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Development of a Web-Based Training Administration Information System at PT ZAF International

Muhammad Fahmi[1], Septiano Alvian Ismau[2], Yasin Kamil[3], Sutriyono[4]
Program Studi Teknik Informatika, Fakultas Ilmu Komputer, Universitas Pamulang.
Jl. Raya Puspitek, Buaran, Kec. Pamulang, Kota Tangerang Selatan, Banten 15310

Article Info

Corresponding Author:
Muhammad Fahmi
E-mail:
muhamfahmi03@gmail.com

ABSTRACT

PT ZAF International is a training institution that provides various training programs for the community. Previously, the training administration process utilized Google Forms for participant registration and spreadsheets for data management. The use of separate applications made the administrative process less efficient, required more time for data processing, and increased the risk of errors in assigning Participant Identification Numbers (NIP) and managing participant records. This internship aimed to design and develop a Web-Based Training Administration Information System to improve the administrative process at PT ZAF International. The system was developed using the Waterfall software development method, which consists of the requirements analysis, system design, implementation, testing, and maintenance stages. The application was built using the Laravel framework with PHP as the programming language and MySQL as the database management system. System testing was conducted using the Black Box Testing method to ensure that all system functions operated according to the specified requirements. In addition, User Acceptance Testing (UAT) was carried out to evaluate the system's acceptance by the end user. The result of this internship is a web-based information system that provides features for participant registration, registration data management, participant management, training management, training categories, training batches, referral management, and user management. The system is also capable of generating Participant Identification Numbers (NIP) automatically, thereby reducing the manual work previously performed by the administrator. Based on the testing results, all system functions operated successfully, and the system was considered capable of improving the efficiency and effectiveness of the training administration process while facilitating data management at PT ZAF International.

Keywords: Information System, Training Administration, Laravel, Waterfall, Black Box Testing, User Acceptance Testing.

INTRODUCTION

The education sector is currently undergoing a significant transformation driven by the rapid advancement of information and communication technology (ICT) (Surianto et al., 2023). This transformation has been accelerated by the continuous growth of internet users

worldwide, making the internet a fundamental infrastructure for communication, information exchange, and data transmission without geographical or time constraints. As a result, educational and training institutions are increasingly adopting digital technologies to improve the effectiveness of data management and overcome the limitations associated with conventional manual administrative systems (Surianto et al., 2023). Moreover, the growing competition among educational institutions requires organizations to provide administrative services that are faster, more accurate, and more efficient to enhance organizational quality and competitiveness (Surianto et al., 2023). In the era of digital transformation, administrative processes such as participant registration and admission have increasingly shifted toward online platforms to improve transparency, accessibility, and service quality (Surianto et al., 2023). Online registration systems have proven effective in accelerating administrative procedures through automation and real-time accessibility. By implementing such systems, participants no longer need to visit the institution directly because all registration activities, from form submission to announcement of results, can be completed online. Furthermore, digital registration systems significantly reduce data entry errors commonly found in manual administrative processes through structured data validation and management mechanisms (Ansar, 2023; Surianto et al., 2023).

PT ZAF International currently faces considerable challenges in managing training administration, which requires efficient, accurate, and integrated data processing. However, the existing administrative process still relies on Google Forms for participant registration and spreadsheet applications for data management. The use of separate applications creates several operational problems, including lengthy administrative procedures, inefficient data processing, and a high risk of manual input errors. Furthermore, the absence of an integrated information system makes it difficult for administrative staff to synchronize participant information efficiently, resulting in delays in data verification, participant record updates, and administrative reporting.

To address these challenges, this study proposes the development of a web-based Training Administration Information System that integrates digital registration forms with a centralized administrative dashboard for participant data management. A web-based information system is considered an effective solution for improving the speed, accuracy, and efficiency of administrative processes. The proposed application was developed using the PHP programming language because it is specifically designed for web application development, supported by affordable hosting services, and backed by a large developer community, making it a cost-effective solution for web-based information systems (Upwork, 2023; GeeksforGeeks, 2025). The system was implemented using the Laravel framework, which provides numerous development advantages, including an MVC architecture, template engine, routing mechanism, and modular components that facilitate application development and maintenance (Siregar et al., 2024). In addition, MySQL/MariaDB was employed as the database management system due to its reliability, ease of implementation, and strong security features for web applications (Siregar et al., 2024). The software development process adopted the Waterfall model, which consists of requirements analysis, system design, implementation, testing, and maintenance, thereby ensuring a structured and systematic software development lifecycle.

The proposed system is expected to improve participant registration and training administration by providing a centralized database that enables administrators to record, manage, retrieve, and monitor participant information more efficiently. In addition, the system is

designed to enhance administrative effectiveness by providing well-structured and easily accessible information while reducing the workload associated with repetitive manual data processing. Through centralized data management and process automation, the system is expected to minimize data processing errors, improve operational efficiency, and support faster, more organized, and more reliable training administration at PT ZAF International.

