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Employee Payroll Accounting Application Using Extreme Programming Development Method

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ARTICLE INFORMATION

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ABSTRACT

Technology allows company structures to become more effective and efficient for payroll system applications, as almost all parts of the company have adopted this technology. One such company, PT. Langgeng Engineering Tehnik Indonesia, which produces and sells spare parts, has an HR department responsible for managing extensive employee data, including payroll data. The process is currently done manually with the help of Microsoft Excel, requiring a high level of accuracy and being very prone to errors. The most significant issue is certainly payroll management, as it relates to the company's finances and employee welfare. To reduce the risk of errors in managing this data, particularly payroll, this research aims to contribute by creating a payroll application designed to facilitate management in processing and disbursing salaries to every employee working in the company, while also minimizing the risk of errors in management. The application is built using the Extreme Programming method, which offers advantages in terms of rapid development, efficiency, adaptability, and flexibility. This application is developed as a desktop-based solution using Java programming language, as its users are limited and it is intended for internal company use. The application is tested using Black Box testing, a technique that evaluates the functionality without considering the internal structure of components or systems. The testing is conducted with eight scenarios, and all tests yield valid results.

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INTRODUCTION

The development of information technology has transformed various aspects of human resource management in companies. One important component of this management is the employee payroll system. Salary is a type of compensation in a work relationship, consisting of services provided by a company to its employees, paid in monetary form and regulated according to legal principles (Rahmawati & Yaumaidzinnaimah, 2021). At PT Langgeng Engineering Teknik Indonesia, the payroll management system still uses Microsoft Excel, facing various challenges. Although Excel offers ease in data processing, the use of this method in employee payroll often results in a slow process, requiring a high level of accuracy and being prone to errors. The manual calculation

process, from attendance data to overtime wage calculations, takes longer and can disrupt the company's operational efficiency.

A study was conducted at SMP Islam Taman Quraniyah, which still uses a manual method for processing employee payroll. Some payroll operations are performed in writing in a ledger, facing various challenges, leading to the development of this payroll information system, which can certainly improve the performance of its financial department (Fitriyani et al., 2020). Another study was conducted to build an information system related to a vocational training center by applying Extreme Programming as the method for developing the information system. This method was chosen because it develops software using an agile framework concept that provides simple stages, relatively short system development time, and aligns with the developer's focus scope (Pohan & Firdaus, 2022).

Extreme Programming is a reliable software development framework that helps produce high-quality software (Shrivastava et al., 2021). In this context, the application of the Extreme Programming (XP) method becomes highly relevant. XP is an approach to software development that emphasizes team collaboration, rapid iterations, and constant feedback. This method is designed to enhance flexibility in responding to changing user needs, thereby resulting in applications that better meet expectations and operational requirements. By applying XP in the design and development of payroll accounting applications, it is hoped that data management processes can be carried out more effectively and efficiently.

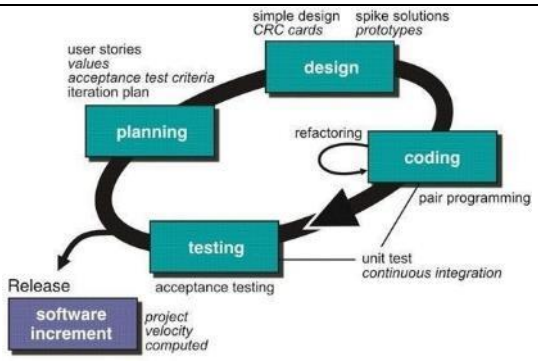
This research aims to design and build an accounting application for managing employee payroll with several supporting features at PT Langgeng Engineering Teknik Indonesia using the Extreme Programming method. By transitioning from an Excel-based system to a more integrated application, it is expected that the payroll data processing will become faster, more accurate, and more structured.

Through this section, the author aims to provide a comprehensive overview of the background of the problem, the research objectives, and the significance of applying the Extreme Programming method in the context of employee payroll at PT Langgeng Engineering Teknik Indonesia. It is hoped that the results of this research will make a meaningful contribution to improving the quality of the payroll system in the company while also offering innovative solutions for managing employee data.

