SIAKAD Mobile with API Service to Improve Academic Services

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Abstract: Developing SIAKAD (commonly called SIAM, Student Academic Information System) Mobile using API Service to improve academic services for students is the goal of researchers doing so because it supports the implementation of education to create better information distribution services for everyone who wants access to it. And this also has an impact on academic performance, it is easier to organize lecturer attendance schedules, value recapitulation, and so on. Conventional SIAKAD (SIAM) which can be accessed via a computer or laptop has limited accessibility and practicality, which can hinder students from accessing academic information flexibly. Therefore, after researchers have examined and paid attention to several systems that can be implemented to assist users in accessing them, the development of SIAKAD in the form of a mobile application is a solution to increasing accessibility and ease of access to academic information. The API service is used as a communication bridge between the SIAKAD mobile application and the backend system. Through this, the Mobile Application can communicate (send requests and receive responses from the backend system) quickly and efficiently. But to shorten the application development time we use the SCRUM method and for the business process model, we use BPMN to create, design and design this application. The results of this study the authors see a compare of the time that can increase after using Mobile in access SIAKAD (SIAM).

Keywords: API; BPMN; Mobile Apps; SCRUM; SIAKAD

INTRODUCTION

One of the private tertiary institutions in Medan, namely Universitas Prima Indonesia, received a grant program for the development of a project-based learning model for project-based compulsory Higher Education curriculum (MKWK) courses in 2023. The aim of this activity is to improve the quality of higher education in Indonesia by developing more effective and innovative learning models. However, the development of higher education requires a system that can manage data completely for both students and lecturers (Krisna et al., 2022; Made Pradnyana Ambara, 2023).

Because actually students are learners and also implementers in activities, as well as lecturers as a complement to this activity. It takes a system that is able to accommodate information in its support, and a system called SIAKAD (SIAM) is built. Storing data and managing academic information by creating a system, namely SIAM (Student Academic Information System) is one way for institutions to present information on each role involved in the system in the form of a website. The development of the information system is carried out in such a way that the system adapts to the wishes of the user (Septiani et al., 2020). In Siam several modules can be seen including general categories consisting of student profiles, and announcements, then there are Study Cards consisting of Semesters 1 to 8 and the new Study Card module, then there is a library as a feature for publishing books, and there is research in which there are research proposals, research reports, research publications and also dissemination schedules. The research proposal, if explained briefly, is regarding research proposals submitted by students for preparation to complete undergraduate education programs. Scientific work created by students is part of the research report as a requirement to fulfill reporting in completing undergraduate education programs. The publication is a feature to convey the results of research and thesis writing. As the final result of completing assignments at the University, students are then asked to share information through Dissemination activities as an action to make participants aware of obtaining information, awareness, receiving and utilizing the results of their scientific work. then finally there is the dissemination schedule which functions to deliver the schedule to be implemented. But even if this feature exists, this did not work according to its function to present it live because

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the supervisor also had to provide information to students to take part in the Zoom meeting which was shared in their respective class groups. However, the author feels that after seeing the purpose of the website being made, it does not achieve the goal because it is a waste of time presenting students with this information.

According to (Arief & Sugiarti, 2022), the web-based information system is able to make it easier for humans to access information easily and quickly by using the internet. Even though SIAKAD (SIAM) conveys information about the dissemination schedule, this is done repeatedly by spreading the notification through group chats.

The author conducted research to develop the system to make it easier for students to get the dissemination schedule directly. System development has various ways of making and developing it, including by utilizing interconnected equipment to produce a digital vision beam that can store, collect, process information, namely the desktop (Hendri & Mochammad Arief Sutisna, 2021), then there is a website which is also a collection of media information pages that function to access information provided via the internet network, which consists of several modules and features provided therein (Pasaribu, 2021), while Android is the latest device that is often used by the public with the aim of facilitating communication with touch screen gestures (Indah & Jollyta, 2022). And meanwhile the massive increase in user experience among young people makes it support in making journals (Mulyadi et al., 2020). This is what became a consideration and decided to research, develop a system on Android. However, researchers have problems in communicating directly to the database owned by SIAD (SIAM) UNPRI because they cannot access the database arbitrarily, but research (Mubariz et al., 2020) moved the author to continue the research, with a program armed with the so-called RESTful API in running. Then a program whose goal is to be able to directly interact with the database owned by UNPRI in the Front-end using Android as the main display that can be accessed by students to get a dissemination schedule. This development offers a new user-friendly interface, more accessible and easy to use. For the work of this system the author uses Scrum as the author's work method which is better than UML.

