is for users which are the student to request books to borrow and library admin to handle the request
Actor	Student and Library Admin
Pre-Conditions	Users already login into system
Basic Flow	**STUDENT** 1. Use case start when user enter the "Manage Borrow Book module" 2. User tap <<search>> button to search for books throughout school library inventory 3. User tap <<borrow>> button to borrow books from library [**A1**: Cancel borrow] 4. System save progress into database 5. Use case end **LIBRARY ADMIN** 1. Use case start when user enter the "Manage Borrow Book module" 2. User views book borrow request 3. User checks book availability in library inventory 4. Book is not available [**A2**: Book is available] 5. User tap <<reject>> button to reject borrow request 6. System saves activities details into database 7. Use case end 8. User tap <<generate report>> button to generate evaluation report 9. System save activites details into database 10. Use case end
Alternative Flow	**STUDENT** **A1:** Cancel borrow 1. User tap <<cancel>> button to cancel borrow book 2. Use case continue with step 4 in basic flow **LIBRARY ADMIN**

	A2: Book is available 1. User tap <<accept>> button to accept borrow request 2. System updates the library inventory 3. User generates borrow report
Exception Flow	None
Post-Conditions	User already request to borrow book and request have been either accepted or rejected
Constraints	None

Table 3.7 Manage Borrow Book use case description

3.4.3.5 Manage Library Inventory

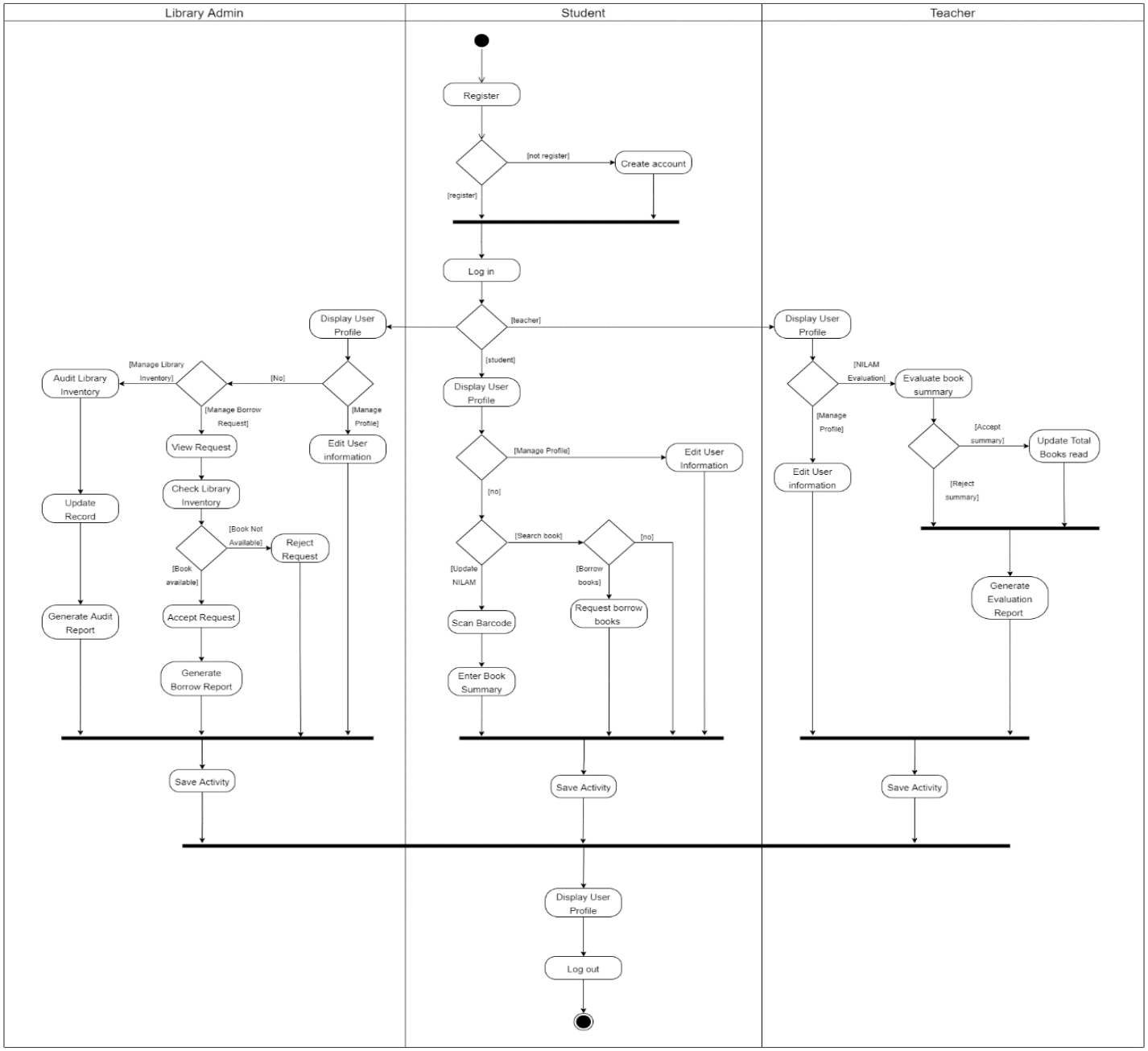
Use Case ID	i-NAB-005
Use Case Name	Manage Library Inventory
Brief Description	This use case is for user which are library admin to manage the library inventory
Actor	Library Admin
Pre-Conditions	Users already login into system
Basic Flow	**LIBRARY ADMIN** 1. Use case start when user enter the "Manage Library Inventory module" 2. User check book list in library inventory 3. User update record 4. System save record into database 5. User generates inventory report 6. Use case end
Alternative Flow	None
Exception Flow	None
Post-Conditions	User already check and update inventory record
Constraints	None

Table 3.8 Manage Library Inventory use case description

3.5 ACTIVITY DIAGRAM

An activity diagram, like a flowchart or a data flow diagram, visually depicts a series of actions or control flow in a system. In business process modelling, activity diagrams are frequently employed. They also usually describe step in the use case diagram. Figure 3.4 below show the activity diagram for Integrated Nilam And Bochord system.

Figure 3.4 Activity Diagram

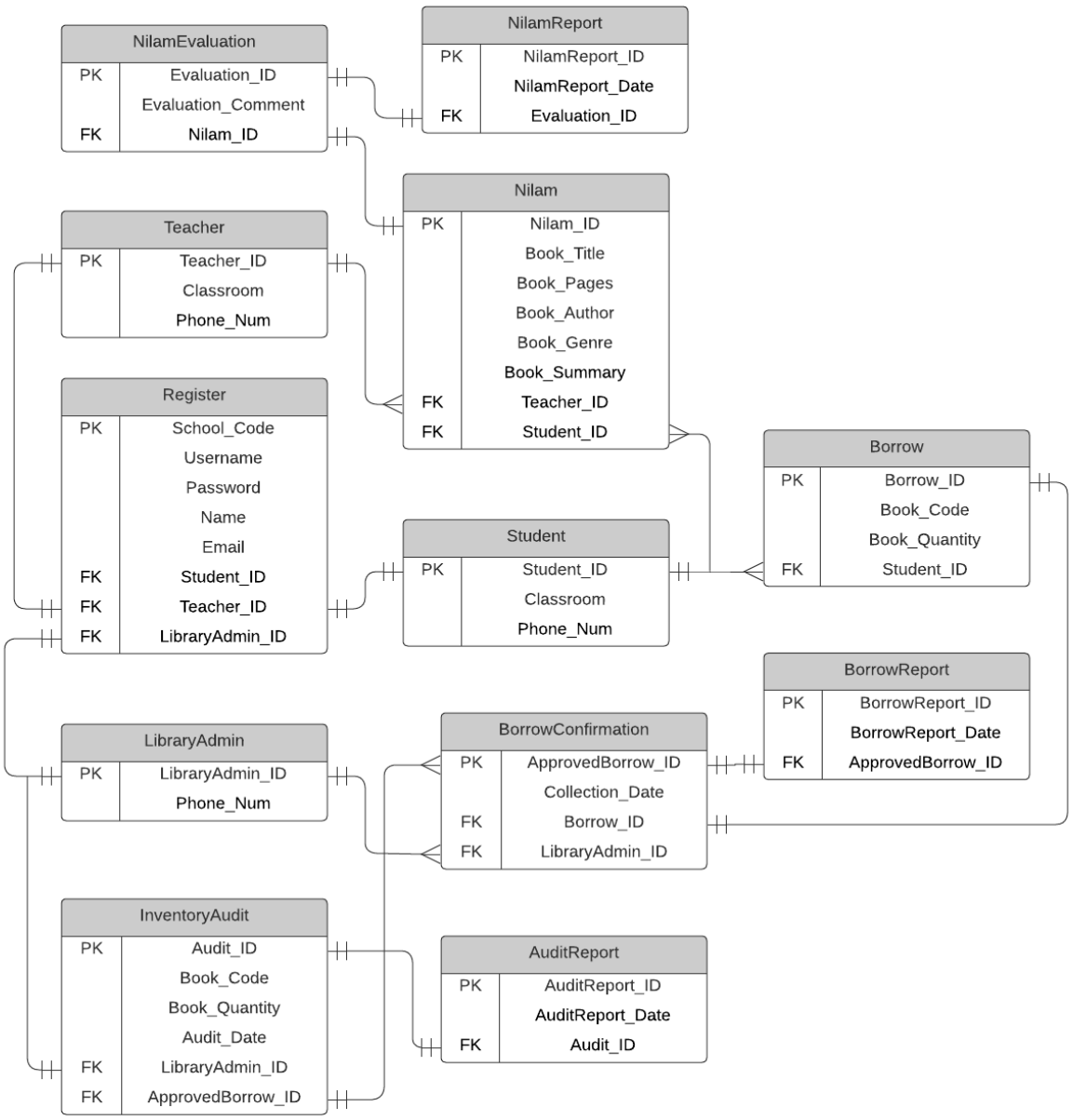


3.6 DATA DESIGN

3.6.1 Entity Relationship Diagram

The figure below represents the Entity Relationship Diagram (ERD) which illustrates how all the 12 entities which are Register, Student, Teacher, LibraryAdmin, Borrow, BorrowConfirmation, BorrowReport, InventoryAudit, AuditReport, Nilam, NilamEvaluation and NilamReport relate to each other within the Integrated Nilam And Bochord System.

Figure 3.5 Entity Relationship Diagram



3.6.2 Data Dictionary

Register, Student, Teacher, LibraryAdmin, Borrow, BorrowConfirmation, BorrowReport, InventoryAudit, AuditReport, Nilam, NilamEvaluation and NilamReport are the 12 tables in this application. Each table's attribute is described in detail in the description, data type and constraint section.

3.6.2.1 Register

Field Name	Description	Data Type	Constraint
School_Code	Exclusive code that will be use to determine user's school	VARCHAR (10)	PK
Username	Username that will be use for login session	VARCHAR (20)	
Password	Password that will be use for login session	VARCHAR (20)	
Name	User's full name	VARCHAR (30)	
Email	User's email	VARCHAR (30)	
Student_ID	ID number for student	VARCHAR (10)	FK
Teacher_ID	ID number for teacher	VARCHAR (10)	FK
LibraryAdmin_ID	ID number for library admin	VARCHAR (10)	FK

Table 3.9 Register data dictionary

3.6.2.2 Student

Field Name	Description	Data Type	Constraint
Student_ID	ID number for student	VARCHAR (10)	PK
Classroom	Student's classroom name	VARCHAR (10)	
Phone_Num	Student's phone number	VARCHAR (15)	

Table 3.10 Student data dictionary

3.6.2.3 Teacher

Field Name	Description	Data Type	Constraint
Teacher_ID	ID number for teacher	VARCHAR (10)	PK
Classroom	Teacher's classroom name	VARCHAR (10)	
Phone_Num	Teacher's phone number	VARCHAR (15)	

Table 3.11 Teacher data dictionary

3.6.2.4 Library Admin

Field Name	Description	Data Type	Constraint
LibraryAdmin_ID	ID number for library admin	VARCHAR (10)	PK
Phone_Num	Library admin's phone number	VARCHAR (15)	

Table 3.12 LibraryAdmin data dictionary

3.6.2.5 Borrow

Field Name	Description	Data Type	Constraint
Borrow_ID	ID number for borrow request	VARCHAR (10)	PK
Book_Code	Borrow's book code	VARCHAR (20)	
Book_Quantity	Quantity of borrow's book	INT	
Student_ID	ID number for student	VARCHAR (10)	FK

Table 3.13 Borrow data dictionary

3.6.2.6 BorrowConfirmation

Field Name	Description	Data Type	Constraint
ApprovedBorrow_ID	ID number for approved borrow request	VARCHAR (10)	PK
Collection_Date	Date of book collection	DATE	
Borrow_ID	ID number for borrow request	VARCHAR (10)	PK
LibraryAdmin_ID	ID number for library admin	VARCHAR (10)	FK

Table 3.14 BorrowConfirmation data dictionary

3.6.2.7 BorrowReport

Field Name	Description	Data Type	Constraint
BorrowReport_ID	ID number for borrow report	VARCHAR (10)	PK
BorrowReport_Date	Date of borrow report generated	DATE	
ApprovedBorrow_ID	ID number for approved borrow request	VARCHAR (10)	FK

Table 3.15 BorrowReport data dictionary

3.6.2.8 InventoryAudit

Field Name	Description	Data Type	Constraint
Audit_ID	ID number for inventory audit	VARCHAR (10)	PK
Book_Code	Book's code in library inventory	VARCHAR (10)	
Book_Quantity	Book's quantity in library inventory	INT	
Audit_Date	Date of audit	DATE	
LibraryAdmin_ID	ID number for library admin	VARCHAR (10)	FK
ApprovedBorrow_ID	ID number for approved borrow request	VARCHAR (10)	FK

Table 3.16 InventoryAudit data dictionary

3.6.2.9 AuditReport

Field Name	Description	Data Type	Constraint
AuditReport_ID	ID number for inventory audit	VARCHAR (10)	PK
AuditReport_Date	Date of audit report generated	DATE	
Audit_ID	ID number for inventory audit	VARCHAR (10)	FK

Table 3.17 AuditReport data dictionary

3.6.2.10 Nilam

Field Name	Description	Data Type	Constraint
Nilam_ID	ID number for Nilam activity	VARCHAR (10)	PK
Book_Title	Title of book for Nilam activity	VARCHAR (30)	
Book_Pages	Pages of book for Nilam activity	INT	
Book_Author	Author of book for Nilam activity	VARCHAR (30)	

Book_Genre	Genre of book for Nilam activity	VARCHAR (30)	
Book_Summary	Summary of book for Nilam activity	VARCHAR (2000)	
Student_ID	ID number for student	VARCHAR (10)	FK
Teacher_ID	ID number for teacher	VARCHAR (10)	FK

Table 3.18 Nilam data dictionary

3.6.2.11 NilamEvaluation

Field Name	Description	Data Type	Constraint
NilamReport_ID	ID number for Nilam report	VARCHAR (10)	PK
NilamReport_Date	Date of Nilam report generated	DATE	
Evaluation_ID	ID number for Nilam evaluation	VARCHAR (10)	FK

Table 3.19 NilamEvaluation data dictionary

3.6.2.12 NilamReport

Field Name	Description	Data Type	Constraint
NilamReport_ID	ID number for Nilam report	VARCHAR (10)	PK
NilamReport_Date	Date of Nilam report generated	DATE	
Evaluation_ID	ID number for Nilam evaluation	VARCHAR (10)	FK

Table 3.20 NilamReport data dictionary

3.7 PROOF OF INITIAL CONCEPT/PROTOTYPE

The project prototype's design is presented below, and it provides an early interface model of the Integrated Nilam And Bochord (i-NAB) application so that the user may understand the concept and idea of the project. These prototypes are also a beta version of the system that users can use to provide feedback. As a result, the real-world application's ultimate design may differ from the current's prototype model.

3.7.1 Login and Registration Section

Figure 3.6 Login

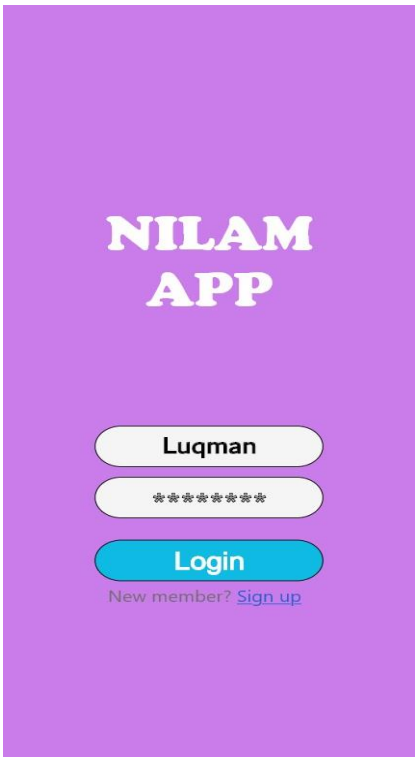


Figure 3.7 Account Registration

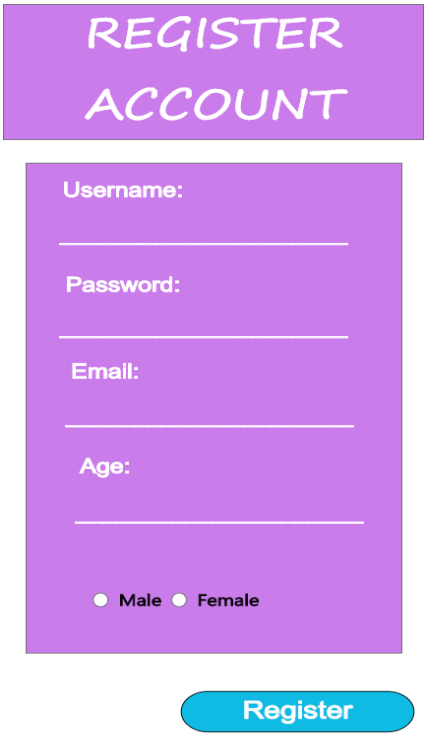


Figure 3.6 above shows login page for i-NAB application. When user open the application tap on Register Account, the system will bring user to login page for user to fill which consist of username and password. On the other hand, if user tap on Sign up button, the system will redirect to the registration form page for user to fill as shown in figure 3.7 above.

3.7.2 View Profile Section

After system validate the information entered by user, user may view their profile page, which is shown in the figure 3.8, figure 3.9 and figure 3.10 below.

Figure 3.8 Student Profile

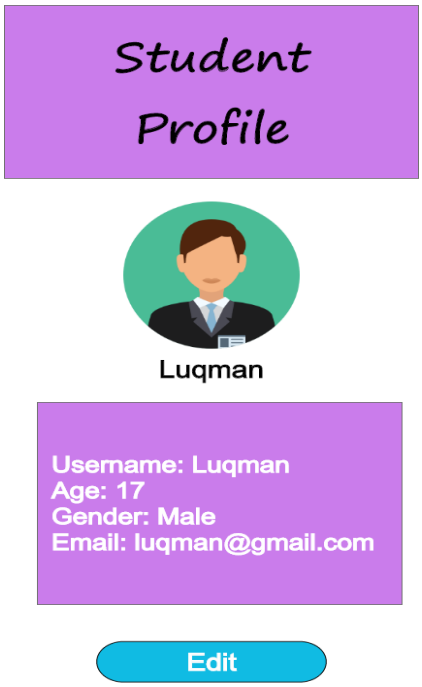


Figure 3.9 Teacher Profile

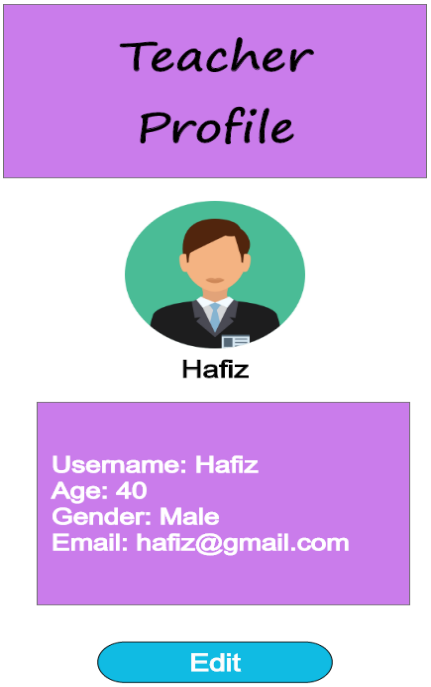


Figure 3.10 Library Admin Profile

3.7.3 Edit Profile Section

If user tap on the Edit button on the bottom of Profile page, user will be redirected to Edit Profile section as shown in the figure 3.11, figure 3.12 and figure 3.13 below.

