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A Cross-Platform Payroll Information System for SMEs: An Agile-Scrum Approach at CV. Gema Syifa Engineering

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Abstract

This study focuses on constructing an integrated payroll application utilizing web and Android platforms at CV Gema Syifa Engineering through the implementation of Agile Scrum methodology. The primary challenge motivating this research involves the company's reliance on a semi-automated compensation mechanism that necessitates manual information entry via spreadsheet documents and data storage in fragmented directories. This situation generates various operational obstacles including time wastage during payroll data insertion, elevated frequency of data validity errors, restricted information access, and complexity in remuneration computation procedures. Furthermore, the absence of system integration results in sluggish wage calculation execution, inconsistent computational outcomes, and questionable data credibility. The research approach adopts the Agile Scrum framework which facilitates adaptive and cyclical software development processes through sprint iterations. System architecture is designed by applying Unified Modeling Language (UML) notation encompassing use case representations, activity flow diagrams, interaction sequence diagrams, and database structures normalized to the third stage (3NF).Implementation outputs demonstrate that the constructed solution successfully accommodates comprehensive integration of the entire payroll workflow, spanning from personnel information administration, attendance documentation, overtime computation, to automated generation of compensation calculations and salary slip documents. The application provides layered access segregation: administrators possess full privileges for system configuration, while employees can access their personal remuneration information and attendance records. Security protection mechanisms are implemented through two-factor authentication (2FA) for administrators and automatic account locking systems following three unsuccessful login attempts. System verification through Blackbox testing approach confirms that all functionalities operate according to design parameters. This implementation proves to optimize efficiency and precision in payroll data management, minimize computational errors, and provide superior accessibility for HR divisions and workforce. The system is projected to support enhanced operational performance and human resource satisfaction at CV Gema Syifa Engineering.

Keywords: Payroll Information System, Web, Android, Agile Scrum, CV Gema Syifa Engineering.

1. Introduction

The rapid technological development due to globalization has changed the way humans think and work, especially in computer usage. Computerization is now used in various fields because it can save time, effort, and costs, as well as reduce errors in data processing [1]. One important part of companies that requires speed and accuracy is the payroll system. Payroll is directly related to employee welfare, so salary data must be managed quickly, accurately, and carefully to properly reflect employee work contributions [2].

Regulation of the Minister of Law and Human Rights of the Republic of Indonesia Number 17 of 2018 regulates Limited Partnerships (Commanditaire Vennootschap), hereinafter referred to as CV, which is a partnership established by one or more limited partners with one or more general partners, to conduct business continuously [3]. The automotive industry is one of the largest contributors to Indonesia's economic growth. Currently, the strength of the automotive industry in Indonesia is supported by at least 26 four-wheeled motor vehicle industry companies with a total production capacity reaching 2.35 million units per year. The automotive industry has also absorbed 38 thousand direct workers, as well as more than 1.5 million people working along the automotive supply chain from tier 1 to 3 [4]. The two-wheeled motor vehicle industry in Indonesia has successfully increased local content. PT Astra Honda Motor (AHM) has nearly 100% local content in its motorcycle products, with details: underbone motorcycles 98%, scooters 97%, and sport motorcycles 91% [5].

CV. Gema Syifa Engineering is a company operating in the automotive field and producing motorcycle spare parts. Based on research results, the company still uses a semi-manual payroll system, where data is recorded through forms and then input into computers using separate worksheets. This work method makes the payroll process inefficient, prone to errors, and risks file loss or damage. In addition, the non-integrated system causes computers to only be used for data entry without processing it, resulting in slow salary calculations, often inaccurate results, and unreliable generated reports. To solve the above problems, a payroll system model needs to be created that can facilitate the company in performing calculations and data collection [6]. Therefore, based on these conditions, a web-based information system is needed

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that can facilitate salary data processing and minimize errors in salary data processing to produce more accurate reports and process data efficiently [7].Web-based applications are applications that do not need to be installed first on computers or can be run directly using web browsers. Web-based applications have advantages of being lightweight and can be accessed quickly through browsers and internet connections to servers. This means users can access information easily through laptops, smartphones, even PCs without having to install applications just to access data/information [8].

