# Designing Student and Lecturer Attendance System Application Using Progressive Web Apps (PWA)

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**ABSTRACT**
Sriwijaya State Polytechnic currently has a web-based academic information system, namely SISAK. One of the features available in this system is the activity of recording student and lecturer attendance with a lecturer attendance validation system in class. Validation is carried out during lecture activities and the one who carries out the validation is the class leader using the campus intranet network. In its implementation there are still problems such as when many network users will slow down the appearance of the validation feature on SISAK which results in the validation being unable to be carried out at that time. So that students sometimes forget to validate because they are doing the next lecture. In addition, service access rights to validate involve many students, the head of department and Assistant Director I, which can slow down the validation system. This can be a problem in the speed and accuracy of data information. One solution that is considered important to solve this problem is to build an attendance information service for the attendance of students and lecturers through a web-based mobile application using progressive web applicatians (PWA) technology. This system involves students and lecturers in the implementation of validation and information on lecture attendance activities can be seen by class leaders, lecturers and department administrators.

***Keywords:*** *Information systems, mobile applications, attendance, progressive web apps*

## 1. INTRODUCTION

One example of technological developments we can feel is the emergence of various kinds of websites with the sophistication and completeness of features that are presented up to date. So people's habit of accessing a website changed at first only through the desktop and nowadays people use smartphones or mobile devices which are more flexible.

Sriwijaya State Polytechnic currently has a web-based academic information system service, namely SISAK. One of the features available in SISAK is the validation of lecturers' attendance in teaching and learning activities in class. Validation is carried out by the class apparatus, the Head of the Department and the Assistant Director I. Information on the lecturer attendance validation can be seen by the administration of the department and the lecturer concerned through a computer browser using the campus intranet network. On the other hand, access to these services is limited, it can only be done by class equipment, even though information on the attendance of lecturers is also a need for various parties such as students or interested people.

Based on the problems described above, the researcher carried out the research designing the attendance system application for students and lecturers of the Sriwijaya State Polytechnic computer engineering department using Progressive Web Apps (PWA).

The presence system application that will be designed is one way to facilitate the teaching and learning activities of students and lecturers in the classroom and to manage the lecture system. This system will be a realtime and accurate presence of students and lecturers because it uses fingerprint as data input, so that it is able to produce the desired output, which is a web-based mobile application using progressive web apps technology that is integrated with the fingerprint module to confirm the presence of lecturers in class..

## 2. REFERENCES

### *2.1. Attendance*

The Attendance System is a personal attendance management system or institution or agency that automatically records attendance data and can be used as

a source of reports for personal management needs. Meanwhile, according to (Redi Mulyana, 2017) Attendance is the recording and processing of attendance data that is carried out continuously, recording carried out every working hour and reporting to the HRD / Company Manager.

### *2.2. Progressive Web App (PWA)*

Progressive web app is an application built from the web technologies like HTML, CSS add JavaScript. PWA are a hybrid of regular web pages or website and a mobile appliction. This application model attemps to combine feature offered by most modern browser with the benefit of mobile experience.

Basically, progressive web apps technology works like other website applications, but what is different from other website application technologies is that PWA works with independent connectivity. This means that the PWA application can work offline or on low-quality networks with a service worker. Besides being able to run in low or offline connectivity, PWA also uses instant loading technology which makes the website application run fast, a home screen where the website application can be used as an icon on the desktop or home screen and notifications which means that the PWA can display notifications to users about their existence. update information on the website application. The PWA will work by loading the minimum HTML, CSS and java script files needed to form the PWA user interface and is also one of the components that ensures the website can run very fast and is saved temporarily to the local device in the browser for later if every time the user opens it website application, interface files will be loaded from the local device temporary storage which makes loading times faster. That temporary local storage uses a service worker so that on subsequent loads the PWA only needs to fetch the data it needs, rather than loading it all

There are two technologies used by a progressive web application are service workers and web app manifest.

#### *2.2.1. Service worker*

Service workers allow web apps to be run through all existing browsers. When the page is loaded, the site registers a service worker, which is a proxy client written in javascript. No user prompt is shown but the site can be opened offline. Then once the service worker is registered, it can do a lot of different things. For example, it can cache assets required for offline support. You can also define specific events to activate the service worker such as push notifications, camera, and background sync. Figure 1. The principle of the PWA system using a service worker.