Figure 3.11 Student Edit Profile

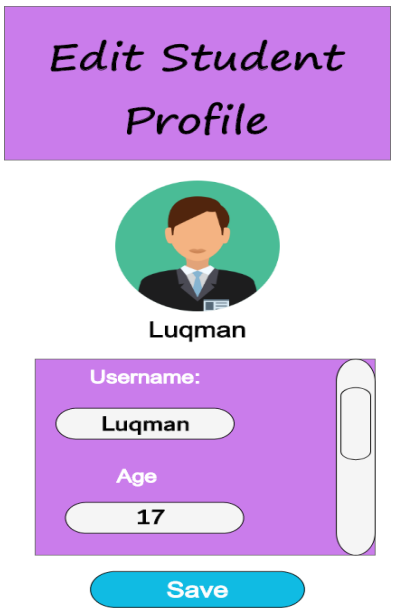


Figure 3.11 Teacher Edit Profile

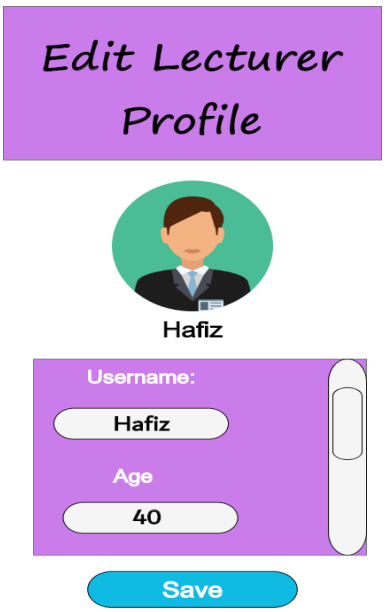
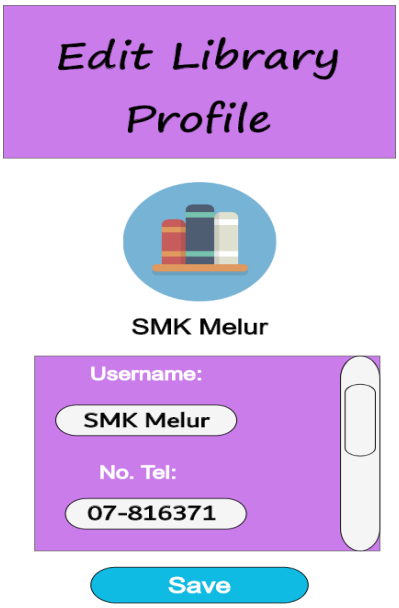


Figure 3.12 Library Admin Edit Profile



3.7.4 Manage Nilam Section

Students and teachers may access the Manage Nilam section.

3.7.4.1 Student's access

Students may scan the barcode of the book that they want to insert into their Nilam progress to export basic details of the books into system. Then, students will be required to write down the book summary for teacher's evaluation as shown in figure 3.14 and figure 3.15.

Figure 3.14 Barcode Scanner

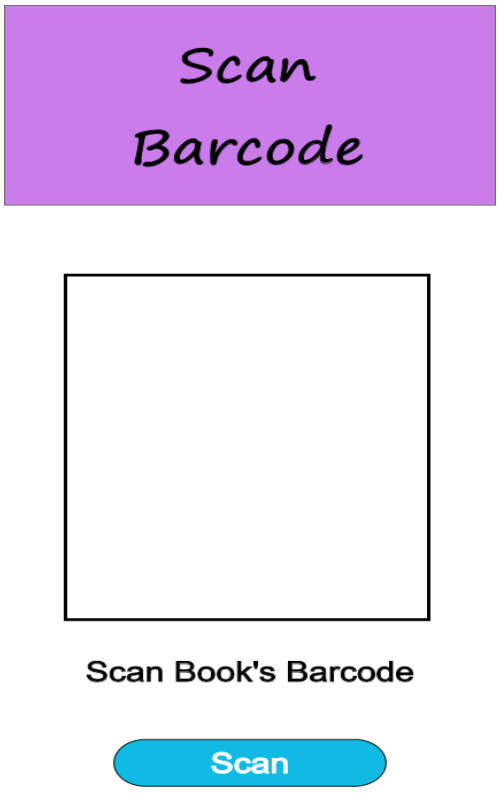


Figure 3.15 Book Summary

3.7.4.2 Teacher's access

Teachers may evaluate students' summary and generate the evaluation report as shown in figure 3.16 and figure 3.17 below.

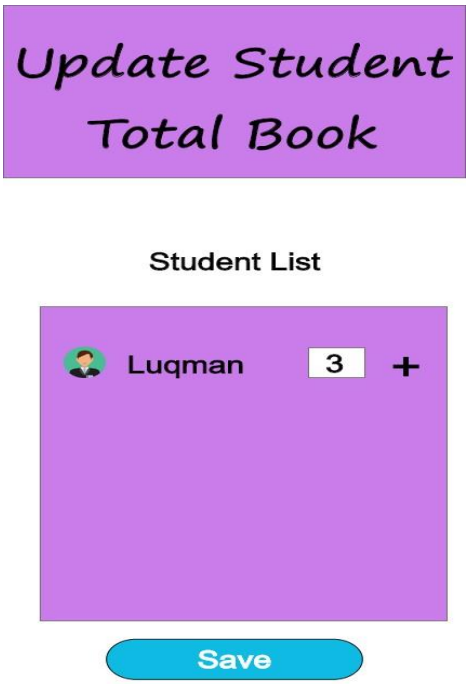
Figure 3.16 Summary Evaluation

Figure 3.17 Generate Evaluation Report

Teachers may view the generated evaluation report which is shown in figure 3.18. Teachers also need to update latest total books read by student after the evaluation process which is shown in figure 3.19.

Figure 3.18 Evaluation Report

Figure 3.19 Update Total Book



3.7.5 Borrow Book Section

In using Borrow Book section, both students and library admin may access the section but with different task.

3.7.5.1 Student's access

Student may access the section to search and request borrowing books from library which are shown in figure 3.20 and figure 3.21.

Figure 3.20 Search Book

Figure 3.21 Borrow Book

3.7.5.2 Library admin's access

Figure 3.22 and figure 3.23 below shows library admin may view students borrow request and check the book's availability in library.

Figure 3.22 View Request

Figure 3.23 Book Availability

Library admin also may manage student's borrow request, generate borrow report and view the generated borrow report as shown in figure 3.24, figure 3.25 and figure 3.26.

Figure 3.24 Manage Borrow Request

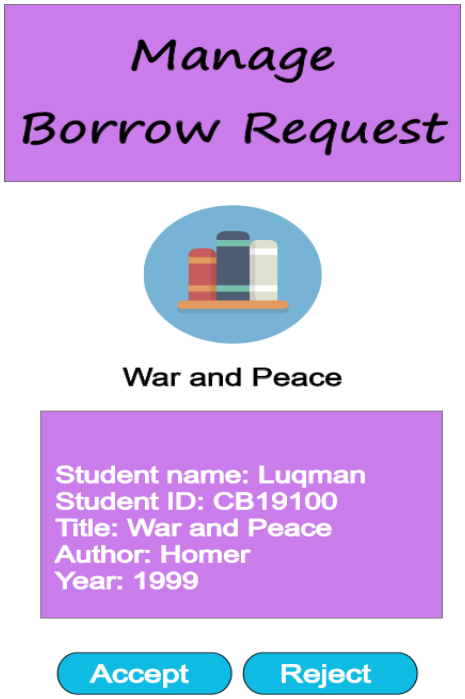


Figure 3.25 Generate Borrow Report

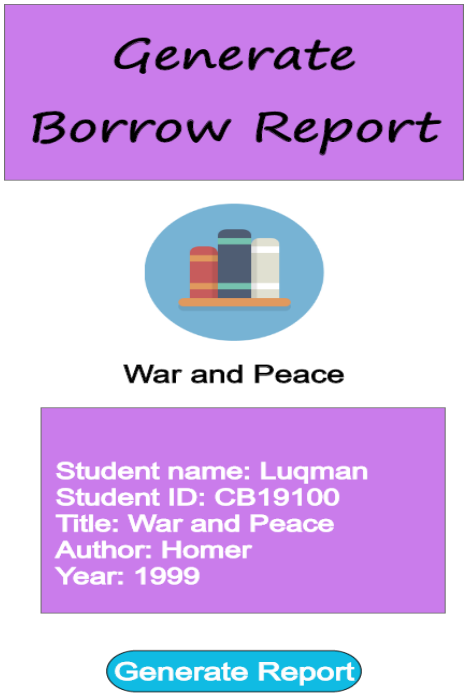


Figure 3.26 View Borrow Report

3.7.6 Audit Section

Only Library admin may access this section, where in this section admin may update the book list availability in the library and generate the report.

Figure 3.27 Audit Library Inventory

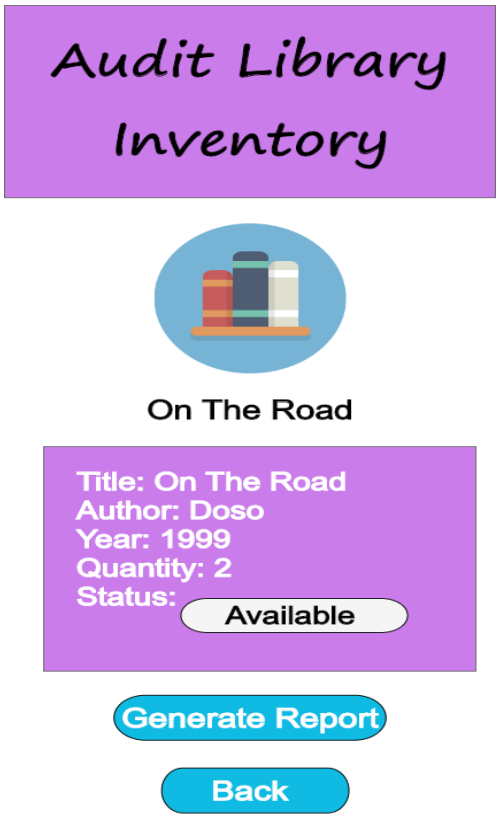
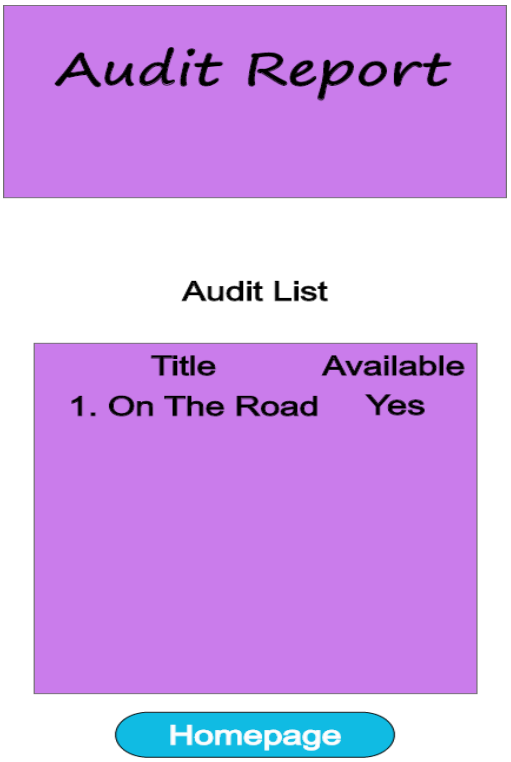


Figure 3.28 Audit Report



3.8 TESTING PLAN

To examine the functioning of the Integrated Nilam And Bochord (i-NAB) mobile application, a test case is created as part of the testing plan. This is to ensure that the system's operation yields the expected result. The test case will also uncover system flaws so that the developer can address them. Table 3.21 below serves as a general guideline for deploying i-NAB application and examining its functionality.

No	Module	Process	Result	Comments
1.	Manage Registration and Login	Register account	Pass/Fail	
2.		Login to the system	Pass/Fail	
3.	Manage Profile	Display profile details	Pass/Fail	
4.		Edit profile details	Pass/Fail	
5.	Manage Nilam	Scan book's barcode	Pass/Fail	
6.		Insert Summary	Pass/Fail	
7.		Evaluate Summary	Pass/Fail	
8.		Generate Summary Report	Pass/Fail	
9.		Update Nilam Total Book Read	Pass/Fail	
10.	Manage Borrow Book	Search Book	Pass/Fail	
11.		Borrow Book	Pass/Fail	
12.		Handle Borrow Request	Pass/Fail	
13.		Check Book Availability	Pass/Fail	
14.		Generate Borrow Report	Pass/Fail	
15.	Manage Library Inventory	Audit Library Inventory	Pass/Fail	
17.		Generate Audit Report	Pass/Fail	

Table 3.21 Integrated Nilam And Bochord Testing Plan

This test has been performed by:

Name : _____

Signature : _____

Date : _____

3.9 POTENTIAL USE OF PROPOSED SOLUTION

Nowadays, students tend to lose their interest in reading books as there is too much gadget and application that offers entertainment to students, though reading once been an entertainment to Malaysian students in about 10 years ago before smart phones are being use widely. NILAM program that been introduced by Malaysian government since 1999 is now have reduced in number of participations. It has been noticed that student's reading passion have been decrease as they lack knowledge in book titles that can offer stories which suit their interest. Meanwhile, the teachers are facing huge problem to manage the NILAM system as manual whereas they are required to bring all their student's books to home for marking progress, before sending the books back to the respective student.

So, in order to rise the NILAM program once again, Integrated Nilam And Bochord (i-NAB) mobile application is created with aims to design and develop an online NILAM system that can provide easier marking and updating progress through online management. Students can also search and borrow books from the school's library that suit to their interest. This application is expected to help teachers in managing the NILAM system in a much easier and modern way. It is also hoped that this application could increase interest in reading among all the students in Malaysia compared to manual version of NILAM program.

3.10 CHAPTER SUMMARY

As per discussed, the Rapid Application Development (RAD) has been chosen for this project development because it is saving the cost and time to implement the application apart from able to satisfy client's changing requirement and the project overtime. The phases involved in this model and the proposed solution of this system which are using Flutter framework and Firebase are being described in this chapter. Whereas Appendix A shows the Gantt Chart of this project using RAD.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 INTRODUCTION

In this chapter, all of the result of the Integrated Nilam And Bochord mobile application will be shown per implementation. All of the listing tasks must be done to develop this mobile application. Upon a successful implementation, test data will be generated to verify the functionality of the application apart finding any errors that may arise in the process. By using the Rapid Application Development (RAD) methodologies, testing is conducted during rapid construction and feedback phase. An android architecture pattern also been implemented for i-NAB application and the chosen pattern is MVVM (Model-View-ViewModel).

4.2 DEVELOPMENT TOOLS

Table 4.1 below shows the tools that are used to develop i-NAB application.

No	Tool	Purpose
1	Android Studio	For designing and developing i-NAB
2	Visual Studio Code	For designing and developing library admin dashboard
3	Adobe Photoshop	To create and edit i-NAB application's logo

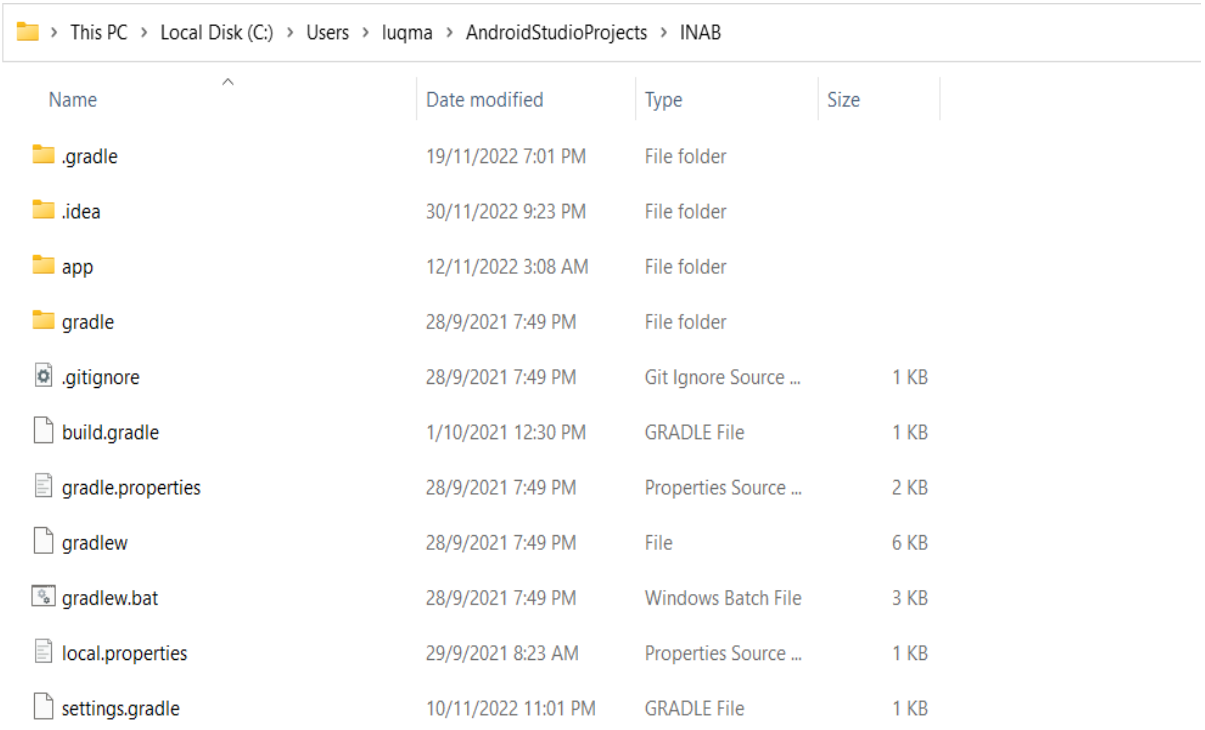
Table 4.1 Tools used to develop i-NAB application

4.3 RESULTS

The result of the system is described in this section by recording specific implementation requirements and procedures. As mentioned previously in chapter 3, i-NAB application uses Java as its front-end and Firebase as the backend. Whereas, in Firebase, we will make use of several different tools which are Authentication, Firestore Database, Storage and Realtime Database to save and retrieve the system data. To work out the code, we use Visual Studio code as the code editor and an emulator of Android Studio is needed to display the working code. Other things to be added, some packages to design the UI beautifully and make connection to the Firebase can be taken from blog.logrocket.com and section.io website. Figure 4.1 below shows the generated folder and dependencies after creating a new Java project using Android Studio and the folder that are been used are lib to write all the code for the application.

.

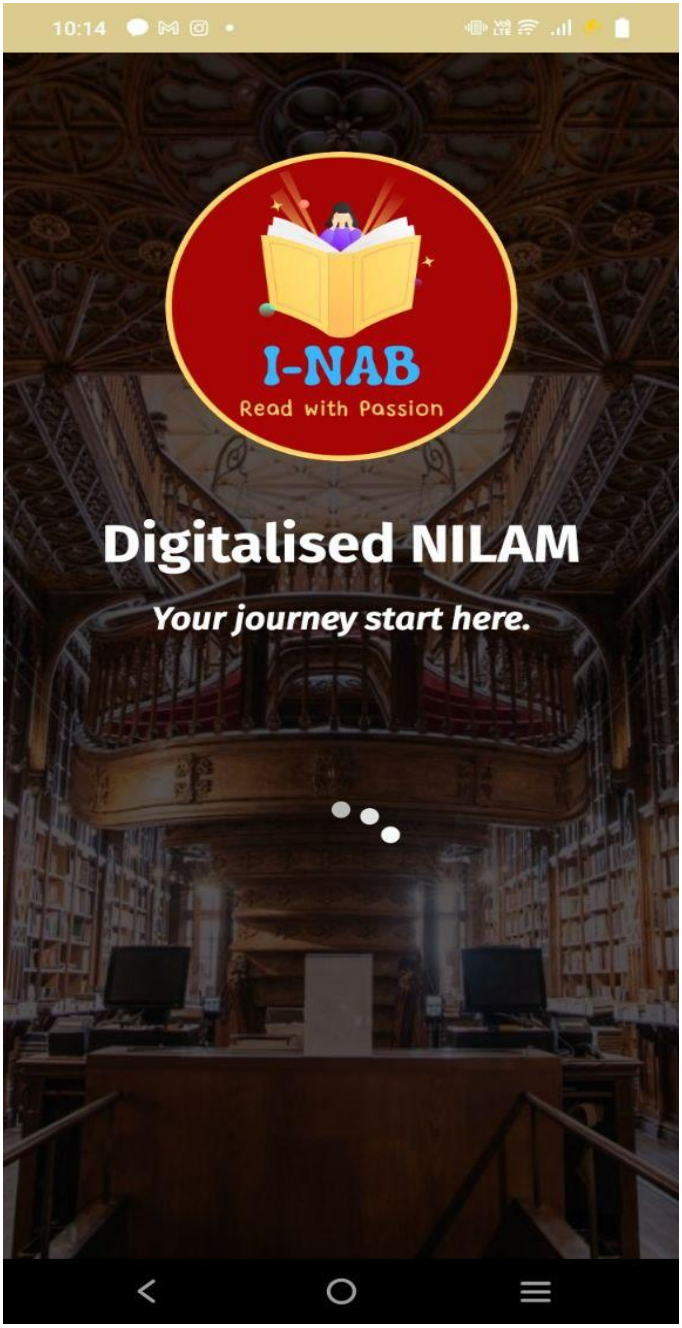
Figure 4. 1 General Folder after Creating i-NAB Project



4.3.1 Landing Page

Figure 4.2 below shows the landing page of Integrated Nilam And Bochord application. This is the first interface that user will interact with when open the application. As it is a splash screen, user is not required to tap any button to continue using this application. Users will automatically redirected to the login page after the splash effect finished.