It was proven when (Nugroho et al., 2022) implemented Scrum which could adjust to the changes that occurred. When implementing the Scrum method it required meeting times or so-called Scrum Meetings, to ensure that everything went according to plan in the timeframe for project work (Dewi & Irham, 2021; Tohirin & Widianto, 2020). The number of members in a team that is needed is not as much as the waterfall method and in the process it must be in accordance with the sequence, starting from analysis to support (Nasution et al., 2023; Tohirin & Widianto, 2020). Then the author uses BPMN to design the business process activities of the application so that it can be more easily understood by users. The main reason for choosing BPMN is because BPMN makes it easy to create graphical notations logically in describing business processes, BPMN is also used to coordinate process sequences connecting different activities (Perdana & Munggaran, 2021; Rifai et al., 2021).

LITERATURE REVIEW

The author found that many have studied the use of the API Service in the SIAKAD system (SIAM), A few researchers focused on making applications but in each of these journals it has the characteristics to use the RESTFUL API to create APIs from SIAKAD which are already owned on their respective campuses, and for the work methods carried out as well no one has used the Scrum method yet. The Scrum method for making API Services to improve academic services has not been widely used by previous researchers.

Research conducted by (Ladiba et al., 2021) uses RESTFUL APIs in creating convenience for different platforms in application development. the author proves it with a large index that is averaged, namely 95.3% of the questionnaire that the author uses, although there are still errors in certain parts.

Whereas research by (Rizky, 2023) focuses more on model design on code architecture, the author uses the Model-View-ViewModel, which the respondents like it because they can access the academic information system using Android and claim to be very satisfied with the display provided, and for the business process that the author uses is MVVM, which separates the graphical interface from business process logic and back-page logic, so that when the master code is used, it does not confuse others when viewing it.

And looking at previous research journals using the RESTFUL API using Web Tokens by (Utama & Indriyanti, 2023) explains that security for development is needed in the RESTFUL API section, the goal is to make security better when the API exists and also security development is also still simple, and the author sees the work method not using scrum. and the latest that we will apply is with several mergers such as using the SCRUM method, and the business model is BPMN then for the RESTFul API documentation the author uses Swagger.

