Journal of Artificial Intelligence and Engineering Applications

Website: https://ioinformatic.org/

15th February 2026. Vol. 5. No. 2; e-ISSN: 2808-4519

Analysis and Design of Web-Based Laundry Management Information System at ELS Laundry using the RAD Method

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Abstract

This significant technological advancement has affected almost all sectors of life, including the business world. ELS Laundry is a laundry service provider. However, in its operations, data management is still done manually. When customers come to drop off their items, data recording and note-taking are done manually, which are then recorded in a customer data ledger. This creates the potential for customer data loss or damage due to lost or torn paper. The manual and suboptimal transaction system causes problems such as the accumulation of archives and reports, slow information flow, and difficulties in searching for data and summarizing transaction reports. To overcome this problem, a Laundry Management Information System is needed to improve the effectiveness and efficiency of ELS Laundry's operations. This study aims to produce a web-based application using the PHP programming language and MySQL database by implementing the RAD development method to design a Laundry Management System. The result of this study is the development of a web-based application that can be used as an information medium to facilitate customer data management at ELS Laundry.

Keywords: *Design; Information System; Laundry; RAD*

1. Introduction

The development of technology is currently growing rapidly, especially in the field of information and communication [1]. This significant technological advancement has affected almost all sectors of life, including the business world. The laundry business, which previously relied on conventional methods, has now begun to adopt technology-based systems to simplify and improve operational efficiency [2] The use of web-based information systems in the laundry sector allows business owners to manage customer data, transactions, delivery schedules, and order status updates more efficiently. This technology also supports faster and more transparent customer service, while opening up opportunities for laundry businesses to compete in an increasingly growing market [3].

One of the research subjects in the development of this web-based laundry information system is ELS LAUNDRY, located on Jl. Lapangan Golf Tuntungan 2. ELS LAUNDRY is a laundry business that provides clothing washing services to customers in the surrounding area [4] As it grows, ELS LAUNDRY needs a better system to manage various operational aspects, ranging from transaction recording, washing schedule management, to customer and employee data management. By using a web-based system, ELS LAUNDRY hopes to provide more efficient services and satisfy customers.

However, despite ELS LAUNDRY's growth, there are several issues that need to be addressed, including the fact that transactions are still carried out manually. This leads to errors in recording, duplicate transactions, and slow information flow to customers. In addition, disorganized employee management also hinders the smooth operation of the laundry, such as managing work schedules, attendance, and monitoring employee productivity. All of these problems can affect the quality of service provided to customers and reduce their satisfaction. Therefore, the design of a web-based information system that can manage transactions, schedules, and employee data more efficiently is an urgent need for ELS LAUNDRY.

The method used in this study is Rapid Application Development (RAD). RAD is a software development method that prioritizes the development of applications in a short time through the creation of prototypes that can be quickly evaluated and improved [5]. This method is very suitable for use in the development of a web-based laundry information system because its main focus is on user involvement in every phase of development, thereby reducing the risk of errors and producing applications that meet user needs more quickly [6] The advantages of the RAD method are its flexibility and ability to produce systems that can quickly adapt to changing business needs [7]. Therefore, RAD was chosen for this study because it can accelerate the system development process required by ELS LAUNDRY, so that it can be immediately implemented and used to improve operational efficiency [8].

2. Research Method

This study uses a qualitative approach to analyze and design a web-based laundry management information system at ELS LAUNDRY. The qualitative method was chosen because it aims to understand the problems faced by ELS LAUNDRY in managing its operations, such as transactions, employee management, and scheduling, through in-depth analysis of data collected directly from the research subjects. This approach emphasizes understanding the process and provides a more holistic picture of existing problems, as well as providing richer insights into the needs of the system to be developed.

2.1. Research Method Steps

1. Preparation and Data Collection Stage
   a) Observation
      In the initial stage, the research began with observations of the operational processes at ELS LAUNDRY, located at Jl. Lapangan Golf Tuntungan 2. The purpose of these observations was to identify problems encountered in manual laundry management, such as transaction processes, employee management, and scheduling, which were not yet well organized.
   b) Interviews
      Data collection was carried out through interviews with the management and employees of ELS LAUNDRY. The purpose of these interviews was to gather more in-depth information about existing processes, including transactions, employee management, and the scheduling system currently in place.
   c) Documentation Study
      In addition to interviews, a documentation study was also conducted to understand the existing processes. This included analyzing transaction records and employee work schedules that had been used to date, in order to obtain a clearer picture of the existing operational constraints.