In developing the payroll information system for CV. Gema Syifa Engineering, the Agile Scrum method is used, which is a gradual and flexible software development approach, making it easy to adjust changes during the development process. Scrum as an Agile framework divides the process into several cycles or sprints lasting a maximum of 30 days, including sprint planning activities, daily meetings (daily scrum), result reviews (sprint review), and process evaluations (sprint retrospective) [9]. Based on this background, this research is focused on developing a Web and Android-based payroll information system using the Agile Scrum method at CV. Gema Syifa Engineering. Based on the above background, the problem can be formulated as: How to build a computerized payroll information system that is web and Android-based that is effective and efficient for CV. Gema Syifa Engineering?.

2. Research Method

This development process includes the approaches, methods, and steps used in system development. Agile methodology provides a flexible and iterative approach, suitable for complex projects with tight timelines, allowing adjustments to changing requirements while managing cost, scope, and quality according to user needs [10]. Scrum, as part of Agile, is a framework for efficiently developing complex products, enabling teams to handle challenging problems and deliver high-value outcomes [11].This study uses the Agile Scrum method, dividing the system development process into several stages: data collection, system analysis, and system design [12].

Research data was collected through three main methods to obtain a comprehensive understanding of problems in the manual payroll system at CV. Gema Syifa Engineering. First, observation was conducted by directly monitoring and gathering data related to employee payroll processing. Second, interviews were carried out with the company head to obtain in-depth information regarding system constraints and organizational needs. Third, a literature review was performed by examining relevant books, journals, and articles, as well as utilizing previous research findings as a foundation for developing the payroll information system [13].

This stage includes analysis of the current system to identify problems, followed by design of the proposed new system.

CV Gema Syifa Engineering currently still relies on manual employee salary recording. This semi-computerized system causes several serious constraints, including time-consuming data processing, high risk of input errors, and complicated salary calculations. This condition indicates the need for a more efficient, accurate, and integrated digital payroll system to improve productivity and minimize human error [14].

This new system design was created considering the weaknesses of the previous manual system and the functional requirements that have been analyzed. In the design process, Unified Modeling Language (UML) is used to visualize the system structure and architecture. UML is a standard language used to define, visualize, build, and document various elements in a software system [15]. These elements can be models, descriptions, or software components developed during the application creation process. UML diagrams are utilized at various development stages by various parties, including analysts, programmers, and teams handling application infrastructure or networks [16]. The diagrams used include:

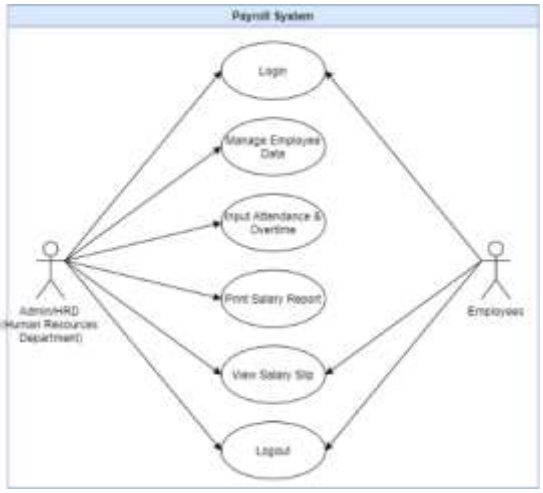

Figure 1. Use Case Diagram

A use case diagram illustrates the actors involved in a system and the actions they are able to perform. This diagram highlights the available features and how users interact with the system [17]. Based on Figure 1, the Use Case Diagram shows that two types of users are involved in the system. The first is the HR Admin, who can log in, manage employee data, input attendance and overtime records, print salary reports, and view payslips. The second is the Employee, who has access to log in and view their own payslips.

