ATTENDANCE APPLICATION DEVELOPMENT USING WIFI WITH ANDROID BASED GPS IN PT. DINUS CIPTA MANDIRI

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ABSTRACT

PT. Dinus Cipta Mandiri experienced problems in attendance is not accurate attendance data, Delays when performing attendance due to the occurrence of queues and the process of recapitulation of the absent data is still done by manual. The step to solve this problem is to build the Android-based attendance application to do the absence and build Web-based applications for the recapitulation of data absent. As for the testing of black box in attendance system This results in attendance stage that suits the needs of companies such as doing absent, data recapitulation absent. With the user entering the correct data then the system will output the appropriate outputs to the expected and the system will give a warning if the user enters the wrong data. With the attendance application All employees can monitor attendance data in real time and done through their respective smartphones and assist in the recapitulation of the absence becomes easier because the recapitulation process is not by manually calculating the attendance amount again. In this Web application only includes the period or month range and the app will display the data.

***Keywords*:** Attendance, Android, GPS, Wifi

1. INTRODUCTION

PT Dinus Cipta Mandiri is a national company engaged in the distribution of food that stood since the year 2000 and headquartered in Jakarta. Starting from become a distributor of Jam brand Budy Jam that produced PT Bersama Cipta Mandiri (Dinus Group) then develops by importing marshmallow, Candy Toys, and chocolate from abroad with the brand ChompChomp through PT Catur Global Sukses (Dinus Group) [1].

Attendance is currently still using a manual card attendance machine or a check-clock machine. The Machine check clock is one unit and the position of the check-in machine is in the company page adjacent to the parking area. Attendance using the check-in machine is allowed to be cheating by the way of the attendance card, it will certainly give the data that is not suitable to the company. The machine check clock often has problems, such as the discrepancy of date data in attendance card. As a result, the data from the attendance card is inaccurate and will affect when the attendance counts. Another problem is that the queue when it will be absent, because the employee comes simultaneously or when the machine check clock is slow in recording attendance to the attendance card. As a result, employees late in employment.

The recapitulation of attendance is done once a month by admin and admin included in the Finance section. The recapitulation of attendance is done by calculating the number of attendance based on attendance card data for further will be made into a report. The process is less effective for processing attendance data because the number of attendance is calculated based on attendance card data. While the data from the attendance card is often inaccurate, such as the date discrepancy described above. So the admin should see whether it is a weekday or a public holiday.

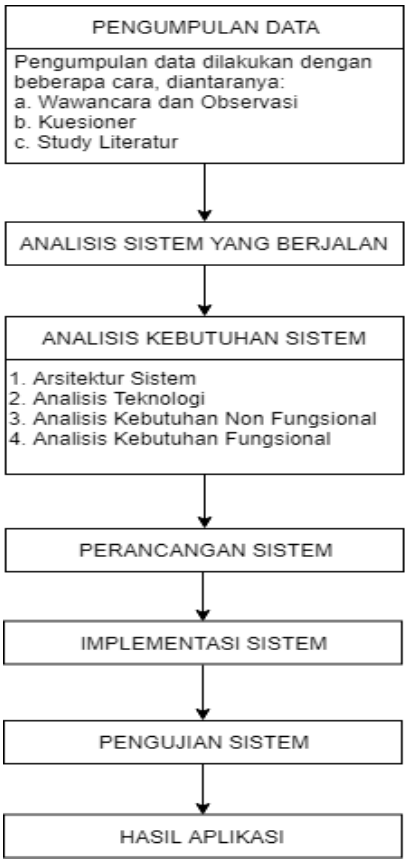
Attendance application that will be built using Android smartphone with Wifi and GPS features as a tool to do attendance all employees at PT. Dinus Cipta Mandiri. When the smartphone will be absent must be connected to the company's WiFi and the location of the smartphone must be in the location of the company that has been determined, therefore the smartphone must be in an area that is reachable by WiFi and location of the company. While the employee has been in the company's location, the system will provide verification by randomly sending a pin and the employee must enter the pin properly before the absence. While the application to know the number of attendance of employees are constructed web-based to be operated by the admin, which can help the recapitulation process of attendance data by selecting the month span to further the system will display the number of Employee attendance.

