



Adoption of Mobile Smartphone Attendance System Based on Case Study of PT XYZ

Bunga A. Hutagaol¹, Lufty Abdilah², Scelen Utari Ramona Jaya³, Gunawan Wang⁴

^{1,2,3,4}Information Systems Management Department, BINUS Graduate Program-Master of Information Systems Management, Bina Nusantara University, Jakarta, Indonesia.

e-mail: ¹bunga.hutagaol001@binus.ac.id; ²lufty.abdilah@binus.ac.id; ³scelen.utari@binus.ac.id; ⁴gwang@binus.edu

ABSTRACT

PT XYZ is the largest outdoor adventure manufacturing and retailing company in Indonesia with more than 3000 employees. To meet the needs of salary calculation, every working day all employees are required to attend work during work hours and after work hours using a fingerprint machine. With a fingerprint machine that is currently owned and the number of employees of more than 3000 people causes long queues during the attendance process. Not to mention if there are technical problems such as unreadable fingerprints or machine fingerprint errors, the attendance process will take longer. This can cause the start time to work backwards and not on time. Therefore we need a attendance system that can speed up the attendance process. The purpose of building a smartphone-based attendance system is so that employees can directly attend attendance via smartphones owned without having to attend through the fingerprint machine. The presence system will be built using android technology and intranet wifi networks. Intranet wifi networks are used to connect smartphones and servers. The intranet network was also chosen so that the attendance system coverage is limited to the PT XYZ factory environment, in order to avoid absent employees from outside the company.

Key words: Attendance System, Attendance Applications, Mobile Smartphones, Android

1. INTRODUCTION

PT XYZ is the largest outdoor adventure manufacturing and retailing company in Indonesia with more than 3000 employees. To meet the needs of salary calculation, every working day all employees are required to attend work during work hours and after work hours using a fingerprint machine. With a fingerprint machine that is currently owned and the number of employees of more than 3000 people causes long queues during the attendance process. Not to mention if there are technical problems such as unreadable fingerprints or machine fingerprint errors, the attendance process will take longer. This can cause the start time to work backwards and not on time.

The attendance system is very important in knowing the presence of employees in a company. The development of attendance systems is now developing with the support of

technologies such as computers and gadgets. [1] With the current number of smartphones, it is possible for PT XYZ to renew the attendance system using a smartphone. Because it is easier to operate and can do attendance anywhere so that the time used is not much wasted. The attendance system in this way can also maximize attendance process time compared to employees having to queue in front of a fingerprint device. This is a waste of work time. Supported by PT XYZ employees, most of whom already have smartphones.

The presence system will be built using android technology and intranet wifi networks. Intranet wifi networks are used to connect smartphones and servers. The intranet network was also chosen so that the attendance system coverage was limited to the PT XYZ factory environment, in order to avoid absent employees from outside the company. Therefore this case study tries to adopt a smartphone-based attendance system to be able to answer the problem of long queues during the attendance process at PT XYZ.

2. LITERATURE REVIEW

A. Software Development Theory

In developing a software there are a number of frameworks that can be used, such as the Hydreabad Institute of Technology research [2] with the theme Mobile Phone Conversion and Location Application for Android using Spiral Model as a software development model.

In developing this application the researcher will use the Evolutionary process flow framework and Spiral Model like previous research. This study suggests that each phase or cycle begins with the design goal and ends with the client receiving progress. Analysis and application efforts were also applied at each stage of the project. The Spiral Model becomes a reference in developing this timesheet application due to the flexibility found in this model. The flexibility in question is that if an error occurs in development, the author can return to the stages where there are errors and correct these errors. This model can also handle changes that often occur in software development. [3]

In the spiral model there are five stages of software development, which is:

1. Communication Stages

Where researchers communicate to find out about user needs or commonly referred to as User Requirements. User Requirements can be obtained by interview, questionnaire or

observation. User requirements are important in information systems, in order to determine the limitations and needs in a system.

2. Planning (Planning with Estimation, Scheduling)

At this stage the researcher analyzes and plans the results of the User Requirements that have been obtained.