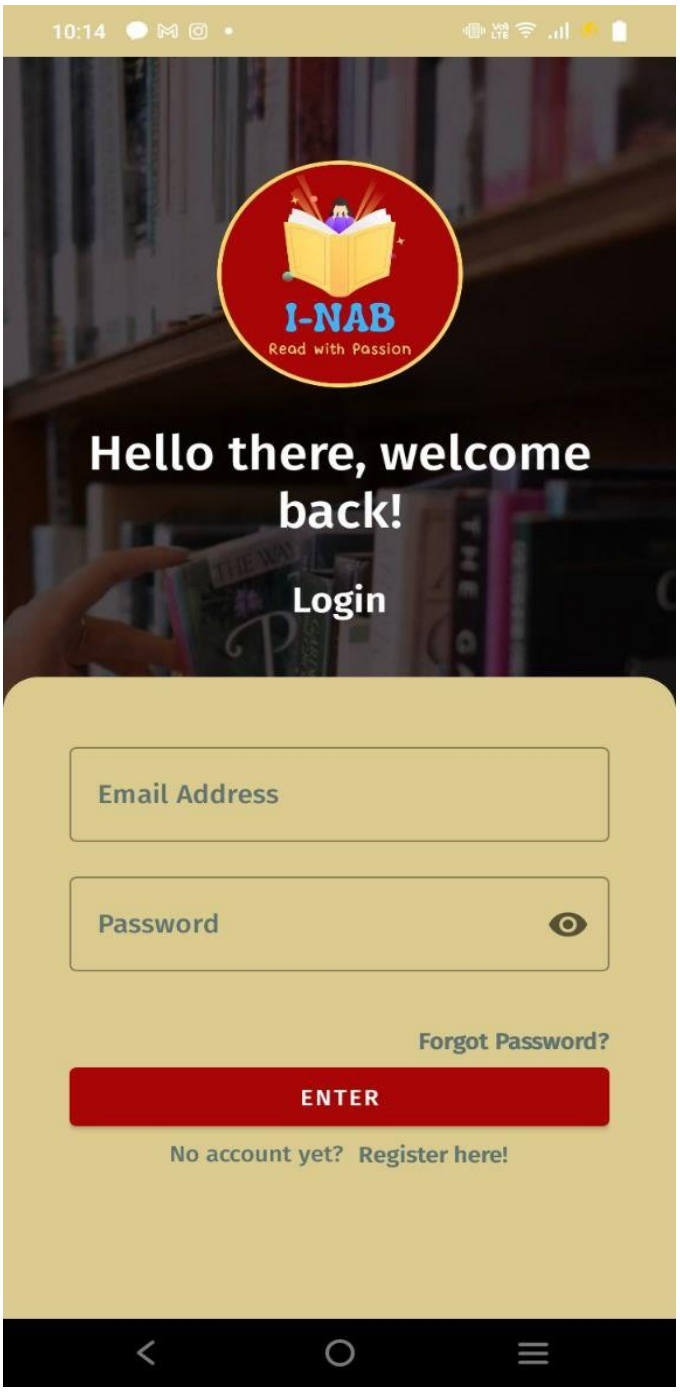
Figure 4.2 Landing Page of i-NAB



4.3.2 Login Page

Figure 4.3 shows the login page for any type of users that consists of email address field, password field, and <<GO>> button. If the user already has an account, they can directly tap on the <<GO>> button to login, but if they have not yet registered to an account, they need to do the registration first by tapping on the link below 'No account yet? Register here!' link. Then, they will be redirected to registration page.

Figure 4.3 Login Page



4.3.3 Registration Pages

Figure 4.4 shows the first registration page for user which consists of field for full name, email address and phone number. User also required to choose type of roles for the account. Once they filled all the field required, user may proceed by tapping <<NEXT>> button. If the user already had an account, they could tap on the 'Already got account? Login here!' link below the <<NEXT>> button and the system will be redirected to Login Page.

Figure 4.4 Registration Page 1

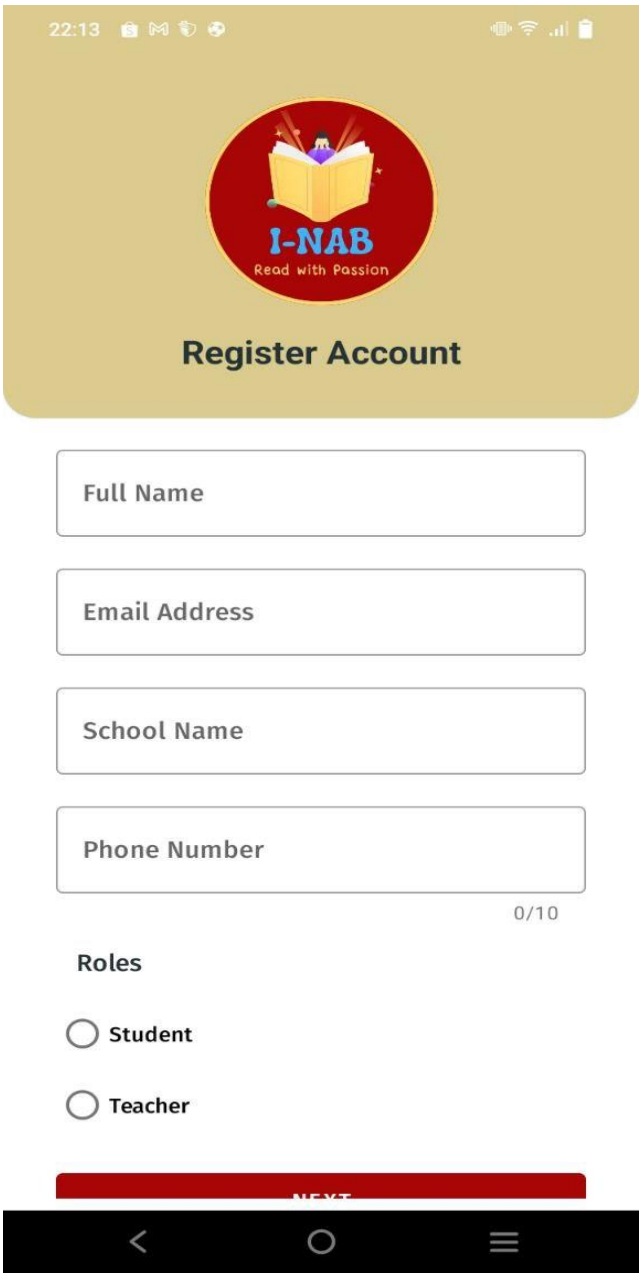
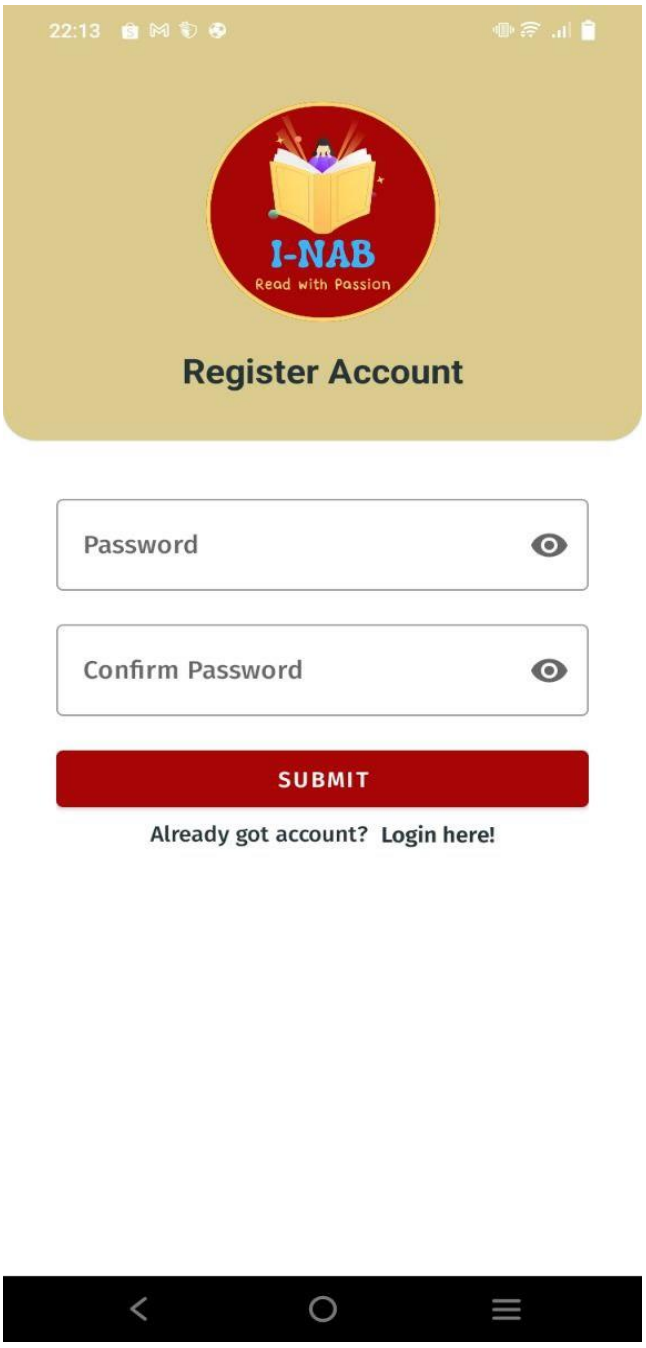


Figure 4.5 below shows the second page for registration. If user tap <<NEXT>> button after filled all the field required in the first page of registration, system will display for registration page 2 which consists of field for password and confirm password. Once user confirmed their password, they may tap on <<SUBMIT>> button to complete the registration process. The application will now display for login page after user submitted details in registration page.

Figure 4.5 Registration Page 2



Moreover, for the registration function to work with login, we need to edit default Firestore rules as shown in Figure 4.6 to Figure 4.7. The edited rule is to ensure that registration information will be added into Firestore along with Authentication in the Firebase. Figure 4.8 and 4.9 shows how alteration of the default rules worked out. The user id that is created by Firebase in Authentication will also be retrieved to the created account at Firestore in “users” collection.

Figure 4. 6 Default Firestore Rules

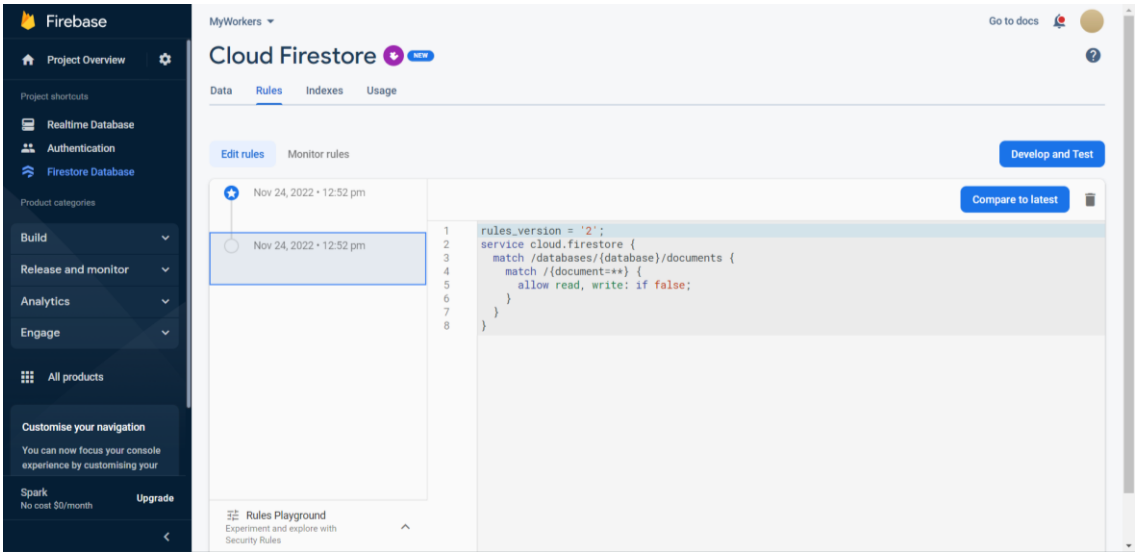


Figure 4. 7 Edited Firestore Rules

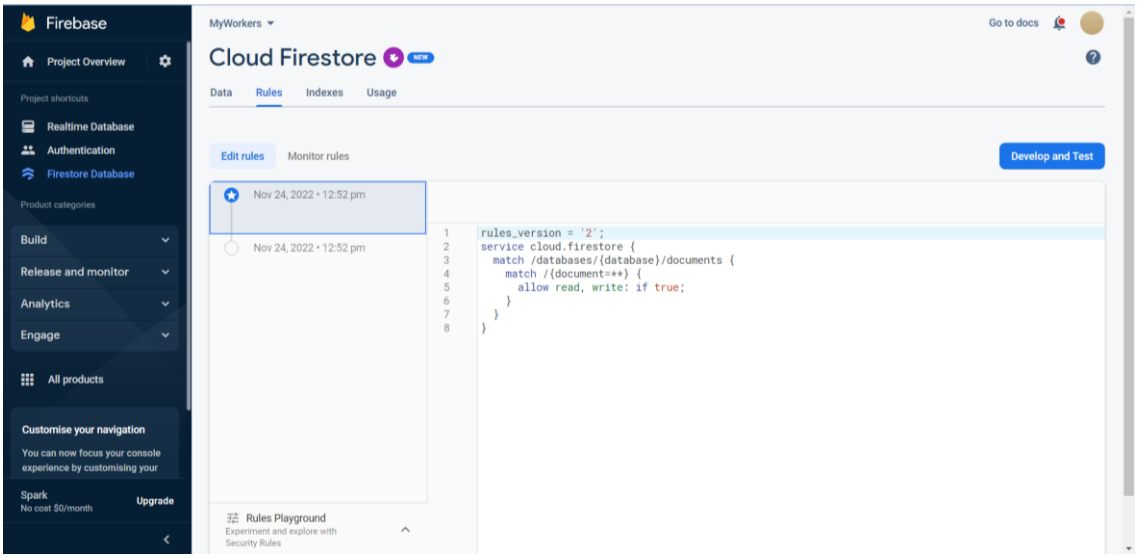


Figure 4. 8 User Id when They Successfully Register to an Account

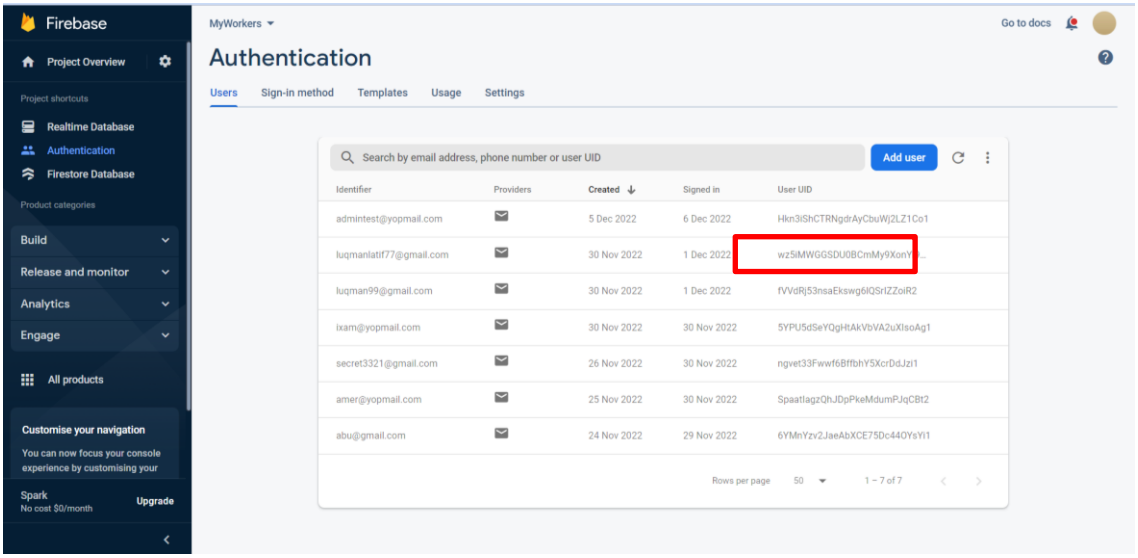
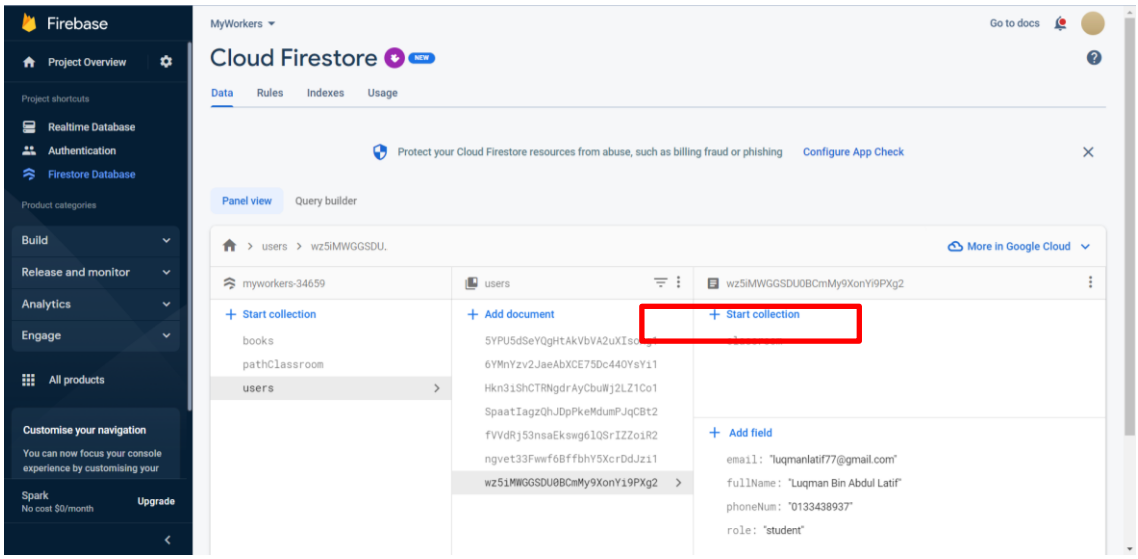


Figure 4. 9 User Data Added Synchronously when User do Registration



4.3.4 Forget Password Page

Figure 4.10 shows page that user will be engage with when they tap ‘Forgot password’ link in Figure 4.3. It contains email field where user need to enter their registered email for resetting password and then tap <<SUBMIT>> button. After tapping the button, an email will be sent to the user, and they need to tap on the link given before setting a new password as shown in Figure 4.11 and Figure 4.12 below. Once all the steps to update a new password settled, they can login to their account once again using registered email and new password at login interface.