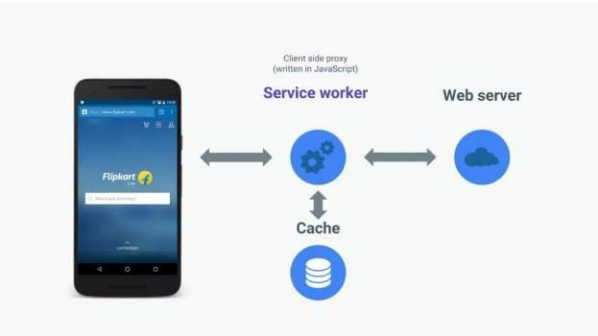


**Figure 1.** The principle of the PWA system using a service worker..

When the user makes a request and passes the SW (Service Worker), SW will first check whether the file is available in the Cache Storage. If the user visits a web page for the first time, then SW will redirect the request to the web server and SW will also save the downloaded file in the Cache Storage.

Now the shell & assets are stored in Cache Storage, for further requests, the request will pass through the SW, and SW will first check in the Cache Storage. Because assets and shell are already available in Cache Storage, SW will automatically send files from Cache Storage to be displayed to the user.

#### *2.2.2. Web app manifest*

Web app manifest provides the ability to control how the application will run. The things that can be arranged are:

1. Screen launch experience
2. Color, theme, app launch screen and icon
3. Enter the web apps icon to the home screen
4. Screen orientation for optimal viewing

## 3. EXPERIMENT

### *3.1. System Design*

System design is a description of the application work process to be made, besides that it is also a comprehensive picture of the making of the application. The purpose of designing this system is a design that is carried out in working on a system that will be run and implemented into a form of the initial concept of the Student Presence application using Progressive Web Apps in the Department of Computer Engineering, Sriwijaya State Polytechnic. With a conceptual system design, the making of this application template will be focused. The making of this application uses the Visual Studio code editor application with the MongoDB database. The use of PWA (Progressive Web Apps) technology is also important in the design of this application system, because with this technology

application developers benefit in time efficiency. A website that has been supported by this technology can allow the website to be installed on the homescreen of an Android or iOS smartphone. PWA itself was developed by google developers, with the advantages of being Reliable, Fast, and Engaging, which emphasize the experience of application users..

### *3.2. Block Diagram*

Figure 2 show system block diagram.

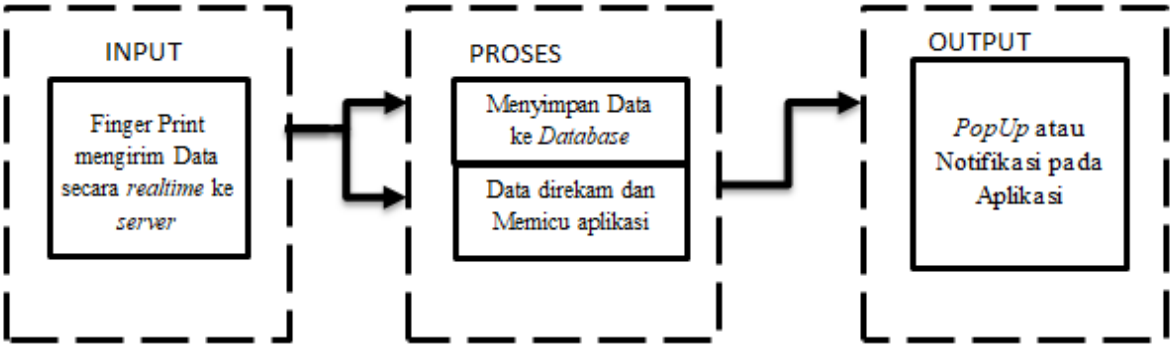


**Figure 2.** System Block Diagram

The work process of this system, namely, the process when the lecturer has logged in first in the application using an account provided by the admin of the department, then the lecturer who will teach students to attend with fingerprints which we assume the lecturer fingerprints have been registered on the fingerprint tool. The fingerprint module itself has limitations, namely the recorded fingerprint image can only be used on the fingerprint device.

