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Development of Web and Android Based Employee Attendance Monitoring Application

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Abstract

This research was conducted to develop an Android-based employee attendance monitoring system that can assist the Department of Manpower and Transmigration of East Kalimantan Province in monitoring employee attendance, recapitulating employee attendance, and timely submission of attendance reports.
The objective of this research is to simplify employee attendance monitoring and expedite the recapitulation of employee attendance lists at the Department of Manpower and Transmigration of East Kalimantan Province.
The system development method used is the prototype model. This method consists of five stages: Communication, Quick Plan, Modeling Quick Design, Construction of Prototype, and Deployment Delivery & Feedback.
The result of this research is a web-based information system for Administrators and Direct Supervisors to process data and monitor employee attendance, and an Android-based system for employees to record their check-in and check-out times. In the Android-based system, employees can also input attendance with various remarks such as early leave, absence, sick leave, personal leave, business trips, and external duties. The blackbox testing in this research shows that the system functions as expected, and the betabox testing results in a score of 89.60%.

Keywords: Android-based attendance system, Employee monitoring, Prototype model, Web-based information system, betabox testing

1. Introduction

The Manpower and Transmigration Service (Disnakertrans) of East Kalimantan Province is an implementing element of government affairs tasked with implementing regional government affairs in the field of manpower and transmigration based on the principles of autonomy and assistance tasks [1]. The Manpower and Transmigration Service of East Kalimantan Province has around 160 employees. In carrying out employee attendance, the East Kalimantan Provincial Manpower and Transmigration Office currently uses fingerprints [2]. However, attendance using fingerprints has a weakness, namely the process of inputting data for employees who are on duty outside, sick and on leave is still done manually, namely by inputting one by one on the fingerprint web application, this method is considered less than optimal in displaying data because it is not real-time and sometimes attendance reports to the leadership are slow. In addition, if employees who are on leave, sick or on duty outside do not provide evidence, the attendance officer must confirm the employees one by one which results in the slow process of reporting the recapitulation of attendance and the East Kalimantan Disnakertrans agency will receive a warning from the East Kalimantan Provincial Civil Service Agency. Therefore, an application is needed that can monitor employee attendance at the East Kalimantan Provincial Manpower and Transmigration Office in real-time.
From these problems, the East Kalimantan Provincial Manpower and Transmigration Office requires an android-based employee attendance monitoring application that can be used to monitor employee attendance every day. This system uses android because it makes it easier for employees to do attendance quickly while still in the office area without having to queue at the existing fingerprint machine, thus the system that is built is expected to minimize queues that cause delays in doing fingerprint machine attendance

2. Related Works

2.1. Application

Monitoring is a step to review the activities carried out according to plan, identify problems that arise so that they can be resolved immediately[3], assess the work patterns and management used are appropriate to achieve goals, find out the relationship between activities and goals to obtain a measure of progress [4]. Monitoring is monitoring that can be explained as awareness of what you want to know, high-level monitoring is carried out in order to make measurements over time that show movement towards or away from the goal [5]. Monitoring will provide information about the status and trends that the measurements and evaluations completed are repeated over

time, monitoring is generally carried out for a specific purpose, to check against the following process objects or to evaluate conditions or progress towards management results goals for the effects of actions from several types between actions to maintain ongoing management [6].

2.2. Android

Android is a Linux-based operating system used for mobile devices or tablet devices (PDAs). Android provides an open platform for developers to develop their own applications, making Android a popular mobile operating system to date. Android was founded in 2003 by Andy Rubin, Nick Sears, Rich Miner, and Chris White, which was later purchased by Google in 2005 [7]. Android is an operating system that is widely used on mobile devices that are currently well-known and popular for use on smartphones. Android is also a programming platform developed by Google for smartphones. Android can run on several types of devices developed by many different vendors and includes a software development package for writing native code and assembling software modules in creating applications for Android developers [8][9], [10], [11].

