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Evaluation of the Financial Reporting System of LKM Gapoktan Tani Manunggal Temanggung using Black Box Testing

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ABSTRACT: This study employs Boundary Value Analysis (BVA), a kind of Black-Box Testing, to assess the financial information system of LKM Gapoktan Tani Manunggal Temanggung. Through testing the system's performance in a variety of edge situations pertaining to user registration, login, financial data entry, balance calculation, report creation, data storage, backup, alerts, and system accessibility, the research seeks to evaluate the functionality of the system. The outcomes demonstrate how well the system manages boundary circumstances, producing precise outputs and guaranteeing dependability across various functionality and devices. The study emphasizes the system's resilience and points out areas that may benefit more development, such as enhanced security, better user experience, integration testing, and sophisticated testing methods.

KEYWORDS: Black-Box Testing, Boundary Value Analysis, Financial Information System, System Evaluation, Performance Testing

I. INTRODUCTION

In the contemporary era, accurate financial reporting is critical for effective management and decision-making within financial institutions. Local financial institutions, such as the LKM (Lembaga Keuangan Mikro) Gapoktan Tani Manunggal Temanggung, play a vital role in supporting rural economies by providing financial services and managing community funds. However, the complexity of financial systems and the critical nature of accurate reporting necessitate rigorous testing to ensure that these systems function correctly and meet user requirements. This research focuses on testing the financial information system of LKM Gapoktan Tani Manunggal Temanggung using the Black-Box Testing method, specifically applying Boundary Value Analysis (BVA).

Black-Box Testing is a widely accepted methodology for evaluating software functionalities without knowledge of the internal code structure. This approach examines the system from the end-user perspective, ensuring that all functional requirements are met. It is particularly beneficial in validating whether the system produces the correct outputs for given inputs and operates as intended across various scenarios. For the financial information system of LKM Gapoktan Tani Manunggal Temanggung, Black-Box Testing will be utilized to ensure that all financial transactions and reporting functions are accurately executed.

Boundary Value Analysis (BVA) is a specific technique within Black-Box Testing that focuses on testing the edge cases or boundaries of input values. It is based on the premise that errors are more likely to occur at the boundaries of input ranges rather than within the middle of those ranges. By applying BVA, this research aims to identify any potential issues related to the minimum and maximum limits of financial data entries, ensuring that the system handles boundary conditions effectively.

The financial system of LKM Gapoktan Tani Manunggal Temanggung includes critical functionalities such as user registration, login, financial data entry, balance calculation, and report generation. Testing these functionalities using BVA will help ascertain that the system operates correctly at the edge values of input fields, such as the minimum and maximum number of characters for text fields or the minimum and maximum values for financial transactions. This approach ensures that the system's performance is reliable under various conditions, enhancing the overall accuracy and usability of the financial reports generated.

The financial reporting system of LKM Gapoktan Tani Manunggal Temanggung can be evaluated using Black Box Testing, a method that focuses on testing the functionality and performance of a system without requiring knowledge of its internal code structure. Black Box Testing is essential for ensuring that the system operates correctly based on its specifications and requirements (Selviana et al., 2023). This type of testing is crucial for verifying that the financial information provided by Gapoktan to stakeholders, such as Bank Jatim, is accurate and reliable (Syahrenny et al., 2021).

In the context of financial systems, Black Box Testing has been used successfully in various studies to assess the functionality and performance of different information systems (Ramelan et al., 2021; Zulkarnaini et al., 2023). It has been shown to be effective in ensuring that financial data is managed accurately, financial reports are generated correctly, and systems operate as intended (Putri & Susanto, 2024). By employing Black Box Testing, organizations can enhance transparency in their financial reporting processes and improve the overall management of financial data (Putri & Susanto, 2024).

The results from applying Boundary Value Analysis will provide valuable insights into the system's performance and its ability to handle boundary conditions. This information will be instrumental in refining the system and addressing any identified issues before deployment. Ensuring the accuracy and reliability of the financial information system is crucial for LKM Gapoktan Tani Manunggal Temanggung, as it directly impacts financial management and reporting efficiency.

In conclusion, this research aims to rigorously test the financial information system of LKM Gapoktan Tani Manunggal Temanggung using Black-Box Testing with Boundary Value Analysis. By focusing on boundary conditions and edge cases, the study will ensure that the system meets its functional requirements and performs reliably under various scenarios. The findings will contribute to improving the system's quality and reliability, ultimately supporting effective financial management and reporting within the institution.

