Development of a Financial Management Application for Boarding Students Using the Waterfall Method: An Effective Solution for Managing Budgets and Expenses

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Abstract

Financial management is a considerable difficulty for students residing in boarding homes, who often possess restricted revenue sources and diverse expenditure requirements. An extravagant lifestyle coupled with inadequate financial literacy frequently results in students encountering difficulties with budgeting and experiencing financial crises at month's end. This study seeks to create a web-based financial management tool employing the Waterfall methodology, intended to assist students in documenting income and expenditures, managing budgets, and enhancing their financial literacy. The Waterfall technique is methodically executed through the phases of requirements analysis, design utilising UML, implementation employing tools such as Vscode and MySQL, and testing to verify the application's operation. This program has transaction recording capabilities, financial reporting, and profile management, enabling students to efficiently track cash flow and assess spending habits. The research findings indicate that this application assists students residing in boarding homes in managing their funds more systematically, mitigates the danger of extravagance, and enhances awareness of the significance of effective financial management. This application aims to enhance students' independence in money management and facilitate their preparation for a secure financial future.

1. Introduction

Financial management is a considerable difficulty for students residing in boarding homes, who typically have restricted revenue sources and diverse expenditure requirements. An extravagant lifestyle coupled with inadequate financial literacy frequently leads students to have difficulties in budgeting and experience financial crises at month's end. This study seeks to create a web-based financial management tool utilising the Waterfall methodology, intended to assist students in documenting income and expenditures, managing budgets, and enhancing their financial literacy. The Waterfall technique is methodically executed through the phases of requirements analysis, design utilising UML, implementation employing tools such as Vscode and MySQL, and

testing to verify the application's operation. This program has transaction recording capabilities, financial reporting, and profile management, enabling students to efficiently track cash flow and assess spending habits. The research findings indicate that this application assists students residing in boarding homes in managing their funds more systematically, mitigates the danger of extravagance, and enhances awareness of the significance of effective financial management. This application aims to enhance students' independence in money management and facilitate their preparation for a secure financial future.

A multitude of students struggle to systematically document their costs and income, frequently resulting in imprudent spending and unregulated outlays. This circumstance may lead to considerable difficulties at the month's conclusion, particularly when the budget is inadequate for fundamental necessities. Typically, financial recording is conducted manually, such as by inscribing in notebooks or utilising basic programs. This strategy is frequently less successful due to its susceptibility to inaccuracies and inconsistencies between the records and the actual financial status. Consequently, students lack a precise understanding of their cash flow, hence intensifying budget management challenges. The advent of technology renders financial tracking programs a viable answer to this issue..

This program is particularly engineered to assist students in planning and maintaining their budgets, enabling them to exercise greater financial prudence. Students can systematically document their spending and revenue using straightforward features. This application aims to enhance children' knowledge of the significance of effective money management from an early age, a crucial ability for their future endeavours. This tool enables users to calculate and analyse their spending habits, facilitating the identification of areas for development.Juhardi and Khairullah (2019).Consequently, this application functions both as a recording instrument and as an instructional resource to assist students in achieving more independence in financial management.

1.4 Literature Review

The scholarly publication "Financial Information System in Elite Kost Companies Using the Waterfall Method" emphasises the significance of information systems in financial management inside elite kost service organisations. PT. Grha Kusuma Residence is seeing challenges in generating precise financial reports, which may result in financial losses and increased fraud risks. The deployment of a financial information system enables administrators to comprehend operating expenses more effectively and provide pertinent financial reports, including income and expenditure statements.(Asmarajaya et al., 2021).

The scholarly publication "Android-Based Personal Finance Management Application (ANGSA)" emphasises the significance of personal financial management in view of the growing consumerist tendencies within society. The growing diversity of individual requirements renders financial management essential for attaining financial objectives. This project seeks to create an Android application that assists users in documenting income, spending, and simulating Islamic mortgage computations. The research technique include data collecting, analysis, design, and deployment of applications. The research findings indicate that this application facilitates effective financial management for users and generates clear financial reports.(Fauzani & Capah, 2019).