Figure 4. 10 Forget Password Page

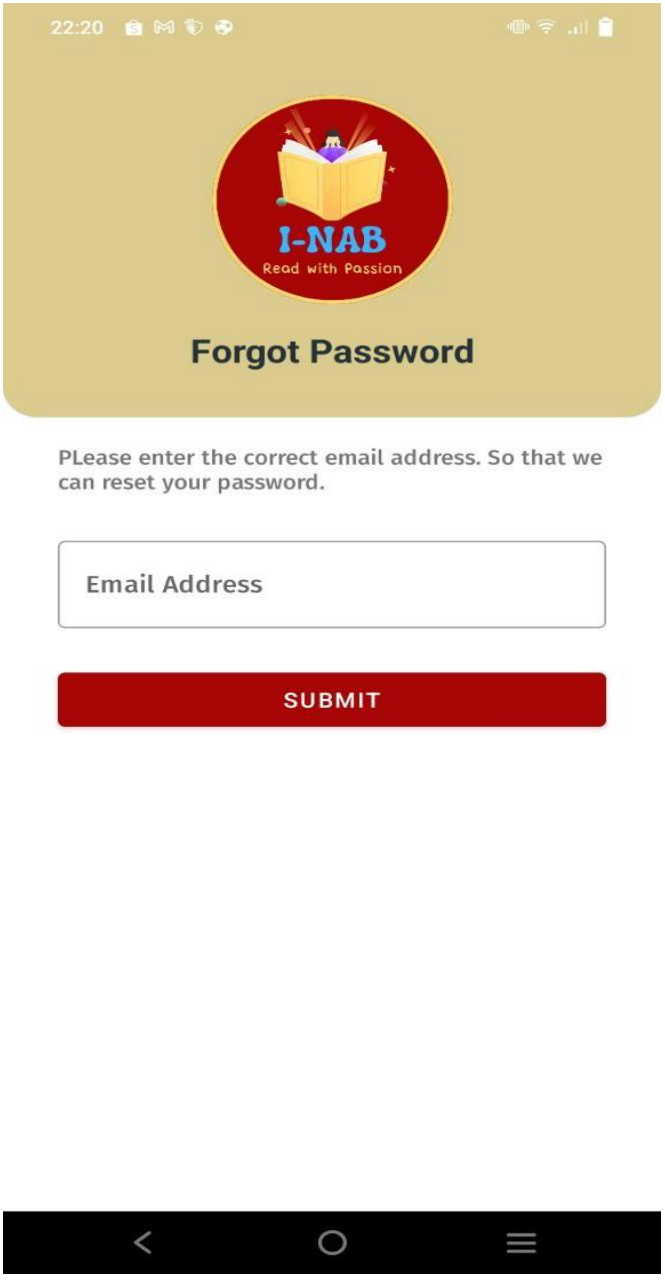


Figure 4.11 Email for Resetting Password

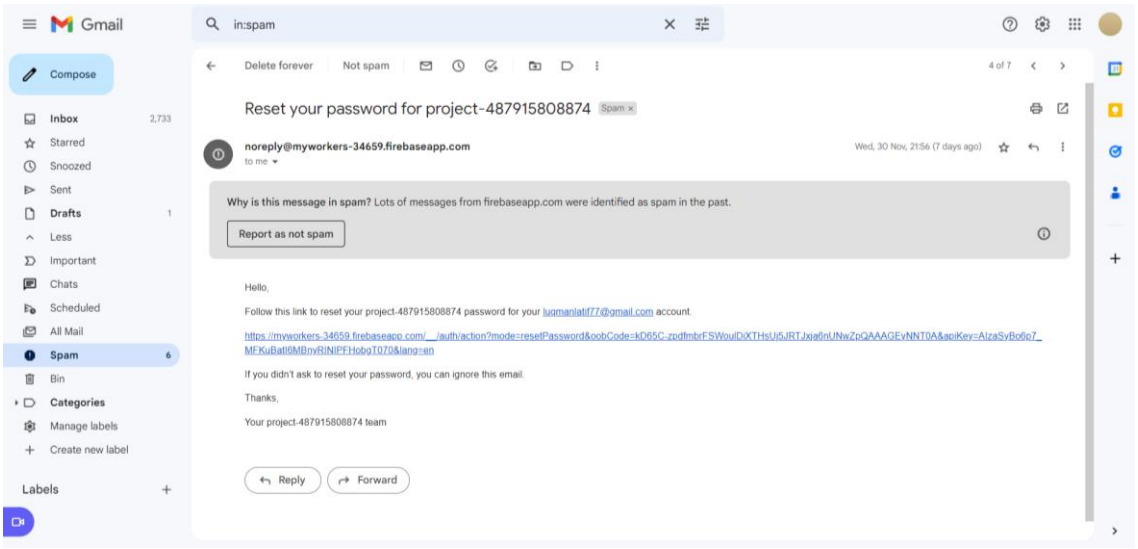
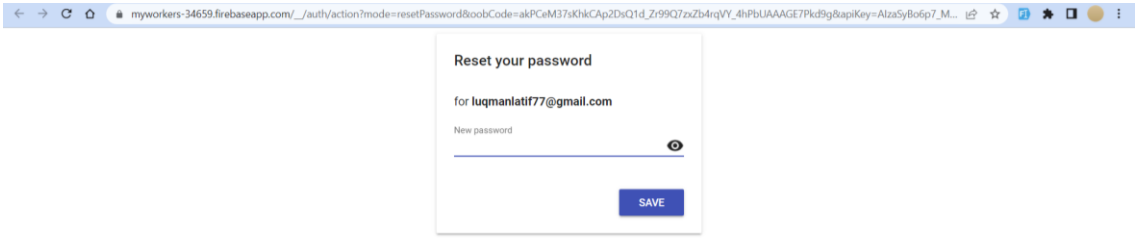


Figure 4.12 Reset to a New Password



4.3.5 Home Page

Figure 4.13 below shows homepage of teacher after they successfully login to their account. They are i-NAB logo and 4 buttons at the teacher's homepage interface. Teacher may access their profile though <<PROFILE>> button. As for <<MANAGE NILAM>> button, teacher may access and handle all of their student's Nilam progress page through the button. <<CLASSROOM>> button will allow teacher to view their classroom. Then, teacher can also logout from the application by tapping on the <<LOG OUT>> button. Once the user logout from the account, they will be navigated to login page.

Figure 4.13 Homepage of Teacher account

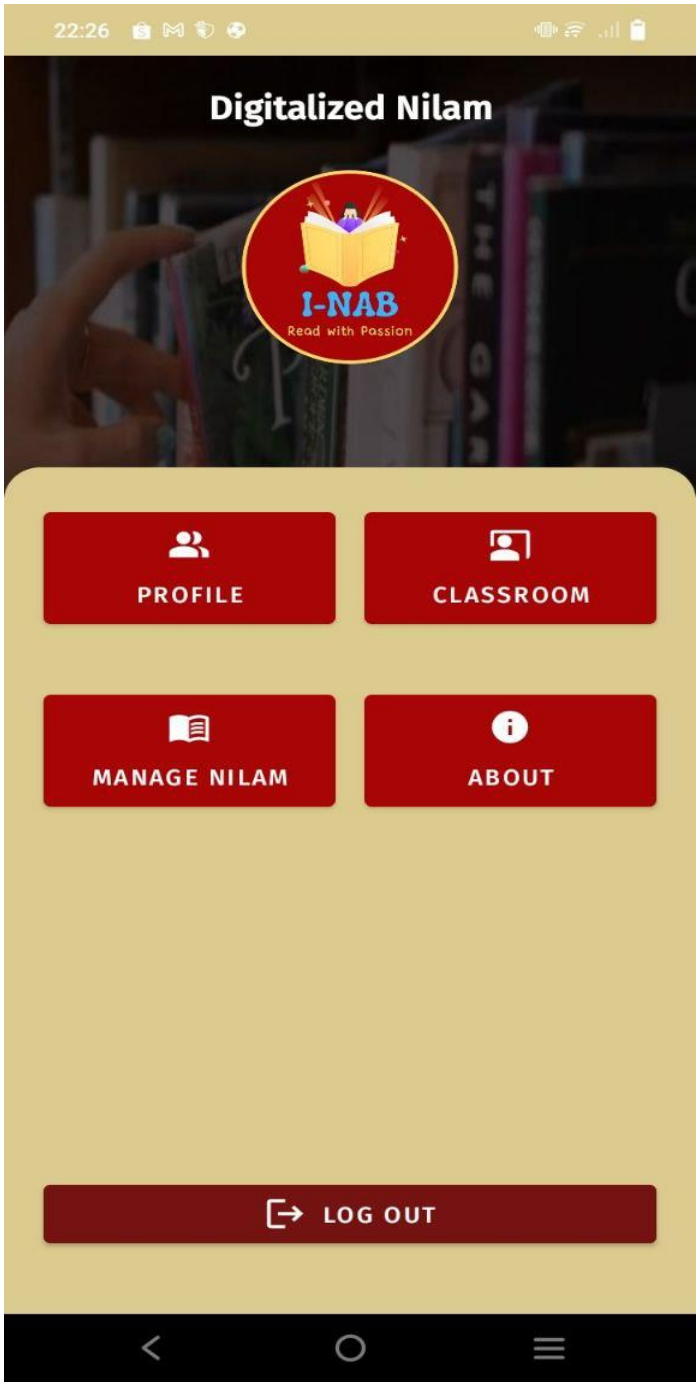
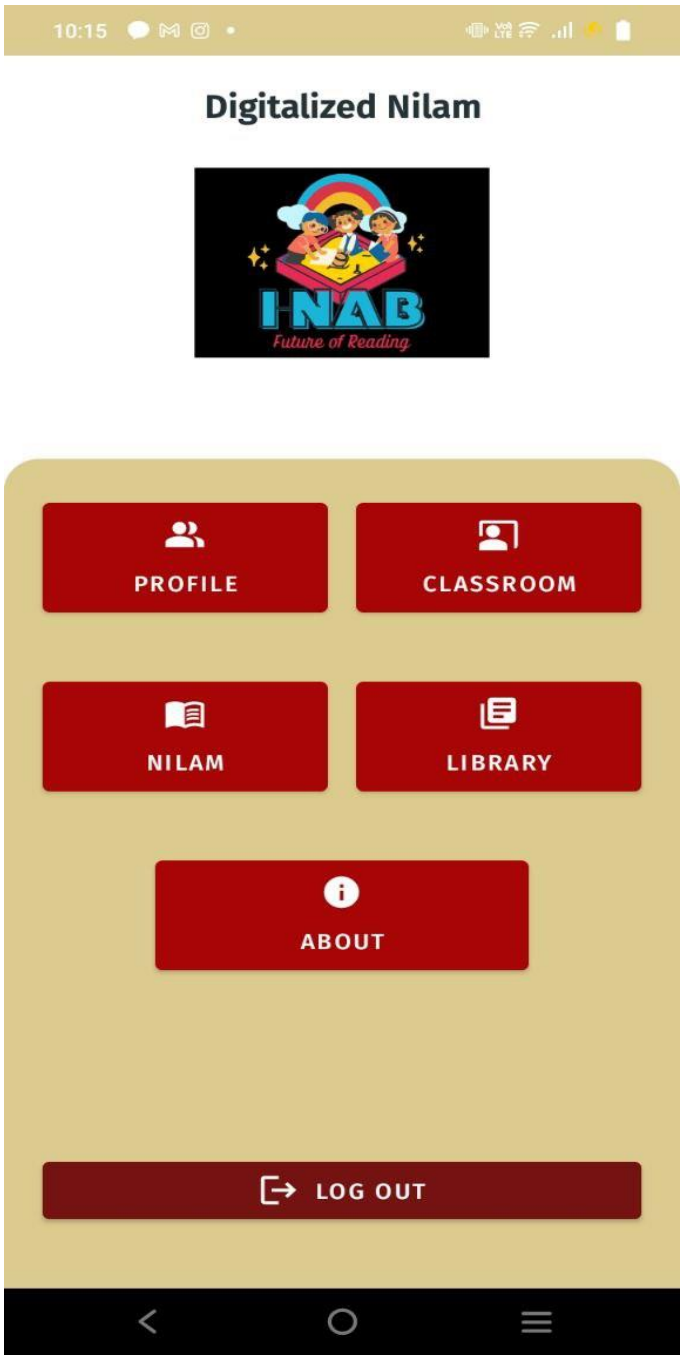


Figure 4.14 below shows homepage of student after they successfully login to their account. They are i-NAB logo and 4 buttons at the student's homepage interface. Student may access their profile though <<PROFILE>> button. As for <<MANAGE NILAM>> button, student may access their Nilam progress page through the button. <<CLASSROOM>> button will allow student to view their classroom. <<LIBRARY>> button will allow student to access for borrowing or returning book. Then, student can also logout from the application by tapping on the <<LOG OUT>> button. Once the user logout from the account, they will be navigated to login page.

Figure 4.14 Homepage of Student account



4.3.6 Profile Page

Figure 4.15 and figure 4.16 below shows profile for teacher and student account that consist of user's full name, email address and phone number. User may change their account's password by tapping on <<CHANGE PASSWORD>> button. Users are also allowed to edit details in their profile. They may access the features by tapping the <<EDIT PROFILE>> button. As for the <<BACK HOME>> button, user will be redirected to homepage.

Figure 4.15 Profile Page of teacher account

Figure 4.16 Profile Page of student account

4.3.7 Edit Profile Page

Figure 4.17 and figure 4.18 below shows edit profile page for teacher and student account. Through edit profile page, user may choose to change their profile details which are their full name, email address and phone number. After editing any of those field, user need to tap <<SUBMIT>> button to update the profile page and data in database.

Figure 4.17 Edit Profile Page of teacher account

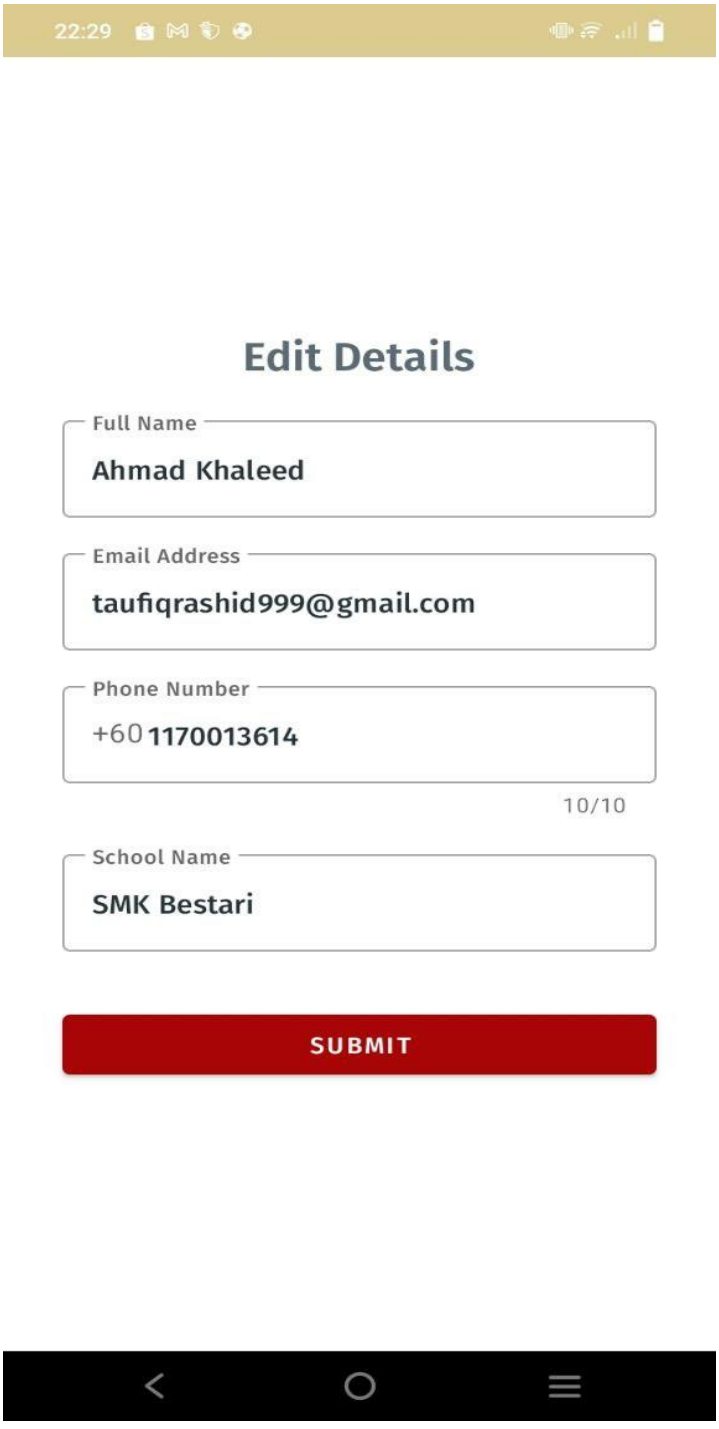
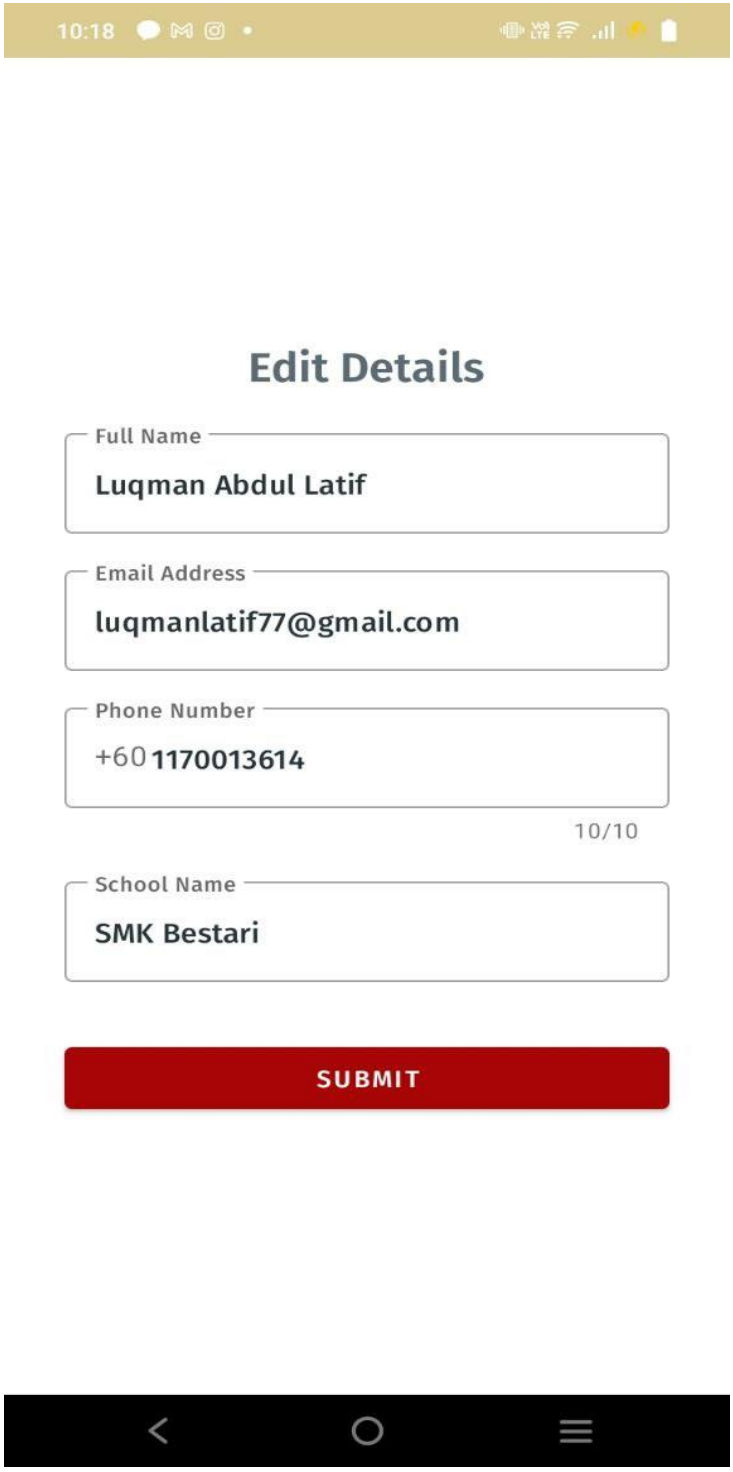


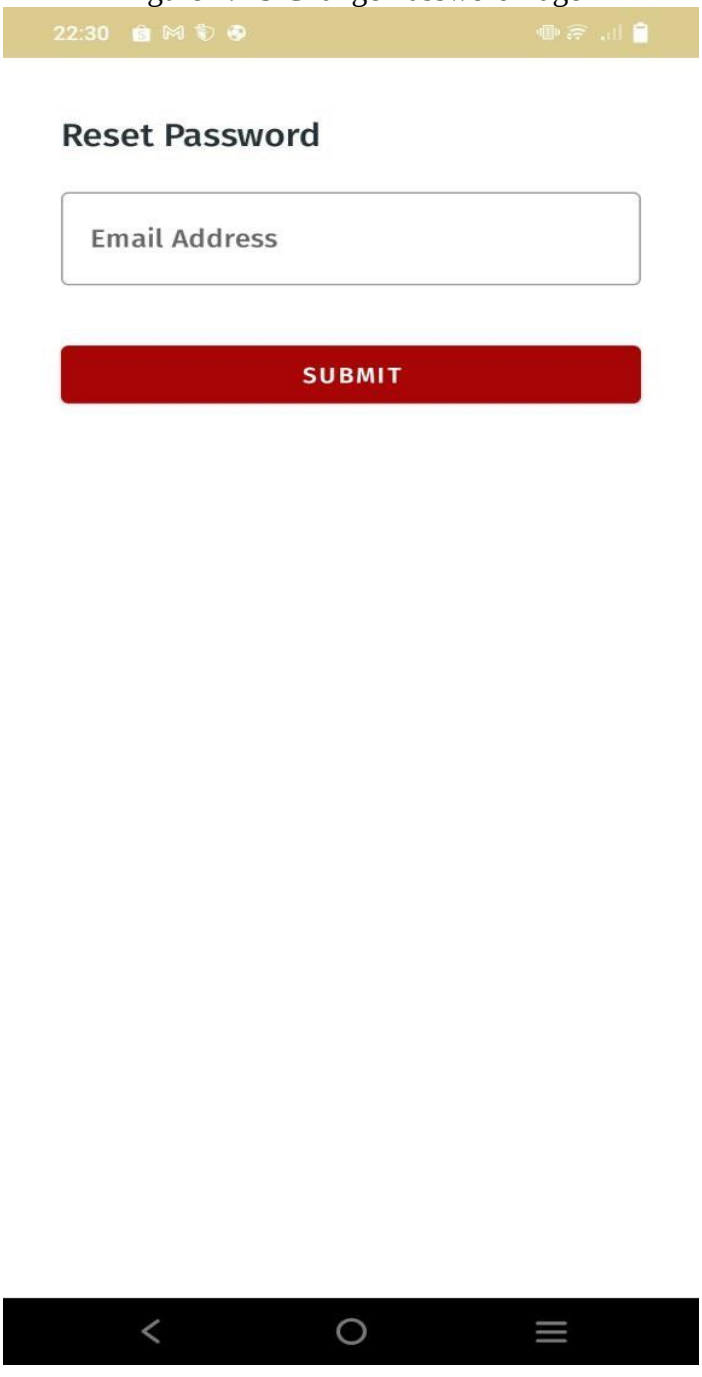
Figure 4.18 Edit Profile Page of student account



4.3.8 Forget Password Page

Figure 4.19 shows page that user will be engage with when they tap ‘CHANGE PASSWORD’ link in Figure 4.16. It contains email field where user need to enter their registered email for resetting password and then tap <<SUBMIT>> button. This features only allow both student and teacher to reset their password in their profile which can only be accessed if user managed to login successfully before it.