3. Modeling and Design (Modeling and Design)

This stage contains UML diagrams, initial appearance (mockup) and user interface that has been designed in such a way.

4. Construction and Development (Code and Test)

This stage the researcher begins to build a system with various steps in its implementation such as creating a database, implementing system design and implementing programming. After completing the coding process, researchers will conduct testing to test the system.

5. Deployment (Delivery Feedback)

This stage will only be implemented if the system is planted in the server and will be deployed for the long term.

B. Attendance

Absence according to Kamus Besar Bahasa Indonesia is the absence of someone in an agency. Whereas attendance is usually referred to as the marking process or recording of the time someone is present in a document that is made properly as a reference in determining a decision within the scope of the assessment. Attendance is also a list of data on the presence of someone from an activity in an institution that is arranged and arranged so that it can be used at any time by the parties concerned. Where data from employees who are absent will be recorded in the staffing list and can be checked at any time by the agency. In English, the use of the word absent is often used as the term List of Absent, which means someone who is absent from a meeting while the use of the word attendance is often used as a term of List of Presence or List of Participants. [1]

C. Mobile Application

Over the past five years, mobile devices, such as smartphones and tablets have become far more popular than traditional desk-based devices such as personal computers and laptops. Since the iOS iPhone was released in 2007, and Android was released on various smartphones and tablets in 2008, the most popular Operating System that runs on computing devices has become a mobile operating system. Therefore there are currently more applications running on the mobile operating system than the desktop operating system. [4]

Application programs that run on smartphones and tablets are called mobile applications. Mobile applications are usually developed and operated according to their Operating Systems, and are usually available from distribution platform applications, such as Google Play, Apple App Store.

D. Intranet

An intranet is a private network that uses internet protocols such as TCP / IP that are used to communicate and share information within a certain scope with a limited area. For example in the scope of schools, schools or office environments. [5]

An intranet network is different from an internet network, an intranet is the smallest part of the internet because an intranet only covers a very small environment

and the intranet itself cannot be connected to a wider network if there is no internet access.

The function of the intranet is to connect one computer to another computer as well as other network devices such as: switches, servers, printers and access points, but the service is limited to only one location. [4]

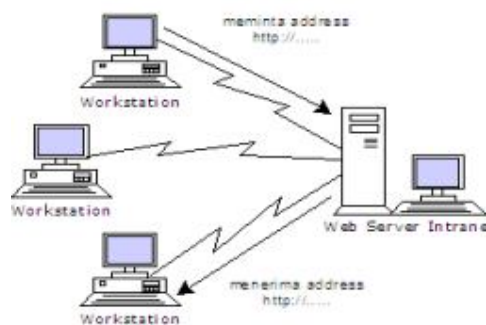


Figure 1: Intranet

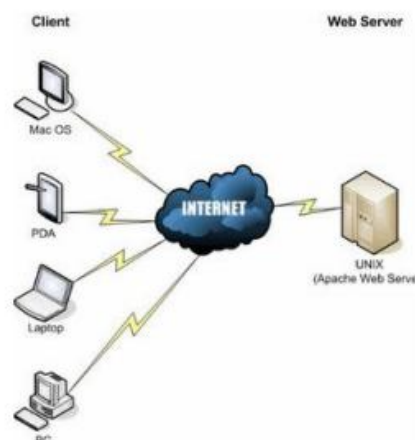


Figure 2: Intranet Principal Concept

3. ANALYSIS AND SYSTEM PLANNING

A. Problem Analysis

The process of recording employee attendance at PT. XYZ currently still uses a fingerprint machine based attendance system which causes long queues during hours of entry and return from work. The queue occurred because the number of employees numbered 3,000 in one factory location.

By utilizing mobile device and intranet technology, an attendance system application is adopted using a mobile smartphone. Employees can make a presence using their respective smartphones. Employees who have an Android smartphone can download the attendance system application on the Android Playstore service and install it on their respective smartphone devices. Before making attendance via smartphone devices, employees must first be connected to the company's local network (intranet network). This was done because the system was designed so that it could only record the presence of smartphones connected to the company's local network to prevent fraud in the form of absence outside the company / factory area. For employees who do not have an android smartphone can still attend attendance through a

fingerprint machine that was previously available at the factory.