METHOD

This study employed a Research and Development (R&D) approach to design and develop a web-based training administration information system for PT ZAF International. The research focused on analyzing the existing administrative process, designing an integrated information system, implementing the application, and evaluating its functionality and user acceptance. The developed system aims to improve the efficiency of participant registration and administrative data management by replacing the previously separated use of Google Forms and spreadsheet applications with a centralized web-based platform.

Data collection was conducted through three techniques, namely observation, interviews, and literature study. Observation was carried out by directly examining the existing administrative workflow at PT ZAF International to identify operational problems and user requirements. Interviews were conducted with the organization's management and administrative staff to obtain detailed information regarding system requirements, current administrative procedures, and challenges encountered during participant data management. In addition, a literature study was performed by reviewing books, scientific journals, and other relevant publications related to information systems, web application development, software engineering, and training administration to support the system development process.

The software development process adopted the Waterfall model, which provides a structured and sequential framework consisting of five stages: requirements analysis, system design, implementation, testing, and maintenance. During the requirements analysis stage, functional and non-functional system requirements were identified based on the results of observation and interviews. The system design stage involved developing system models using Unified Modeling Language (UML), including flowcharts, activity diagrams, use case diagrams, sequence diagrams, class diagrams, database design, and user interface design. The implementation stage translated the approved design into a functional web application using the Laravel framework, PHP programming language, and MySQL database management system. The testing stage evaluated the developed application before deployment, while maintenance was intended to support future system improvements and operational sustainability.

The developed application provides integrated features for participant registration, participant management, training management, training categories, training batches, referral management, user management, and automatic generation of Participant Identification Numbers (NIP). These features were designed to centralize administrative activities and reduce repetitive manual data processing previously performed by administrative staff.

System validation was conducted using Black Box Testing to verify that each functional component operated according to the specified system requirements. This testing method evaluated input processing, system responses, and output accuracy without examining the internal program code. Furthermore, User Acceptance Testing (UAT) was carried out by involving system users from PT ZAF International to assess usability, functionality, and overall acceptance of the developed application. The evaluation results were used to

determine whether the system successfully fulfilled user expectations and organizational operational requirements.

RESULTS AND DISCUSSION

This section presents the results of the development and implementation of the proposed web-based Training Administration Information System at PT ZAF International. The system was developed based on the identified user requirements and implemented using the Laravel framework, PHP programming language, and MySQL database following the Waterfall software development model. The discussion covers the system analysis, system design, database implementation, user interface development, and system evaluation.

Furthermore, the developed system was assessed through functional testing using the Black Box Testing method to verify that each feature operated according to the specified requirements. In addition, User Acceptance Testing (UAT) was conducted to evaluate the usability and acceptance of the system from the users' perspective. The findings presented in this section demonstrate how the proposed system addresses the limitations of the previous manual administrative process while improving the efficiency, accuracy, and effectiveness of participant data management at PT ZAF International.

System Analysis

The system analysis was conducted to identify the weaknesses of the existing training administration process at PT ZAF International and to determine the functional requirements of the proposed information system. Based on the observation and interview results, the organization previously managed participant registration using Google Forms, while participant data were processed separately using spreadsheet applications. Although these tools supported basic administrative activities, they operated independently, resulting in fragmented data management and inefficient administrative workflows.

The existing administrative process required staff to manually transfer participant data from Google Forms into spreadsheets before performing data verification, participant categorization, Participant Identification Number (NIP) generation, and record updates. This repetitive process increased the administrative workload, prolonged data processing time, and raised the possibility of human errors, including duplicate records, inaccurate participant information, and inconsistencies between registration and participant databases. Furthermore, the absence of an integrated information system made it difficult to monitor participant data, manage training schedules, and retrieve information efficiently.

