



## DESIGN AN INFORMATION SYSTEM FOR EMPLOYEE ATTENDANCE USING BARCODE CODE 39

Suharjo<sup>1</sup>, Muhammad Sakban<sup>2</sup>

<sup>1,2</sup>Department of Information Management, AMIK Parbina Nusantara

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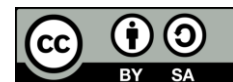
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### ABSTRACT

The development of information and Communication Technology at this time has touched all sides of life. There is almost no side of human life that is not touched by information technology, not least also with computerization that is popular in the corporate environment. When in ancient times everything was still done manually. However, at this time all the leaders and management of the company have realized the importance of this information technology product that can facilitate them in carrying out Daily company functions. Many a design that uses computerized attendance but not integrated with attendance recording. Attendance recording is still manual so that it takes a long time in the process of making attendance because they have to do the counter manually. The waterfall model is used in this study's system technique, which will aid in the creation of the intended software. In this study will be designed a computerized attendance information system where the attendance process using database processing applications using assisted by using the barcode method code 39. The final result of the design of attendance information system is expected to help companies to manage attendance data effectively and efficiently.

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### Corresponding Author:

**Suharjo,**

Department of Information Management,

AMIK Parbina Nusantara

Email: [suharjo@amikparbinanusantara.ac.id](mailto:suharjo@amikparbinanusantara.ac.id)

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## 1. INTRODUCTION

Barcode-based employee attendance Information System is one of the information technology that is widely used by companies today. This is because the use of this method is very helpful and easier in the attendance process itself and the creation of the required reports. Technology and science in the field of computerization at the present time makes the use of computers as supporting work, because at this time it is no longer possible to do something manually. Because if we still use the system manually, there will be many errors that occur and it is difficult for us to change back. Conversely, if using a computerized system, it can be overcome and the time required for these activities will be faster.

The use of the code 39 barcode method is highly promising considering the various benefits that can be acquired for its users, as with prior study conducted under the title design of student absence system

applications using barcode code 39 encoding method at rakyat sei glugur senior high school. A barcode is a set of lines and spaces with a specific thickness that can be read by an optical scanner. Given how widely this barcode is used, the codes have been established so that the barcode reader machine can recognize the barcode's meaning. Additionally, in earlier studies, the use of the barcode system throughout the book-lending procedure at the various D pamulang reading gardens, where book data.

Computers are considered to improve the performance of an institution or company in terms of increasing speed, capacity and accuracy. The use of computers is very necessary considering the problems faced by more and more difficult. The computer is used as a tool in operating the inputs to provide the expected output and results. The processed computer data or output is referred to as information. This has several weaknesses, especially in terms of the accuracy of information needed by management such as employee attendance recapitulation. It required a tool that can process the attendance data. A Barcode is basically an arrangement of black and white vertical lines of different thicknesses. With the barcode and computer attendance data processing will be faster and more accurate where the barcode scan results are stored in a reminder media called the hard drive.

## 2. RESEARCH METHODE

Design is a system design to determine how a system will complete what must be completed, this stage involves configuring the software and hardware components of a system so that after installation of the system will completely satisfy the design that has been set at the end of the system analysis.

### 2.1. System

A system is a set of subsystems that are interrelated and dependent on each other, working in tandem to achieve pre-established goals and objectives. All systems have inputs, processes, outputs and feedback.

### 2.2. Information

Humans often use the terms data and information as the same thing. However, more views data as raw raw material resources that are processed into finished information products. Information is defined as data that has been transformed into meaningful and useful contexts for specific end users. So data usually depends on value-added processes (as data processing or information processing) in an aggregated form, manipulated or organized, analyzed and evaluated, placed in an appropriate context for the wearer. So information is as data that has been processed and put in a context that provides value to a particular end user.

### 2.3. Information Systems

Information system is a system within an organization that meets the needs of daily transaction processing that supports the functions of managerial organizational operations with the strategic activities of an organization to be able to provide certain external parties with the necessary reports. Based on the understanding of information systems above, it is concluded that an information system is a system that transforms data into information and is useful for users.

### 2.4. System Development Life Cycle

The system development life cycle is an approach that is carried out through several stages to analyze and design a system that has been developed very well through the use of specific analysis and user activity cycles. The life cycle of system development is the stage of the process of developing the old system into a new system by correcting the deficiencies contained in the old system, as shown on Figure 1.