2.2. Data Collection Period

Data collection will begin in early January 2026 and continue until the end of January 2026. During this period, data will be collected and analyzed to support the development of a more efficient information system.

2.3. Data Analysis Stage

Data obtained from interviews, observations, and documentation studies will be analyzed using thematic analysis methods to identify the main problems faced by ELS LAUNDRY in operational management. This analysis aims to find patterns or themes that emerge related to transactions, employee management, and scheduling that require further improvement or development. At this stage, the analysis results are used as the basis for designing the information system to be developed.

2.4. RAD Development Method

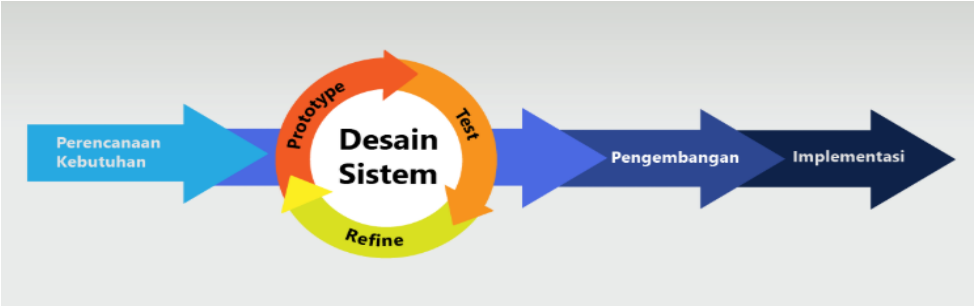

Fig. 1: RAD Method Steps

The Rapid Application Development (RAD) method was used in this study because of its ability to produce applications quickly through the creation of prototypes that can be evaluated and improved continuously. RAD consists of several stages, which broadly include [9].

1. Preparation and Data Collection Stage
   In this stage, system requirements are identified by involving users and stakeholders to ensure that the developed system meets the expectations and needs of ELS LAUNDRY.
2. Prototype Development
   An initial prototype is developed with basic features that can be immediately tested by users. This prototype allows users to provide immediate feedback on the developed system [10].
3. System Development
   Based on feedback from prototype testing, the system is refined and further developed until it is ready for testing and implementation in the ELS LAUNDRY operational environment.
4. Testing and Evaluation
   Once the system has been developed, testing is carried out to evaluate the effectiveness and functionality of the system. Feedback from users is essential to ensure that the developed system meets the needs and provides an efficient solution [11].

3. Result and Discussion

This research began with a design phase using UML diagrams, which was then followed by the presentation of several interface design examples. The designs that were created were then implemented into a web-based information system.

3.1. Use Case Diagram

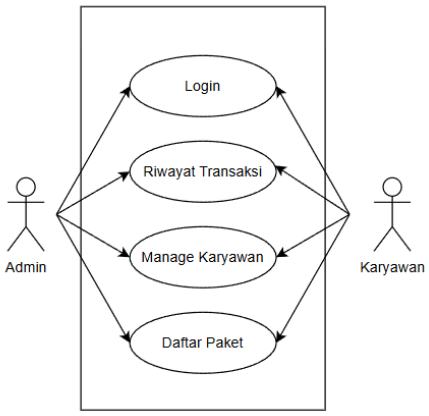

Fig. 2: Use Case Diagram

This laundry system involves two main actors, namely Admin and Employees, who have different roles and functions in managing laundry operations.

1. Login
   Every user, whether Admin or Employee, must go through the Login process to access the system using valid credentials. This ensures that only authorized users can access the system features according to their access rights.
2. Transaction History
   The Admin has access to view and manage the Transaction History, which serves to monitor every transaction made by customers, including order status and transaction details.
3. Manage Employees
   Admins can also manage employees, which includes adding, editing, and deleting employee data as well as setting work schedules, to ensure that laundry operations run smoothly.
4. Package List
   Admins are responsible for managing the laundry service package list, including setting prices and updating information about available services, providing flexibility to customers in choosing the services they need.
5. Employees
   Employees can access assigned tasks through the system after logging in. They are responsible for processing laundry orders according to the package selected by the customer.