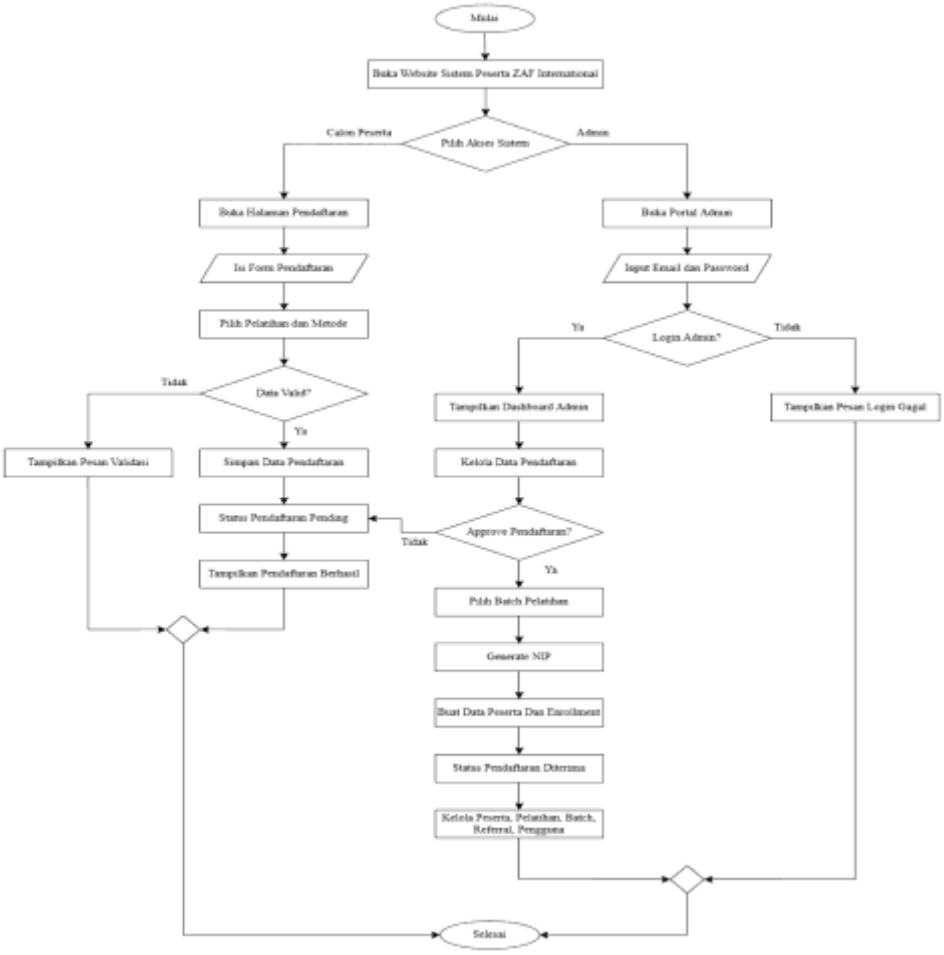

Figure 1. System Flowchart

To overcome these limitations, this study proposes a web-based Training Administration Information System that centralizes all administrative activities into a single integrated platform. The proposed system enables online participant registration, automatic data validation, centralized participant management, training category management, batch management, referral management, user administration, and automatic generation of Participant Identification Numbers (NIP). By integrating these functions into a unified database, the proposed system is expected to reduce manual administrative tasks, improve data accuracy, accelerate information processing, and enhance the overall efficiency of training administration at PT ZAF International.

The analysis results indicate that the proposed system fulfills the operational requirements of the organization by replacing fragmented administrative procedures with an integrated web-based information system. This digital transformation is expected to support faster decision-making, improve data consistency, and provide more effective administrative services for both administrators and training participants.

System Design

Following the system analysis, the proposed information system was designed to translate user requirements into a structured system architecture. The design stage employed Unified Modeling Language (UML) to describe system functionality, user interactions,

and relationships among system components. The resulting models serve as technical guidelines for the implementation of the web-based application.