2.3. Prototipe Method

The prototyping model is a method used to quickly gather specific information about user needs. The main focus is on the presentation of aspects of the software that will be visible to customers or users. This prototype is then evaluated by customers or users and used to refine software development needs. A prototype is defined as a tool that provides ideas to creators or potential users about how the system works as a whole, and the process of creating a prototype is called prototyping [12][13], [14]. The system development method using the prototype model is an approach in software development that is often used by developers to allow direct interaction between developers and users during the system creation process. Below is a visual depiction of the prototype method [15], [16].

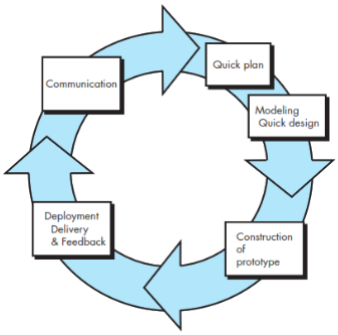

Fig. 1: Prototype Method

2.4. React Native

React Native is a JavaScript platform for developing portable applications for iOS and Android. The React and JavaScript libraries serve as the foundation on which the React Native interface is built[17]. In addition to describing the javascript interface for the Programming interface stage where engineers can access highlights such as cameras, areas, and others tracked on mobile phones, Respond Local is compiled with a combination of JSX and javascript [18].
React is one of the open source javascript libraries. This library was developed by Facebook in 2011 [17], [19]. React itself is not a pure framework because it still requires some support but can still be said to be a framework because it has superior features. The superior features of react are [20], [21]:

1) JSX or extended JavaScript, with this JSX you can modify the DOM (Document Object Model) using HTML code.
2) Single way data flow, the data flow in react is only one way and is a superior feature because it makes it easier to handle problems.

Virtual DOM, virtual DOM will process the changes we make and will be re-rendered in the changed section.

3. Method

The system development method used in developing this Android-based employee attendance monitoring application uses the prototype method.
The stages of the prototype method in this study are as follows:

1. Communication; At the communication stage, the developer meets with stakeholders from the Kalimantan Manpower and Transmigration Service to determine the software needs that are known at that time and identify areas that require further definition for the next iteration in developing the Android-based employee attendance monitoring application.
2. Quick Plan; At the Quick Plan stage, prototype development is carried out quickly after determining the needs in the communication stage. This is followed by the creation of a quick design model to plan how the prototype will be implemented in practice.
3. Modeling Quick Design; At the Modeling Quick Design stage, system planning is modeled using several object-oriented models using UML tools. This stage includes the use of Use Cases to define the functions of the system, Class Diagrams to describe the classes in the system, and Activity Diagrams to illustrate the business process flow.
4. Construction of Prototype; At the Construction of Prototype stage, the development team begins to translate the quick design into an operational prototype. Focus on implementing the aspects of the software that will be visible to end users, such as the user interface and the appearance of the application. This process involves coding, testing, and iteration to ensure that the prototype

meets the needs and expectations that have been set. Thus, this stage is the first step in building a functional product that can be tested by users.

5. Deployment Delivery & Feedback; At the Deployment Delivery & Feedback stage, the prototype that has been developed is submitted to stakeholders for evaluation. The feedback provided is then used to improve the requirements specifications. If necessary, iterations are carried out where developers make improvements to the prototype based on the feedback received, thus ensuring that the final result meets the needs and expectations of stakeholders.

4. Result and Discussion

The stage of presenting research results and in-depth discussions related to the development of an Android-based employee attendance monitoring system. The results of this study include an analysis of the system implementation, system performance based on testing conducted, and an evaluation of the functions and features developed.

4.1. Modelling Quick Design

Quick Design Modeling Stage, system planning is modeled using several object-oriented models using UML tools. This stage includes the use of Use Case to determine the function of the system, Class Diagram to describe the classes in the system, and Activity Diagram to illustrate the business process flow, and sequence diagrams.
The following is an explanation of each diagram below:
1. Usecase Diagram
This diagram shows the function of a system or class, how the system can interact with users. The use case in this application is as shown in Figure 2.