METHOD

In carrying out the research, the things used are experiments where researchers want to find out whether the Scrum method plays an important role in making SIAKAD Mobile with API Service to improve Academic Services. Fig. 1 shows the working procedures for making SIAKAD Mobile with the API service to improve academy services.
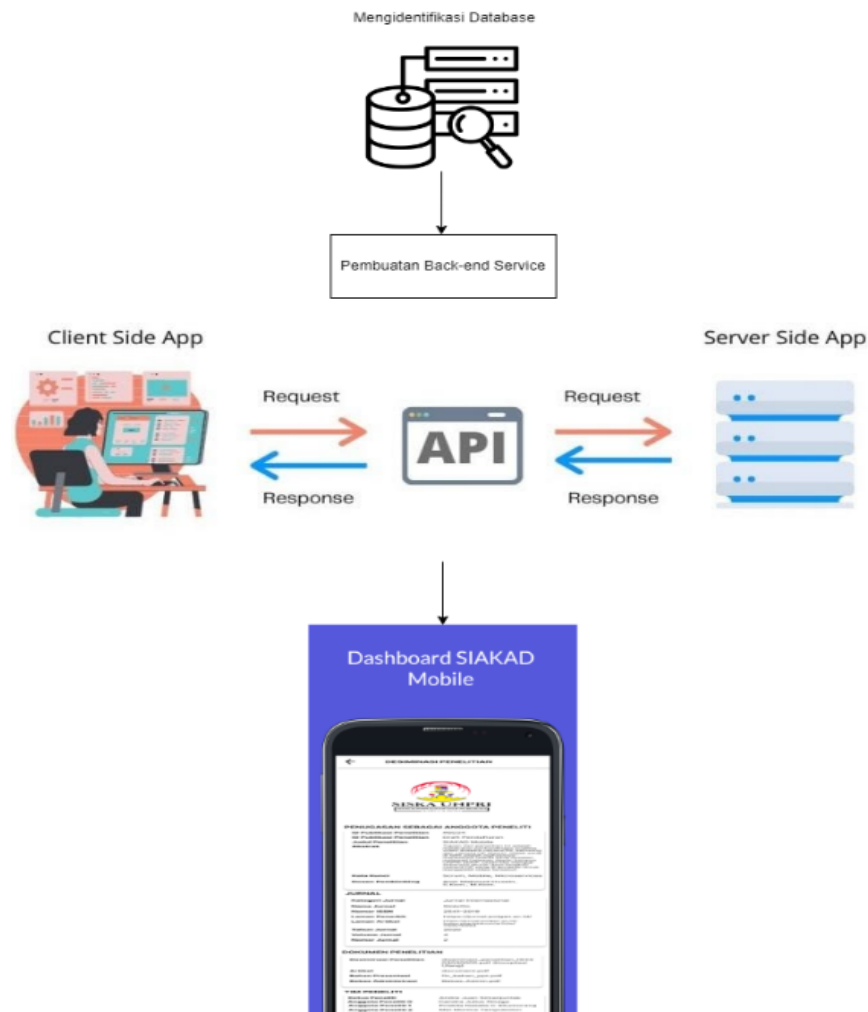
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Fig. 1 Ways of working
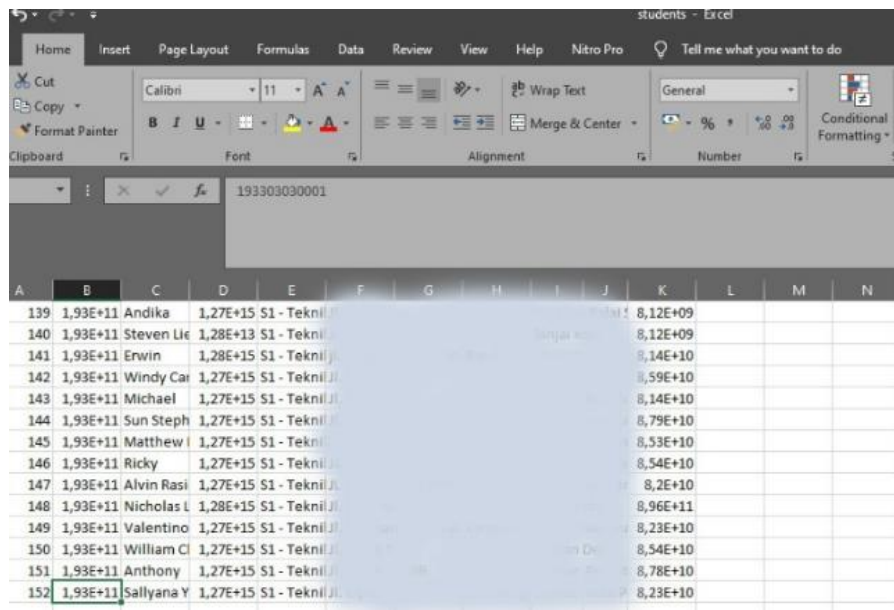
The working procedures can be summarized as:
- First identify the database in order to find out what tables can be used as research material.
- Creating a RESTful API as a result for the API to be used on Mobile.
- Create a front-end that is implemented on Android.