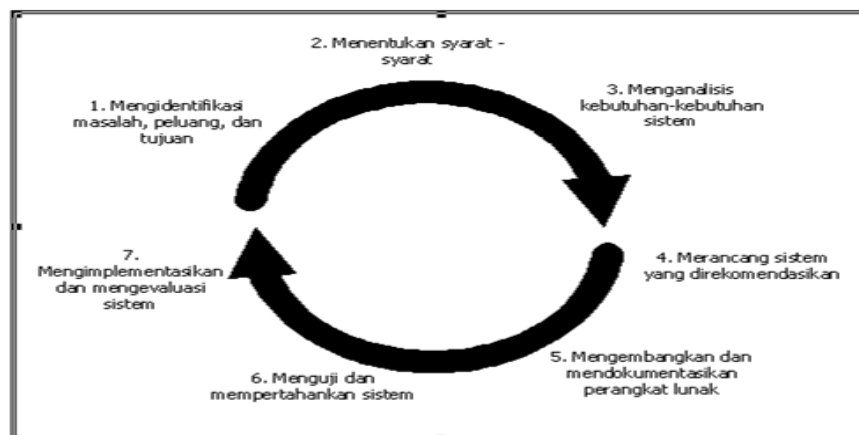


Figure 1 : System Development Life Cycle

description of the system development life cycle can be described as follows:

1. Determine issues, opportunities, and goals  
This initial step suggests that the analyzer takes an unbiased look at what is happening in the system. The analyzer then swiftly identifies the issues and pinpoints them.
2. Term definition  
Anything that establishes the information needs of the concerned users is included in the analyser. Among the instruments used in business to ascertain information requirements are samples and raw data analysis, interviews, behavior of decision makers and office environment observation, and prototyping.
3. Examine system specifications  
The system requirements analysis comes next. Once more, specific tools and methods will aid the analyzer in identifying needs. The tool in question is the creation of structured graphs from lists of inputs, processes, and outputs for business functions using data flow diagrams.
4. Create a suggested system  
The system analyst creates a logical information system architecture at this level by using data that has already been gathered. Data entry procedures are created by the analyst to ensure that all information entered into the information system is accurate. The analyzer also employs certain screen layout and design strategies to guarantee the efficiency of the information system input.
5. Create and catalog software.  
In the fifth stage, the programmer and the analyst collaborate to create the initial software that is needed. Pseudocode, Nassi-Shneiderman charts, and structural plans are a few systematic methods for creating and describing software.
6. Validate and keep up the system  
An information system must first be tested before it can be used. If you can identify a problem before the system is put in place, you will save money. The systems analyst runs some tests, while the programmers themselves handle others. This test series is initially done using both sample data and real data from working systems. At this point, routine maintenance of the system and its documentation starts to be done while the information system is being used
7. Put the system into action and assess it  
The analyzer aids in the information system's implementation at this final step. Training users to operate the system is part of this phase. While some of the training is carried out by the vendor, any mistakes made during training are the systems analyst's own. The analyzer must also prepare for a gradual transition from the old system to the new system.

## 2.5. Barcode

Barcode or in Indonesian often called bar code is an optical machine-readable representation of data. The code is black and white lines and contains a collection of combinations of different sizes, and arranged in such a way according to certain atauran so that it can be translated by the Reading Machine. If you search on google with the keyword "barcode", you will find various types of barcodes that are growing. The code inside the barcode collects data in a one-dimensional linear symbology or also has the shape of a square, point, Hexagon and other geometric shapes in a two-dimensional symbology. Furthermore, since barcodes are usually attached to a specific product, it is of course present the data related to the product where the barcode is located. Using the correct barcode system will certainly benefit the company. Starting from standardized coding, automation and speed in data Reading Ease of users and so on. More fully, here are some of the benefits of barcodes.