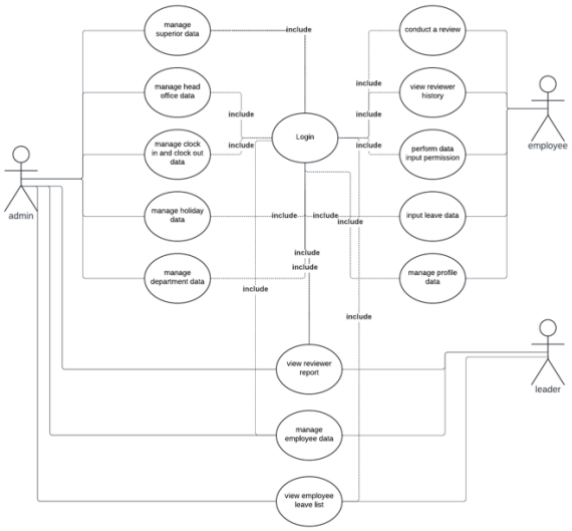

Fig. 2: Use Case Diagram

There are 3 actors who use the system that will be designed in this study, namely admin, superior and employee. Admin and superior access the system through the website while for employees through the installed application. To access the presence system or application, all users need to log in using their respective usernames and passwords. Admin can manage superior data, manage employee data, manage head office data, manage entry and exit time data, manage holiday data, and manage department data. What is meant by managing is that the admin can add new data, change existing data, or delete data. While for leave data and attendance data, the admin can only see the same as the superior. Superiors can manage employee data such as adding new employee data, changing existing employee data, and deleting employee data. And can see attendance and leave reports that have been carried out by employees. Meanwhile, for employees through the application, employees can take attendance such as entry attendance and exit attendance. View the attendance history of all attendance that has been carried out by employees. Submit permission such as permission to be late or permission to go home early by adding information. Can take leave by uploading a leave letter. And apply for permission with the option of other permissions, sick leave or permission for outside work along with attaching evidence.

4.2. Class Diagram

Class diagrams are used to describe the design in the form of entities used in the system along with the relationships between entities. The following explanation of the class diagram is shown in Figure 3.

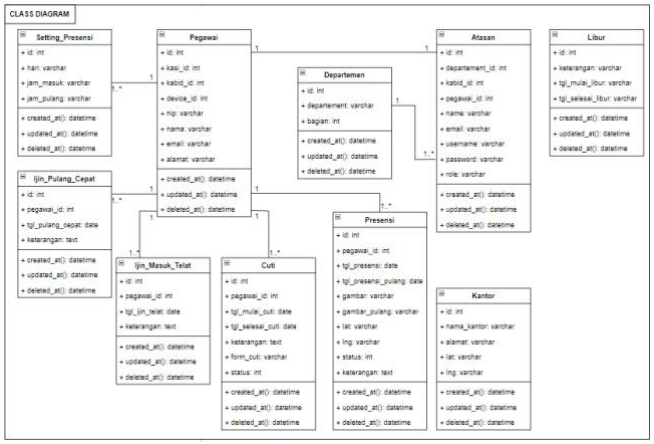

Fig. 3: Class Diagram

4.3. Construction of Prototype

In the Construction of Prototype stage, the development team translates the quick design into a working prototype. The main focus is on implementing the aspects of the software that are seen by the end user, such as the user interface and the appearance of the application. This process involves coding, testing, and iterating to ensure the prototype meets the needs. This stage is the first step in building a functional product that can be tested by users. The results of the implementation of the design that has been done are 2 types of systems, namely the website system used by admins and superiors and the android mobile application system used by employees to do attendance. The following is a display of the implementation results.