B. General Description of System

The system is divided into two parts, the backend and front end applications. In the backend system there is one access right, which is the system admin. Admin has the duty to register employees who want to do attendance using a smartphone and monitor attendance records periodically for further download and submit it to the Human Resources (HR) section to record salary calculations. In the frontend system there is one access right that is the user for the employee. The user is tasked with taking action on the smartphone attendance application in the form of pressing the enter button during work hours and pressing the exit button when work hours go home. Then the system will process and send the presence data to the backend application. The process in the system will be explained in the next steps:

1. The input stage is the employee logging in to the application by entering the employee ID number (NIP) and password. Next the employee presses the Attendance Enter button at the time of entry and the Exit Absence button at the time of coming home from work.
2. The process stage is the mobile application processes by sending NIP data, passwords and device telephone numbers for validation.
3. The output stage is the successful sending status to the employee in making attendance.

C. Design of System Architecture

Software architecture in this application uses 3-layer architecture consisting of Data Layer, Business Layer and Presentation Layer. The Data Layer functions to handle the application database, the Business Layer functions to handle application logic and the validation of the smartphone device's telephone number. While the Presentation Layer functions to handle the appearance of the user interface.

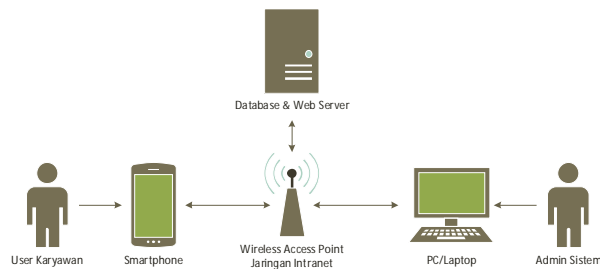


Figure 3: System Architecture

D. Process Design

The flow of usage of the smartphone device-based attendance system application is as follows:

1. Employees register in the attendance system by entering the Employee Identification Number (NIP) data, password, employee name and telephone number. Then the system will forward it to the system admin for verification.
2. The system admin will access the backend application and then verify the data of the employee registering. If

the data is valid, the system admin will activate the employee account.

3. Employees as users do the attendance process on the application on each smartphone that has been registered (after downloading and installing the application). Attendance is done by lagging to the application with a nip and password then pressing the Absent Enter key at the time of entry and the Exit Exit button at work hours.
4. The validation stage is the system will validate the NIP data, password and incoming telephone numbers.
5. The system admin will periodically record attendance data by downloading from the backend system to be forwarded to the human resources department as a basis for calculating salaries.

E. Use Case Diagram

Use Case Diagram is a technique used in developing a software or information system to capture the functional requirements of the system in question. Use Case for mobile smartphone-based attendance systems can be seen in Figure 4 below.

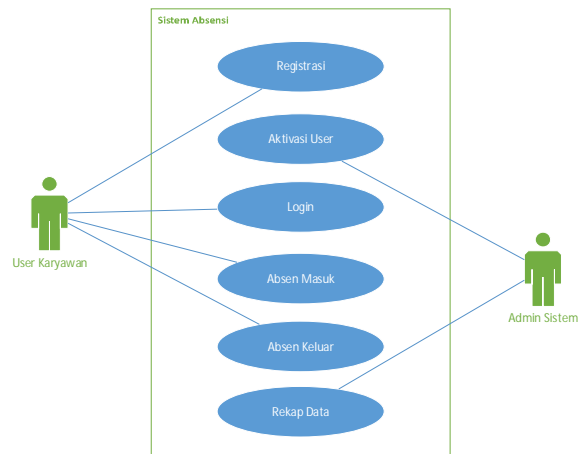


Figure 4: Use Case System

F. Activity Diagram

Activity diagram is something that illustrates the various activities in the system being designed. Activity Diagram for attendance systems based on mobile smartphones can be seen in Figure 5.

In figure 5 activity diagrams, there are 3 parts which include user, admin and system with 6 activities that describe the process of employee user registration, data verification, activation of verified accounts, login and absenteeism processes, verification of absent data processes and absenteeism data recap.