1. Standardization of Data Encoding  
The use of barcodes will certainly adhere to a certain standard in coding. With good standardization, it will provide uniformity and ease of data processing. Standardized data encoding using barcodes will certainly ensure that information is received and conveyed in the right way, so that it can be generally accepted and understood.
2. Data reader automation  
Barcodes can be read automatically with a fast time by its reader machine. Thus the user does not have to manually write the code data of an item. For example, the cashier in a supermarket does not type the item code when entering the item data on the computer, but simply shines a barcode reader on the item and the code will automatically be entered into the computer by the barcode reader.
3. Reader Accuracy

Typing data manually by Humans, Of course, is at high risk of error. Errors that commonly occur if typing data manually for example are code reader errors and typos. The slightest typo when entering data, will certainly cause an error in the report resulting from the data processing. The use of barcodes will certainly be able to improve accuracy by reducing human error when entering data manually.

4. User Convenience

Although using a code that is complicated and difficult to read by the ordinary eye, but the barcode scanner machine will simplify everything. Barcode scanner is very easy to use to read barcodes. Just by shining the reader light on the place where the code is written, the code will be read immediately. Furthermore, with the right hardware and software will certainly be able to maximize the process of data collection automation. With this, of course, it will be easier to make an accurate inventory with a barcode system, than manually.

5. Increase productivity and profits

With the ease of use, automation and accuracy offered by barcodes, it is clear that barcodes greatly help increase productivity and company profits. Information generated from data processing will be more timeliness (on time). Thus data will be received quickly, and allow quick decision making based on the latest information. Barcodes also keep business operations short. The increased efficiency that barcodes provide allows companies to save costs most importantly increase profits in their business.

## 2.6. Barcode type Code 39 (code of 39)

An alphanumeric (full ASCII) barcode that can represent alphabets (A-Z) and numbers (0-9), as well as some other characters, such as \$, /, +, %, periods and spaces. The maximum number of digits is 16. Codes like this are usually suitable for barcodes for books and for library members. Other applications for example for inventory, asset tracking and used in identity identification. Barcodes have varying line lengths, The barcode 39 can be found in Figure 2.



Figure 2 : Code 39

Barcode Pattern 39 is very easy to apply. There are several options for programmers to display barcodes 39. For those who don't want to bother with coding, you can buy a ready-made application and sell it commercially, so the programmer will focus more on the form application that must be done, because it is already plug in in the script that is built. However, for programmers who want to write a programming language routine, they can make a translation of Barcode pattern 39 into a script that will describe 0 with a white image and 1 with a black graphic. Barcode length 39 can be used as a variable and in accordance with the needs of the application. Likewise, the thickness and thickness of the black and white image display can be adjusted according to the ratio, starting from 2 to 3, meaning that the comparison of thick black images is 2 times (maximum 3) with thick white images. As the limiting character in Barcode 39 at the beginning and end of the code is given the character “\*” so that the scanner will be easy to interpret the code listed. If the code will be re-examined for correctness, validation characters can be included in the following example. Suppose the exhibitor ID is: \* ZB65732\* then the \* character at the beginning and end is a delimiter, and re-translation (recode) for ZB65732 which is equipped with validation facilities using the Barcode pattern table 39, character value: Z = 35; B = 11; 6 = 6; 5 = 5; 7 = 7; 3 = 3; 2 = 2, if the sum of all the code the result is:  $35 + 11 + 6 + 5 + 7 + 3 + 2 = 69$ . Because all character values in the 30 barcode pattern table are 43, the value of the result of the number of All codes will be divided by 43, the result is:  $69 / 43 = 1$ , remaining 26.

## 3. RESULT AND ANALYSIS

### 3.1. Systems Analysis and Design

Systems analysis is a human-oriented, unstructured activity that involves forecasting and negotiation. While the system design is basically more structured and technical. Conceptually, system analysis is the decomposition of an information system into its component parts with a view to studying the existing system with the intention of conducting research and observation of work units that are seen in managing employee attendance data. To

make it easier to analyze the attendance process carried out on a running system, Flow of Documnet (FOD) is used. FOD employee attendance system as follows Figure 3.