1) Implementation of Website Login Page

The website login page is the main or first page that will be displayed after the admin or superior accesses the website address. To login, the admin and superior need to use the username and password that have been registered each in order to have access rights according to needs. The display of the implementation results that have been carried out can be seen in Figure 4.

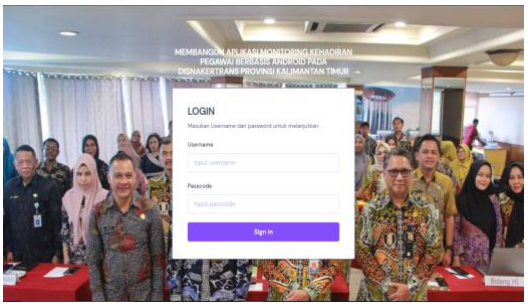

Fig. 4: Implementation of Website Login Page

2) Implementation of Admin Dashboard Page

The admin dashboard page is the page displayed after the admin has successfully logged in. The appearance of this page can be seen in Figure 5.

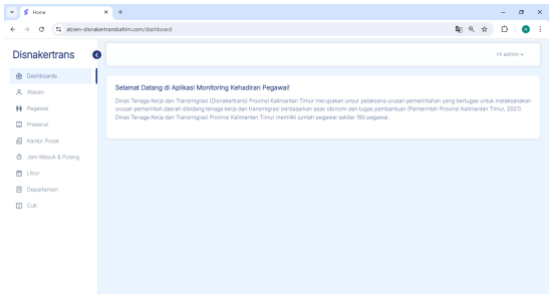

Fig. 5: Admin Dashboard Page

3) Admin Top Data Management Page

Figure 6 shows the results of the implementation that has been done on the manage superior data page. On this page, the admin can add superior data by selecting add data, change superior data, and delete superior data through the action column.

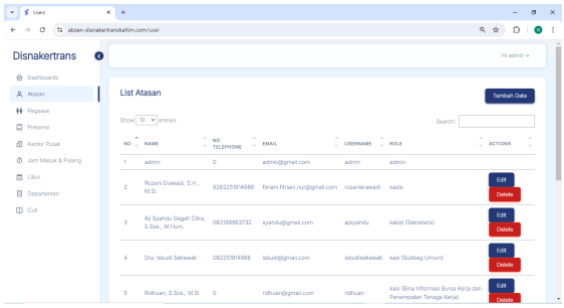

Fig. 6: Admin Top Data Management Page

4) Admin Employee Data Management Page

The employee data management page is used by the admin to add employee data, change and delete employee data and view the employee data list. The page display can be seen in Figure 7.

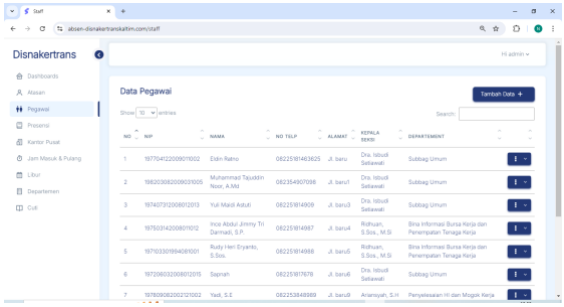

Fig. 7: Admin Employee Data Management Page

5) View Admin Presence Report Page

This attendance page, which is displayed in Figure 8, shows that the admin can see a list of attendance that has been done by employees. The admin can also set the period of attendance data that will be displayed.

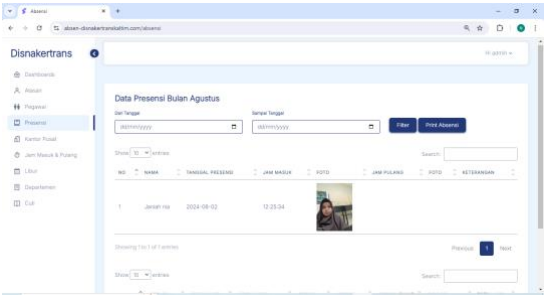

Fig. 8: View Admin Presence Report Page

6) Admin Headquarters Data Management Page

The implementation of the head office page functions to manage head office data. The page display can be seen in Figure 9.