After the lecturer has an attendance on the fingerprint, a popup will appear in the application in the form of an information notification that the lecturer is teaching the course and the class that has been scheduled. After that the lecturer fills in the controls for teaching and learning activities and student attendance in class with the application. And after all learning activities have been completed, the lecturer takes another attendance at the fingerprint to validate that the lecturer leaves at the specified time. All transaction information and data are stored in a database so that it can be seen by the admin of the Computer Engineering Department.

### *3.3. System Flowchart*

#### *3.3.1. Flowchart of Student Attendance System Application*

This flowchart is a depiction of the data flow from the realtime student attendance system at the Department of Computer Engineering, Sriwijaya State Polytechnic. Flowchart consists of Login Flowchart, Student Application Flowchart and Lecturer Application Flowchart.

Login is a way for users to access the student and lecturer attendance system. Before logging in by entering a username and password in the available login form, the user selects the user level status, whether the user is a student or a lecturer. Figure 3 shows the student and lecturer user login flowchart.

*3.3.1.1. Login Flowchart*

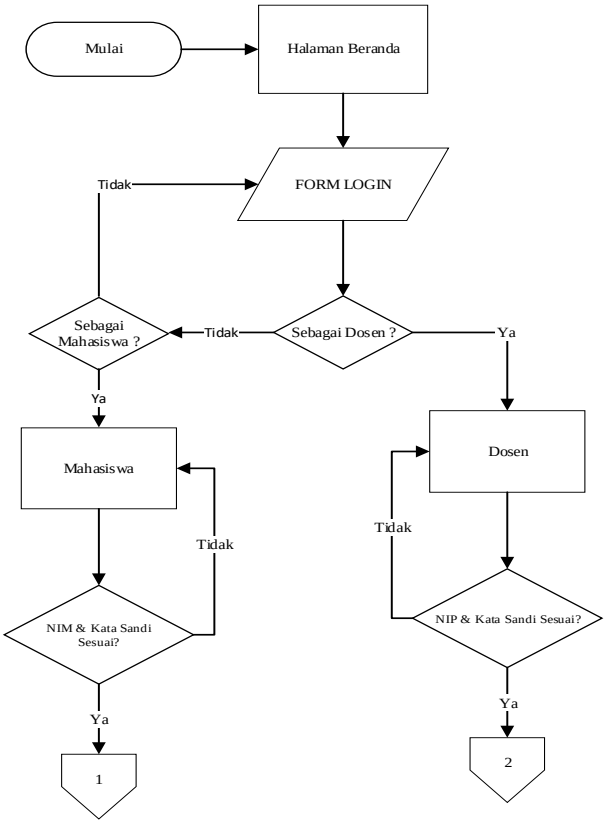


**figure 3.** application login flowchart

*3.3.1.2. Student Application Flowchart*

1The student application has a menu of absent proposals that are used to request the right to conduct lecture activities with the approval of the lecturer, the information menu for the lecturer who teaches courses and the class information used as can be seen in Figure 4