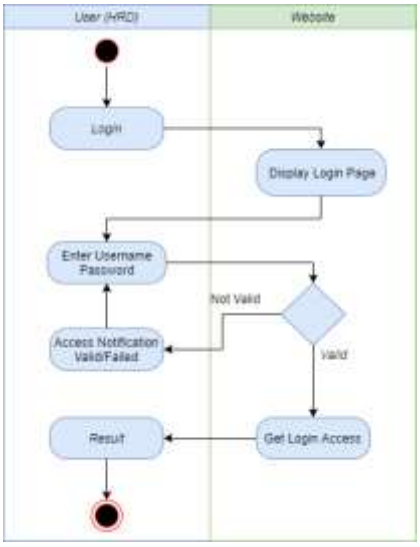

Figure 1. Activity Diagram Login

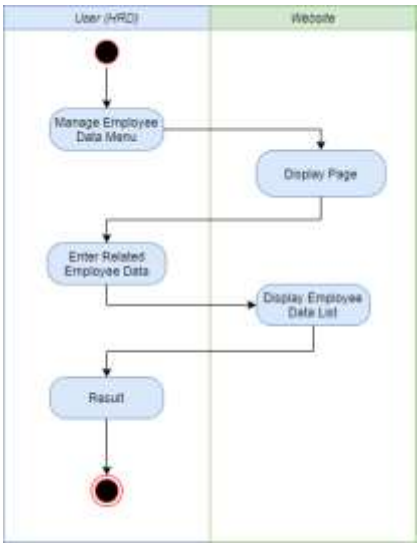

Figure 2. Activity Diagram Employee Data

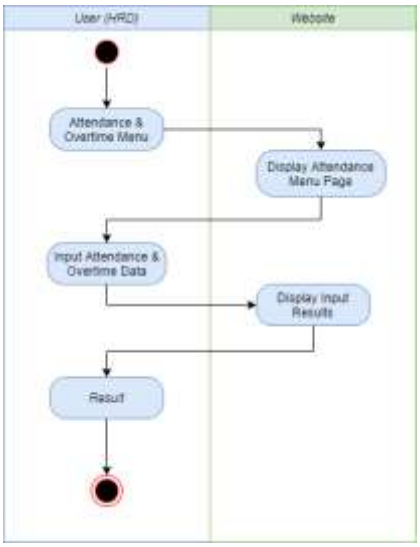

Figure 4. Activity Diagram for Attendance and Overtime Input

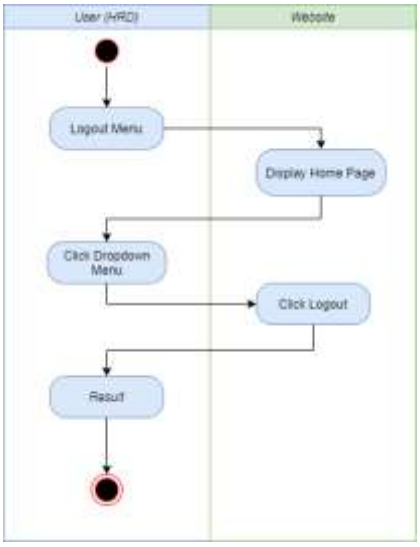

Figure 5. Activity Diagram Logout

Activity diagrams illustrate the workflow or activities of a system or business process or menu in the software [18].