With a clear division of tasks between Admin and Employees, this system aims to improve operational efficiency and customer service at ELS LAUNDRY.

3.2. Database Design

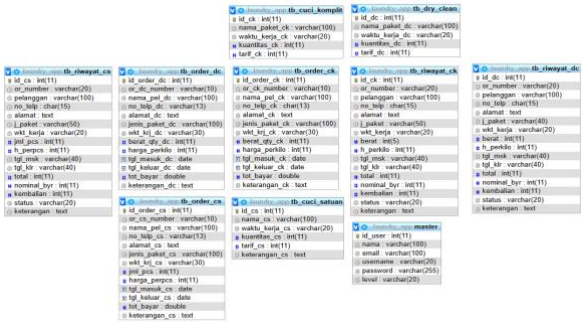

Fig. 3: Database Design

3.3. System Design Results

This study applies the black-box testing method to evaluate the functional performance of the system without referring to internal details or implementation logic. Testing of this application system covers several important aspects, including customer requirements, customer data management, payment processes, and employee management. The main focus of this testing is to verify the accuracy of system inputs and outputs to ensure appropriate responses.

a. Login Page Display

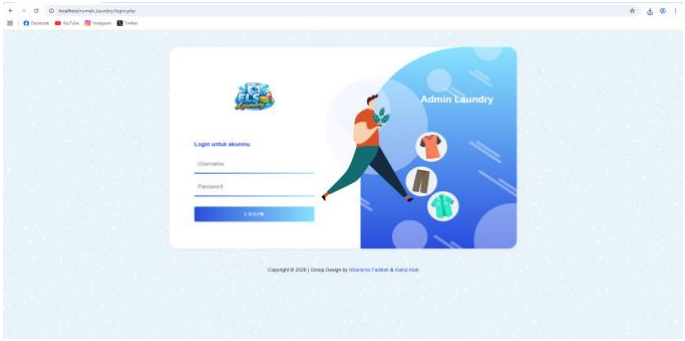

Fig. 4: Login Page Display

Login Page Display During the login testing phase, two scenarios were tested: correct data and incorrect data. In the correct data scenario, the user (cashier) entered the appropriate username and password, then pressed the login button, and the system checked the login data. If the data entered was correct, the cashier was able to log in and run the system successfully. Meanwhile, in the incorrect data scenario, if the cashier enters an incorrect username and password, the system will display an error message saying "Username & Password incorrect," and the cashier will not be able to log in to the system. The results of this test show that the system functions as expected, namely successfully verifying the login data correctly in the case of valid data, and providing the correct error message when the login data is incorrect.

b. Home Page Display

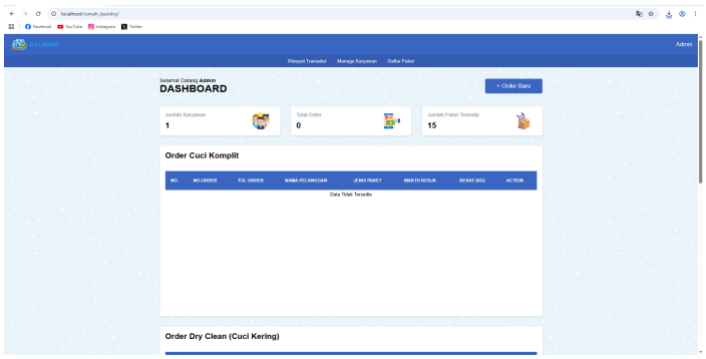

Fig. 5: Home Page Display

Figure 5 shows the home page of a user who has successfully logged in. Employees can add new orders, make payments, and print invoices that will be entered into the Transaction History.