The tool used by researchers in conducting this research activity is ASUS Vivobook Max X441U laptop with specifications: 12 GB DDR4 dual-channel RAM, Intel Gen 11 Core i3-1115G4 processor, 500 GB M.2 NVMe 3.0 SSD, and Intel UHD Graphics. This research utilizes Ubuntu 18.04.6 LTS operating system in the server. The database is Postgresql 10.23 and the code editor used is Android Studio Flamingo. The material researchers used in this study is data from Universitas Prima Indonesia database.

In carrying out research, the method used is an experiment to find out whether the Scrum Method is a methodology, then the business process model used is BPMN and RESTful API technology can provide convenience to students in accessing dissemination information through the android application that we use. The Scrum Team consists of Scrum Master, Developer, and Business Process Model Designers. Andre Juan Simanjuntak takes on the responsibilities of Scrum Master, Candra Julius Sinaga takes on the role of Developer, Mei Monica Tampubolon and Priskila Natalia C. Situmorang are Business Process Model Designers.

RESULT

The testing stage uses a collection of student data sourced from academic databases, then a Restfull API is developed in JSON format as a gateway for data exchange consumption in cellular applications. The test dataset consists of 152 student data which has been converted to a CSV file as shown in Fig 2

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Fig. 2 The snapshot of the CSV file

In the Scrum Team, product backlogs present the objectives of the application as seen in Table 1.

Table 1
Product Backlogs

Backlog Name	Estimated Time	Urgency	Demo
Determination and creation of UML designs	4	4	Checks whether the UML that has been specified is in accordance with the product owner's request through the scrum master.
Creating RESTful API for API output	6	4	Tried HTTP methods including GET, POST, PUT, DELETE.
Creation of login interfaces	1	4	Successfully logged in using a UNPRI Lecturer account.
Creating a student research dissemination page	1	4	Successfully create a student research dissemination page.

The following are the steps used in creating a trousers application integration with SIA UNPRI using a JSON-based RESTful API.
- Create an ERD for a database originating from Prima Indonesia University.
- Create RESTful to generate API.
- Designed mobile app prototype after getting API from backend.
- Create mobile applications.

This business process describes the business process flow for submitting research dissemination. The process starts from submitting the title to the seminar and report process. All processes to be developed are described using the Business Process Model and Notation (BPMN) approach. The BPMN business process used is as shown in Fig 3.
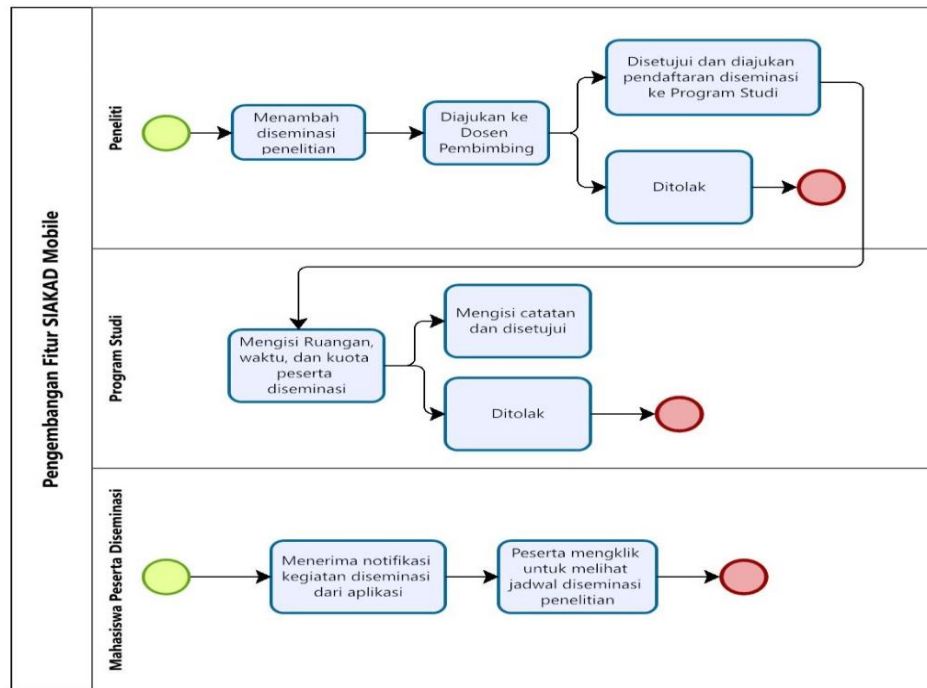
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Fig. 3 BPMN