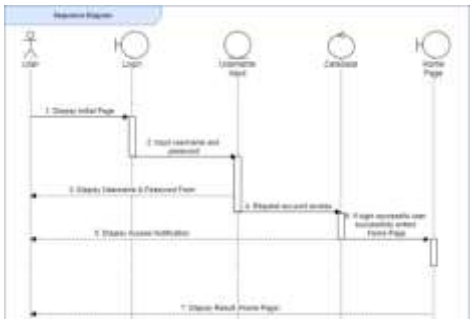

Figure 6. Sequence Diagram Login

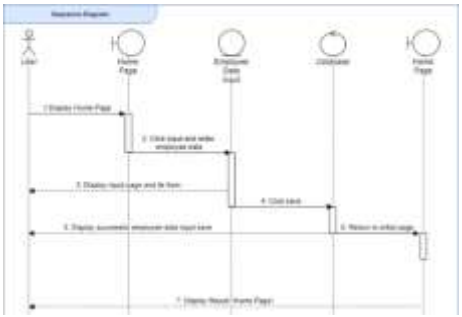

Figure 7. Sequence Diagram Employee Data

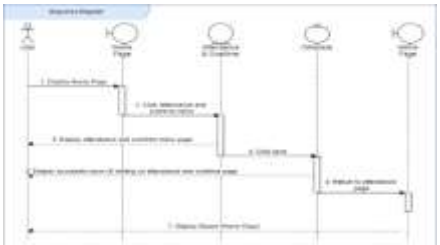

Figure 8. Sequence Diagram for Attendance and Overtime Input

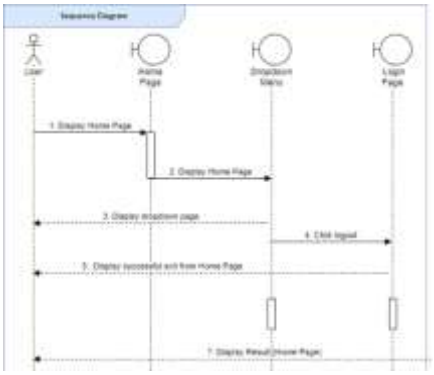

Figure 9. Sequence Diagram Logout

Sequence Diagram illustrates object behavior in use cases by describing object lifetimes and messages sent and received between objects [19].

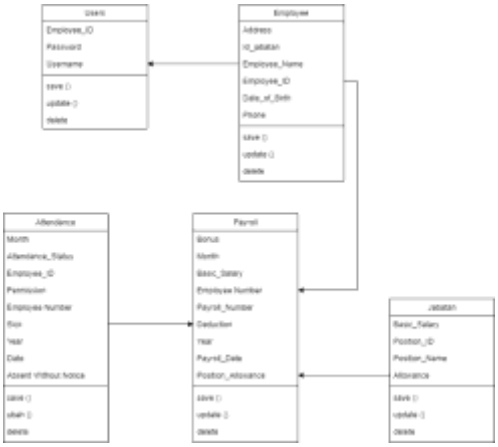

Figure 10. Class Diagram

Class Diagram is a static diagram that illustrates the system structure from a class perspective. This diagram shows the classes that will be used in the system along with attributes (data) and operations (methods) owned by each class. With class diagrams, relationships between classes in the system can be clearly seen, including inheritance, association, aggregation, and composition relationships [20].

3. Result and Discussion

This section explains the design and development results of the system, including user interface displays, while conducting comparative analysis with research objectives and relevant theoretical foundations. Development of the Payroll Information System at CV Gema Syifa Engineering has been successfully implemented according to the design created using Agile Development methodology. This system is designed to overcome weaknesses in the manual payroll system and improve efficiency of employee salary management processes. Following are implementation results visualized through user interfaces:

Figure 11. Website Login User Interface

Figure 12 Android Login User Interface

The login page in the payroll application has two types of access rights: admin and user. Admins can manage all data and system features, while users can only view their own salary data. Users log in using username and password, with a maximum limit of 50 characters. If login errors occur up to three times in a row, the account will be locked for 30 minutes. For additional security, admins use Two-Factor Authentication (2FA) based on OTP sent to official email before being able to access the system. This system aims to protect important data and ensure only authorized users can make changes.

Figure 13. Admin Dashboard Website

Figure 14. User Dashboard Website

Figure 15. Admin Dashboard Android

The payroll application dashboard displays the main page after user login, functioning as an information center and access to other features. Several main components include salary recipient information for monitoring payment status, total number of employees, and system date and time in real-time. Navigation menu is on the left side of the screen, with differences in access rights between admin and user; admins can manage user data, positions, attendance, and payroll, while users can only view salary data and manage their own accounts. In addition, there is a calendar feature that facilitates monitoring of schedules and activities related to payroll or attendance. Overall, the dashboard is designed to provide quick summary of important information and facilitate data management.

Figure 16. Employee Data Management Page on Website

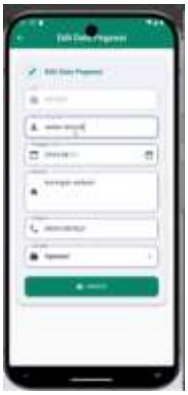

Figure 17. Employee Data Management Page on Android

The Employee Data and Position Data pages, which can only be accessed by admins, function to add, manage, and store employee information in a structured manner. In Employee Data, admins fill in information such as employee ID, name, date of birth, address, phone number, and position related to the position table. While in Position Data, admins record position name, basic salary, and allowances for each position. This form becomes an important element because the entered data is used as the basis for attendance management and salary calculations, making the data collection process more efficient, organized, and minimizing manual recording errors.