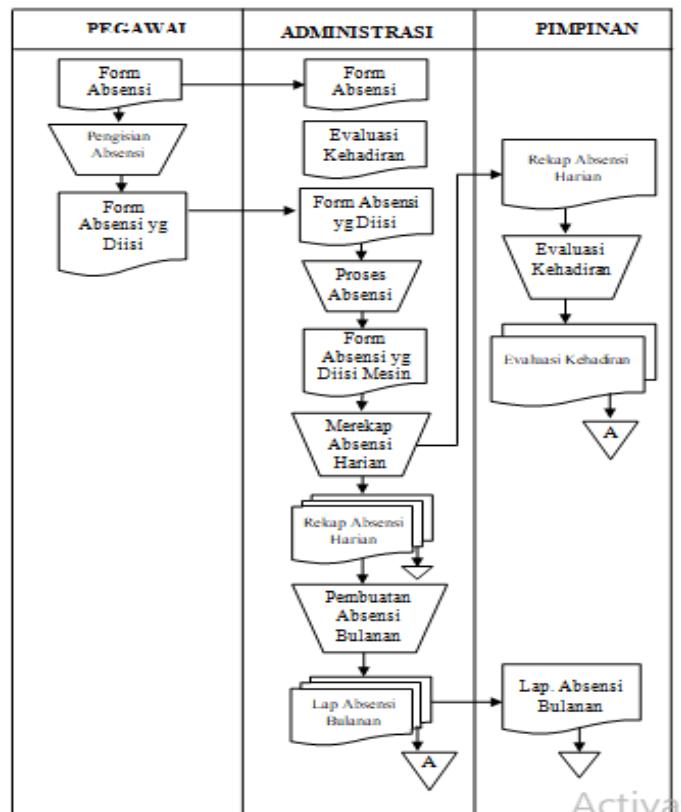


Figure 3. Document Attendance Flow

Description :

1. Employees submit attendance forms to employees to be filled. After the employee fills out the attendance form, the employee again submits the form back to the administration for further processing.
2. Attendance Data are processed using an attendance machine by the administration and will produce a daily attendance recap to be submitted to the leadership.
3. Based on the daily attendance recap of administrative staff then prepare monthly attendance reports.
4. At the end of the month the leader will make a Attendance evaluation report using the daily attendance recap and submitted to the administration.

### 3.2. Analysis Methods Used

Code 39 can encode alphanumeric characters i.e. decimal numbers and uppercase letters as well as additional special characters (-.\*\$/%+). One character in code 39 consists of 9 elements, namely 5 bars (black vertical lines) and 4 spaces (white vertical lines) arranged alternately between bars and spaces. 3 of the 9 elements have a thickness thicker than all the others. The 3 thicker elements consist of 2 bars and 1 space. The wide element represents the binary digit 1 and the narrow element represents the binary digit. Images of code 39 characters and their character values are listed below Figure 4.

Karakter ASCII	Karakter Set										Nilai Karakter
	Digit Biner										
	B	S	B	S	B	S	B	S	B	S	
0	0	0	0	1	1	0	1	0	0	0	0
1	1	0	0	1	0	0	0	0	0	1	1
2	0	0	1	1	0	0	0	0	0	1	2
3	1	0	1	1	0	0	0	0	0	0	3
4	0	0	0	1	1	0	0	0	0	1	4
5	1	0	0	1	1	0	0	0	0	0	5
6	0	0	1	1	1	0	0	0	0	0	6
7	0	0	0	1	0	0	1	0	0	1	7
8	1	0	0	1	0	0	1	0	0	0	8
9	0	0	1	1	0	0	1	0	0	0	9
A	1	0	0	0	0	1	0	0	0	1	10
B	0	0	1	0	0	1	0	0	0	1	11
C	1	0	1	0	0	1	0	0	0	0	12
D	0	0	0	0	1	1	0	0	0	1	13
E	1	0	0	0	1	1	0	0	0	0	14
F	0	0	1	0	1	1	0	0	0	0	15
G	0	0	0	0	0	1	1	0	0	1	16
H	1	0	0	0	0	1	1	0	0	0	17
I	0	0	1	0	0	1	1	0	0	0	18
J	0	0	0	0	1	1	1	0	0	0	19
K	1	0	0	0	0	0	0	1	1	0	20
L	0	0	1	0	0	0	0	1	1	1	21
M	1	0	1	0	0	0	0	1	0	0	22
N	0	0	0	0	1	0	0	1	1	1	23
O	1	0	0	0	1	0	0	1	0	0	24
P	0	0	1	0	1	0	0	1	0	0	25
Q	0	0	0	0	0	0	1	1	1	1	26
R	1	0	0	0	0	0	1	1	0	0	27
S	0	0	1	0	0	0	1	1	0	0	28
T	0	0	0	0	1	0	1	1	0	0	29
U	1	1	0	0	0	0	0	0	1	0	30
V	0	1	1	0	0	0	0	0	1	1	31
W	1	1	1	0	0	0	0	0	0	0	32
X	0	1	0	0	1	0	0	0	1	0	33
Y	1	1	0	0	1	0	0	0	0	0	34
Z	0	1	1	0	1	0	0	0	0	0	35
-	0	1	0	0	0	0	1	0	1	0	36
SPACE	1	1	0	0	0	0	1	0	0	0	37
*	0	1	1	0	0	0	1	0	0	0	38
\$	0	1	0	1	0	1	0	0	0	0	39
/	0	1	0	1	0	0	0	1	0	0	40
+	0	1	0	0	0	1	0	1	0	0	41
%	0	0	0	1	0	1	0	1	0	0	42