Figure 3 explains the business process stages used in creating applications where each attribute has a mutually sustainable relationship. The first stage is to carry out the seminar application process, then this process will continue to the evaluation stage from the supervisor. If the supervisor approves the proposal, it will be forwarded to the study program department to determine the seminar schedule. If the application is rejected, there will be a notification to the proposer to make improvements.

The process carried out in the seminar stage is making a report which will then be evaluated by the supervisor. This process also has a validation stage from the supervisor. All validations will produce notifications as useful information for the proposer and the academic department.

RESTful API application development using the Ruby on Rails framework which will be used as a data consumption service in mobile applications. The following is an example of a user service that has a user login and several other requirements which are summarized in Table 2 and Fig 4 shows the API documentation using Swagger.

Table 2
User Service

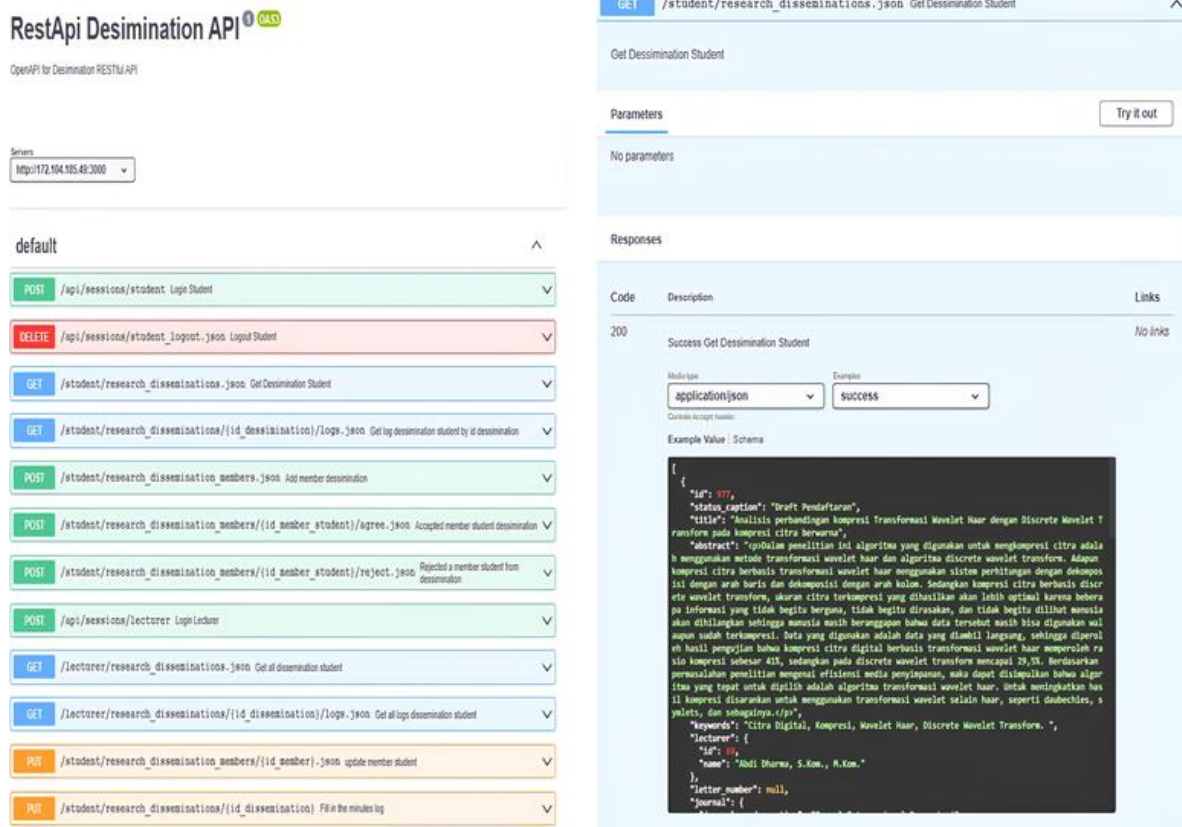| Requirement	Method	URL
Login student, generate JWT	POST	/api/sessions/student
Get student dissemination	GET	/student/research_dissemination
Student session	DELETE	/api/sessions/student_logout
Research dissemination	PUT	/api/student/research_dissemination_members