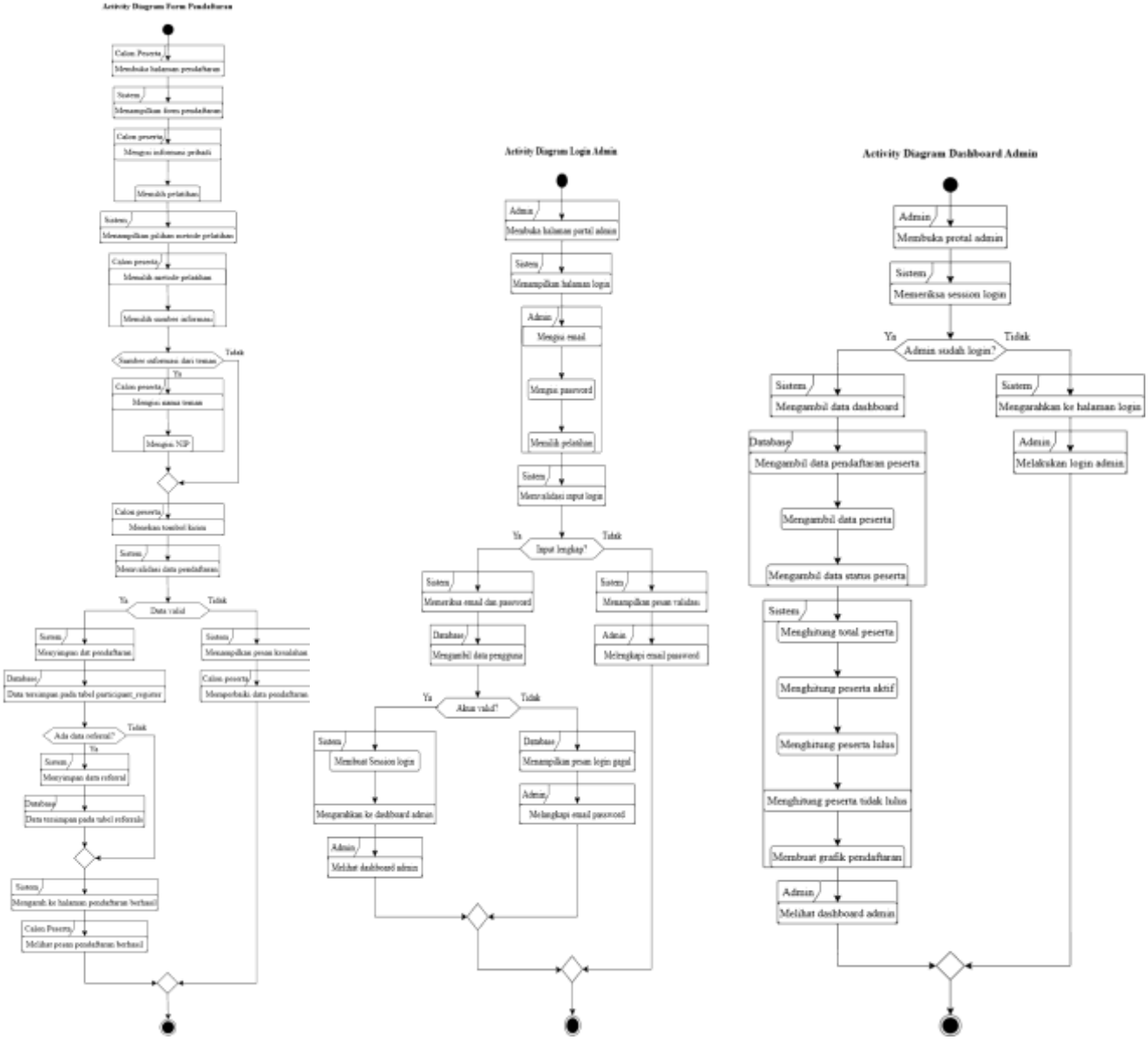

Figure 2. Activity Diagram

Figure 2 illustrates the activity flow of the proposed web-based Training Administration Information System. The process begins when prospective participants access the online registration page and complete the required personal information through a digital registration form. The submitted data are validated by the system before being stored in the centralized database. Once the registration is successfully completed, the information becomes immediately available through the administrator dashboard for further verification and management. Administrators can subsequently manage participant records, training programs, training categories, training batches, referrals, and user accounts through an integrated workflow. In addition, the system automatically generates the Participant Identification Number (NIP), eliminating repetitive manual data entry and reducing the likelihood of administrative errors. Overall, the activity diagram demonstrates that the proposed system

streamlines the administrative workflow by integrating registration, validation, data management, and participant administration into a single, efficient process.

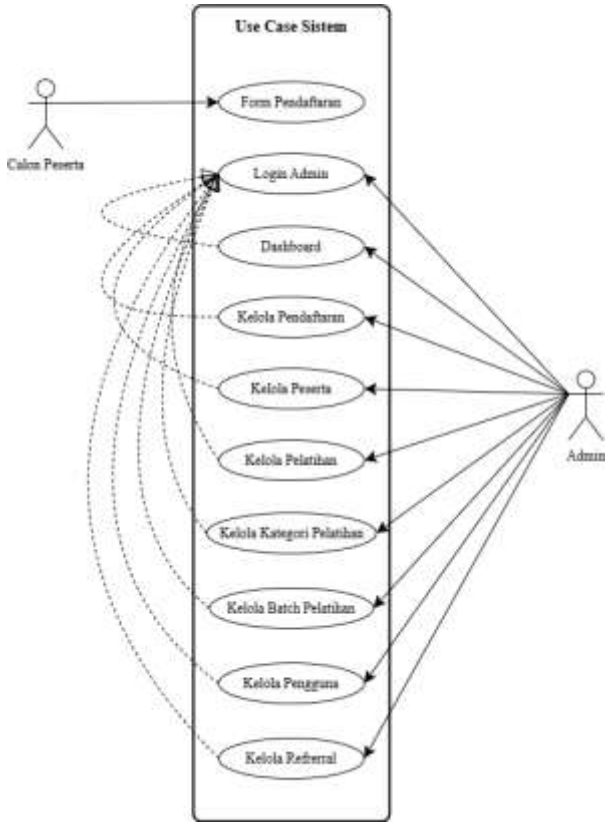

Figure 3. Use Case System

Figure 3 illustrates the use case diagram of the proposed Training Administration Information System, which describes the interactions between system users and the available functionalities. The system involves two primary actors, namely prospective participants and administrators. Prospective participants are responsible for completing the online registration process by submitting the required personal information through the web-based registration form. Once the registration is completed, the submitted data are automatically stored in the centralized database for further processing.

Administrators have broader access privileges to manage the overall training administration process. Through the administrative dashboard, they can manage participant registration data, participant records, training programs, training categories, training batches, referral information, and user accounts. In addition, the system automatically generates Participant Identification Numbers (NIP) after participant verification, thereby reducing manual administrative tasks and improving data consistency. The use case diagram demonstrates that the proposed system integrates all major administrative functions into a centralized platform, enabling more efficient, accurate, and systematic management of training activities.