The objectives that will be achieved in this study include the following:

1. *All employees can monitor attendance in real time.*
2. *Help Admins to recapitulation attendance data to know the number of attendance.*

1.1. Research Method

The stages of research used in the design of this application, among others, can be seen in the following image:



Gambar 1 ***Phases Research***

2. LANDASAN TEORI

2.1. Android

Android is a mobile operating system based on the open source Linux kernel that was originally created by Android Inc. Android includes an operating system designed to be optimally used in a flexible mobile environment [2].

Android is a Linux-based open source operating system. Initially, Android is only for mobile phones, but can now be used on tablets, TVS, computers, and mobile stereo [3].

2.2. GPS

Global Positioning System is a widely used location-determining technology today. GPS is a satellite navigation system for determining location using satellites. With the help of satellites, it will be obtained an accurate and fast position with a 3-dimensional coordinate (x, y, z) coupled with coupled with time information and moving speed. The position of the GPS unit will be determined based on latitude and longitude coordinates which it obtained from the degree value of a measured point [4].

2.3. Wifi

WiFi is one standard Wireless Networking without cables, only with the appropriate components can connect to the network [5]. *Wi-Fi technology is a part or region connected to a wired internet network. Wi-Fi* (Wireless Fidelity) *is a popular term for wireless (cordless) networks with high frequencies. Wireless Network is a cordless network using radio or infrared transmitting media* [6]. *Nowadays, there are more outlets or specific locations that provide wireless network service. So that users can easily do the Internet access without wires. The frequence used on radio for computer networks usually uses high frequencies of 2.4 GHz and 5.8 Ghz. While the use of infrared is generally only limited to a network type that only involves two computers only or called Point to Point. This causes the infrared is not as popular as radio waves.*

2.4. Mac Address Filtering

MAC Address Filtering is a filtering method to restrict the access rights of MAC Address corresponding. *Almost every wireless access point and routers are facilitated with security MAC Filtering. MAC filters This is also a good method of security system in WLAN, because it is sensitive to the type of interference such as PC Card theft in MAC filters from an access point sniffing against WLAN. This MAC Address Filter feature serves to help you to prevent foreign (unwanted) users who intend to access the login to your wireless router network. By implementing this feature, only wireless devices that have a registered MAC address (defined) can gain access to the wireless router. Wireless LAN can filter based on the MAC address of the station/client, almost all access points have the ability to filter by MAC address. Network administrators can compile, distribute, and maintain a list of allowed MAC addresses* [7].

2.5. Google Maps API

Google Maps APIS are programming functions provided by Google maps in order for Google maps to be integrated into the WEB or apps. Google Maps API is an interface application that can be accessed via JavaScript so that Google Map can be displayed on a Web page. On Google Maps JavaScript API version 2, to be able to access Google Map on a Web page required Google API Key. API Key is an array of code as a permission to display Google Map on a webpage. However for version 3 does not require API Key, but Google parties recommend using API Key to make it easier to control the Google Maps APIS. The API Key is single, only applies to a URL. One of the conditions for obtaining an API Key is to have a Google/Gmail account to generate the domain or Web URL on the link https://code.google.com/apis/console/. API Key is free up to a limit of 25,000 visitors per day. If more than 25,000 visitors per day it is necessary to purchase additional quota [8].

2.6. UML (*Unifield Modeling Language*)

UML is a graphical notation family backed by a single meta-model that assists with the descriptations and design of software systems, particularly systems built using object-oriented programming.

UML is issued by OMG (Object Management Group, Inc.) which is an international organization formed in 1989, consisting of information systems

companies, software developers and computer systems users [9].

2.7. *State Of Art*

In this State of ART, there are some examples of research in advance as a guide or sample for research conducted which will later become reference and comparison in conducting this research.