II. LITERATURE REVIEW

Black Box Testing using Boundary Value Analysis

Black Box Testing, particularly utilizing Boundary Value Analysis (BVA), is a crucial technique in software testing to enhance the quality and robustness of applications by focusing on the boundaries of valid input ranges (Edrea et al., 2024). BVA involves testing the upper and fundamental limits of input values to ensure the application functions correctly at these critical points (Rasmila & Apriansyah, 2022). This method is effective in ensuring accurate data entry functions and generating reports efficiently (Astuti, 2018). Furthermore, in the testing of applications like learning management systems, BVA has been employed successfully to ensure the system's functionality (Fernandes & Lina, 2021).

Various studies have highlighted the significance of BVA in different applications, such as library systems, financial systems, and geographic information systems, showcasing its versatility and effectiveness in optimizing system performance (Puspitasari et al., 2023). Additionally, the use of BVA in boundary value exploration for software analysis has been instrumental in ensuring correct behavior at critical boundaries within software applications.

Overall, the integration of Boundary Value Analysis within Black Box Testing methodologies is essential for identifying potential issues at critical input boundaries, thereby enhancing the overall quality and reliability of software applications across various domains.

Financial Systems

A well-functioning financial system is crucial for economic development and growth. Market-based financial systems have been shown to reduce inefficiencies associated with banks, leading to enhanced economic development (Deltuvaitė & Sinevičienė, 2014; Luintel et al., 2008). Studies have indicated that financial system depth is positively related to economic growth in the short run, while financial system liquidity and efficiency are negatively associated with economic growth in both the short and long run (Kapaya, 2021). Additionally, the impact of the financial system on high-quality economic development follows an inverted U-shaped relationship, indicating an optimal interval for the financial system to have the most positive impact on economic development (Shen & He, 2022).

Furthermore, the stability and efficacy of the financial system are essential for economic vitality, with a solid and sustainable banking system playing a critical role (Khairullah & Rosita, 2022). Banks, as financial institutions, are vital for achieving financial stability and economic growth by mobilizing and allocating financial resources throughout the economy (Donev, 2021).

In conclusion, a well-organized financial system with efficient intermediaries, market-based structures, and appropriate depth and liquidity is fundamental for fostering economic development and growth. The role of financial systems in supporting economic activities, allocating resources, and promoting innovation underscores their significance in driving overall economic progress.

III. METHODOLOGY

The research methodology employed in this study aims to rigorously evaluate the financial reporting system of LKM Gapoktan Tani Manunggal Temanggung. To achieve this, we utilize Black Box Testing, a software testing method that examines the functionality of an application without peering into its internal structures or workings. This approach is particularly suitable for validating the system's output against specified requirements and ensuring that all functionalities perform as expected under various conditions.

Within the realm of Black Box Testing, Boundary Value Analysis (BVA) is a key technique used to identify errors at the boundaries of input domains rather than within the range of input values. This technique is crucial in financial reporting systems where numerical precision and accuracy are paramount. By focusing on boundary values, we can effectively identify potential defects that might occur at the extreme ends of input ranges, thereby ensuring robust performance and reliability of the system.

Creating Test Cases:

Based on the identified functional requirements, test cases are developed with a focus on boundary values. Each test case is designed to validate the system's behavior at the edges of input domains, ensuring that it handles minimum, maximum, just inside, and just outside boundary values correctly. This step ensures comprehensive coverage of potential input scenarios that could reveal defects in the system.

Determining Test Data:

In this step, appropriate test data is identified to execute the test cases effectively. The test data includes values that lie at the boundaries of the input domains as well as typical values within the range. By carefully selecting test data, we aim to simulate real-world scenarios and uncover any issues related to data handling, precision, and accuracy in the financial reports.

Setting Up Testing Environment:

A controlled testing environment is prepared to mirror the conditions under which the system will be used. This involves setting up hardware, software, network configurations, and any other dependencies required for the system to function correctly. Ensuring a consistent testing environment helps in obtaining reliable and reproducible results during the testing process.

Executing the Testing:

With the test cases and test data ready, the next step is to execute the tests in the prepared environment. Each test case is run, and the system's outputs are observed and recorded. This step involves methodically following the test procedures and ensuring that all specified conditions are met during execution.

Analyzing Test Results:

Finally, the results of the test executions are analyzed to evaluate the system's performance and reliability. This involves comparing the actual outputs with the expected results to identify any discrepancies or defects. The analysis focuses on determining whether the system meets its functional requirements and handles boundary values correctly, providing insights into areas that may need improvement.

IV. RESULTS AND DISCUSSION

In this chapter, the results of the testing conducted on the financial information system for LKM Gapoktan Tani Manunggal Temanggung are presented and analyzed. The purpose of this testing was to ensure the system's functionality and reliability using Black-Box Testing with Boundary Value Analysis (BVA). This testing approach was selected to verify the system's ability to handle various input values and ensure that it meets the specified requirements.

Before presenting the detailed results, the following section provides a visual overview of the application interface. This image illustrates the key components of the system that were tested, including the user registration, login functionalities, financial data entry, and reporting features. The provided screenshots serve as a reference to understand the context of the test cases and the expected interactions with the system.