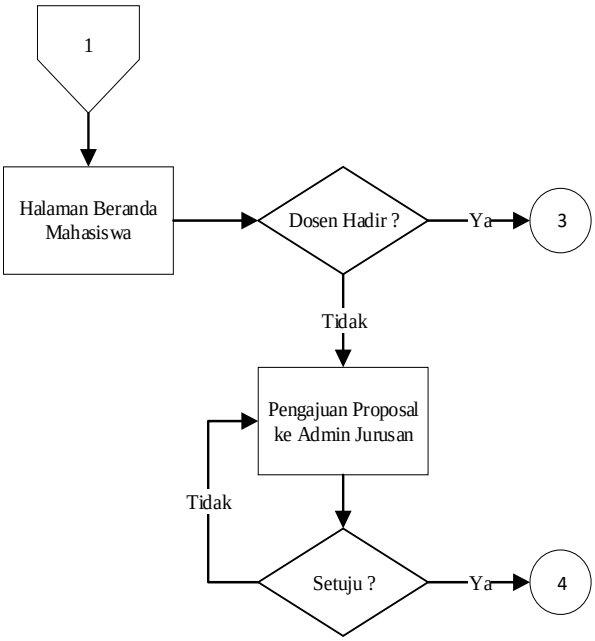


**Figure 4.** Student Application Flowchart

### *3.3.2. Flowchart of Student Attendance System Application*

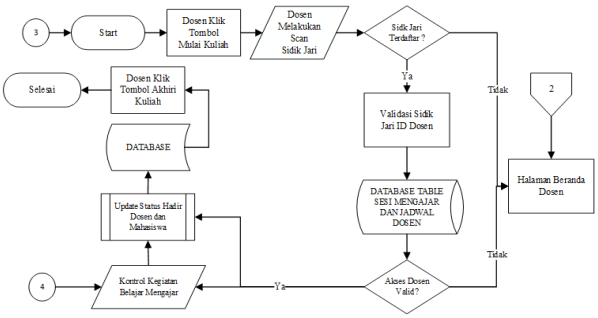


**Figure 5.** Flowchart lecturer application

The lecturer application has a menu of student attendance, a menu of teaching schedule information and history of lectures that have been done. As can be seen in the picture, there can be student attendance when students carry out teaching and learning activities in real time which functions as a control for teaching and learning activities as can be seen in Figure 5.

## 4. RESULTS AND DISCUSSION

In the application system that has been designed, there are two types of user accounts where each account has a username, password, and user level field when logging in to the login form, on the login page the web user is required to fill in these fields according to the data that has been created by admin web application majors Figure 6. If the login is successful, the user will enter the main menu page on the web application, but if the data entered by the user is invalid then the user remains on the login page.

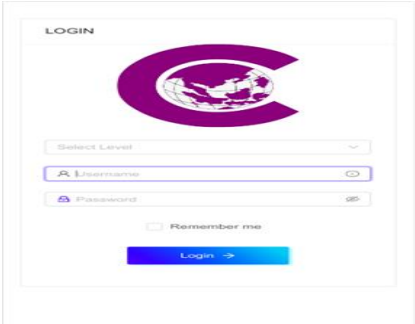


**Figure 6.** User login form display

The user account has a three button menu component and a profile component on the main page after the user logs in. The three buttons on the lecturer user account have a student attendance menu, a menu to view lecturer teaching schedules in class, and a menu to view the history of lecturers teaching in class. Whereas in the student user these three buttons are different, namely the attendance suggestion menu, the lecturer information view menu, and the class information view menu.

### *4.1. Lecturer Menu Display*

The three menu buttons on the main page of the lecturer user are the student attendance menu which is used when the lecturer teaches class as a learning control, the menu sees the teaching schedule and the menu sees the teaching history which is used to view the history of lectures that the lecturer has done.

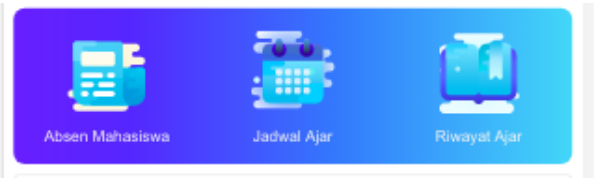


**Figure 7.** Lecturer menu display

### *4.2. Student Menu Display*

There are also three navigation menu buttons for student users. One of them is the absences proposal, which functions if the lecturer does not enter according to the

teaching schedule, then the student in the class proposes to the admin that lecturers who want to teach in the class do not enter, and students ask for absent access rights to the admin of the department, by filling out the proposal form and sending it to the admin, if the admin agrees with the student's proposal, the student can attend class. This is done because if a student does not attend, the status of all students in that class is absent.

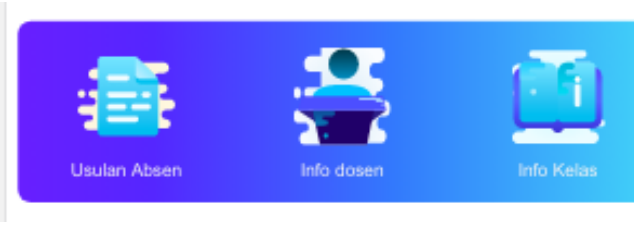


**Figure 8.** Student menu Display

## 5. CONCLUSION

From the research results it can be concluded that the application has two levels of user accounts, namely the lecturer account and the student account. User accounts as lecturers can manage lecturer attendance, while users as students can view lecturer information data or class information. Applications that can be accessed by users must log in first as identification and verification as a security system for users who already have an account and have registered with the web application on the admin computer.

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