RESEARCH METHOD

1. Data Collection Methods
   In the preparation of this report, the author employed several data collection methods, namely:
   a. Observation
      The author conducted direct observations of activities related to employee payroll. These observations were recorded by the author, who was able to identify errors and the payroll process from the observed activities.
   b. Interview
      To obtain comprehensive information for this report, the author conducted a question-and-answer session with Mrs. Sumiyati from the finance department regarding all activities related to employee payroll at PT Langgeng Engineering Teknik Indonesia.
   c. Library Method
      The author conducted a literature review through various sources, including books, journals, and references related to the preparation of the report.
2. System Development Model
   Extreme Programming is a software development model that simplifies various stages of system development to make them more efficient, adaptive, and flexible. The core values of the Extreme Programming method are as follows (Septiani & Yanti, 2021):
   a. Communication: Emphasizes the importance of effective interaction between programmers and users, as well as among programmers themselves.
   b. Courage: Software developers need to always have confidence, courage, and integrity in carrying out their tasks.
   c. Simplicity: Do everything simply.
   d. Feedback: Relies on feedback, which requires quality team members.
   e. Quality Work: A quality process results in quality software as the final output.

   The Extreme Programming method, also known as XP, is a form of software development model that has stages or phases of system development that are more efficient, adaptive, and flexible. XP not only focuses on coding but also encompasses all areas of software development.



Source: (Fazrin et al., 2021)

Figure 1. Extreme Programming Method

Figure 1 represents the framework of the Extreme Programming development method, which consists of four stages, namely (Carolina et al., 2019):

1) Planning
   This phase is the initial step in system development and involves several planning activities such as problem identification, needs analysis, and establishing a schedule for system development implementation. The planning stage can begin by listening to a series of system activity requirements, allowing users to understand the business processes of the system and have a clear picture of the main features, capabilities, and desired outcomes (Hutagalung & Arif, 2018). During this stage, the activities of the payroll system to be implemented in the application are formulated, and the necessary tools for building the application are prepared.
2) Design
   The next stage is the design phase, where modeling activities are carried out, starting from system modeling, architecture modeling, to database modeling. System and architecture modeling use Unified Modeling Language (UML) diagrams, and database modeling uses Entity-Relationship Diagrams (ERD).
3) Coding
   This phase involves the implementation of the model, which is translated into the user interface using a programming language. PHP is used as the programming language with a structured method. For database management, MySQL software is used.
4) Testing
   After the coding phase is completed, the next step is system testing to identify any errors that occur when the application is run and to determine whether the system meets user requirements. The testing method used is black box testing, which will verify whether several input forms function as intended. Black box testing is a testing technique that does not consider the internal structure of the components or the system (Sutiah & Supriyono, 2021).

RESULTS AND DISCUSSION

1. Planning
   Based on the payroll process in place at PT Langgeng Engineering Teknik Indonesia, the next stage is needs analysis. The main function of this application is payroll management. However, there are additional features to support the payroll management process. Below are the system requirements for the payroll system at PT Langgeng Engineering Teknik Indonesia.
   a. User/Treasurer Requirements:
      5) Perform Login
      6) Manage Employee Attendance
      7) Manage Employee Loans
      8) Manage Forecast Forms
      9) Manage Employee Forms
      10) Manage General Journal Forms
      11) Manage Payroll
      12) Manage Reports
   b. Hardware Specifications:
      The hardware here refers to the specifications of the computer that physically supports the system.
      1) Processor: Celeron, @2.13 GHz
      2) RAM: 4 GB
      3) Hard Disk: 500 GB
      4) Monitor: 14” LED

5) Keyboard: 108 keys
6) Printer: Dot matrix
7) Mouse: Standard

c. Software Specifications:
Software is a component of the data processing system consisting of programs used or required to control the system and operate the hardware, ensuring that the programs created by the author function properly (Rahmawati & Yaumaidzinnaimah, 2021).
1) Java NetBeans IDE 8.1 is used as a tool to create and design the program interface.
2) XAMPP is used to create the database structure

2. Design
a. Use Case Diagram
A use case diagram is a diagram used to inform stakeholders about what the system can do (Abdillah et al., 2019). Below is the use case diagram for the payroll application.