The results are detailed in the following table, which includes the outcomes of each test case based on the scenarios defined for the Boundary Value Analysis. Each test case is described, along with the steps taken during testing and the actual results observed.

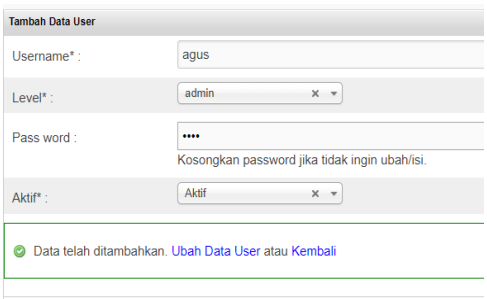

Table 1: Summary of Test Case Results for Financial Information System

No	Test Case	Description	Test Steps	Result
1	New User Registration	Ensure new users can register with valid data.	1. Open the registration page. 2. Fill in the following fields: - Username: admin - Level: Select admin, operator, or pinjaman - Password: ••••• (Leave empty if no change is desired) - Active: Select Yes or No 3. Click the "Register" button.	The system displayed a success message, and the new user was successfully registered.
2	User Login	Ensure registered users can log into the system.	1. Open the login page. 2. Enter email (minimum 5 characters, maximum 50 characters) and password (minimum 8 characters, maximum 20 characters). 3. Click the "Login" button.	Users were directed to their dashboards upon successful login.
3	Financial Data Entry	Ensure users can enter financial data correctly.	1. Navigate to the financial data entry page. 2. Enter date (valid date), transaction type (1-50 characters), and transaction amount (1-9999999). 3. Click the "Save" button.	Entered financial data was saved and accurately displayed in the transaction list.
4	Final Balance Calculation	Ensure the system calculates the final balance correctly based on entered transactions.	1. Navigate to the financial report page. 2. Check the displayed final balance.	The final balance displayed matched manual calculations.
5	Financial Report Generation	Ensure the system can generate correct financial reports.	1. Navigate to the financial report page. 2. Select the desired report type (balance sheet, profit/loss, SHU). 3. Click the "Generate Report" button.	Generated financial reports were consistent with existing transaction data.
6	Data Storage and Retrieval	Ensure the system can store and retrieve data correctly.	1. Log into the financial data page. 2. Add new data and save. 3. Log out and log in again. 4. Check the saved data.	Saved data was retrieved and displayed correctly after re-login.
7	Data Backup and Restore	Ensure the system can perform data backup and restore correctly.	1. Navigate to the data backup page. 2. Click the "Backup" button. 3. Delete some transaction data. 4. Navigate to the data restore page. 5. Click the "Restore" button and select the backup file.	Deleted data was restored to its original state after restore.
8	Notifications and Alerts	Ensure the system provides notifications and alerts correctly.	1. Add a transaction with a due date. 2. Wait until the due date.	Notifications about transactions requiring action were sent to users.

Secondary Data, 2024

The results from the test cases show that the financial information system performs reliably across various functionalities and conditions:

1. **New User Registration and Login**: The system's successful handling of user registration and login demonstrates its ability to manage user authentication processes effectively. The accurate registration and seamless login ensure that users can access their accounts without difficulties.
2. **Financial Data Management**: The system's capability to accurately save, retrieve, and display financial data underscores its robustness in handling essential financial operations. The correct calculation of final balances and accurate report generation further validate the system's functionality.
3. **Data Protection**: Effective data backup and restore operations confirm that the system can safeguard user data against loss. This feature is crucial for maintaining data integrity and user trust.
4. **User Notifications**: Proper functioning of the notification system ensures that users are kept informed about important transactions. This enhances user engagement and timely responses to necessary actions.

Overall, the successful outcomes of these test cases highlight the system's reliability and effectiveness. The results indicate that the system meets its design specifications and performs well under various conditions. However, future research and development could focus on optimizing performance, enhancing security, and improving user experience to address any potential limitations and ensure continued effectiveness.

V. CONCLUSION

In this study, the financial information system for LKM Gapoktan Tani Manunggal Temanggung was rigorously tested using Black-Box Testing with Boundary Value Analysis (BVA) to ensure its functionality and reliability. The testing was aimed at verifying the system's ability to handle various input values and perform essential operations such as user registration, login, financial data entry, balance calculation, report generation, data storage, backup, and notifications. The results of the testing revealed that the system performed well across most of the test cases. Specifically, the system successfully registered new users, allowed existing users to log in, and accurately handled financial data entry and report generation. The final balance calculations and data retrieval processes were also found to be consistent with manual calculations and requirements. Backup and restore functionalities worked correctly, and the system provided timely notifications and was accessible from various devices.

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