c. Add Order Page Display

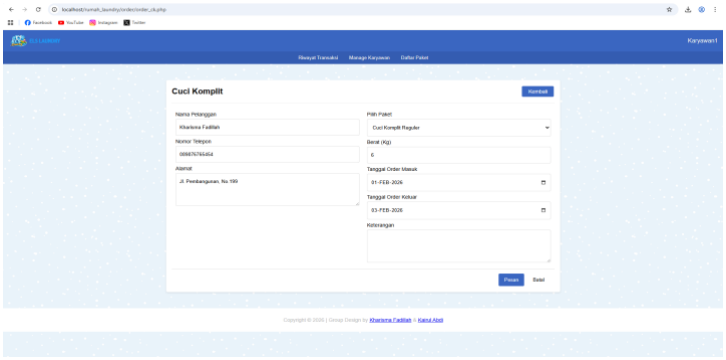

Fig. 6: Add Order Page Display

During the order data testing and data editing stages, two scenarios are carried out: new order data and order data editing. In the new order data scenario, the user (cashier) enters new order data, then clicks the "Order" button. The system will then process and save the customer's order data into the database. If this process is successful, the order data entered will be stored correctly in the database. Meanwhile, in the order data editing scenario, users can change or update existing order data in the system. After the correct data is entered, the user clicks the save button, and the edited data will be successfully stored in the database. The test results show that the system can successfully process and store both new order data and edited data without any problems.

d. Payment Page Display

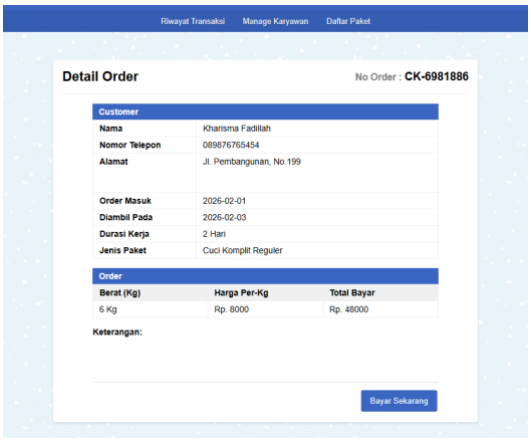

Fig. 7: Order Details Page

Fig. 8: Display Page. Transaction History

During the payment testing phase, two scenarios were conducted: correct payment data and incorrect payment data. In the correct payment data scenario, the user entered the payment amount corresponding to the total amount due, then clicked the "Pay" button. The system then processed the payment and displayed the corresponding payment receipt. This process was carried out successfully and the payment was recorded correctly. In the incorrect payment data scenario, if the user enters an incorrect payment amount but still clicks the "Pay" button, the system still processes the payment and displays the payment receipt. The results of this test show that the system can process payments correctly in both conditions, whether the data is correct or incorrect, and provide appropriate feedback for each condition.

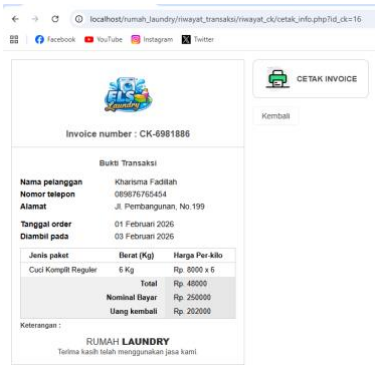

Fig. 9: Display Page. Print invoice

This study uses the black-box testing method to test the functionality of the system without regard to the details of the internal implementation. The testing covers various aspects, such as customer data management, payment processes, and employee management, with a focus on the validity of the system's inputs and outputs. The test results show that the system successfully handles various usage scenarios, validating data accurately. This method overcomes the weaknesses of manual evaluation, which is prone to input-output errors and human error, and ensures that the system can operate efficiently. Overall, this testing proves that the application is reliable and effectively meets user needs.

4. Conclusion

Based on the results of the research and discussions that have been conducted, it can be concluded that:

1. The Customer Data Management System at ELS Laundry currently uses a computerized system, which stores customer data neatly in the system. This reduces the potential for customer data loss, and proof of payment is now printed out, ensuring data security and accuracy.
2. The Laundry Management Information System that is currently in place provides a choice of laundry packages, which reduces the potential for errors in entering package types. This system also automatically calculates the price per kilogram based on the weight of the clothes entered by employees, thereby simplifying calculations and reducing human error.

3. ELS Laundry employees now have no difficulty finding customer data, as the laundry management information system is equipped with a Transaction History List menu. This menu includes complete information about customer names, package types, clothing weight, laundry status, and total price, allowing employees to access data quickly and accurately.

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