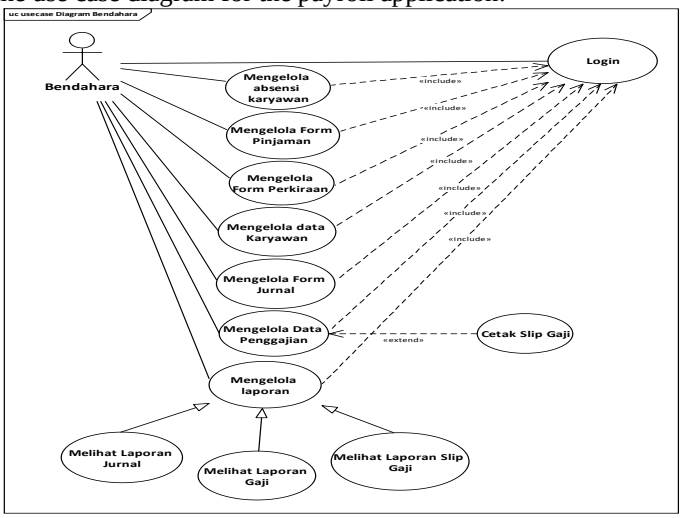


Figure 2. Use Case Diagram for the Payroll Application

Based on Figure 2, there are several cases in the employee payroll application, each with its own objectives as follows:
1) Login Case
The treasurer logs into the user page, which contains employee data, employee salary data, attendance, report data, forecast data, and journals.
2) Attendance Case
The treasurer can manage the data available in the attendance submenu.
3) Loan Case
The treasurer can manage the data available in the loan submenu.
4) Forecast Case
The treasurer can manage the data available in the forecast submenu.
5) Employee Case
The treasurer can manage the data available in the employee submenu.
6) General Journal Case
The treasurer can manage the data available in the general journal submenu.
7) Payroll Case
The treasurer can manage the data available in the payroll submenu.
8) Report Case
The treasurer can display report data

b. Activity Diagram
An activity diagram is an activity diagram that depicts the workflow and activities of a system, actor, or business process (Yusman, 2018). The activity diagram illustrates system activities in the form of a collection of actions, showing how the action starts, possible decisions that may occur, and the conclusion of that action (Suendri, 2018). Based on the use case diagram that has been created, there are eight activities in this payroll application: login, attendance, loans, employees, general journal, payroll, and reports. Below

is the activity diagram for the payroll page, which is the main activity of the application.

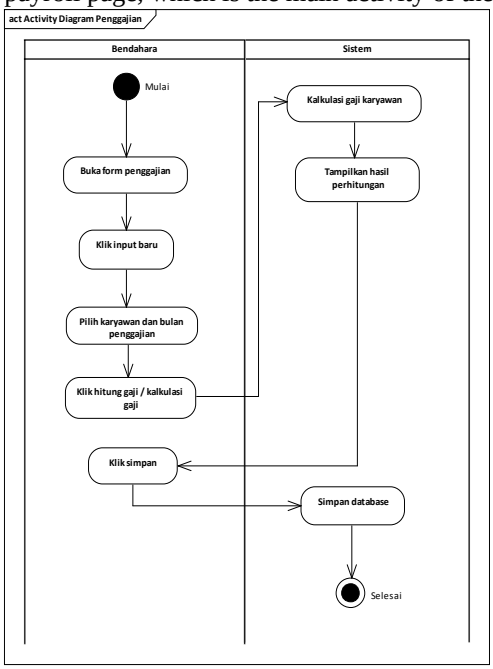


Figure 3. Payroll Activity Diagram

c. Database

The database for this payroll application is designed with an ERD and represented using LRS. Below is the Entity Relationship Diagram for the Payroll Application.