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Fig. 4 API testing and documentation

Fig. 5 shows the application that has been made in Flamingo version of Android Studio Kotlin. For the next step, students are expected to log in first to get notifications.
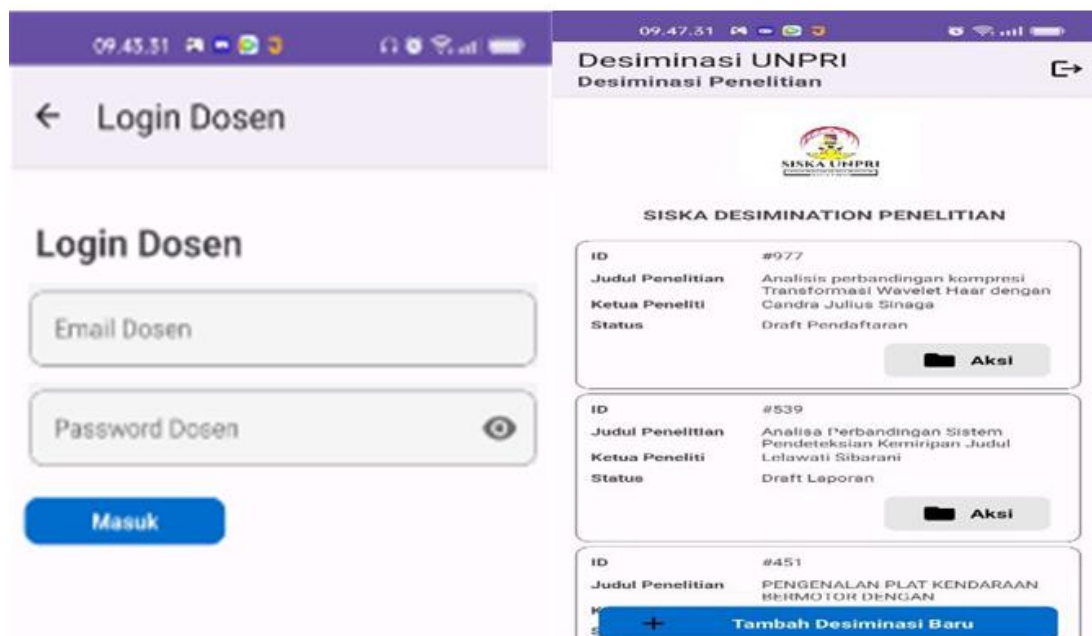