Figure 4. Character Code 39 And Its Character Value

While, structure of the barcode Code 39 is as follows Figure 5.

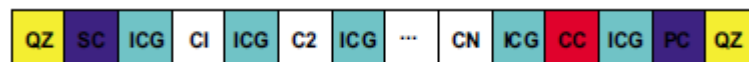


Figure 5. Structure of the Barcode Code 39

Description :

- X : Narrow element thickness (minimum 0.19 mm).
- QZ : Quiet zone or Start-Stop Margin with a minimum thickness of 6 mm or 10 times X
- SC : Start character (character \*)
- ICG : Inter Character Gap with a thickness of 1 kaliX
- C1 .. CN: 1st character to Nth character.
- CC : Check character
- PC : Stop character (character \*)

To be able to distinguish wide and narrow vertical lines, the thickness ratio between wide and narrow vertical lines is at least 2:1, where a 3: 1 ratio would be better. The overall width of the barcode can be formulated as follows:

$$L = \underset{\text{I}}{N(3RX+7x)} + \underset{\text{II}}{(6RX + 13X)} + \underset{\text{III}}{(3RX + 7X)} + \underset{\text{IV}}{(MI + M2)} \tag{1}$$

Description :

- L : Overall Width of barcode
- N : Number of characters
- R : Comparison of wide and narrow vertical lines

- X : Narrow Vertical Line Thickness  
 I : N character width plus N inter character gap  
 II : Width of the start and stop characters plus 1 inter character gap between the start character and the first character.  
 III : Check Character width plus 1 inter character gap  
 IV : Width 2 times quiet zone (M1 (start margin) + M2 (stop margin)). Check character is the remainder of the sum of all character values divided by 43.

Here is the implementation of barcode structure using employee NIP

Barcode for NIP : 19521206  
 Message : 19521206  
 Character : 19521206  
 Character value : 1 9 5 2 1 2 0 6  
 Total :  $1 + 9 + 5 + 2 + 1 + 2 + 0 + 6 = 24$   
 Result :  $26/43 = 0.61$

here is barcode 39 for 19521206, as shown on Figure 6.



Figure 6. Barcode Result 39 Text 19521206

A different NIP can be used in the following works:

Barcode for NIP : 19521207  
 Message : 19521207  
 Character : 19521207  
 Character value : 1 9 5 2 1 2 0 7  
 Total :  $1 + 9 + 5 + 2 + 1 + 2 + 0 + 7 = 27$   
 Result :  $27/43 = 0.62$

here is barcode 39 for 19521207, as visualized in Figure 7



Figure 7. Result Barcode 39 Teks 19521207

Barcode for NIP : 19521208  
 Message : 19521208  
 Character : 19521208  
 Character value : 1 9 5 2 1 2 0 8  
 Total :  $1 + 9 + 5 + 2 + 1 + 2 + 0 + 8 = 28$   
 Result :  $28/43 = 0.65$

here is barcode 39 for 19521208, as illustrated in Figure 8



Figure 8. Result Barcode 39 Teks 19521208

Barcode for NIP : 19521209  
 Message : 19521209  
 Character : 19521209

Character value : 1 9 5 2 1 2 0 9  
 Total : 1 + 9 + 5 + 2 + 1 + 2 + 0 + 9  
 Result : 28/43 = 0.65

here is barcode 39 for 19521209, as represented in Figure 9



Figure 9. Result Barcode 39 Teks 19521209

### 3.3. System Design

#### a. Entity Relation Diagram (ERD)

The explanation Entity Relationship Diagram designed in the system is as follows :

1. In the FK position entity, the position is the primary key and is the foreign key in the Employee entity where the relationship formed is one to many.
2. In the FK group entity, the primary key and the foreign key in the Employee entity where the relationship formed is one to many.
3. In the FK employee entity, the employee is the primary key and is the foreign key in the attendance entity where the relationship formed is one to many.
4. In the noabsen attendance entity is the primary key where the relationship formed is one to many with the Employee entity.