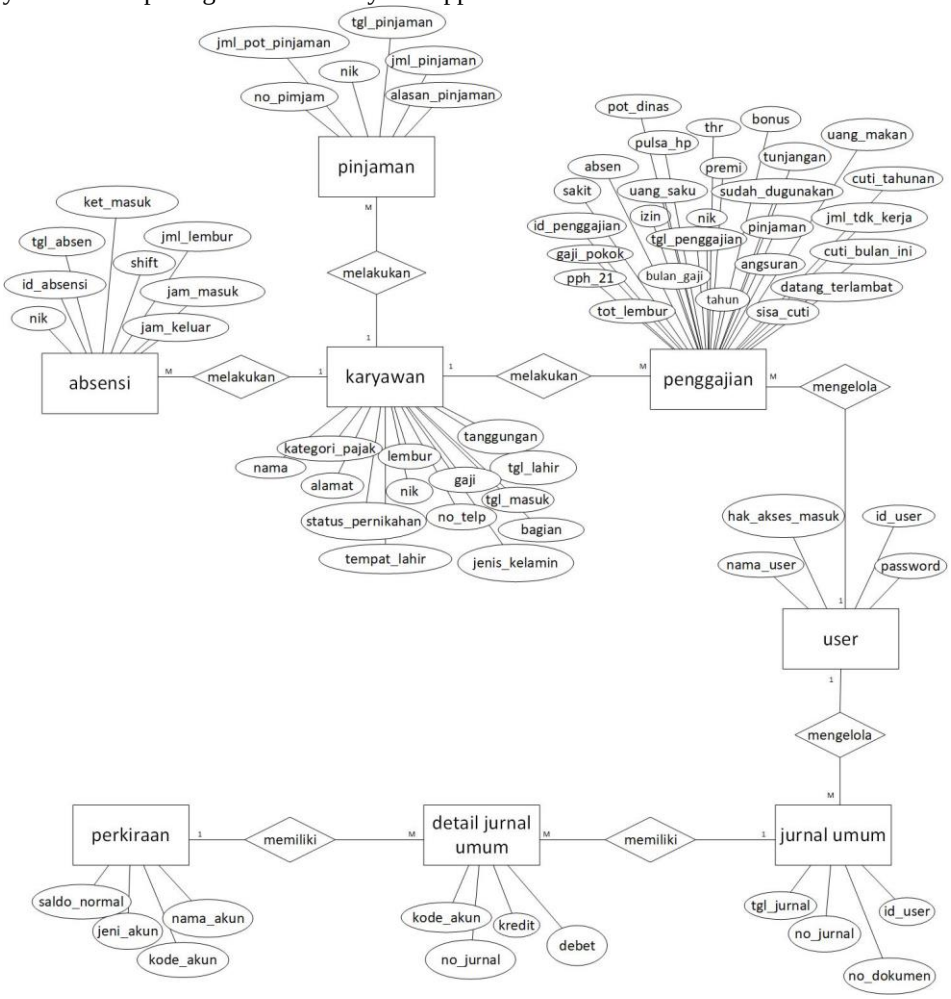


Figure 4. Entity Relationship Diagram for the Payroll Application

Below is the representation of the database design for the Payroll Application.

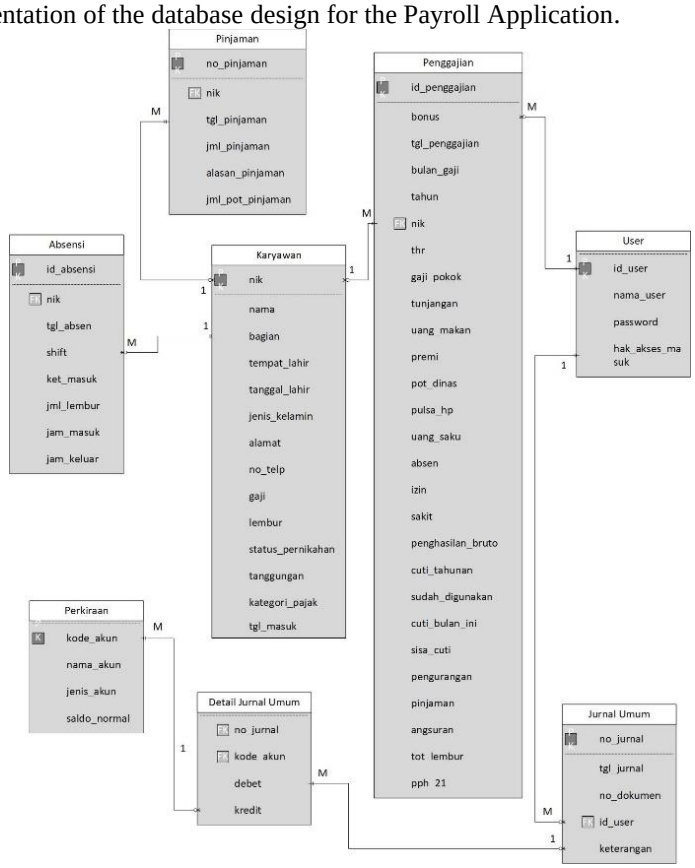


Figure 5. Logical Record Structure (LRS) for the Payroll Application

d. Software Architecture

1) Class Diagram

Below is the class diagram for the Payroll Application.