Fig. 5 The mobile application

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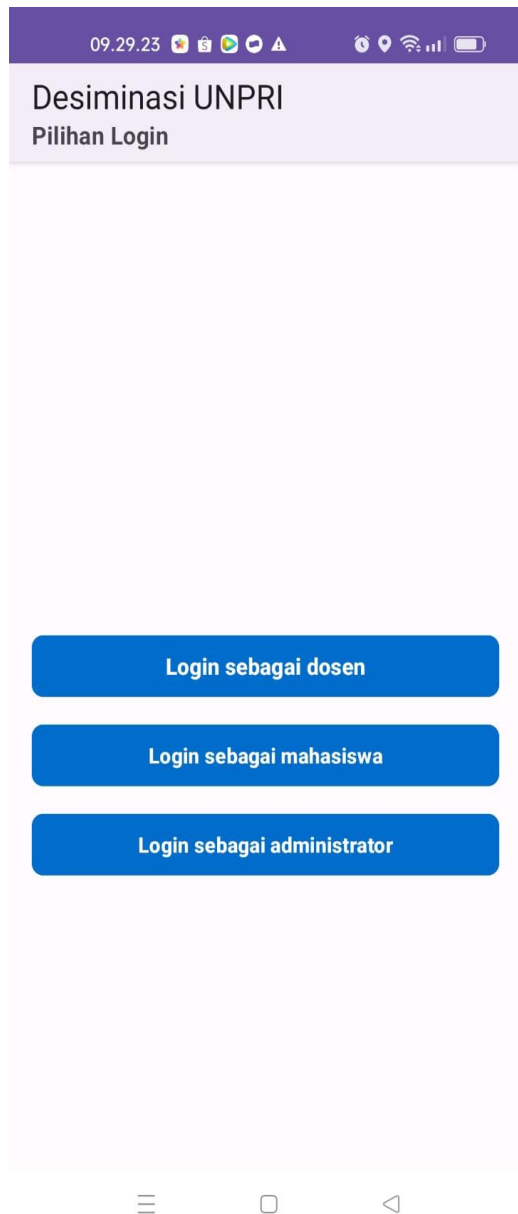
Fig. 6 The apps Login
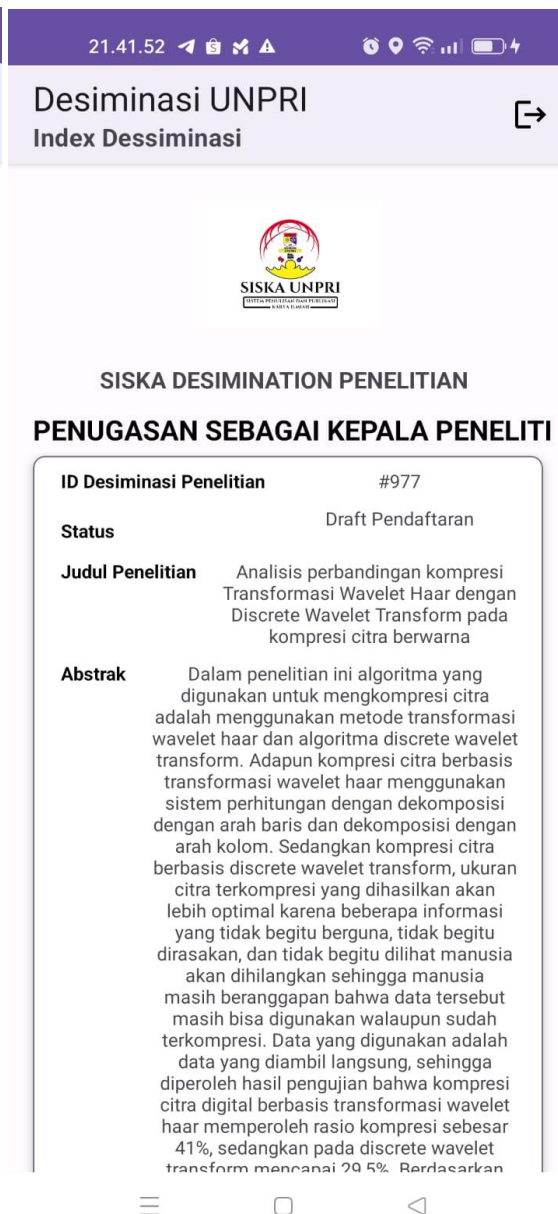
Fig. 7 The mobile app feed view

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Fig. 8 Change Note Disemination

Fig. 9 Apply For member Disemination

CONCLUSION

Based on the test results, the developed mobile application can work optimally by testing a student dataset of 152 people, the interaction of using the mobile application in the seminar submission process produces significant performance, but the need for smaller bandwidth consumption makes this application a useful solution in the future. Apart from that, the Restful API can answer the challenge of solving how to make the database able to communicate with the Android mobile application development architecture. In our research, we produced a REStfull API and also an Android application as a front-end to display the applications used by students. The application also provides notification facilities as an information medium.

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