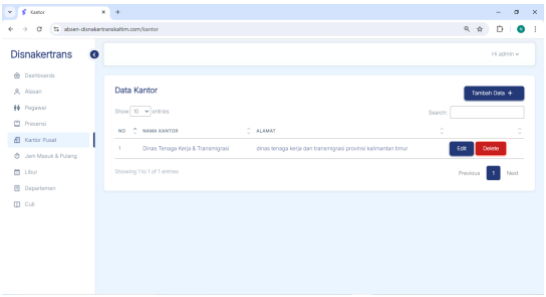

Fig. 9: Admin Headquarters Data Management Page

7) Check-in and Check-out Time Data Page

The page displayed in Figure 10 is used by the admin to manage work clock in and clock out data according to applicable rules.

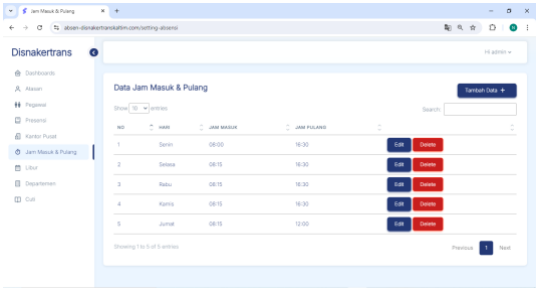

Fig. 10: Check-in and Check-out Time Data Page

8) Manage Admin Holiday Data Page

The page for managing holiday data on the holiday menu can be used by the admin to add work holiday data such as during holidays or joint leave so as not to affect the number of employee attendance. The display of this page is like Figure 11.

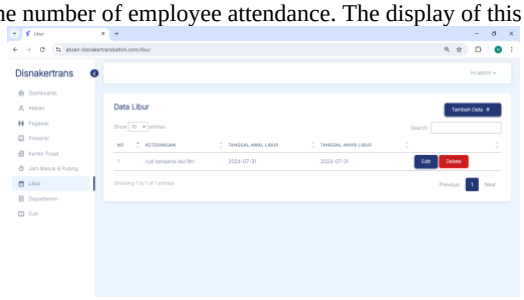

Fig. 11: Manage Admin Holiday Data Page

9) Admin Department Data Page

Admin can add, change, and delete department data according to what is available at the Disnakertrans office. The page display can be seen in Figure 12.

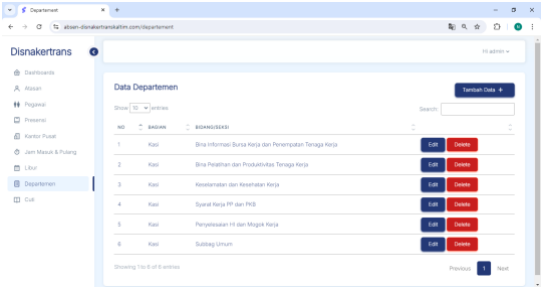

Fig. 12: Admin Department Data Page

10) View Admin Leave Report Page

On the leave page, the admin only has access rights to view the list of leave that employees have taken, as in Figure 13.

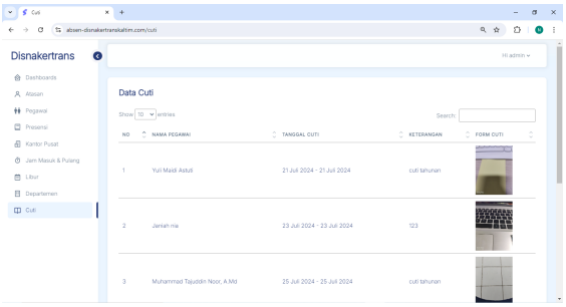

Fig. 13: View Admin Leave Report Page

11) Application Login Page

The page used by employees to fill in their username and password to be able to access the application to take attendance, as shown in Figure 14.