G. Class Diagram

Class diagram is a class that describes the structure and explanation of classes, packages, and objects and relationships with each other such as containment, inheritance, association, and others. Class Diagram for attendance systems based on mobile smartphones can be seen in Figure 6 below.

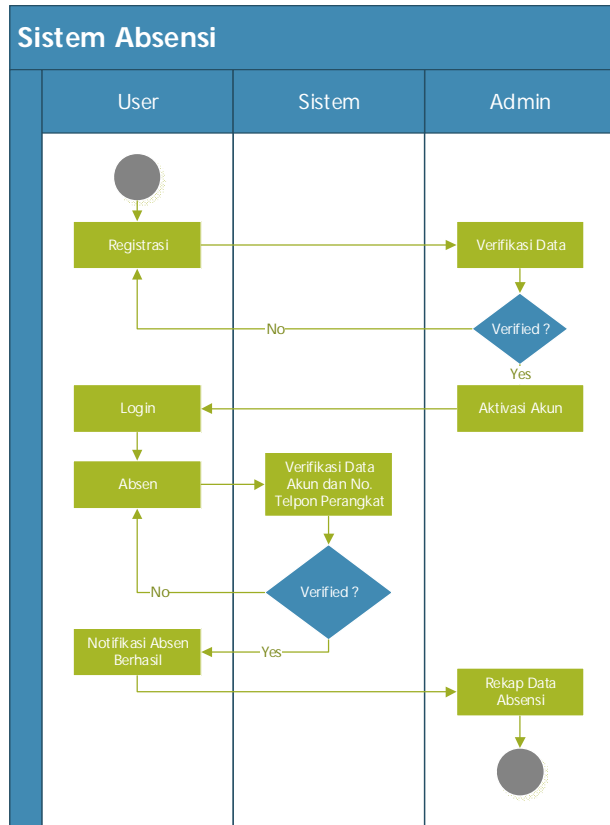


Figure 5: Activity Diagram System

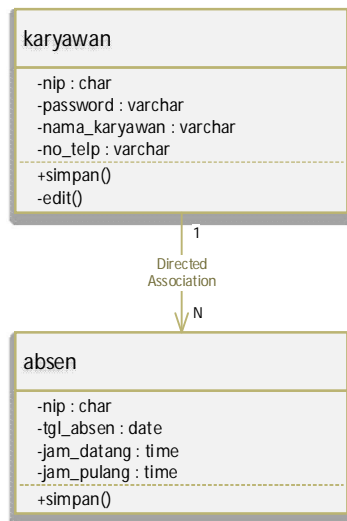


Figure 6: Activity Diagram System

4. APPLICATION DESIGN

A. Login Page

The application design is made with responsive web design methods. Responsive Web Design (English: Responsive Web Design (RWD)) is a method or approach to web design systems that aim to provide an optimal surfing experience on a variety of devices, both mobile and desk computers. Mobile attendance system login page can be seen in Figure 7 below.

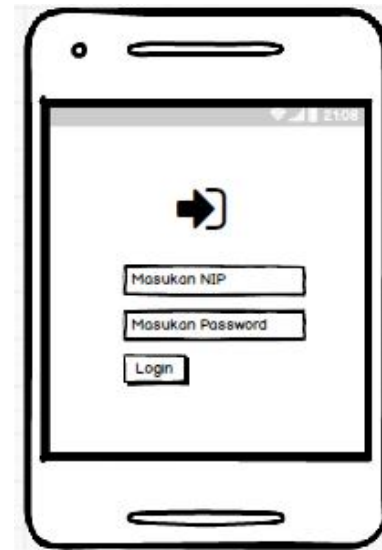


Figure 7: Login Page

B. Attendance Page

Attendance page shows 3 views, namely absentee page for attendance at work, absenteeism page home for attendance at work and attendance display for attendance if success / failure. In picture 8 shows the main page for employees to do clock in process.



Figure 8: Clock in Process Page

In Figure 9 shows the main page for employees to do the clock out process

Figure 10 shows the notification display when the system succeeds / fails to verify attendance data.