Figure 18. Attendance Input Page on Website

Figure 19. Attendance Input Page on Android

The employee attendance page, part of the transaction menu, is used to record employee attendance based on certain periods. On the input form, admins select month/year and employee ID from dropdown lists connected to stored employee data. This page allows systematic attendance management, making the recording process more efficient, reducing manual errors, and facilitating integration with the payroll module.

Figure 20. Salary Calculation Page Display on Website

Figure 21. Salary Calculation Page Display on Android

The salary data page, part of the transaction menu, is used to manage employee payroll processes based on certain periods. Admins can select month/year and employee ID from stored data, so salary input is done in a structured manner and integrated with attendance and position data. After salary data is entered, the system automatically generates payslips containing details of income, allowances, and deductions for each employee, which are then distributed according to company regulations. This feature ensures more accurate, efficient salary calculations and reduces potential errors compared to manual systems.

In this study, testing was carried out using the Black-box Testing method. This approach evaluates the system's performance based on its responses to various inputs, without requiring knowledge of the program's internal structure or logic. The testing primarily focuses on verifying whether each feature produces the expected output according to predefined test scenarios [21] [22] [23] [24]. This ensures that the system functions correctly from the user's perspective. The table below contains test scenarios for several main functions in the application:

Tabel 1. Black Box Testing

No	Test Name	Expected Result	Result
1	Click Login	If entering wrong username and password and clicking login button, system will display message "Login Failed! Username & password do not match."	OK
		If entering correct username and password, will be directed to dashboard page.	OK
2	Click Homepage	Display main menu or dashboard page information.	OK
3	Click Submenu	Display menus within menus, whether in the form of input forms and others.	OK
4	Click Profile	Display input username, password, level, and upload photo.	OK
5	Click User Data	Display form to add user data, click save, data saved in database.	OK
6	Click Position Data	Display form to add employee position data, click save, data saved in database.	OK
7	Click Employee Data	Display form to add employee or worker data, click save, data saved in database.	OK
8	Click Attendance	Display attendance form and CRUD functions.	OK
9	Click Salary	Display salary form and CRUD functions.	OK
10	Click Change Password	1.Enter wrong old password, click change then pop up "oops! Password Wrong" will appear.	OK
		2.Not filling all columns, click change then pop up "please fill in the existing columns first" will appear.	OK
		3.Enter correct old password and fill all columns, click change then pop up "Password successfully changed" will appear.	OK
11	Click Logout	Display login page again.	OK

Implementation and testing results using the Black Box method (Table 1) show that the developed system can solve all research problems and achieve predetermined objectives. Based on implementation and testing results, it can be concluded that all design stages have been successfully realized into a functioning application according to design. Concepts, theories, and references used were realized well, so each feature meets established standards and methods. This web and Android-based payroll information system can be accessed by admins and users according to their respective access rights. Testing with the Black-box method shows all main functions run smoothly without significant errors. Thus, this system successfully answers research problems, is in line with applied theories and methods, and achieves the main objective, namely creating an effective, efficient, secure, and integrated payroll system for CV. Gema Syifa Engineering.

4. Conclusion

Based on the research on the design and implementation of a web- and Android-based payroll information system at CV Gema Syifa Engineering, several conclusions can be drawn. First, the system was designed using UML and Agile methods, supported by a database normalized to 3NF, in order to enhance efficiency, accuracy, and integration in payroll management. Second, the system was successfully implemented with core features such as login, employee data management, attendance and overtime recording, and the generation of salary calculations and payslips. Third, testing using the Black-box method showed that all features functioned according to the design, producing accurate input and output without logical errors. Based on these conclusions, the author proposes several recommendations for parties interested in the continuation or application of this research. The first is operational testing, where the application should be tested directly within the CV Gema Syifa Engineering work environment to ensure system stability and its ability to meet user needs effectively. The second is feature development, where future enhancements may include automatic salary notifications for employees and integration with the company's financial system to further streamline payroll processes. The third recommendation is training and socialization, in which HRD personnel and employees should receive adequate training prior to full implementation to minimize usage errors and improve overall system effectiveness.

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