Fig. 14: Application Login Page

12) Application Dashboard Page

Figure 15 is the dashboard page display if the employee has successfully logged in. There are 6 menus provided by the application, namely presence, permission, history, leave, absence and profile

Fig. 15: Application Dashboard Page

13) Reviewer page

The Employee Attendance page is used to take attendance. As in Figure 16, there are attendance options, employee data and features for self-portraits.

Fig. 16: Reviewer page

14) Attendance History Page

The history page displayed in Figure 17 functions to view a list of attendance records that have been taken by employees.

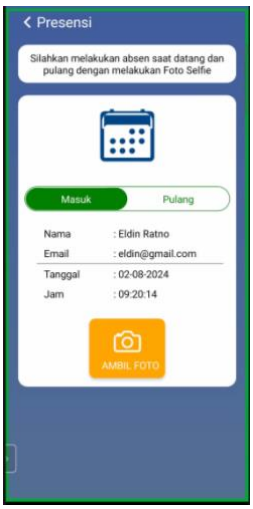

Fig. 17: Attendance History Page

15) Permissions Page

Figure 18 is used if the employee has permission to arrive late and permission to leave early accompanied by a statement.

Fig. 18: Permissions Page

16) Leave Page

The leave page shown in Figure 19 is used by employees when taking leave. Employees need to fill in the start and end dates of leave, information and photos of the leave letter

Fig. 19: Leave Page

17) Page Not Logged In

Figure 20 is used by employees if the employee takes permission for reasons such as other permits, illness, and external service and includes information.

Fig. 20: Page Not Logged In

18) Profile Page

The profile page is used to view employee personal data. Employees can change their personal data on this page. The appearance of this page is as shown in Figure 21.

Fig. 21: Profile Page

5. User Acceptance Test

UAT testing was conducted on 10 employees of the East Kalimantan Province Manpower and Transmigration Office to fill out the questionnaire, the results were summarized into a score value which can be seen in Table 1.

Table 1: UAT Testing

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	Total
R1	5	4	5	5	4	5	3	3	5	5	**44.00**
R2	3	5	5	3	5	4	5	5	5	4	**44.00**
R3	5	3	5	5	5	5	5	5	5	4	**47.00**
R4	5	5	3	4	4	5	5	4	4	5	**44.00**
R5	4	5	5	5	5	5	4	5	5	5	**48.00**
R6	5	4	3	5	4	5	4	5	4	5	**44.00**
R7	4	3	5	4	5	3	5	5	4	3	**41.00**
R8	5	5	5	4	5	4	3	5	4	5	**45.00**
R9	5	5	4	5	5	5	5	5	5	5	**49.00**
R10	5	4	4	5	3	3	5	4	5	4	**42.00**
Total Score											**448.00**
Test Results (%)											**89.60**

Based on table 4.14, the first stage carried out is to determine the highest value on the distributed questionnaire using equation 2.2, then the results obtained are as follows:
Highest value = 10 Respondents x 10 question items x 5
Highest value = 500
then the results obtained are as follows:

$$percentage\ UAT = \frac{448}{500} \times 100\ \%$$

Based on the results of the calculations carried out on the UAT test results, an index of 89.60% was obtained, indicating that all respondents strongly agreed that the presence system and application implemented at the Disnakertrans were running very well and were said to be suitable for use.

5. Conclusion

The conclusion of this study is that the Android-based employee attendance monitoring system developed successfully meets the objectives of simplifying employee attendance monitoring and accelerating the recapitulation of attendance lists at the East Kalimantan Provincial Manpower and Transmigration Office. This system includes a web-based platform for administrators and supervisors, as well as an Android application for employees that allows them to record their clock-in and clock-out times, as well as provide additional notes such as leave, sick leave, and outside assignments. Blackbox testing shows that the system functions as expected, and the betabox test results scored 89.60%.

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