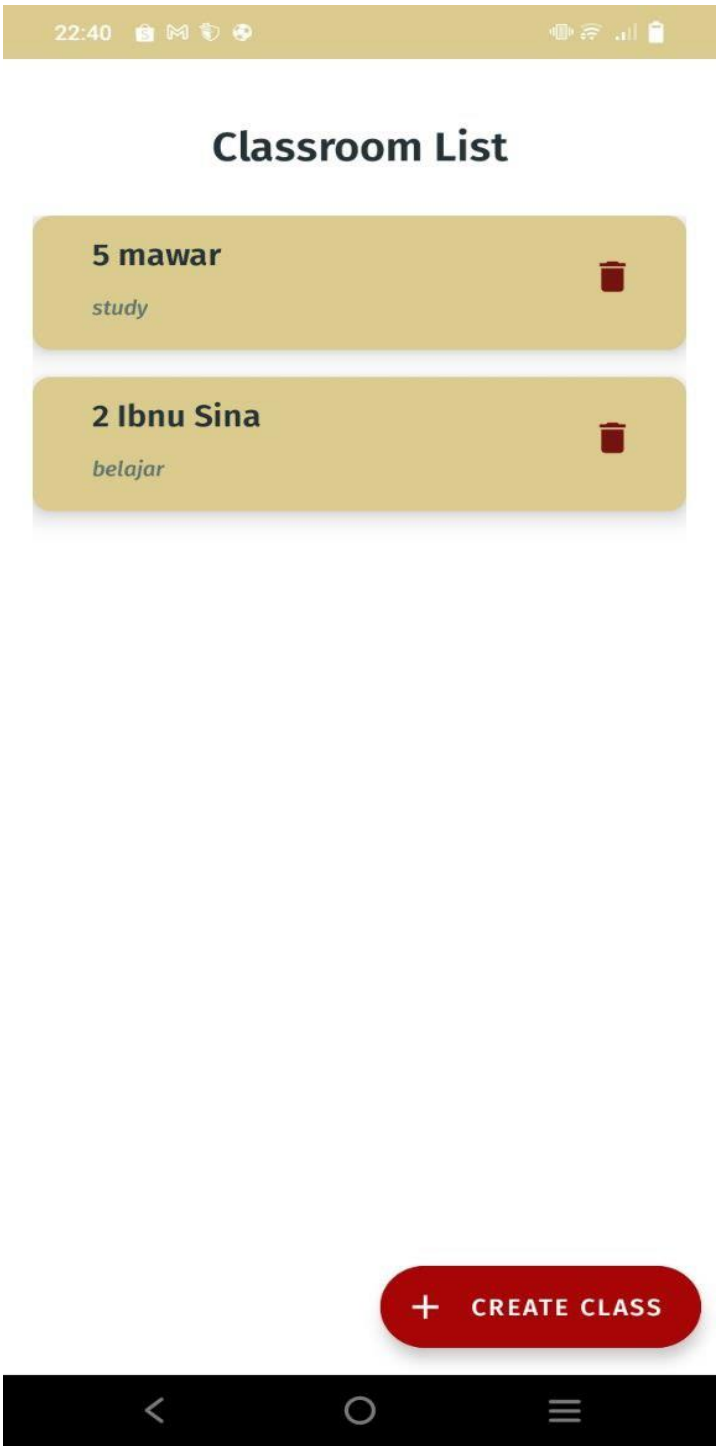
Figure 4. 19 Change Password Page



4.3.9 Classroom Pages for Teacher and Student

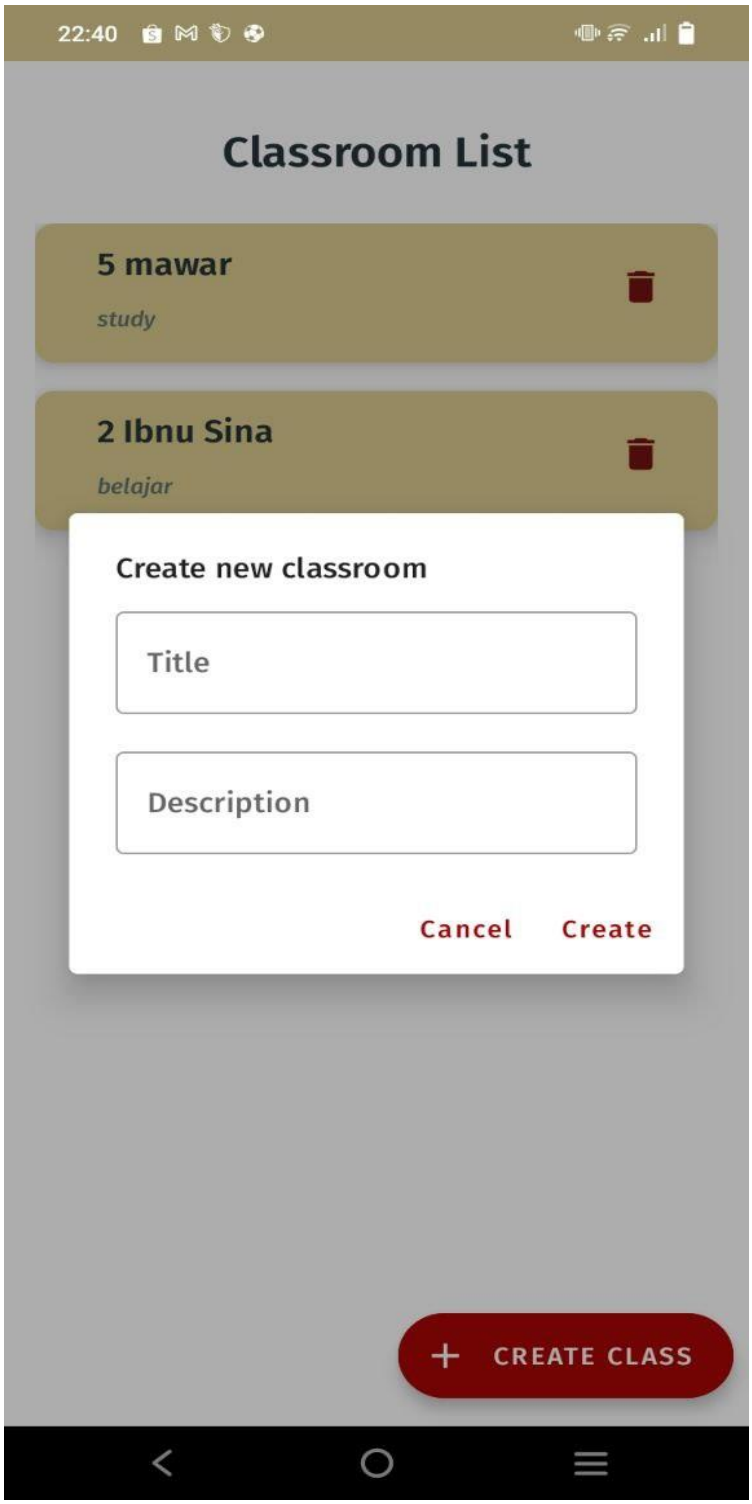
Figure 4.20, figure 4.21 and figure 4.22 shows classroom pages for teacher account. If teacher tap <<CLASSROOM>> button in homepage, teacher will be redirected to view class list where all the classes that teacher had created and still active will be displayed as in figure 4.20.

Figure 4.20 Classroom page 1 of teacher account



Teacher may also create a new class by tapping on <<CREATE CLASS>> button and required to fill the class title and description before tap on the <<CREATE>> button to launch the class as shown in figure 4.21.

Figure 4.21 Classroom page 2 of teacher account



Once a classroom successfully created, a class code will be generated. Teacher may share the code to their student in the respective class, so that they can join the classroom. Teacher may also choose to reset the class code by tapping the <<RESET CLASS CODE>> button. All student that already joined the classroom created by teacher will be displayed for teacher's view which is shown in figure 4.22.

Figure 4.22 Classroom page 3 of teacher account

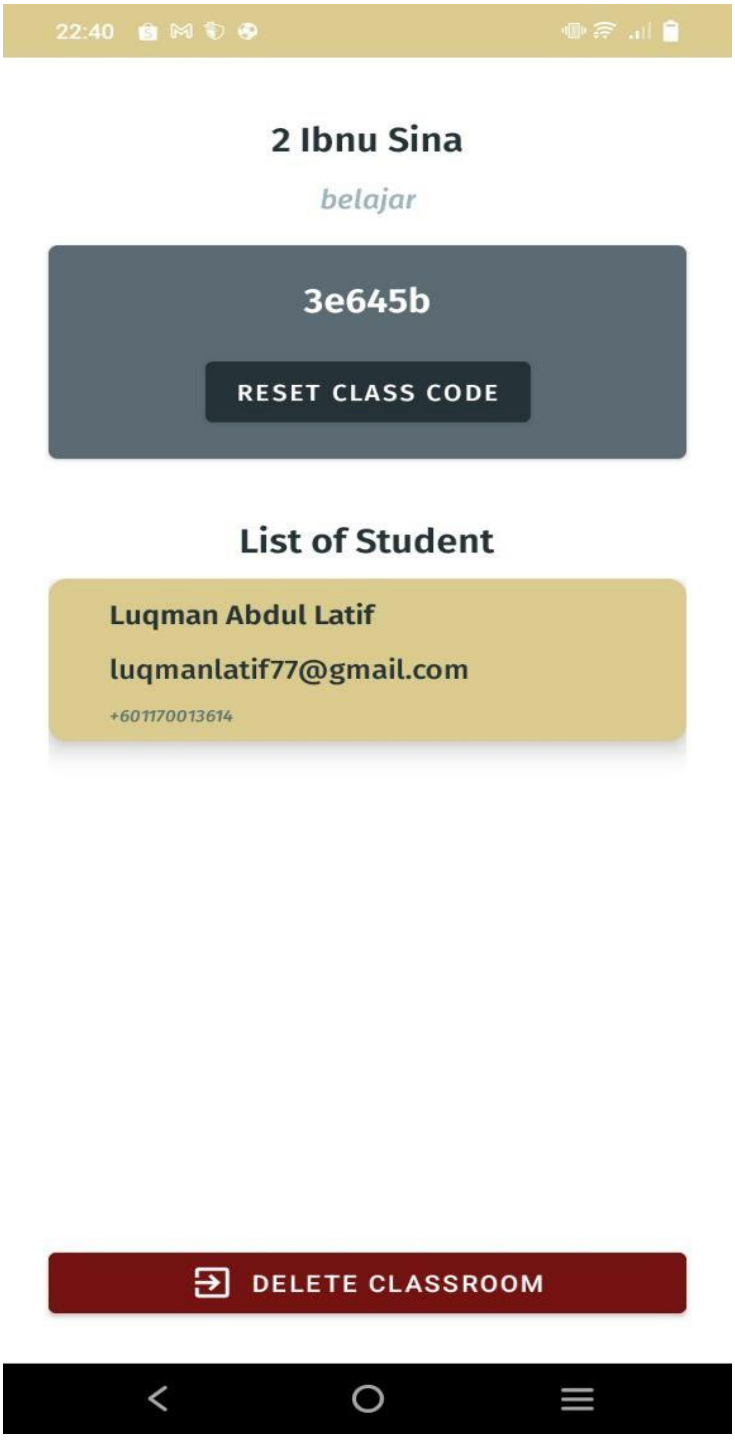


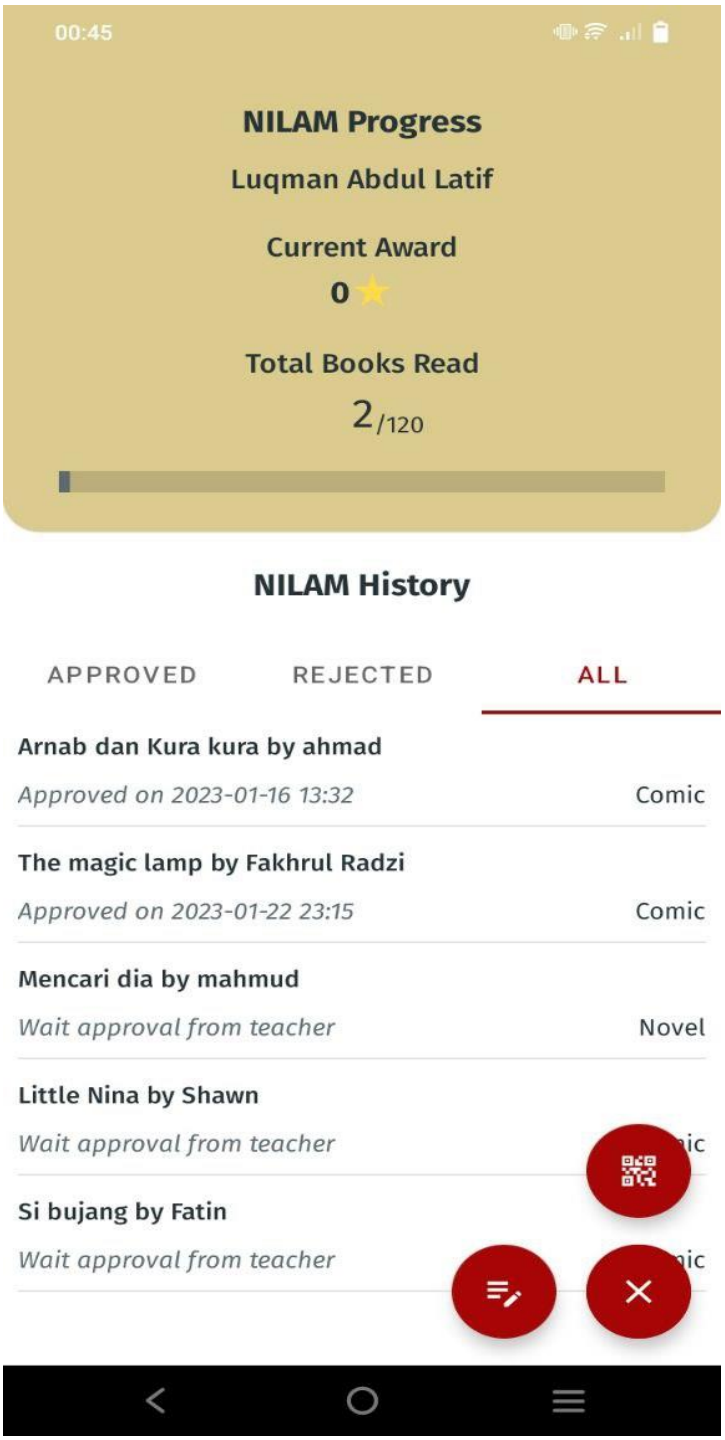
Figure 4.23 below shows classroom pages for student account. If student tap <<CLASSROOM>> button in homepage, student will be redirected to this page where they may enter class code that been shared by their teacher in order to join the classroom. If student successfully join a classroom, it will be displayed on this page as shown in figure 4.23.

Figure 4.23 Classroom page of student account

4.3.10 Manage Nilam Pages for Teacher and Student

Figure 4.24, figure 4.25 and figure 4.26 shows manage Nilam pages for student account. If student tap <<MANAGE NILAM>> button in homepage, student will be redirected to view their Nilam progress where they can look into their Nilam history as well which is shown in figure 4.24 below.

Figure 4.24 Manage Nilam page 1 of student account



Through page in Figure 4.24, student can also access to update their Nilam progress by choosing either using barcode scanner which is shown in figure 4.25 below or by updating Nilam progress manually which is shown in figure 4.26 below.