Figure 6. Class Diagram for the Payroll Application

2) Sequence Diagram
A sequence diagram represents user activities based on the chronological order of interactions with the system (Suendri, 2018). Below is the sequence diagram for payroll management.

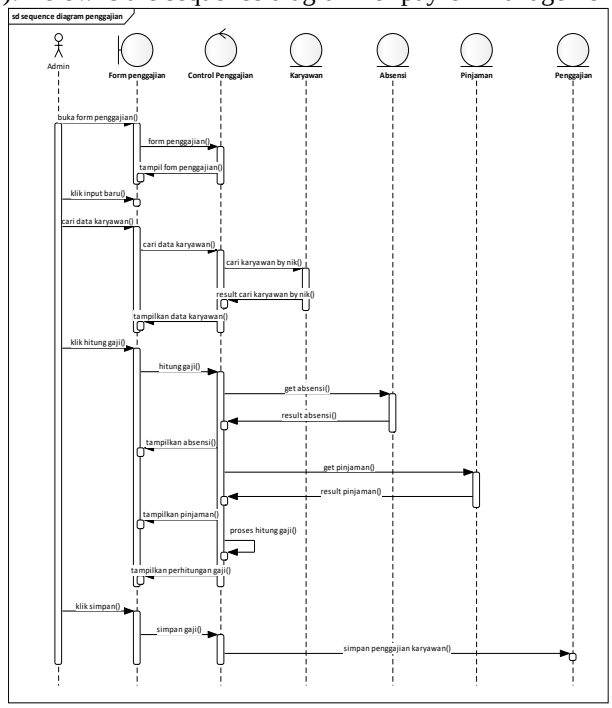


Figure 7. Sequence Diagram for the Payroll Application

3) Component Diagram
Below is the Component Diagram for the Payroll Application

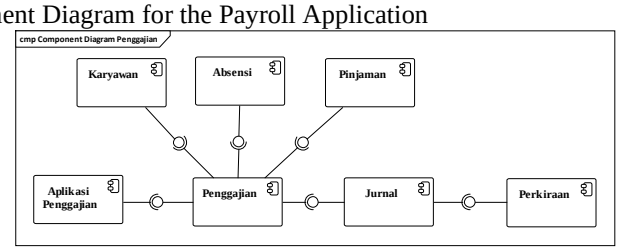


Figure 8. Component Diagram for the Payroll Application

4) Deployment Diagram
A deployment diagram is a diagram that visualizes specifications and documents the methods occurring within a software system using UML (Hadi et al., 2018). Below is the deployment diagram for the Payroll Application.

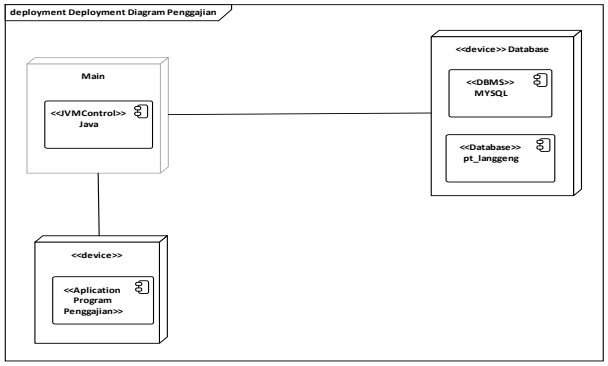


Figure 9. Deployment Diagram for the Payroll Application

3. Coding
The payroll application is built as a desktop-based system using the Java programming language, which is part of object-oriented programming (OOP). It utilizes NetBeans IDE as the development tool. The database is managed using SQL with MySQL tools, and the Apache web server is embedded within the XAMPP application. Below is the interface of the developed application.

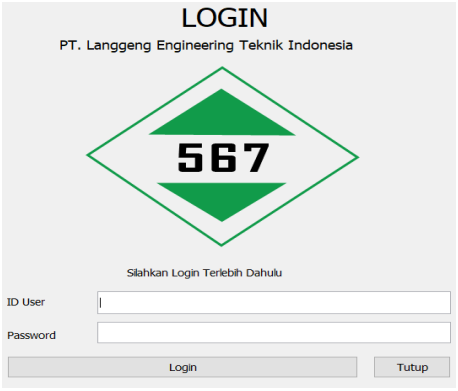


Figure 10. Login Interface of the Payroll Application

Figure 10 shows the login screen for users who are already registered in this payroll application. The login process requires a username and password, which must already be registered in this payroll application.