Sequence Diagram

The sequence diagram was developed to illustrate the chronological interactions among system components during the execution of business processes within the proposed Training Administration Information System. It describes the exchange of messages between users, the application interface, the system controller, and the database, thereby

providing a clear representation of the operational workflow and system behavior during runtime.

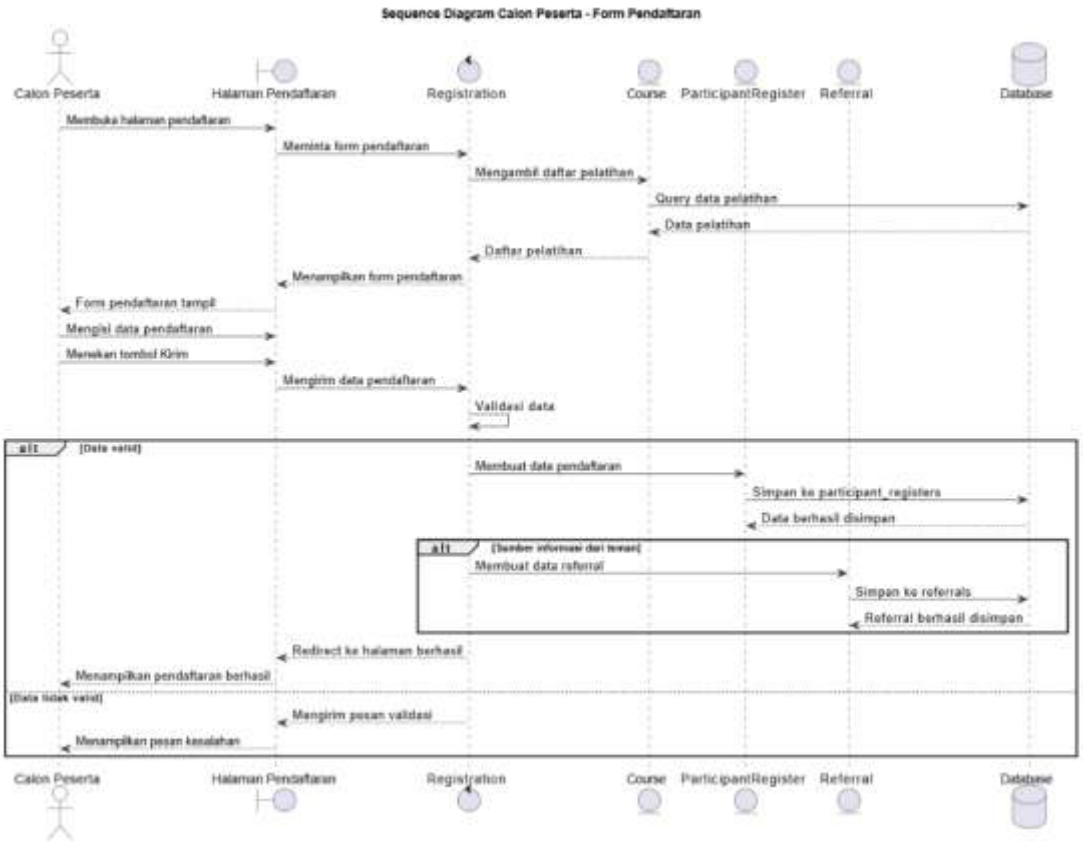

Figure 4. Sequence Diagram of Participant Registration

Figure 4 illustrates the sequence of interactions during the participant registration process. The workflow begins when a prospective participant accesses the registration page and submits the required personal information through the web interface. The system validates the input data before forwarding the request to the database for storage. Once the registration data are successfully saved, the system returns a confirmation message to the participant, indicating that the registration process has been completed successfully. This interaction ensures that participant information is validated and stored consistently in the centralized database.