Figure 9: Clock Out Page

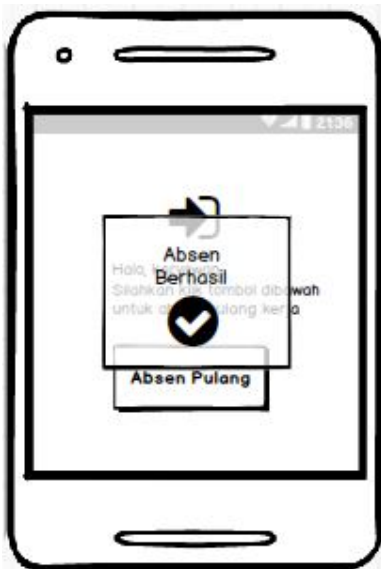


Figure 10: Notification Page

C. Attendance Recap Page

Attendance Data Recap page shows the absent data display of all employees, with a display like this makes it easier for system administrators to monitor employee attendance and download employee attendance data recap for reporting to HR. The attendance data recap page can be seen in Figure 11 below.

5. SUMMARY AND CONCLUSION

A. Summary

The advantage of this mobile smartphone based attendance system is that the system can be accessed using a mobile smartphone with an Android operating system so that it can facilitate employees in making attendance. Very easy and fast access using a WLAN network makes the system accessible anywhere in the corporate environment.

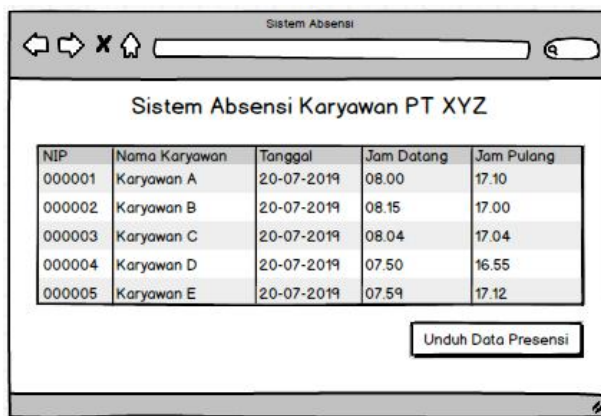


Figure 11: Attendance Recap Page

B. Limitation

The disadvantage of this mobile smartphone-based attendance system is that if the smartphone device that the employee uses to attend absenteeism is damaged or the intranet network or server is damaged, then the employee cannot be absent. However, this can be overcome by still providing a fingerprint machine. Therefore, maintenance is also needed for the performance of the intranet network and also the database server.

C. Conclusion

The attendance system that was developed using technology such as Android smartphone technology allows the company to get a lot of benefits, because it will simplify and speed up employees in the attendance process. This also affects the report that will be made by HR, because the data in the system is neatly arranged so that the salary calculation can be younger and does not rule out the possibility that it can be integrated with the payroll system in the future. In terms of designing a smartphone-based attendance system a good method is needed and continued research so that in the future this system can be more beneficial for the company. With this mobile smartphone-based attendance system, attendance is expected to be more effective and efficient because there are no more queues and employees can directly focus on their respective jobs.

REFERENCES

1. Agus Irawan, 2014, **Sistem Informasi Absensi Mahasiswa (Studi Kasus Jurusan Administrasi Bisnis Poliban)**, Jurnal INTEKNA, 2 : 102-209.
2. Praveen, K. K. d., **Mobile Phone Mode Conversion and Location Application for Android**, 2016
3. Pressman, R., **Software Engineering : A Practitioner’s Approach**. New York: McGrawHill, 2010.
4. Wijayanto, Eko. 2017. **Sistem Presensi Mahasiswa Dengan Fingerprint Berbasis Website**. Surakarta: Universitas Muhammadiyah Surakarta.
5. Muhammad, Noval Aditya, Febriliyan Samopa dan Radityo Prasetianto Wibowo. 2013. **Pembuatan Aplikasi Presensi Perkuliahan Berbasis Fingerprint**. Surabaya: Institut Teknologi Sepuluh Nopember.