Here is the first state of art that can be seen as follows [10]:

Tabel 1 State Of Art 1

Research title	Aplikasi Absensi Menggunakan Metode Lock GPS Dengan Android di PT.PLN (Persero) APP Malang Basecamp Mojokerto
Author	Ronny Makhfuddin Akbar & Nanu Prabowo
Published	Majapahit Techno Agustus 2015 ISSN: 2081-9210
Research results	*This research was conducted at PT. PLN (Persero) APP Malang Basecamp Mojokerto engaged in the service provider of electrical transmission network. Attendance system that is running now that uses fingerprint attendance system. In carrying out the registration obligations of attendance, employees are required to approach the attendance device that is placed in the company lobby. If there is a job schedule in a substation (designation for high voltage electric booths), the officer must be dating to the office in advance to do attendance. But if the location of the landlines from the house is closer, then most employees will go straight to the job site from the office first. Because it felt less effective, in this research is made application to be able to do attendance without having to go to the attendance machine by utilizing an Android phone with GPS and WIFI features as a tool to do attendance directly from Table or the parent Gardu of the job location.*
Equation	*The similarities are the same purpose, making a system or application of attendance utilizing WIFI.*
Difference	*The difference is in previous research discussing the development of applications using WIFI by using the GPS lock method.*

Here is the second state of art that can be seen as follows [11]:

Tabel 2 State Of Art 2

Research title	Pemanfaatan Mac *Addres* Hotspot Dalam Pengembangan Sistem Absensi GPS Dalam Rangka Meningkatkan Keakuratan Posisi Pengguna
Author	Fransiskus Adikira
Published	Jurnal SISFO: Inspirasi Profesional Sistem Informasi Vol 5 No 4
Research results	*Constraints occur for companies that have a workplace in the high-rise building, if using attendance only based on GPS, then the GPS will not be able to provide the exact location where the employee is located. Continuing the previous research on the design of GPS based attendance system (Adikara, 2013), it will be carried out the development of the system with other technologies as a placemark of the employees in the high-rise building , that is by using the facility WIFI Router (Hotspot) to then transmit MAC Addres from the WIFI Router (Hotspot). The problem that will be completed in this research is how to develop GPS based attendance system in Android version 4. x by adding MAC Address detection function from WIFI Router (Hotspot) which is connected in order to increase Employee or user position accuracy.*
Equation	*The similarities are using Mac Address from WiFi for attendance process.*
Difference	*The difference is a previous study that only did absent when in the office while the study will be absent during the Foreign Service (central or branch).*

Here is the third State of art that can be seen as follows [12]:

Tabel 3 State Of art 3

Research title	Perancangan Sistem Absensi Online Menggunakan Android Guna Mempercepat Proses Kehadiran Karyawan Pada PT. Sintech Berkah Abadi

Author	Al Husain, Abdul Haqi Aji Prastian, dan Andre Ramadhan
Published	Technomedia Journal (TMJ) Vol.2 No.1 Edisi Agustus 2017 E-ISSN: 2528-6544 P-ISSN: 2620-3383
Research results	*This research was conducted in PT. Sintech Blessing Abadi. Attendance system that is currently not so optimal and effective in the absence process, so it is made a solution to overcome it by using wireless based Android.*
Equation	*The similarities are using wireless in building this Android based application.*
Difference	*The difference the previous research only utilize wireless technology while the research will use GPS technologies.*

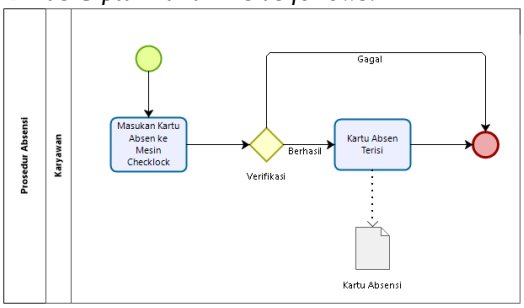
3. ANALYSIS AND PLANNING

3.1. *Analysis Procedure*

The procedure is a sequence of steps that occur or that are performed in a running system. Some of the procedures involved in this system are:

3.1.1. *Attendance Procedure*

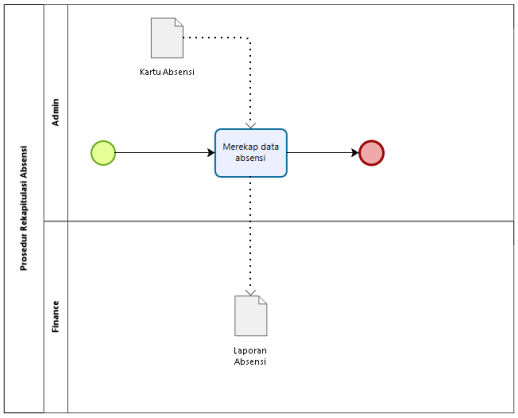
Attendance procedure that is currently running in PT. Dinus Cipta Mandiri is as follows:



Gambar 2 *Attendance Procedure*

3.1.2. *Recapitulation procedure*

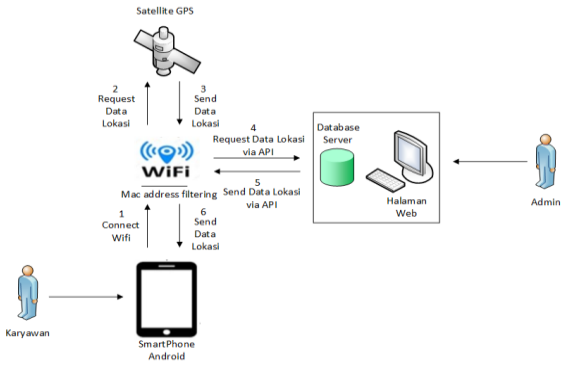
The procedure of attendance recapitulation that is currently running in PT. Dinus Cipta Mandiri is as follows:



Gambar 3 *Recapitulatition Procedure*

3.2. *System architecture*

In general there will be two systems to be built. Sub-systems mobile and sub-systems Web. Mobile system will use Android smartphone which has Wifi and GPS feature and Internet connection. This sub-systems is used to transmit the location in the form of latitude and longtitude coordinates and send the data of the connected Wifi to the database server. Sub-systems web will be used to display the data located on the database server.



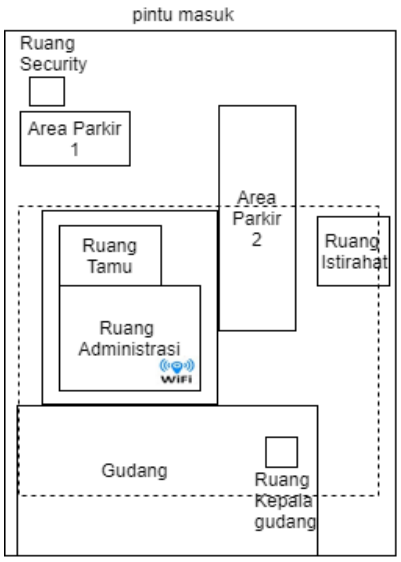
Gambar 4 System *Architecture*

3.3. *Technology analysis*

Technological analysis is a process of analysis aimed at knowing what technology to use and how it works in the system to be built. The technology used in the system to be built is as follows:

3.3.1. *Analysis* GPS

In the application development of this attendance company PT. Dinus Cipta Mandiri is a square shape. The employee who will be absent must be inside the square:



Keterangan:
- Ruang security: 3 x 2 m
- Ruang tamu dan ruang administrasi: 20 x 15m
- Gudang: 40 x 25 m
- Area Parkir 1: 8 x 8 m
- Area parkir 2: 15 x 10 m
- Ruang Isirahat 10 x 10 m
- Luas Keseluruhan 75 x 60 m

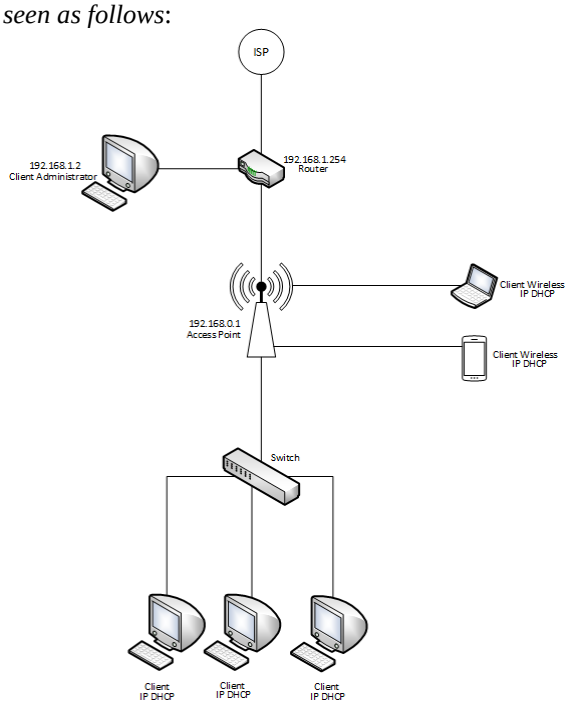
Gambar 5 Analysis GPS

If the employee who will be absent is outside the square dots then the employee can not do the absence and if the employee is inside the square then the

system will know and the employee can do the absence. So that employees should actually be at the company's location to do the absence.