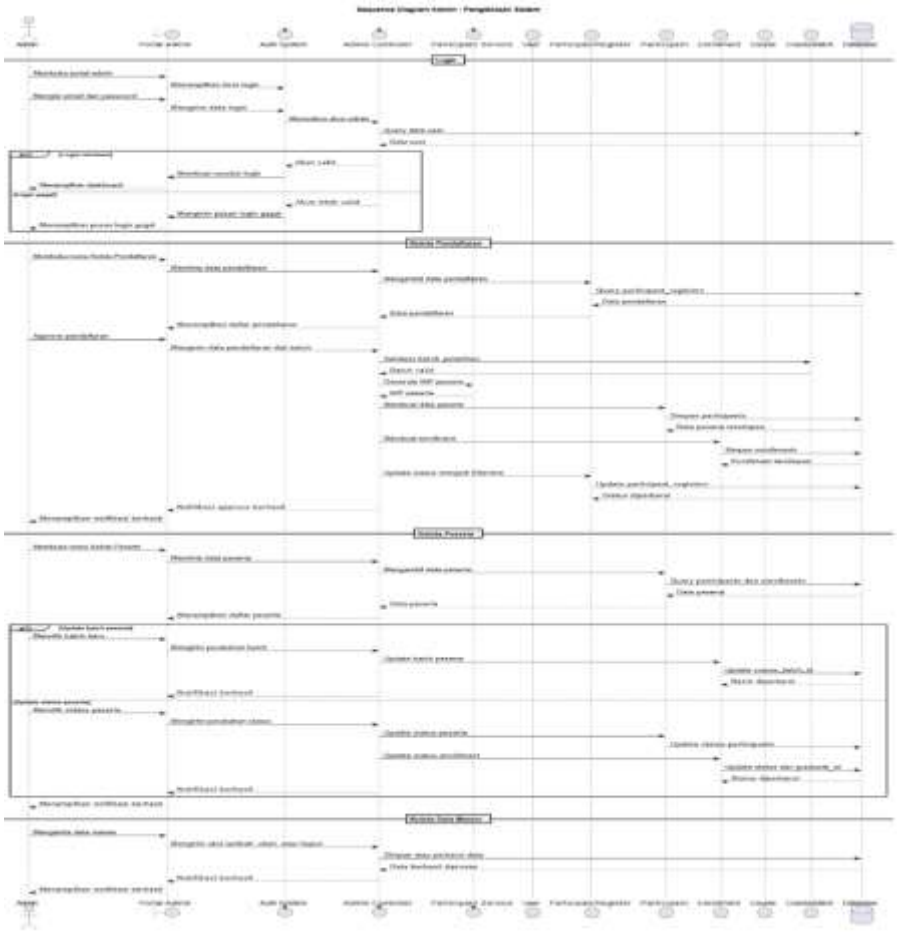

Figure 5. Sequence Diagram of Administrator Management

Figure 5 presents the sequence of interactions performed by the administrator during system operation. After successful authentication, the administrator can access the dashboard to manage participant records, training programs, training categories, training batches, referral information, and user accounts. Every management request is processed by the application, validated, and synchronized with the database before the updated information is displayed on the dashboard. This sequence demonstrates the integration between the application interface and the database, enabling efficient, accurate, and centralized management of training administration data.

Class Diagram

The class diagram was developed to represent the static structure of the proposed Training Administration Information System. It illustrates the system's classes, their attributes, methods, and relationships, providing a comprehensive view of how the system components are organized and interact with one another. The class diagram serves as the foundation for implementing the object-oriented architecture of the application and facilitates the integration of various functional modules.