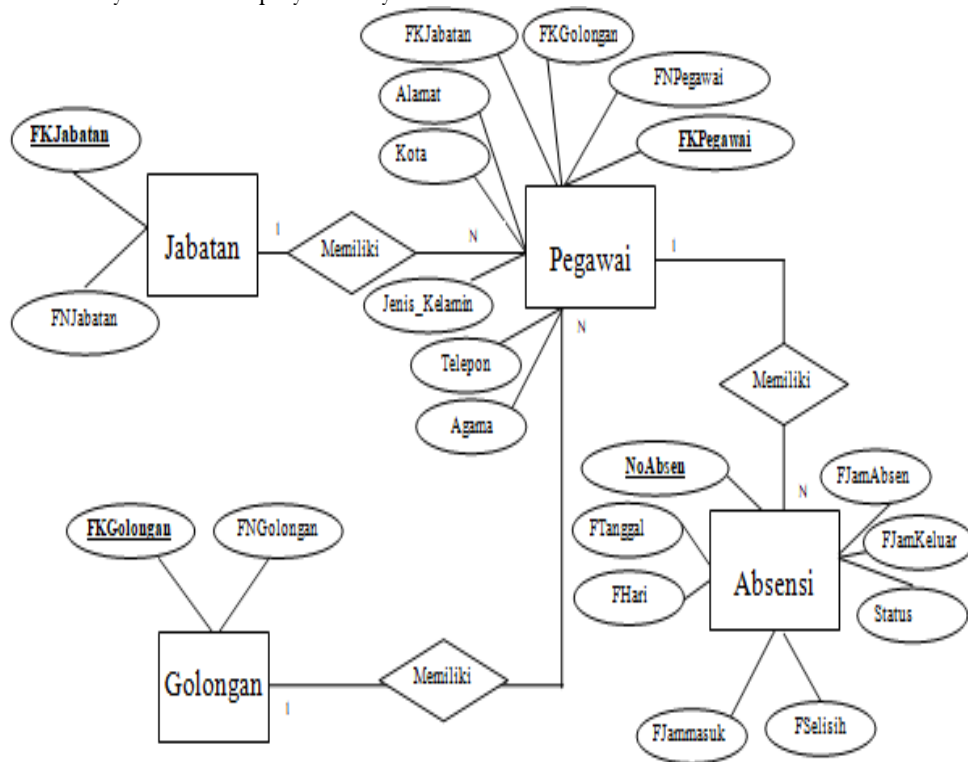


Figure 10. ERD Attendance Information System

The output design of employee attendance information system is as follows :

#### b. Attendance Card

The employee attendance card design is as shown below, Figure 11 :



Figure 11. Attendance Card

- Output name : attendance card.
- Function : as an employee attendance tool.
- Media : paper, computer and Barcode Scanner.
- Distribution : personnel.
- Description : This card is used every day by employees to record hours presence. Usage using a parallelized barcode scanner with a computer.

**c. List Of Employee**

The design of the list screen is as shown below, Figure 12

No	NIP	Nama	Jenis Kelamin	Pendidikan	Tanggal Mulai Kerja	No.SK Pegawai	Status Pegawai	Alamat	Kota	No. Telp

Figure 12. Staff List

- Output Name : List of Employees.
- Function : Display the list of employees
- Description : Report displays data such as NIP, name, address, work start date, SK number and employee status.
- Media : Paper
- Frequency : Any additions or changes in employee data.

**d. Daily Attendance Report**

The design of the daily attendance report screen is as shown below, Figure 13.

Figure 12. Daily Attendance Report

Output Name : Daily Attendance Report.  
 Function : Present daily attendance report  
 Description : Report displays attendance data such as clock in, and the difference if the employee concerned is late coming.  
 Media : Paper.  
 Frequency : Every day.