Figure 4.25 Scan Barcode for Nilam progress of student account

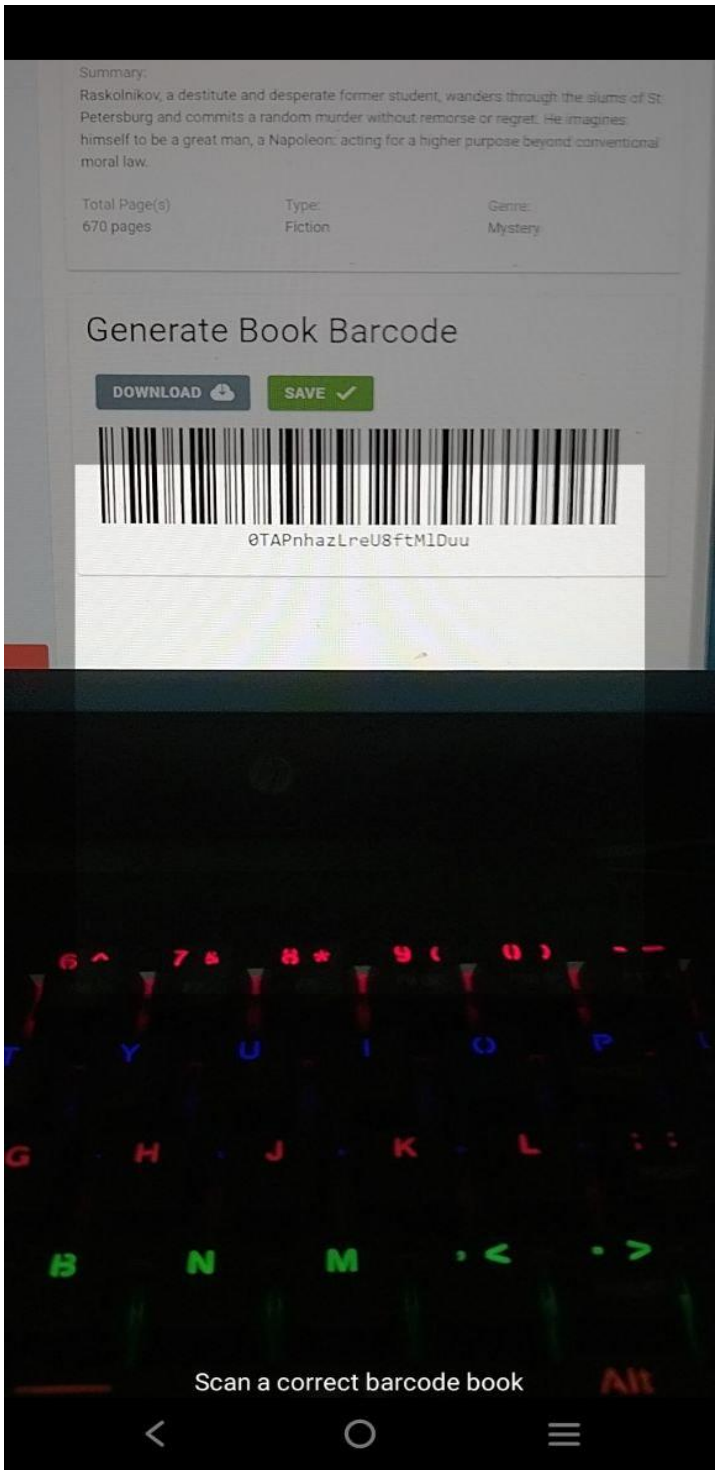
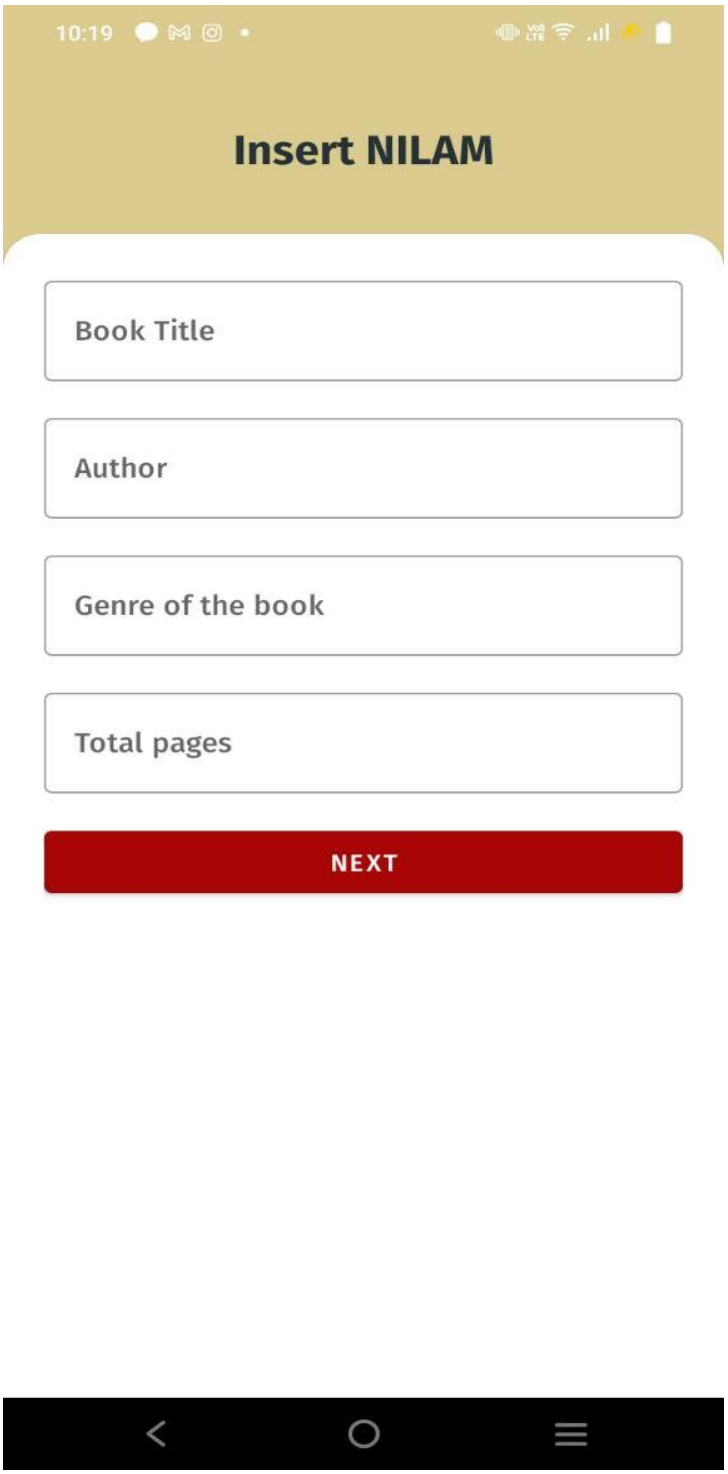
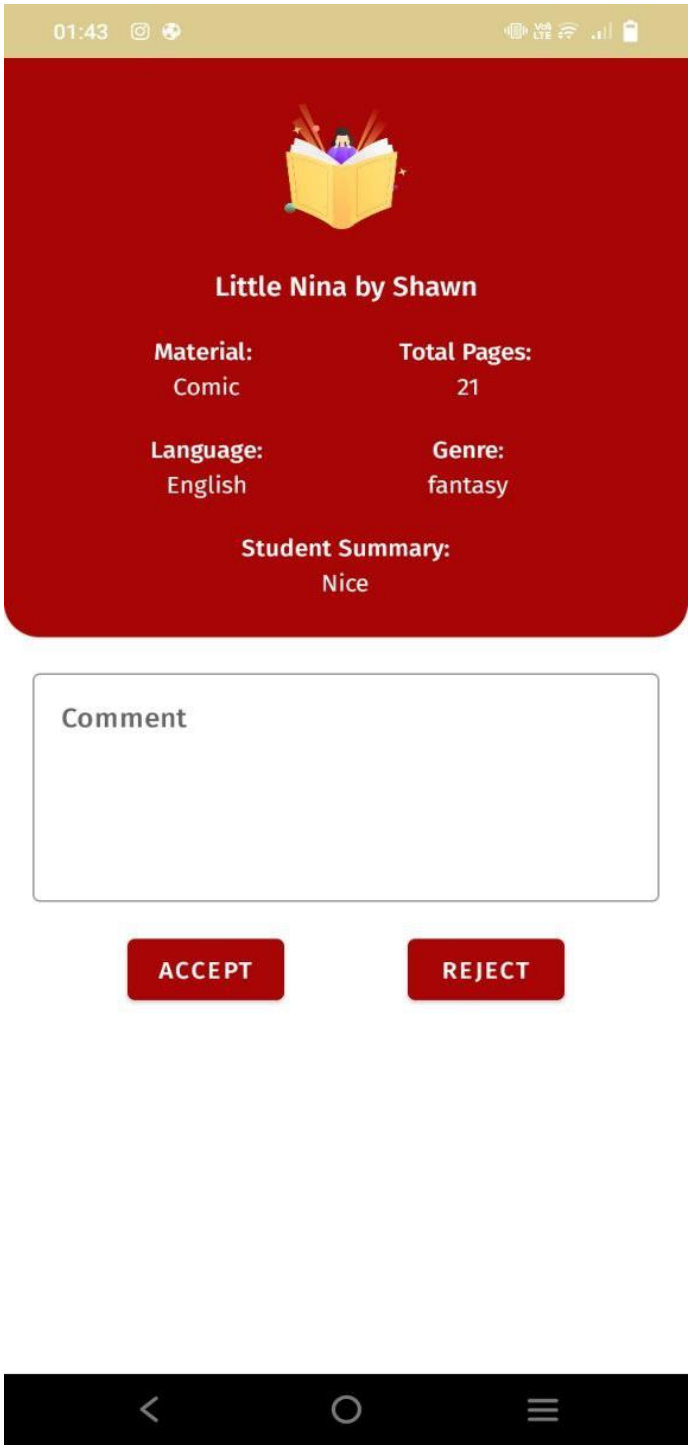


Figure 4.26 Manual method for Nilam progress of student account



Meanwhile for teacher account, teacher can manage their student progress update by validating student's summary. Teacher may choose either accept or reject the progress update which is shown in figure 4.27 below. If teacher choose to accept the summary, quantity of total books read by student, will automatically update as well.

Figure 4.27 Validate book summary for teacher account



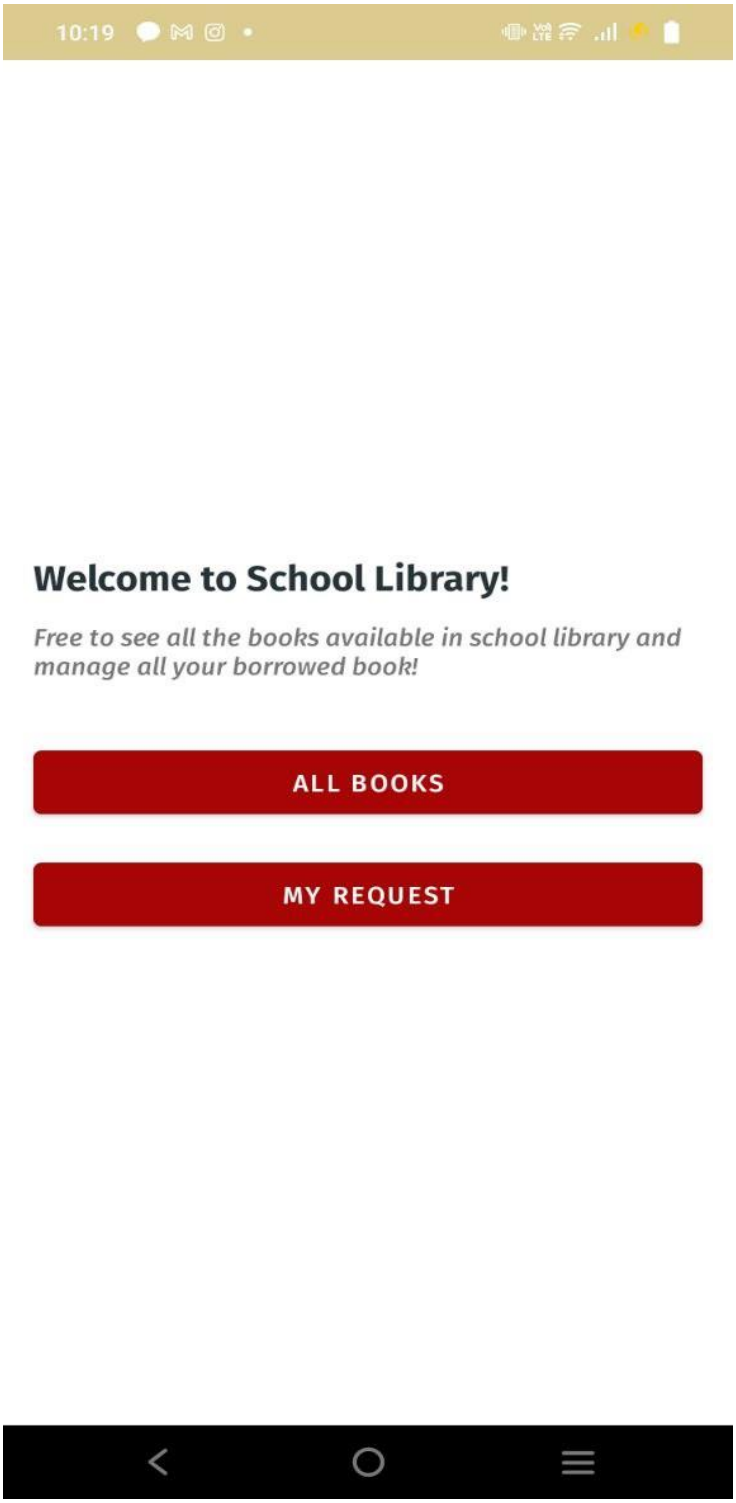
Teacher may also view notification page in Manage Nilam on which books that are still waiting for approval which is shown in figure 4.28 below.

Figure 4.28 Approval Notification for teacher account

4.3.11 Library Pages for Student and Library Admin

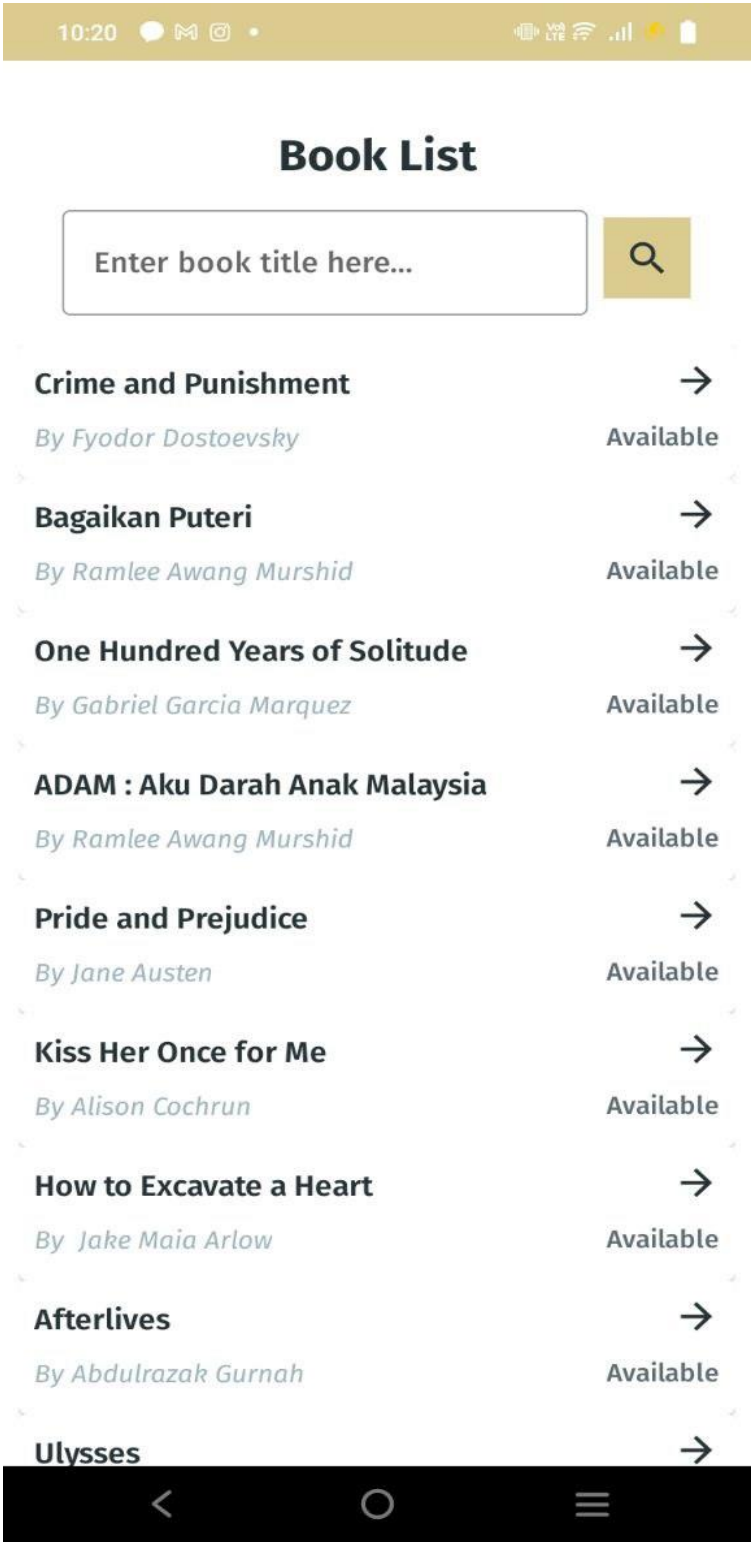
Figure 4.29, figure 4.30 and figure 4.31 shows library pages for student account. If student tap <<LIBRARY>> button in homepage, student will be redirected to library dashboard where they can choose action either to view all books available in their library database or student may choose to view their borrow request history which is shown in figure 4.29 below.

Figure 4.29 Library dashboard of student account



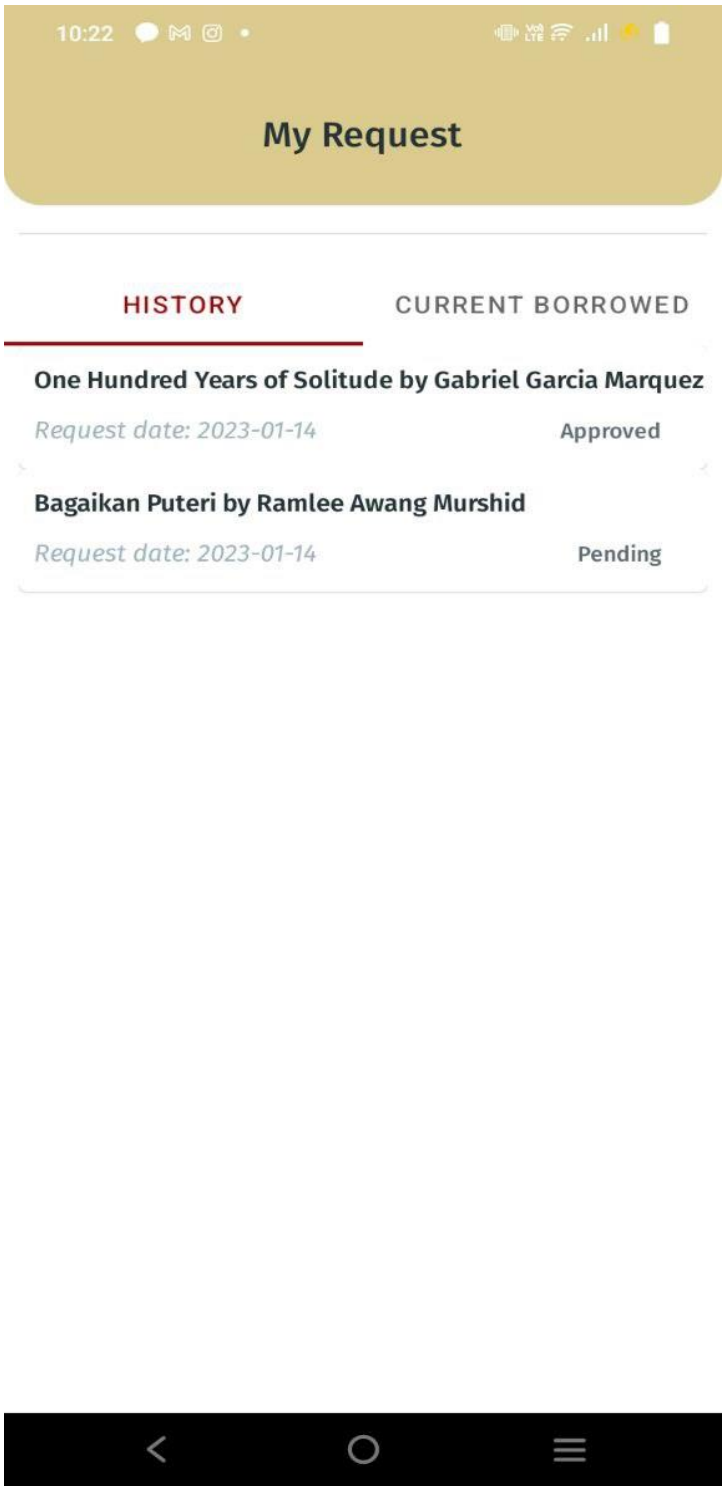
If student tap on <<ALL BOOKS>> button on library dashboard, they may view all books in their library database and by clicking on the book title, they may proceed to borrow the book if the book is still available which is shown in figure 4.30 below.

Figure 4.30 Book list of student account



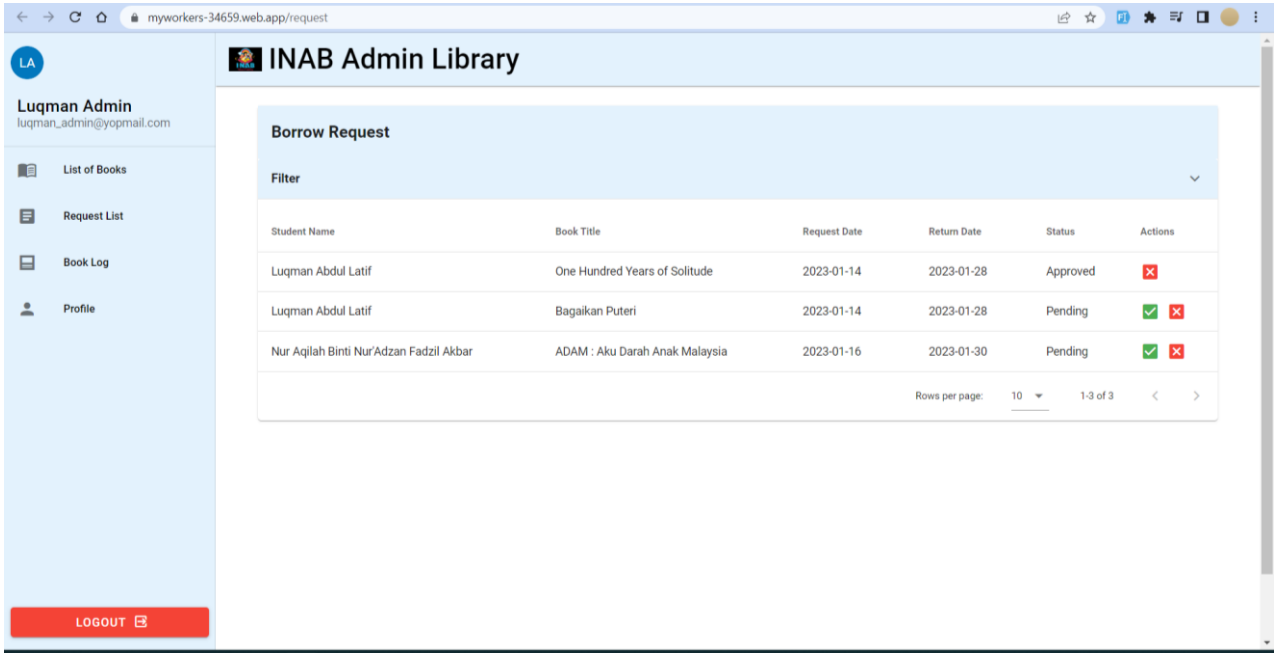
If student tap on <<MY REQUEST>> button on library dashboard, they may view their borrow request history which is shown in figure 4.31 below.

Figure 4.31 Borrow request history of student account



Meanwhile in library admin dashboard, admin may manage the borrow request from students by approve or reject the request which is shown as in figure 4.32 below.

Figure 4.32 Manage borrow request of library admin account



4.4 DISCUSSION

i-NAB is a mobile application that is being built for Android user using Java framework and Firebase. It involves User Acceptance Test (UAT) that is conducted to validate and verify the application functionality. There are five testers from Universiti Malaysia Pahang (UMP) specifically from Fakulti Komputeran (FK) student. The detailed result can be referred at Appendix F.

The UAT form is distributed using Google Form by providing the link to the tester. They need to do the testing process after successfully install the app on the devices. From the UAT form, the result that we obtain has less than 1% error. All the requirement specification and requirement design specified in SRS and SDD pass in test item. Nevertheless, this i-NAB application still needs improvements to make in nilam management features as to make it become more efficient and organized. For instance, to update nilam progress, i-NAB application will allow user to scan book's barcode to scan in order to retrieve some of the book's details such as book's title, author's name, no of pages and book's language. However, there is still some other reading material that can be used to update nilam progress such as article. Unfortunately, article do not have barcode that student can use to scan to retrieve the book's details. So, in order to key in the book's details for article, student need to enter it manually.