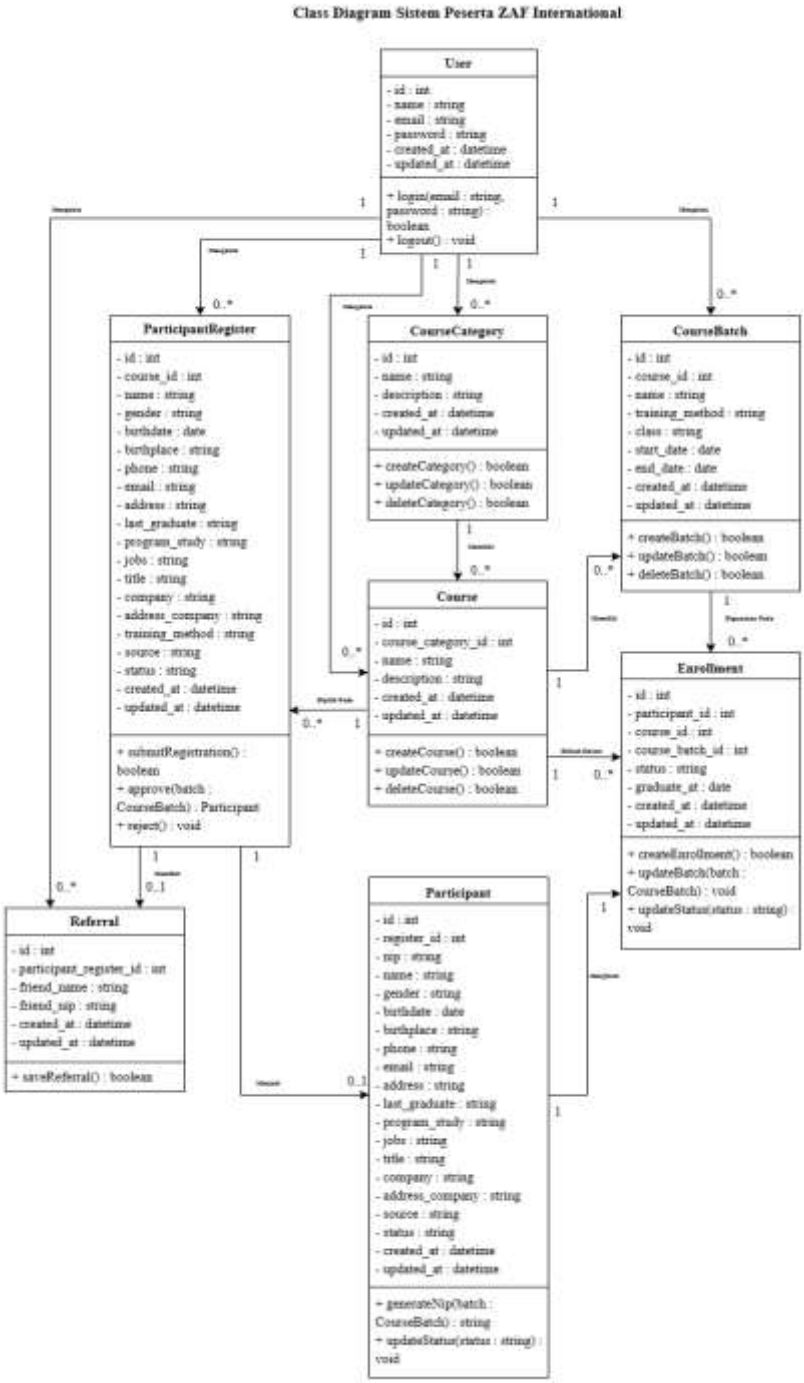

Figure 6. Class Diagram of the Proposed System

Figure 6 presents the class diagram of the proposed system. The diagram consists of several core classes, including Participant, Participant Registration, Course, Course Category, Course Batch, Enrollment, Referral, and User. These classes are interconnected through associations that represent the relationships among participant data, training information, registration records, referral data, and user management. Each class contains attributes and operations that support the execution of system functionalities, such as participant registration, training management, participant verification, and user administration.

The class relationships enable the system to manage data consistently while maintaining referential integrity across all modules. Furthermore, the object-oriented design improves system maintainability, scalability, and code reusability, allowing future enhancements to be implemented more efficiently. Overall, the class diagram provides the structural

blueprint for developing an integrated web-based training administration system capable of supporting centralized participant data management and administrative operations.

Database Design

The database was designed using a relational model to support centralized data management within the proposed Training Administration Information System. The database consists of several interconnected tables that store information related to training programs, training categories, training batches, participant registration, participant records, enrollments, referrals, and user accounts. The relationships among these tables were established using primary and foreign keys to maintain data integrity, minimize redundancy, and ensure consistent data processing. This database structure enables efficient storage, retrieval, and management of administrative information while supporting the automatic generation of Participant Identification Numbers (NIP) and other system functionalities.