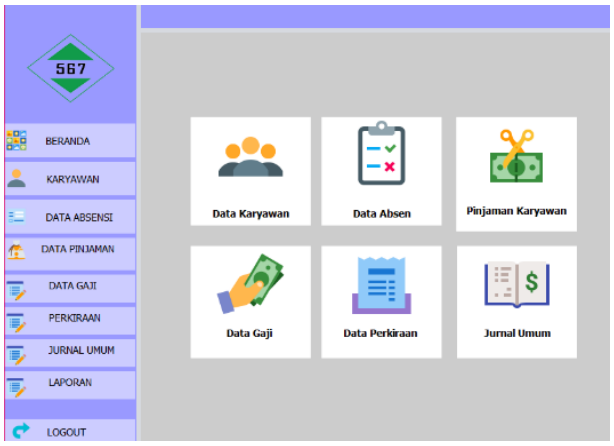


Figure 11. Home Interface of the Payroll Application

Figure 11 shows the main screen of the application after logging in using the treasurer's account. On this page, there are the main menus of the payroll application, including Employee Data, Attendance Data, Employee Loan Data, Salary Data, Estimate Data, and General Journal.

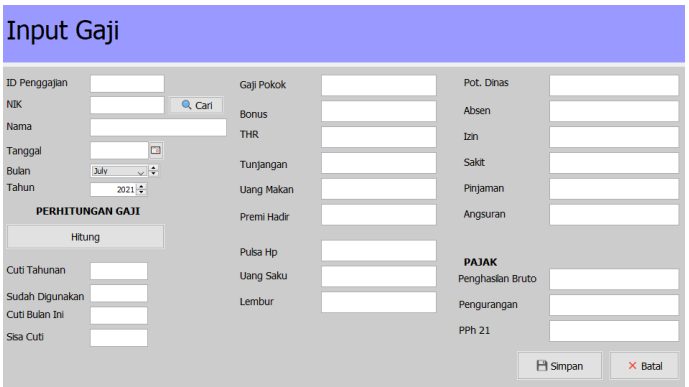


Figure 12. Salary Input Interface of the Payroll Application

Figure 12 shows the form for inputting salary data, which consists of various fields used for salary calculations, along with the tax calculation for the employee's salary.

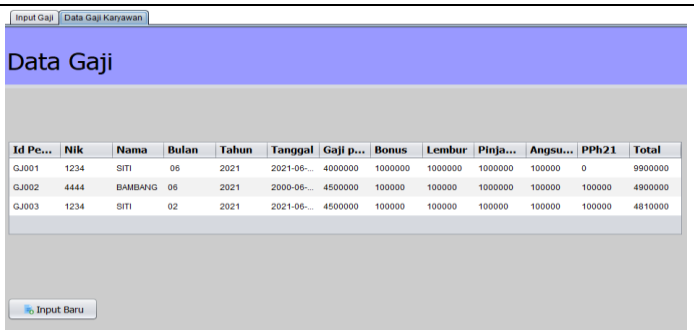


Figure 13. Display Payroll Data

Figure 13 shows the employee salary data that has been input and stored in the database of this payroll application.

4. Testing

Testing was conducted using the Black Box method, which is the process of testing the functionality of the developed program (Agita Sari et al., 2021). Testing scenarios were carried out for each case present in this payroll application. Below are the conclusions from the testing results.

Table 1. Black Box Testing result

Testing	Number of Testing Scenarios	Compliant	Non-compliant	Conclusion
Login Testing	3	3	0	Valid
Employee Data Input Testing	3	3	0	Valid
Salary Input Testing	3	3	0	Valid
Attendance Input Testing	3	3	0	Valid
Loan Input Testing	3	3	0	Valid
Estimation Input Testing	3	3	0	Valid
General Journal Input Testing	3	3	0	Valid
Report Testing	3	3	0	valid

CONCLUSION

This Payroll Application has been successfully developed using the Extreme Programming methodology, which has advantages in terms of a relatively short development time. The application was tested with eight Black Box Testing scenarios corresponding to the number of cases present in the application. The testing results indicate that the application's functionality overall meets expectations, as all tested scenarios yielded valid results. With the computerized application, errors in recording payroll data can be minimized. The application is easy to use, and within the payroll system, there are features such as employee attendance, employee data, employee loan data, user data, salary records, general journals, and reports.

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