CHAPTER 5

CONCLUSION

5.1 OBJECTIVE REVISITED

In this chapter, the conclusion of i-NAB application such as the application limitation and future work is being discussed. i-NAB application has metall the requirement defined in SRS and system design specified in SDD and the UAT has been handed to the user of this application. When identifying the strengths and weaknesses of the existing application we can take the strength as one of our application strengths and fix the weaknesses to produce a better version of application. Lastly, the functionality of this application is determined using UAT form that being distribute using Google Form by surveying their test elements.

5.2 LIMITATION

This i-NAB application still has its own limitation and constraint even when we have made comparison with existing application strengths and weaknesses. The limitation that could be identified from this application are:

5.2.1 Time Constraint

Consume more time to build a more complex application.

5.2.2 Internet Connection

The application must be running on Internet connection or else users cannot get updated data from the database.

5.2.3 Money Constraint

To build big and complex application, the budget can be bigger because ofthe expense for hosting or using more premium functionality for Firebase.

5.2.4 Language

The system run in English language, and there is possibility that users did notfully understand it especially elders in the rural areas.

5.3 FUTURE WORK

After the installation of the prototype to the client, further research has been made to evaluate the system because there is no such thing as ‘perfect system’. Overtime, the system may be degraded in term of their suitability and performance. From the prototype, the constraints that we could gather is that firstly, the system run over Internet connection where we can say that it is a big disadvantage. Student or teacher may be unable to manage the NILAM progress because they do not have any connection to the Internet at time, they need to consume it. For the future, the application can be implemented to running without mobile data or Wi-Fi.

REFERENCES

1. N. A. . Mansor, N. H. . Ubaidullah, and R. . Mailok, “The Acceptance of the iNILAM System by Librarian Media Teacher: A Brief Review”, *NIEBM-V6*, pp. 120–125, Mar. 2022.

2. Mohd Zin, S. H. (2008). The Role Of Nilam Programme In Motivating Primary School Students To Instill Reading Habit: A Case Study (Doctoral dissertation, Universiti Teknologi Malaysia).

3. Y. Wang and T. A. Dawes, “The Next Generation Integrated Library System: A Promise Fulfilled?”, *ITAL*, vol. 31, no. 3, pp. 76-84, Sep. 2012.

4. Putri, N. A., & Azwar, M. (2022). Evaluation of the Utilization of Electronic Filing System as Information Retrieval Medium at the Records Centre Unit of the Ministry of Environment and Forestry, Indonesia.

5. Ponnudorai, P. K., & Zamin, A. A. M. (2022). The Concept and Context of A Reading Program Nilam To Enhance Dual Language Students Reading Performance. Sch Int J Linguist Lit, 5(1), 1-13.

6. Martin, J. (1991). Rapid application development. Macmillan Publishing Co., Inc..

7. Agarwal, R., Prasad, J., Tanniru, M., & Lynch, J. (2000). Risks of rapid application development. Communications of the ACM, 43(11es), 1-es.

8. Sahaimi, N. S. M. (2012). Reading Assessment System on Online (RASO) (Doctoral dissertation, UMP).

9. McGrath, D. H., & Lee, C. R. (1989). The Virginia Tech Library System (VTLS). Library hi tech.

10. Richard, P (2022, April 16). ER Diagram: Entity Relationship Diagram Model | DBMS Example. Retrieved from https://www.guru99.com/er-diagram-tutorialhttps://www.guru99.com/er-diagram-tutorial-dbms.htmldbms.html

APPENDIX A

USER ACCEPTANCE TEST

(UAT)

i-NAB

Integrated Nilam And Bochord Mobile Application

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

1.1 Purpose of Document

User Acceptance Test (UAT) is served as one of the testing strategies to test the acceptance ofthe user on Integrated Nilam And Bochord (i-NAB). It serves as reference for developer and stakeholders on the validation of this application against user requirement specified in Software Requirement Specification (SRS) and Software Design Documentation (SDD).

1.2 Test Target

The test will be conducted among four different types of users which are student, teacher, librarian and software tester which the first three type of users are the users who will mainly use the system once the system been used in daily life. Their feedback and comment are vital for the improvement of the system.

1.3 System Menu

The documents that provide the test elements are:

- Software Requirement Specification of i-NAB (SRS)
- Software Design Document of i-NAB (SRS)

1.4 Entry and Exit Criteria

In order for this test to be able to take place, the following elements need to be presented:

- All requirements are available
- The i-NAB application is fully developed

As for the exit criteria, the following item need to be satisfied:

- Complete testing process

1.5 Item Pass Criteria

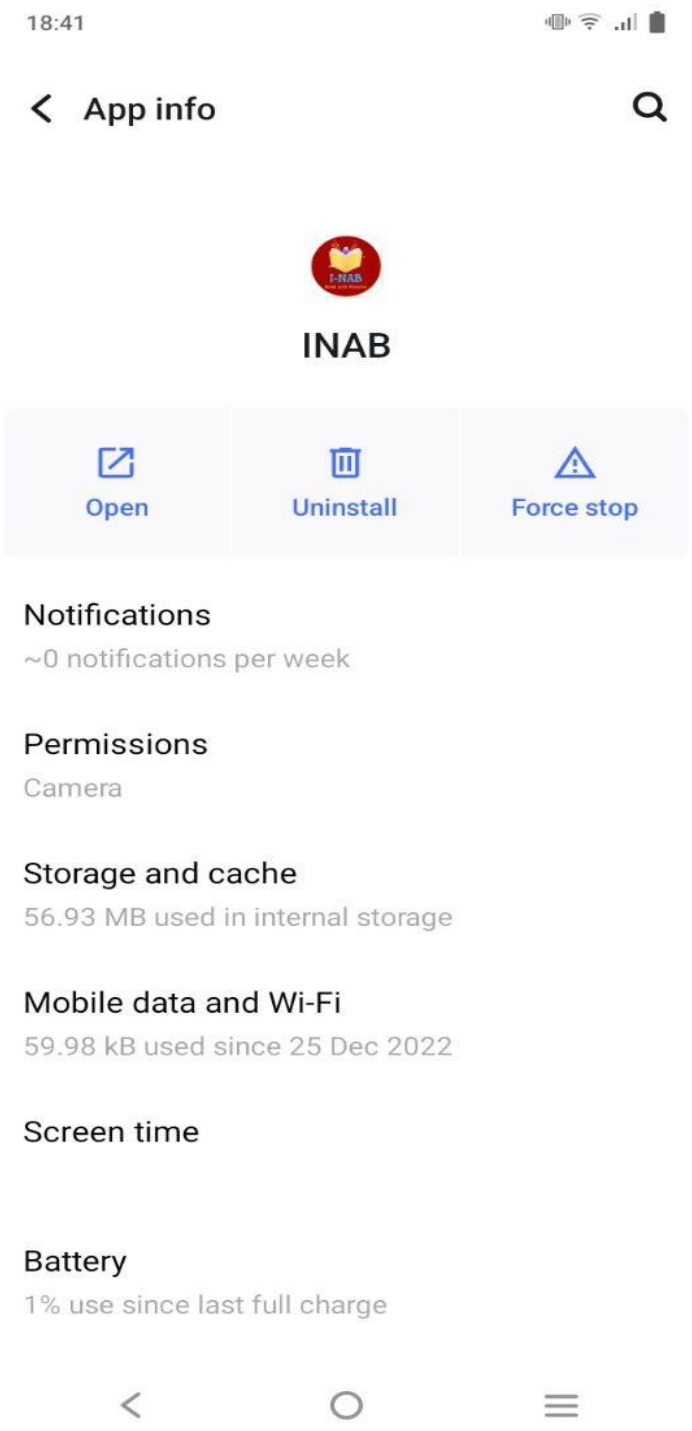
Below is the condition for the i-NAB application to be clarify as passed:

- All of the testing steps are passed
- Found <1% of error in the application
- No deadlock occurs during the operation of the application

1.6 Environment Infrastructure

Figure 1.1 shows application Info detail of installed in one of the real devices whereas Table 1.1 shows the device information requirement that applicable to install i-NAB application.

Figure 1. 1 Application Info in One of the Real Device



Application Name	i-NAB
Version	1.0.0
Application Size	56.93 MB
OS and Version	Android 8.0 (Oreo) and above

Table 1.1 Environment Infrastructure of i-NAB Application

2.0 UAT FORM

User Acceptance Test (UAT)

Project Name : Integrated Nilam And Bochord Mobile Application

Project Abbreviation : i-NAB

Prepared by : Luqman Bin Abdul Latif

Testing Date : 10 / 01 /2023

Signature : 

This form is used to test the mobile application features in order to verify that actual results is matched with the expected results, and the user satisfaction on the function.

Please tick (/) at the “Pass” column if the actual result is match with the expected result. Please tick (x) at the “Fail” column if the actual result does not match with the expected result.

Test ID	Test Items	Expected Results	Actual Results		Comments
			Pass	Fail	
i-NAB-UAT-01	Login and Registration interfaces are user-friendly and can be managed easily by user	Able to understand and use login and registration interfaces easily			
	User able to register new account using unregistered email address	Managed to register new account successfully using unregistered email			
	User able to login using registered email and password	Managed to login successfully using registered email and password			
	User able to reset password using "Forgot Password?" link	Managed to reset password using "Forgot Password?" link successfully			
	INAB application will display validation message if user enter wrong format of details during registration session	System displayed validation message when user enter wrong format of details during registration session			

	INAB application will pop up alert message for successful and failed registration and login session	System popped up alert message for every successful and failed session of registration and login			
i-NAB-UAT-02	Home and profile interfaces are user-friendly and can be managed easily by user	Able to understand and use home and profile interfaces easily			
	User able to edit profile and change password	Managed to edit profile and change password			
	User able to receive reset password link through registered email address	Managed to receive reset password link through registered email address			
	INAB application will pop up alert message for successful edit profile and change password session	System popped up alert message for successful edit profile and change password session			
i-NAB-UAT-3	Classroom interfaces are user-friendly and can be managed easily by user	Able to understand and use classroom interfaces easily			
	Teacher able to create classroom and generate class code for created classroom	Managed to create classroom and generate class code for created classroom			
	Teacher able to delete created classroom anytime	Managed to delete created classroom anytime			
	INAB application will pop up alert message for successful creating and deleting classroom session by teacher	System popped up alert message for successful creating and deleting classroom session by teacher			

	Student able to join classroom using class code generated by teacher	Managed to join classroom using class code generated by teacher			
	Student able to leave classroom	Managed to leave classroom			
	INAB application will pop up alert message for successful joining and leaving classroom session by student	System popped up alert message for successful joining and leaving classroom session by student			
i-NAB-UAT-4	Manage NILAM interfaces are user-friendly and can be managed easily by user	Able to understand and use manage NILAM interfaces easily			
	Student able to add Nilam progress either manually or using barcode scanner	Managed to add Nilam progress either manually or using barcode scanner			
	INAB application will pop up confirmation message when student try to submit their new Nilam progress into chosen classroom	System popped up confirmation message when student try to submit their new Nilam progress into chosen classroom			
	Student able to view their Nilam progress and award rank reached	Managed to view their Nilam progress and award rank reached			
	Teacher able to approve or reject their student's Nilam progress update	Managed to approve or reject their student's Nilam progress update			
	INAB application will pop up confirmation message when teacher try to generate log	System popped up confirmation message when teacher try to generate log			

i-NAB-UAT-5	Manage Library interfaces are user-friendly and can be managed easily by user	Able to understand and use manage Library interfaces easily			
	Student able to check books availability to borrow in their library's store	Managed to check books availability to borrow in their library's store			
	Student able to request for borrowing books	Managed to request for borrowing books			
	INAB application will pop up alert message to notify student return date for book requested to borrow	System popped up alert message to notify student return date for book requested to borrow			

2.1 UAT Results Using Google Form

2.1.1 Form Question View

User Acceptance Test of Integrated Nilam And Bochord (INAB) Mobile Application

Dear Mr/Ms.Mrs,

My name is Luqman Bin Abdul Latif, 4th year student from Faculty of Computing at University Malaysia Pahang. I am currently developing Integrated Nilam And Bochord (INAB) mobile application as my nal year project. Therefore, I am inviting you to participate in this User Acceptance Test by testing the INAB application and completing questionnaire.

The testing process and answering questionnaire will require approximately 10 to 15 minutes to complete. All of the data will be treated with almost con dentiality and used only for academic purposes. Please kindly respond to each question with an answer that most accurately ts the extent to which you agree with the statement.

Thank you for taking the time to assist me in my educational endeavors.

*Required

1. Name *

2. Tester's role *

Mark only one oval.

- Teacher
- Student
- Librarian
- Software Tester

3. Institution Name *

INAB-UAT-01

REGISTRATION AND LOGIN

4. Login and Registration interfaces are user-friendly and can be managed easily by user

Mark only one oval.

- Pass
- Fail

5. User able to register new account using unregistered email address *

Mark only one oval.

- Pass
- Fail

6. User able to login using registered email and password *

Mark only one oval.

- Pass
- Fail

7. User able to reset password using "Forgot Password?" link *

Mark only one oval.

- Pass
- Fail

8. INAB application will display validation message if user enter wrong format of * details during registration session *Mark only one oval.*

- Pass
- Fail

9. INAB application will pop up alert message for successful and failed registration and login session

Mark only one oval.

- Pass
- Fail

INAB-UAT-02

PROFILE

10. Home and profile interfaces are user-friendly and can be managed easily by * user

Mark only one oval.

- Pass
- Fail

11. User able to edit profile and change password *

Mark only one oval.

- Pass
- Fail

12. User able to receive reset password link through registered email address *

Mark only one oval.

- Pass
- Fail

13. INAB application will pop up alert message for successful edit profile and change password session

Mark only one oval.

- Pass
- Fail

INAB-UAT-03

CLASSROOM

14. Classroom interfaces are user-friendly and can be managed easily by user *

Mark only one oval.

- Pass
- Fail

15. Teacher able to create classroom and generate class code for created * classroom

Mark only one oval.

- Pass
- Fail

16. Teacher able to delete created classroom anytime *

Mark only one oval.

- Pass
- Fail

17. INAB application will pop up alert message for successful creating and deleting classroom session by teacher *Mark only one oval.*

- Pass
- Fail

18. Student able to join classroom using class code generated by teacher *

Mark only one oval.

- Pass
- Fail

19. Student able to leave classroom *

Mark only one oval.

Pass

Fail

20. INAB application will pop up alert message for successful joining and leaving classroom session by student * *Mark only one oval.*

Pass

Fail

INAB-UAT-04

MANAGE NILAM

21. Manage NILAM interfaces are user-friendly and can be managed easily by user

Mark only one oval.

Pass

Fail

22. Student able to add Nilam progress either manually or using barcode scanner *

Mark only one oval.

Pass

Fail

23. INAB application will pop up confirmation message when student try to submit * their new Nilam progress into chosen classroom *Mark only one oval.*

Pass

Fail

24. Student able to view their Nilam progress and award rank reached *

Mark only one oval.

- Pass
- Fail

25. Teacher able to approve or reject their student's Nilam progress update *

Mark only one oval.

- Pass
- Fail

26. INAB application will pop up confirmation message when teacher try to generate log

Mark only one oval.

- Pass
- Fail

INAB-UAT-05

MANAGE LIBRARY

27. Manage Library interfaces are user-friendly and can be managed easily by * user

Mark only one oval.

- Pass
- Fail

28. Student able to check books availability to borrow in their library's store *

Mark only one oval.

- Pass
- Fail

29. Student able to request for borrowing books *

Mark only one oval.

- Pass
- Fail

30. INAB application will pop up alert message to notify student return date for book requested to borrow

Mark only one oval.

- Pass
- Fail

IMPROVEMENT

This section is optional to be ll

31. Please leave any suggestion or comment that could help to improvise INAB

2.1.2 Form Question Result

User Acceptance Test of Integrated Nilam And Bochord (INAB) Mobile Application

11 responses

Publish analytics

Name

11 responses

Mazlina

SALMAH BINTI MOHAMAD

Hafizi

Nur Aqilah Binti Nur'Adzan Fadzil Akbar

Rafiah Binti Ghazali

Saiful nizam

Mohamad Rahman

Muhammad Taufiq

Ishak Bin Saad

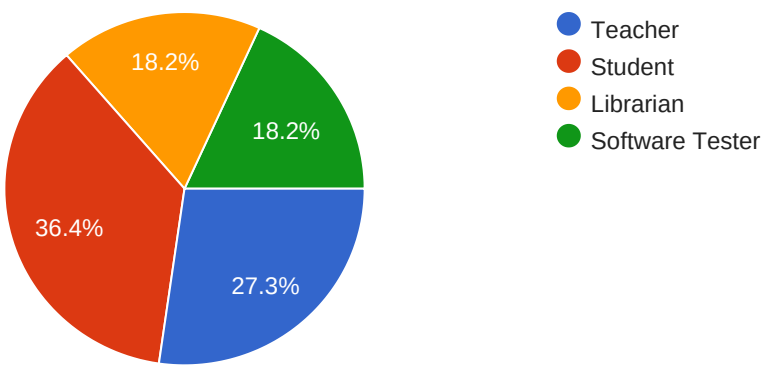
Eyra Eyka Binti Effendi

AMAL SAFIYYA BINTI MOHD AMIRUDDIN

Tester's role

Copy

11 responses



Institution Name

11 responses

SK Mat Kilau

SK BANDAR SUNWAY SEMENYIH

Ump

UNIVERSITI MALAYSIA PAHANG

SMK Mantin

FPT MALAYSIA

Aital Homenursing Care Services

SMK PANGLIMA PERANG KIRI

Perpustakaan Awam Mantin

Sekolah Al-Amin

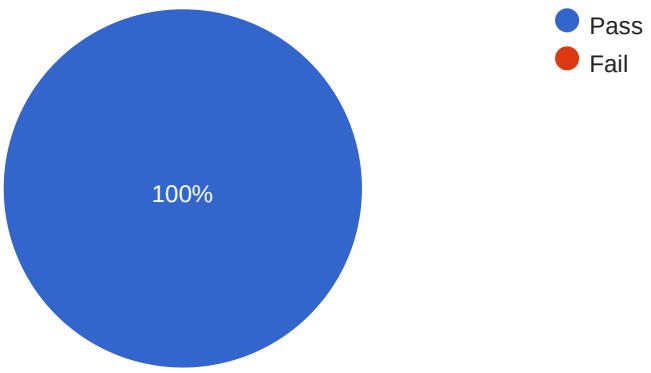
INTERNATIONAL SCHOOL

INAB-UAT-01

Login and Registration interfaces are user-friendly and can be managed easily by user

Copy

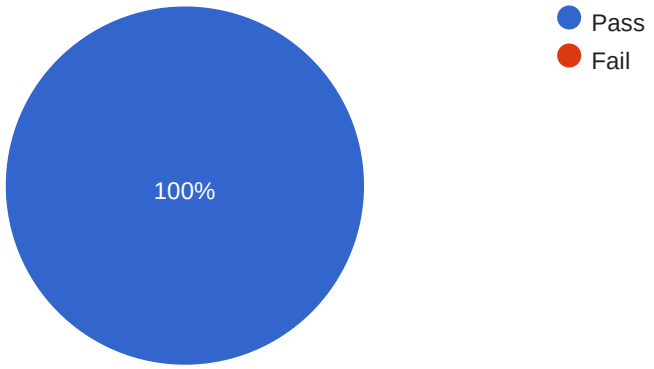
11 responses



User able to register new account using unregistered email address

Copy

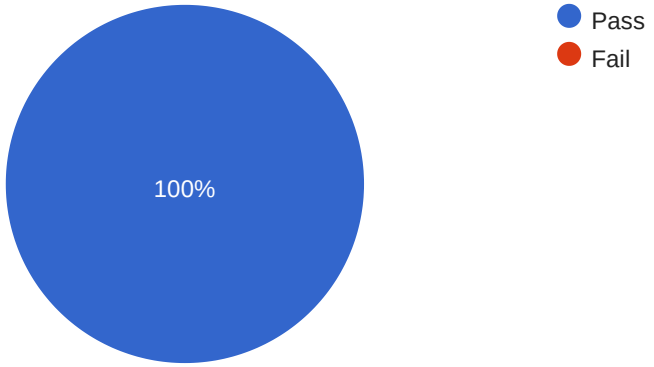
11 responses



User able to login using registered email and password

Copy

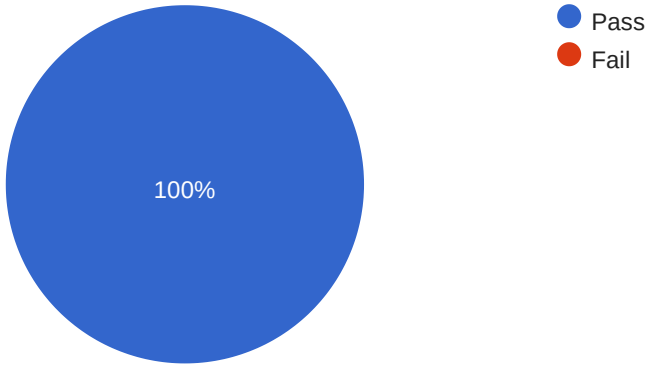
11 responses



User able to reset password using "Forgot Password?" link

Copy

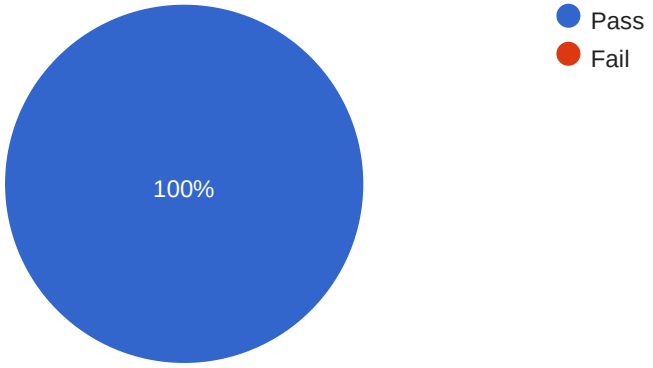
11 responses



INAB application will display validation message if user enter wrong format of details during registration session