The scholarly study "Designing a Mobile-Based Financial Management Application Using React Native to Improve Individual Financial Literacy" asserts that money management is a crucial component of everyday living. Many individuals encounter difficulties in managing their finances owing to insufficient financial literacy and a lack of time to document their expenditures. This research advocates for the development of a mobile application designed to aid users in documenting income and expenditures, as well as using budgeting techniques. The employed approach is Waterfall, encompassing system analysis, design, implementation, and testing. The test findings indicate that the application is viable and can improve users' comprehension of financial management, promoting superior financial habits among individuals.(Sulaeman & Waluyo, 2023).

2. Research Methods

The Waterfall Method, also known as the "Linear Sequential Model," is a prevalent model within the System Development Life Cycle (SDLC) utilised in information system development. This approach is systematic and sequential, progressing from the planning phase to maintenance, and is advantageous for yielding high-quality systems due to its staged development process (Wahid, 2020). The waterfall technique is applicable in web-based system design because to its sequential approach, enabling the completion of each job and component with concentration before progressing to the subsequent task (Akbar et al., 2020). This approach allows for painstaking completion of each job and component, enabling engineers to verify the functionality of all pieces before advancing to the subsequent phase.

This system employs the waterfall methodology for the phases of planning and creating an information system. The phases of the development methodology for the financial management system for students residing in boarding homes adhere to the sequential structure of the waterfall model.

2.4 Analysis Stages

At this juncture, the author gathers data and employs the fishbone approach to ascertain the primary causes of the financial difficulties frequently encountered by students residing in boarding homes.

2.5 Design Stages

The author uses UML modeling to design this information system, specifically using Use Case and Activity Diagram models to design the database.

2.6 Stages of Program Code Development

In this stage, the new system design is created using the Vscode application as a tool for programming and MySQL for creating the database, as well as XAMPP as the connector for the database server.

2.7 Testing Stages

At this stage, testing is conducted with the hope that the design that has been made can run as expected.

3. Result and Discussion

This project seeks to create a web-based financial management tool tailored for students residing in boarding homes. This program provides solutions to the financial management concerns encountered by students, such inefficient manual tracking, difficulties in cost control, and insufficient financial awareness. This program includes essential functionality such as income and cost tracking, budget formulation, and expenditure pattern analysis. These features aim to assist students in comprehending their financial dynamics, recognising areas of inefficiency, and encouraging them to adopt improved financial management practices.

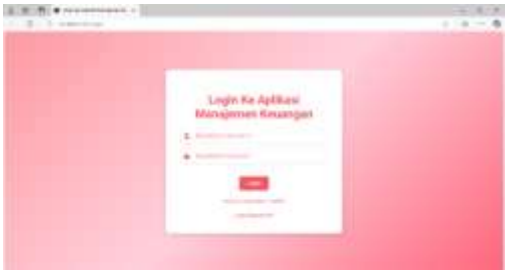

Fig. 1 Login Pages

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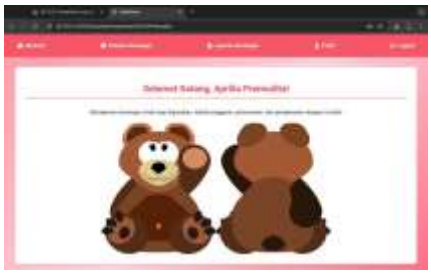

Fig. 2 First Pages

The home page is the initial interface presented to users upon successful login to the program. On the homepage, visitors may choose a menu to access further menus.

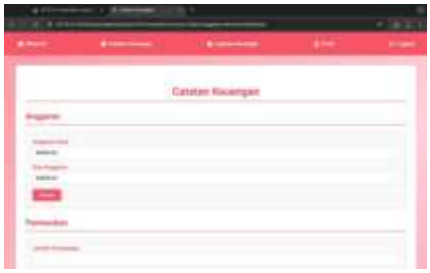

Fig. 3 Note Page

Users will fill in information related to the Initial Budget, including details of income and expenses, such as transaction dates, categories, sources of income, and amounts. Each time users add income or expense data, that information will be stored in the database. After successfully adding a record, the application will update the list of income and expenses and display the remaining budget, total income, and latest expenses on the Financial Report Page.

The user will select the income record they want to change, then enter the date, source of income, and the new amount of income. After that, the user can save the changes made or delete the record if it is no longer needed. Once the user saves the changes, the application will update the modified income record and adjust the total income and remaining budget. If deletion is performed, the income record will be removed from the database and the income list will be updated.