3.3.2. *Analysis* Wifi

Here are the WiFi network schemes that can be seen as follows:



Gambar 6 ***Network Schema***

From the network scheme above, can be concluded the analysis result as follows:

a. *ISP (Internet Service Provider) is connected to the router Speedy ZTE ZXV10 W300S on port 1. This Router serves to change the public IP address obtained from Speedy to local IP.*
b. *Port 2 on the router is connected to a PC. This PC is used as a computer network administrator*
c. *Port 3 on the router connected with wireless access point TL-WR941HP to make WIRELESSS network*
d. *Port 4 on the router configured a DHCP server with a range 192.168.0.10 – 192.168.0.50*
e. *Access point connected with the D-Link 8 port Switch to create wired network*
f. *Client PC connected via a switch terminal with UTP cable transmission media*.

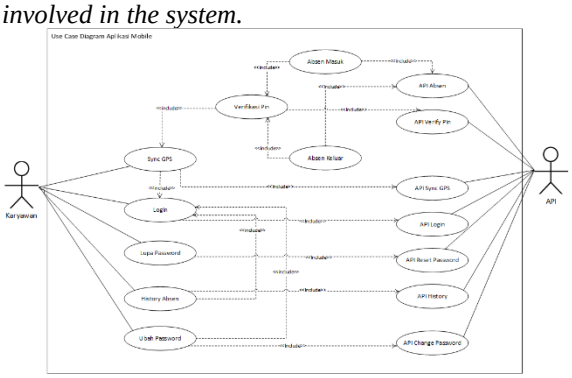
Tabel 4 Daftar IP Address

No	*Hardware*	IP Address	Subnet Mask
1	Router	192.168.1.254	255.255.255.0
2	*Access Point*	192.168.0.1	255.255.255.0
3	*Client Administrator*	192.168.1.2	255.255.255.0
4	*Client*	192.168.0.10 – 192.168.0.50	255.255.255.0

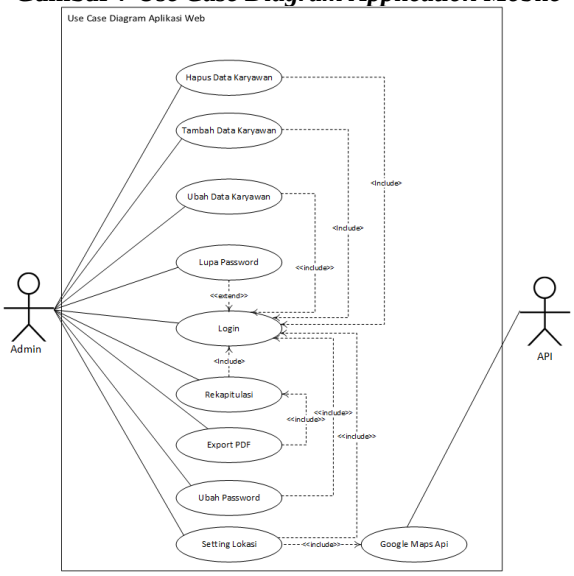
For the security of the changed WiFi network that originally used WPA2-PSK to be MAC address filtering. So that client connected with WiFi is really Clint who get permission. The radius of WiFi to be used to do the absence is 20 meters.

3.4. *Use Case Diagram*

Use case diagram is made to describe the processes that exist in the system and show the actors involved in the system.