**e. Employee Attendance Recapitulation**

The design of the employee attendance recapitulation screen is as shown below, Figure 14.

Bulan :					
No	NIP	Nama	Status	Total Kehadiran	Total Jam Terlambat

Diketahui

NIP: \_\_\_\_\_

Figure 14. Employee Attendance Report

Output Name : Employee Attendance Report.  
 Function : Present employee attendance reports at PT. Invilon Sagita Medan.  
 Description : Report displays employee attendance data such as hours enter, and the difference if the employee concerned is late to come.  
 Media : Paper.  
 Frequency : Every day.

### 3.4. Design Input

The design input system informasi employee attendance as follows :

**a. Mater Class**

The design of the master input group is as shown on Figure 15

Golongan		X
Kode Golongan	<input type="text"/>	▼
Nama Golongan	<input type="text"/>	
<input type="button" value="BATAL"/> <input type="button" value="HAPUS"/> <input type="button" value="SIMPAN"/> <input type="button" value="TUTUP"/>		

Figure 15. Master Class Sail Plan

Input name : Group.  
 Function : Perform data input Officer Class  
 Information : Class code and class name must be filled in the data.

**b. Master Department**

The design of the position master's output is as shown below :

Figure 16. Master Sail Plan Department

Entry Name : Department.  
 Function : Perform data input Officer Department  
 Description : Position Code and position name must be filled in the data.

**c. Master Officer**

The employee master consists of three tabulations, namely employee data tabulation, academic data tabulation, personal data tabulation. The design of the employee Tab employee master input is as shown on Figure 17.

Figure 17. Tab Master Screen Design

**d. Academic Data Tab Master**

The design of the input Master employee academic Data Tab as illustrated in Figure 18.

**INPUT DATA PEGAWAI**

PEGAWAI	DATA AKADEMIS	DATA PRIBADI
LULUSAN TERAKHIR	TAHUN	
TANGGAL DAN NOMOR SK		
IZASAH TERTINGGI		
TANGGL MULAI KERJA	<input type="checkbox"/> AKTIF	
JABATAN		
GOLONGAN		
KETERANGAN KES EHTAN		
	GOLONGAN DARAH	TINGGI BADAN (CM)
		BERAT BADAN (KG)

Photo  
INPUT GAMBAR

BATAL HAPUS SIMP TUTUP CETAK KARTU

Figure 18. Academic Data Tab Master Screen Design

e. **Master Personal Data Tab**

The design of the Personal Data Tab employee master input is as shown on Figure 19.

**INPUT DATA PEGAWAI**

PEGAWAI	DATA AKADEMIS	DATA PRIBADI
NAMA ORANG TUA		
ALAMAT ORANG TUA		
TELEPON / HAND PHONE ORANG TUA		
ANAK KEBERAPA	JLH. SAUDARA	
STATUS MENIKAH		
NAMA ISTRI		
JUMLAH ANAK		

BATAL HAPUS SIMPAN TUTUP CETAK KARTU

Figure 19. Personal Data Tab Master Screen Design

Entry name : Officer.  
 Function : Input employee data  
 Information : Code, Name, Address, City, phone, religion, class, position, All Academic tabs must be filled in or they must not be empty.

**F. Attendance**

The design of employee attendance input is as shown on Figure 20.

HARI		00:00:00	
TANGGAL			
Tanggal	<input type="text"/>	Photo	
Nip	<input type="text"/>		
Nama	<input type="text"/>		
Jabatan	<input type="text"/>		
Golongan	<input type="text"/>		
Jam Absen	<input type="text"/>		
Terlambat	<input type="text"/>		

Figure 20. Employee Attendance Screen Design

Input name : Attendance.  
 Function : Record employee attendance every day.  
 Description : Employee attendance process is done using barcodes.

#### 4. CONCLUSION

The conclusions obtained as follows:

1. The system that runs requires a long time in the preparation of reports needed by the company.
2. The running system has a high error rate in the process of making reports because the recording uses manual.
3. The lack of control over the attendance process used by the old system, so the occurrence of fraud is very high, this is because the recording is done manually.
4. The system designed is a computerized system.
5. The system is designed to avoid fraud during the process of recording attendance. This is because the attendance process uses a barcode scanner and the recording time is adjusted to the computer where the system is located.
6. The system is designed to generate daily attendance reports and attendance recapitulation automatically.

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