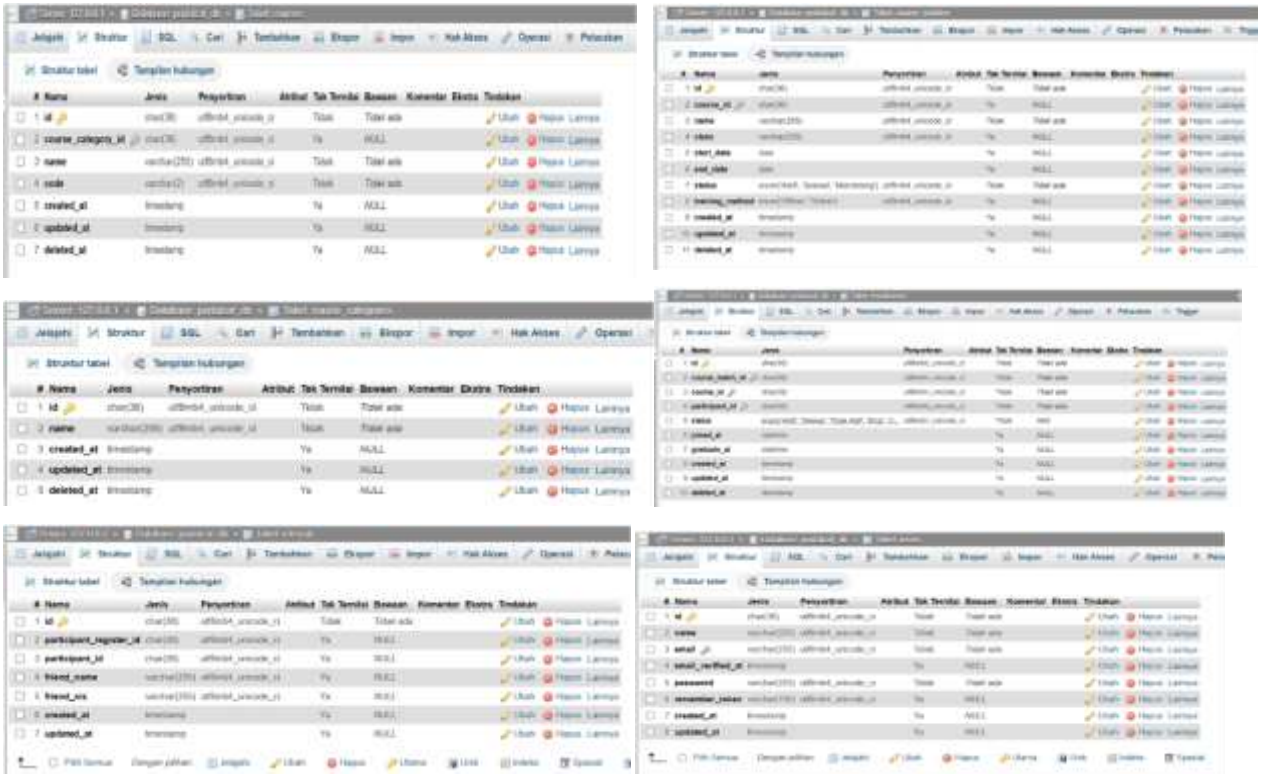

Figure 7. Database Design

'Figure 7 illustrates the database structure of the proposed system. The database integrates eight main tables, namely Course, Course Batch, Course Category, Enrollment, Participant, Participant Register, Referral, and User. These tables are relationally connected to support participant registration, training management, participant enrollment, referral tracking, and user authentication. The integrated database design facilitates centralized data management, improves data consistency, and enhances the efficiency of training administration at PT ZAF International.

User Interface Implementation

The user interface was designed to provide a simple, intuitive, and user-friendly interaction between users and the proposed Training Administration Information System. The interface emphasizes ease of navigation, structured information presentation, and efficient data entry to support participant registration and administrative activities. A consistent lay-

out, navigation structure, and visual design were implemented throughout the application to improve usability and enhance the overall user experience.

Figure 8. Participant Registration Interface

Figure 8 illustrates the participant registration interface, which serves as the primary entry point for prospective participants. The interface provides a structured registration form that enables users to submit personal information required for training enrollment. The form is designed with a clear layout and input validation mechanisms to facilitate accurate data entry while minimizing user errors during the registration process.

Figure 9. Administrator Dashboard Interface

Figure 9 presents the administrator dashboard, which functions as the central management interface of the system. Through this dashboard, administrators can manage participant registration, participant records, training programs, training categories, training batches, referrals, and user accounts. The integrated interface enables administrators to monitor and manage administrative activities efficiently through a centralized platform, thereby improving the effectiveness and efficiency of training administration at PT ZAF International.

System Testing

The developed system was evaluated through functional testing using the Black Box Testing method to verify that each feature operated according to the specified functional requirements. The evaluation focused on validating the input, processing, and output of every major function without examining the internal program code. This testing ensured that all operational modules performed correctly before the system was deployed.

Table 1. Summary of Black Box Testing Results

Module	Number of Test Cases	Result
Participant Registration	17	Passed
Administrator Functions	29	Passed
Total	46	Passed

Table 1 summarizes the results of the Black Box Testing performed on the participant registration module and administrator module. A total of 46 functional test cases were executed to evaluate the primary features of the proposed application. The participant module included registration procedures, input validation, training selection, referral processing, and registration confirmation, whereas the administrator module covered authentication, participant management, training management, batch management, referral management, user management, and automatic Participant Identification Number (NIP) generation. The testing results indicate that all functional requirements were successfully implemented, with every test case producing the expected output. These findings demonstrate that the developed system is functionally reliable and ready for operational use.

User Acceptance Testing (UAT)

Following the functional evaluation, User Acceptance Testing (UAT) was conducted to assess the usability and acceptance of the proposed information system from the users' perspective. This evaluation aimed to determine whether the developed application satisfied user requirements and effectively supported training administration activities at PT ZAF International.

Table 2. Summary of User Acceptance Testing

Evaluation Aspect	Result
Ease of use	Accepted
User interface	Accepted
Data management	Accepted
Registration process	Accepted
Administrative efficiency	Accepted
Overall system	Accepted

Table 2 presents the results of the User Acceptance Testing conducted with administrative users at PT ZAF International. The evaluation indicates that the developed application was positively accepted by users and successfully fulfilled the operational requirements

of the organization. Users reported that the centralized management of participant data, integrated administrative workflow, and automatic Participant Identification Number (NIP) generation significantly reduced manual processing while improving administrative efficiency and data accuracy. Overall, the UAT results confirm that the proposed system is practical, easy to use, and suitable for supporting daily training administration activities.

CONCLUSION

This study successfully developed and implemented a web-based Training Administration Information System for PT ZAF International to improve the efficiency and accuracy of participant data management. The developed system integrates participant registration and administrative management into a centralized platform, replacing the previous manual process that relied on Google Forms and spreadsheet applications. The implementation results demonstrate that the proposed system significantly improves administrative efficiency by reducing the average data processing time from 7 minutes and 27 seconds in the manual process to 3 minutes and 14 seconds using the web-based system. In addition, the centralized database and automated Participant Identification Number (NIP) generation successfully eliminated manual data entry errors, resulting in more accurate and consistent participant records while reducing the administrative workload.

Despite these achievements, the developed system still offers opportunities for further enhancement. Future development may include the integration of an online certificate verification feature that enables participants to validate their certificates independently using their Participant Identification Number (NIP) and date of birth. Additionally, implementing report export functionality in Excel and PDF formats would facilitate documentation, reporting, and administrative decision-making. These improvements are expected to increase the usability and functionality of the system while supporting more efficient and reliable training administration services in the future.

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