Copy

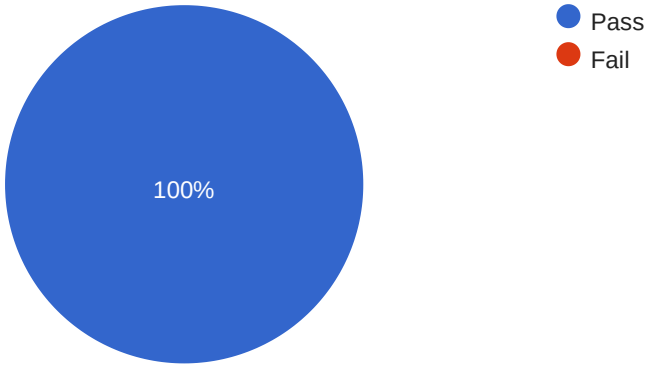
11 responses



INAB application will pop up alert message for successful and failed registration and login session

Copy

11 responses

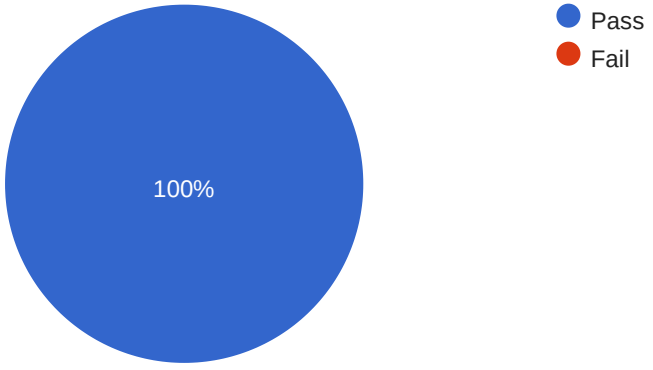


INAB-UAT-02

Home and profile interfaces are user-friendly and can be managed easily by user

Copy

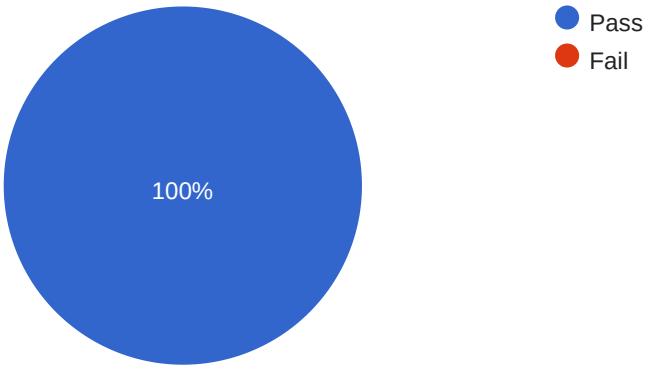
11 responses



User able to edit profile and change password

Copy

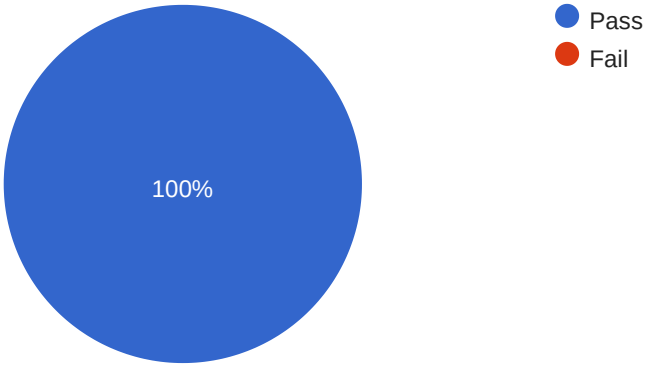
11 responses



User able to receive reset password link through registered email address

Copy

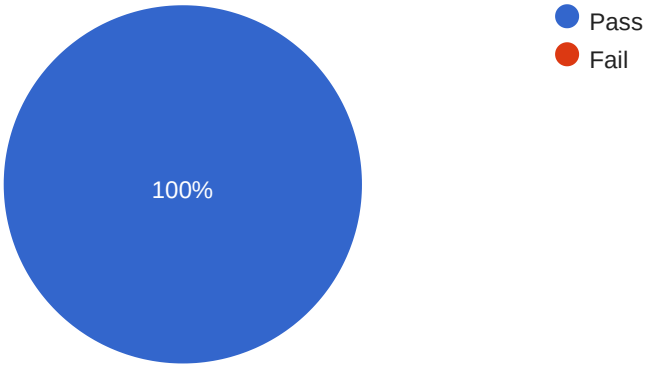
11 responses



INAB application will pop up alert message for successful edit profile and change password session

Copy

11 responses

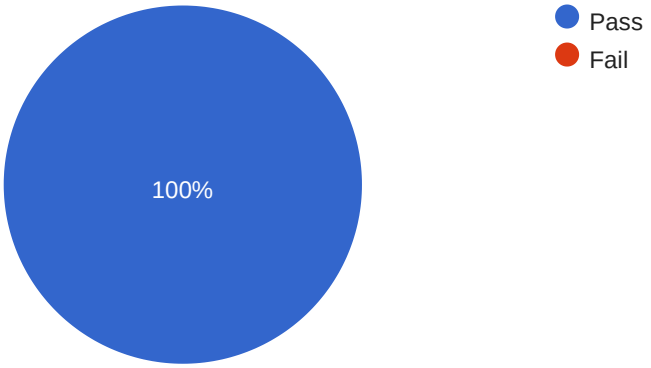


INAB-UAT-03

Classroom interfaces are user-friendly and can be managed easily by user

Copy

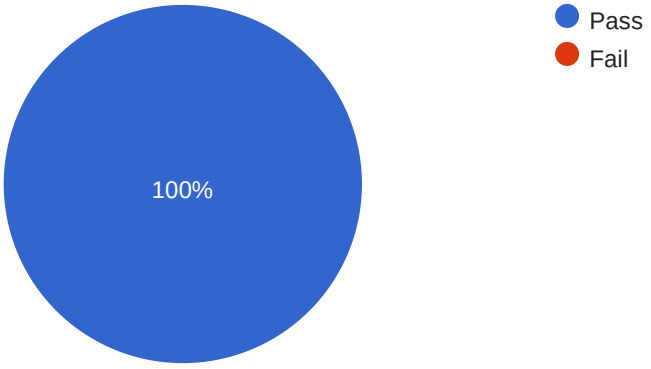
11 responses



Teacher able to create classroom and generate class code for created classroom

Copy

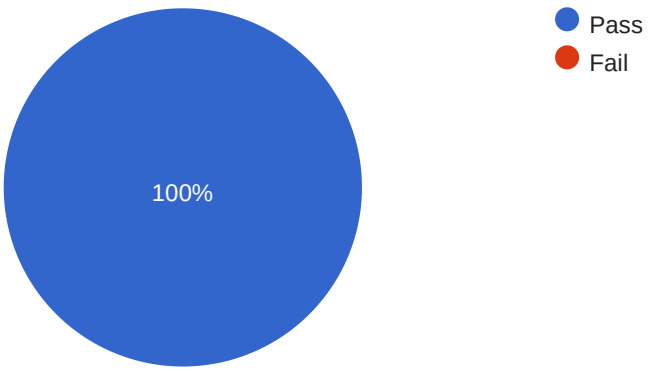
11 responses



Teacher able to delete created classroom anytime

Copy

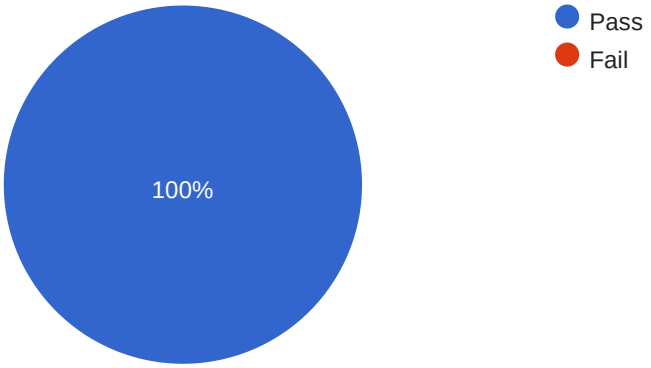
11 responses



INAB application will pop up alert message for successful creating and deleting classroom session by teacher

Copy

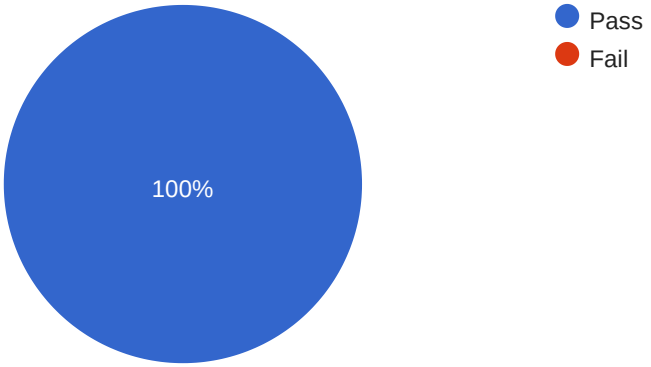
11 responses



Student able to join classroom using class code generated by teacher

Copy

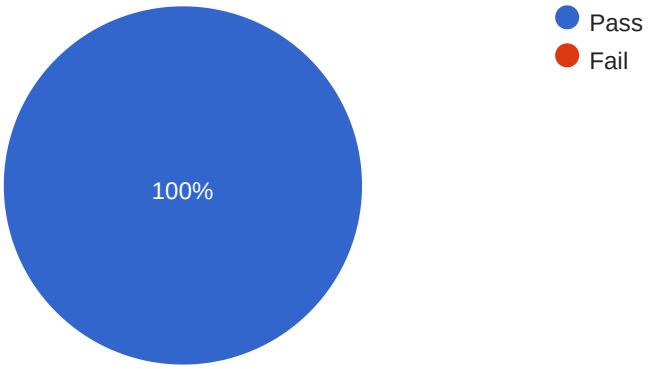
11 responses



Student able to leave classroom

Copy

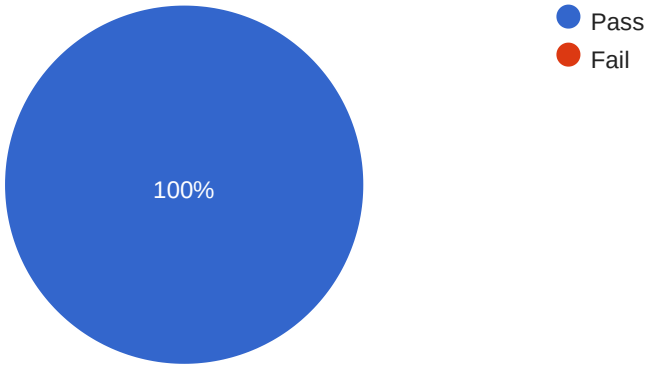
11 responses



INAB application will pop up alert message for successful joining and leaving classroom session by student

Copy

11 responses

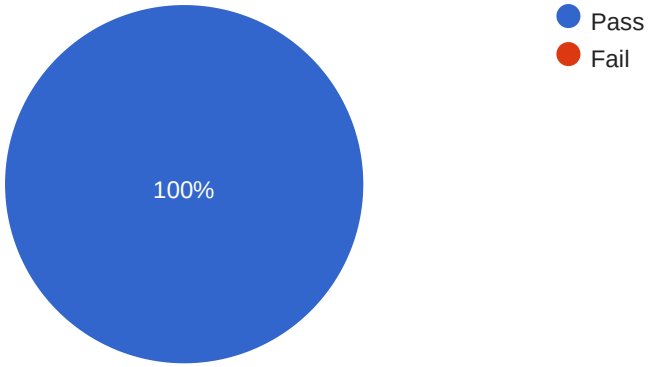


INAB-UAT-04

Manage NILAM interfaces are user-friendly and can be managed easily by user

Copy

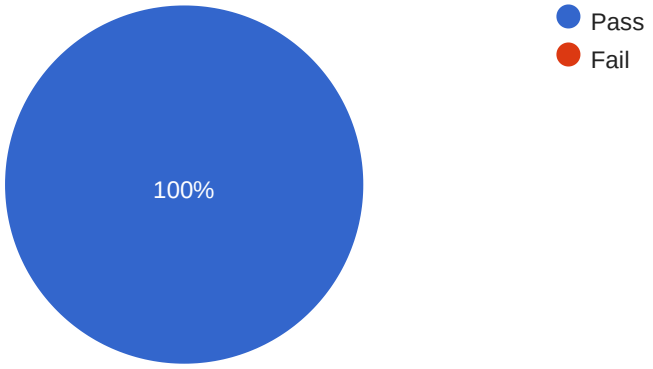
11 responses



Student able to add Nilam progress either manually or using barcode scanner

Copy

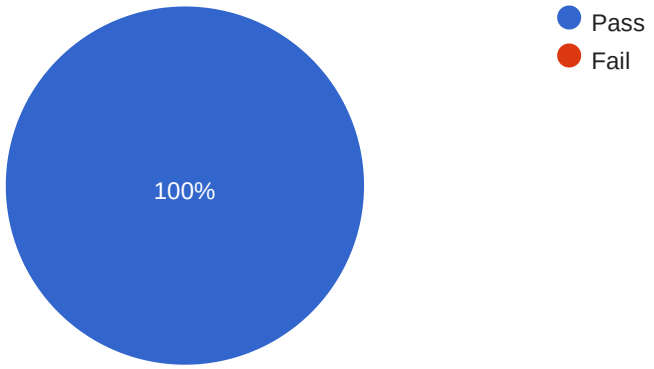
11 responses



INAB application will pop up confirmation message when student try to submit their new Nilam progress into chosen classroom

Copy

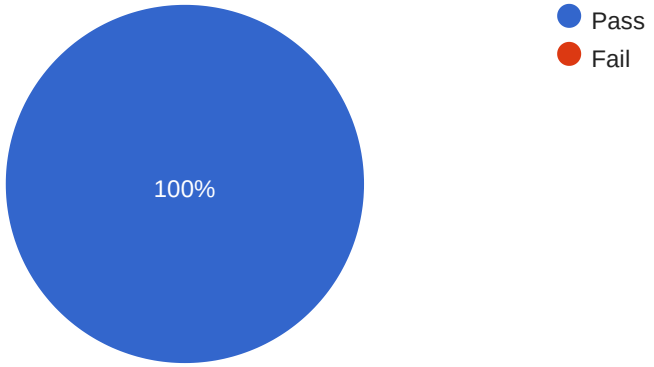
11 responses



Student able to view their Nilam progress and award rank reached

Copy

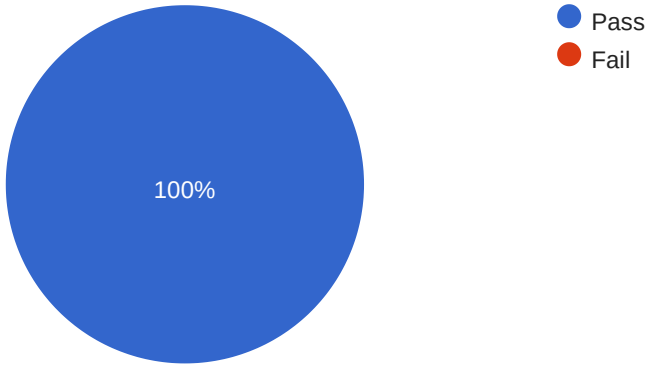
11 responses



Teacher able to approve or reject their student's Nilam progress update

Copy

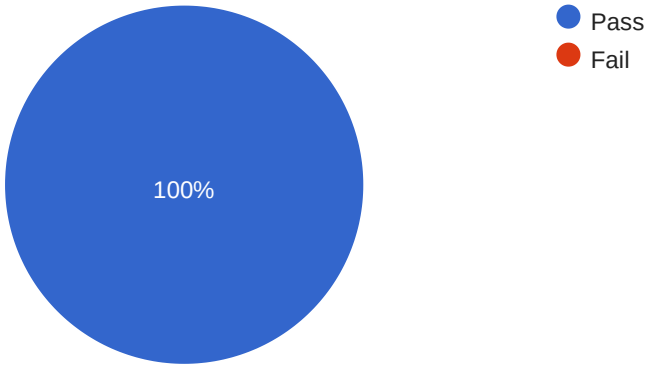
11 responses



INAB application will pop up confirmation message when teacher try to generate log

Copy

11 responses

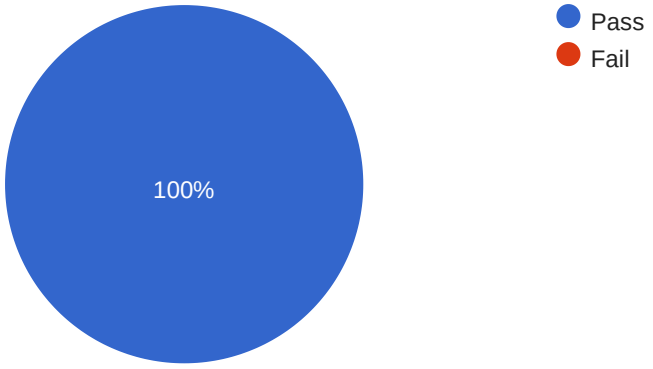


INAB-UAT-05

Manage Library interfaces are user-friendly and can be managed easily by user

Copy

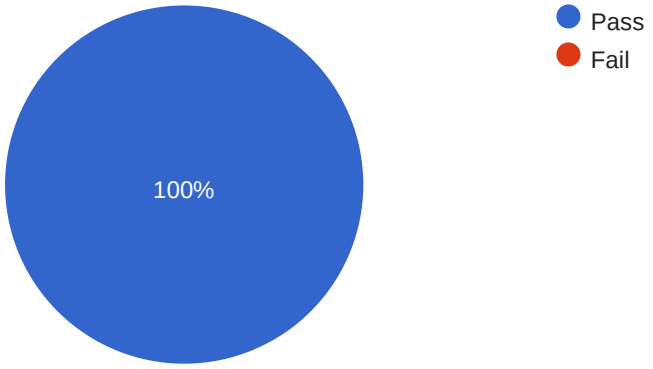
11 responses



Student able to check books availability to borrow in their library's store

Copy

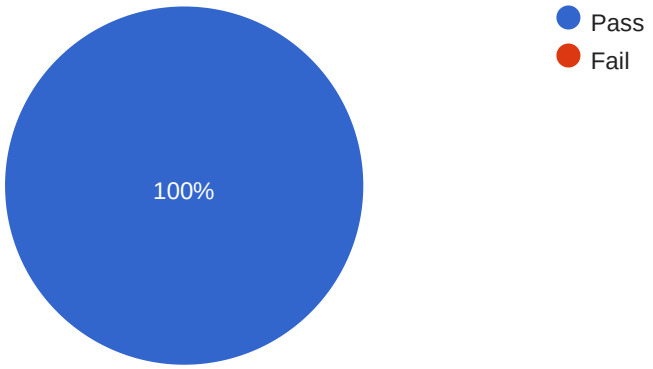
11 responses



Student able to request for borrowing books

Copy

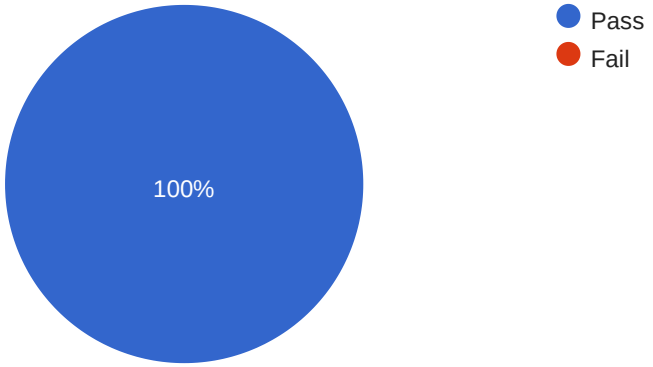
11 responses



INAB application will pop up alert message to notify student return date for book requested to borrow

Copy

11 responses



IMPROVEMENT

Please leave any suggestion or comment that could help to improvise INAB

7 responses

- ok
- Good
- Very good system
- Smooth user interface,maybe can develop using multiple platforms
- Nice app but could improve by making it available for ios users
- Easy to use
- Very user friendly application