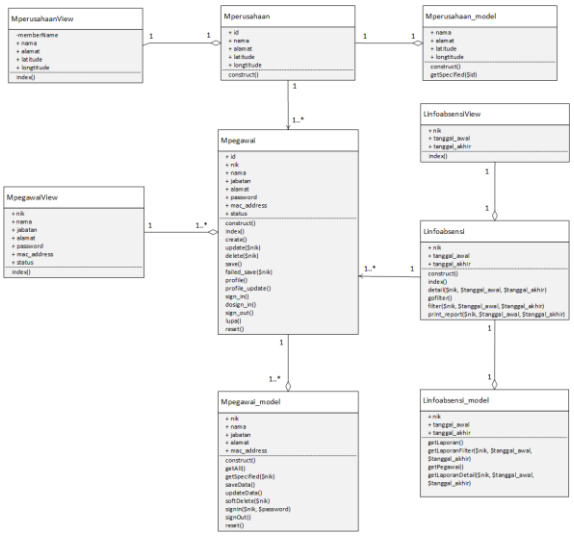
Gambar 7 ***Use Case Diagram Application Mobile***



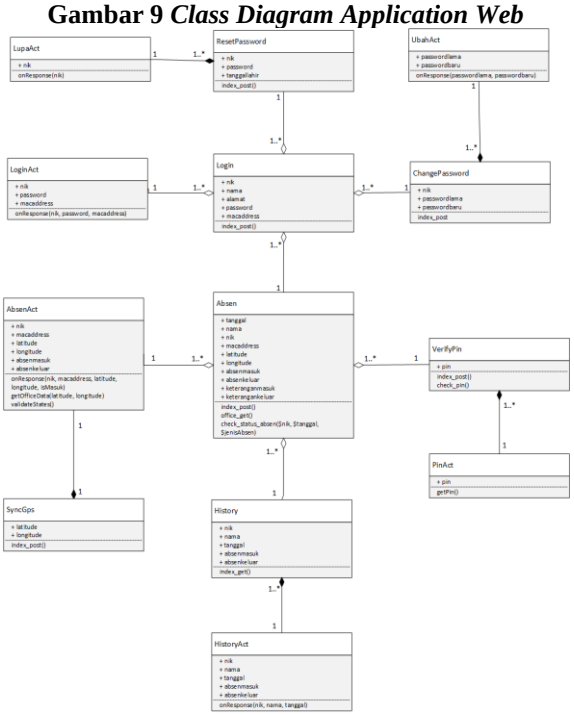
Gambar 8 ***Use Case Diagram Application Web***

3.5. *Class Diagram*

The diagram class is a diagram describing the system structure in terms of the definition of the classes that will be created to build the system. The classes in the system structure must be able to perform the functions according to the needs of the system. The following is a diagram class for Mobile apps:



Gambar 9 *Class Diagram Application Web*



Gambar 10 *Class Diagram Application Mobile*

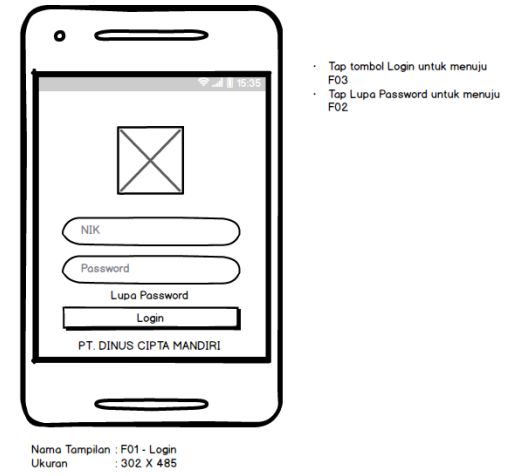
3.6. *Interface design*

The design of interfaces that exist on this system are two applications, namely mobile applications and Web applications.

3.6.1. *Mobile Application Interface Design*

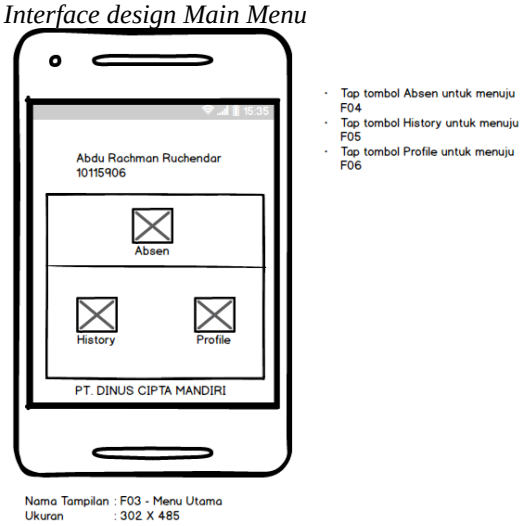
Here is the interface design found in the mobile application built:

1. *Interface design* Login



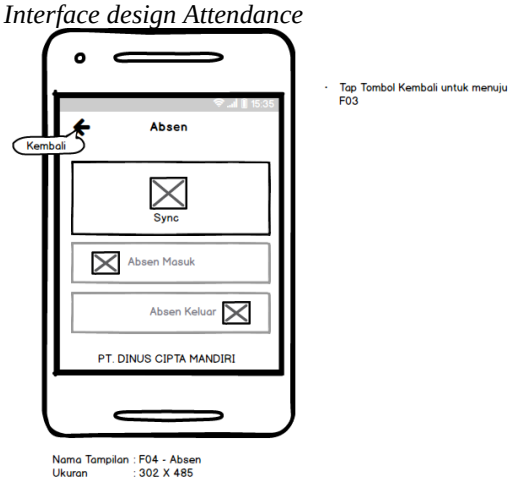
Gambar 11 *Interface Login*

2. *Interface design Main Menu*



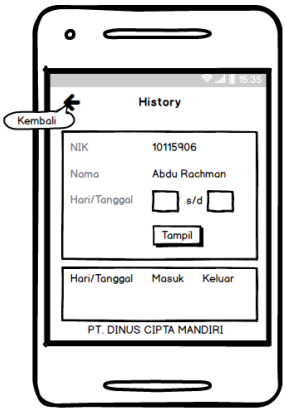
Gambar 12 *Interface Main Menu*

3. *Interface design Attendance*



Gambar 13 *Interface Attendance*

4. *Interface design History*

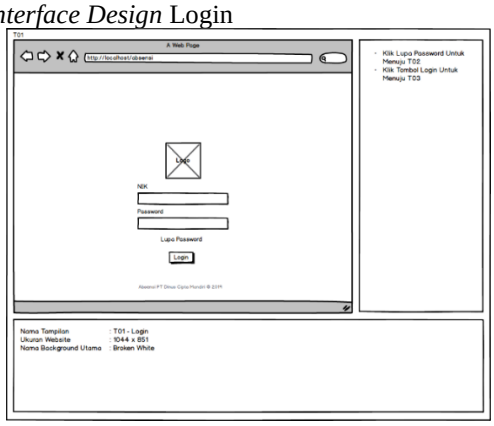


Gambar 14 *Interface History*

3.6.2. *Web Application Interface Design*

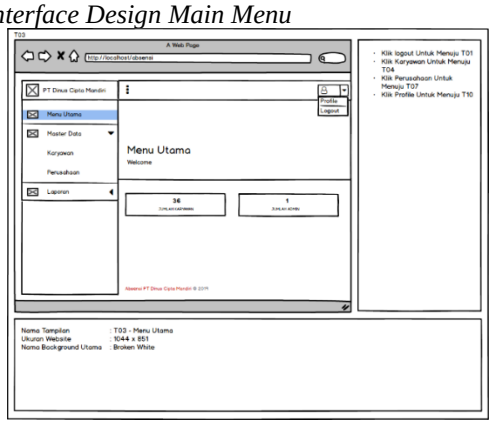
Here is the interface design found on Web applications built:

1. *Interface Design* Login



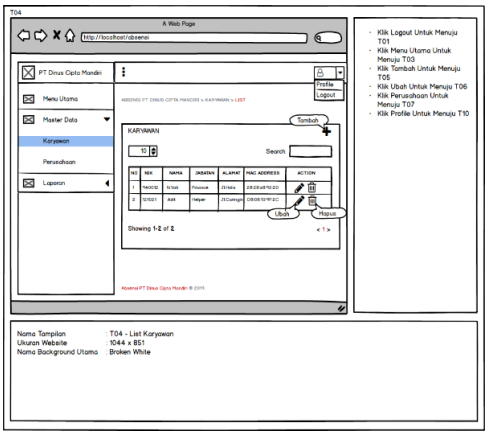
Gambar 15 *Interface* Login

2. *Interface Design Main Menu*



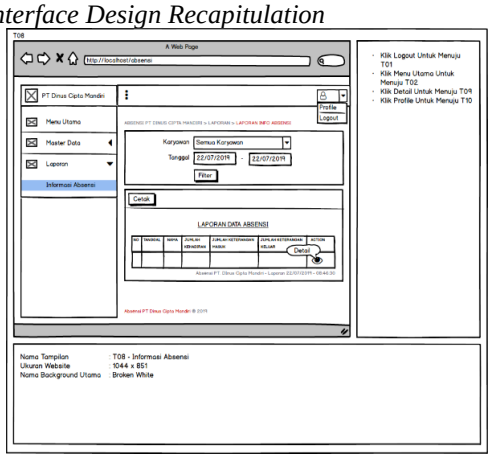
Gambar 16 *Interface Main Menu*

3. *Interface Design List Employees*



Gambar 17 *Interface List Employees*

4. *Interface Design Recapitulation*



Gambar 18 *Interface Recapitulation*

4. *IMPLEMENTATION and TESTING*

4.1. Implementation Interface

Here is the interface implementation on the mobile application:

Tabel 5 *Implementation Application Mobile*

No	Menu	*File Name*
1	*Page* Login	activity_login.xml
2	Page *Forgot* Password	Activity_lupa.xml
3	*Page Main Menu*	activity_home.xml
4	*Page Attendance*	activity_absen.xml
5	*Page History*	activity_history.xml
6	Halaman *Profile*	activity_profile.xml
7	*Page Change* Password	Activity_ubah.xml

Tabel 6 *Implementation Application Web*

No	Menu	*File Name*
1	*Page* Login	login_area.php
2	*Page forgot Passsword*	lupa.php
3	*Page Main Menu*	dashboard.php
4	*Page List Employees*	index.php
5	*Page add Employees*	manage.php

6	*Page Change Employeess*	manage.php
7	*Page Company*	manage.php
8	*Page Information Attendance*	linfoabsensi.php
9	*Page* Detail *Attendance*	Linfoabsensi.php
10	*Page Change Password*	profile.php

4.2. Testing

Testing is the most important thing that aims to find errors in the tested software. This software testing uses black box testing. Here are the tests that have been done:

1. *Mobile Application Testing*

Tabel 7 *Mobile Application Testing*

No	*Test class*	*Test item*	*Types of testing*
1	Login	Login Karyawan	*Black Box*
2	Lupa Password	Lupa Password	*Black Box*
3	Sync	Sync Lokasi	*Black Box*
4	Pin	Verifikasi Pin	*Black Box*
5	Absen Masuk	Absen Masuk	*Black Box*
6	Absen Keluar	Absen Keluar	*Black Box*
7	History	History Absen	*Black Box*
8	Ubah Password	Profile Karyawan	*Black Box*

2. *Web Application Testing*

Tabel 8 *Web Application Testing*

No	*Test class*	*Test item*	*Types of testing*
1	Login	Login Admin	*Black Box*
2	Lupa Password	Lupa Password	*Black Box*
3	Tambah Data Karyawan	Tambah Karyawan	*Black Box*
4	Ubah Data Karyawan	Ubah Karyawan	*Black Box*
5	Hapus Data Karyawan	Hapus Karyawan	*Black Box*
6	Rekapitulasi	Rekapitulasi	*Black Box*
7	Export PDF	Export PDF	*Black Box*
8	Setting Lokasi	Setting Lokasi	*Black Box*
9	Ubah Password	Ubah Password	*Black Box*

5. CONCLUDING

5.1. *Conclusion*

Based on the results obtained from the research conducted in the preparation of the final task referring to the research objectives, it can be concluded.

1. *With this attendance application all employees can monitor the presence in real time.*
2. *With this application helps in the recapitulation of absence and becomes faster and more accurate because the recapitulation process is not done by calculating the number of attendance manually again. In this Web application only enter a period or date range and the app will display its data.*

5.2. *Suggestions*

Attendance application needs more development, therefore there are some suggestions that can be used as a guide for software development in the better direction to support the attendance application at PT Dinus Cipta Mandiri. As for the suggestions on the development of application system attendance are as follows:

1. *This application can be further improved its security in doing absent.*
2. *This application can be developed on other operating systems, such as iOS, and Windows Phone.*

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