The user selects the expense record they want to change, then enters the new date, expense category, and amount. The user can also save the changes or delete the record. After the changes are saved, the application will update the expense record and recalculate the total expenses and remaining budget. If the record is deleted, the expense will be removed from the list, and the total expense data will be updated according to the remaining records.

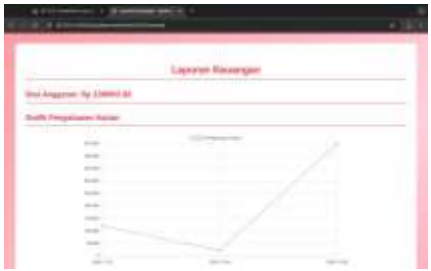

Fig. 4 Report Page

Users can only see the remaining budget and view financial graph reports that include income and expenses, monitor expenses by category, and display a comparative balance between expenses and income as a benchmark in financial management.

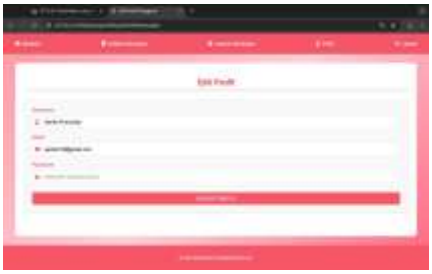

Fig. 5 Profile Page

Users can change profile information such as username, email, or password. Users can also update other information relevant to their account. Once the changes are successfully saved, the user's profile will be updated with the latest information. If the changes are unsuccessful (for example, due to an incorrect email format), the application will display an error message so that the user can correct the mistake.

The testing of the financial management application is conducted using the blackbox method, which focuses on testing the main functions of the application based on predetermined specifications without considering the implementation of the program code. The main objective of this testing is to ensure that each feature of the application can operate as expected by the users.

In this testing, several scenarios were tested, such as the user registration process, login, budget management, income recording, expense recording, and budget data updating. The test results are summarized to evaluate the application's success in meeting functional requirements and to provide an overview of potential improvements to enhance the application's quality.

Table 1. Blackbox Testing Method Table

No	Testing Scenario	Test Case	Expected Results	Test Results	Status!	Picture
1	Access localhost login	Entering the URL in Google Chrome http:// 127.0.0.1:5000/ login	Display the main admin page login.php	suitable	Valid	
2	New User Registration	Entering username, email, and password	Back to the login menu view	suitable	Valid	
3	forgot password	Incorrectly entered the password.	A warning appears to try entering the password again.	suitable	Valid	
4	Reset Password	Entering the email and entering a new password	Email and password verification have been successfully updated.	suitable	Valid	

5	Initial Budget Input	Inputting the Initial Budget	The initial budget was successfully saved.	suitable	Valid	
6	Input Revenue	Entering Income	The income has been successfully added.	suitable	Valid	
7	Input Output	Inputting Expenses	The expenditure has been successfully displayed.	suitable	Valid	
8	Viewing the Remaining Budget, daily expenditure graph, pie chart of expenditures by category, income graph, and comparison balance of expenditures and income.	Click the financial report menu	Displaying the remaining daily expenditure budget	suitable	Valid	   
9	Edit Profil	Mengganti username, email dan password	Berhasil menampilkan perubahan update profil	Sesuai	Valid	
10	Logout menu	Klik tombol logout	Kembali ke halaman login	Sesuai	Valid	

4. Conclusions

Financial management is a considerable difficulty for students, particularly those residing in boarding homes, due to restricted income and elevated, diverse expenditures. An extravagant lifestyle and insufficient financial knowledge are the primary factors that may adversely affect their future financial security. A technical solution, namely a financial management tool, is required to assist students in accurately recording, monitoring, and managing their income and spending.

This research use the Waterfall technique to design and construct a web-based application system with primary functions including financial recording, reporting, and profile management. This program employs a systematic methodology encompassing issue analysis using the fishbone technique, design via UML modelling, implementation utilising technologies such as Vscode, MySQL, and XAMPP, and testing to verify system operation.

The development outcomes indicate that the application facilitates systematic financial management for students, enhances cash flow monitoring, and fosters early understanding of the significance of sound financial practices. This application aims to enhance students' independence in money management, mitigate wastefulness, and facilitate the preparation for a more solid financial future.

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