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Design and Implementation of an Android-Based Financial Management System for an Information Technology Study Program

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Abstract

The rapid development of mobile technology has encouraged the use of Android-based applications in various domains, including financial management. Students of the Information Technology Study Program often face difficulties in recording and managing personal income and expenses systematically, highlighting the need for a practical and accessible solution. This study aims to design and implement an Android-based financial management application to support efficient and structured financial administration. The research employs a Design and Creation methodology with a qualitative approach, following the Waterfall system development model that includes analysis, system design, implementation, and testing. The application was developed using Android Studio with the Kotlin programming language, featuring modules for recording income, expenses, assets, and generating financial reports. Functional testing using Black Box Testing indicates that the system operates according to specifications, while usability assessment shows that users can manage finances more effectively and intuitively. The findings suggest that the developed application reduces manual errors, improves data accessibility, and provides a reliable tool for managing personal finances. The application can be further enhanced with advanced features such as data analytics or intelligent recommendations to support decision-making in academic environments.

Keywords: *Android application, financial management, information systems, Kotlin, Waterfall*

1. Introduction

In today's digital era, mobile technology has become an essential part of daily life, influencing how individuals communicate, learn, and manage personal tasks [1] [2]. Among these tasks, financial management is a critical skill that ensures individuals can monitor income, control expenses, and plan for future needs effectively [3]. Efficient financial management is particularly important for university students, who often face budget constraints and varying financial responsibilities during their studies [4].

Despite the availability of various digital tools, many students still encounter difficulties in maintaining structured records of their income and expenditures [5]. Traditional manual methods or fragmented digital solutions often lead to inconsistent data, lack of clarity in financial tracking, and challenges in planning long-term budgets [6]. This issue highlights the need for an accessible, practical, and user-friendly tool tailored to the specific needs of studentsc [7].

Android-based applications provide an interactive and flexible platform to address these challenges [8]. By integrating financial management features into a mobile application, students can record transactions, monitor assets, generate reports, and plan their budgets in a systematic way[9]. However, existing applications are often generalized and do not account for the unique requirements of Information Technology students, such as simplicity, efficiency, and compatibility with their digital habits [10].

To address this research gap, this study focuses on designing and implementing a financial management application specifically for the Information Technology Study Program. The application is developed using Android Studio and Kotlin, following a structured software development model to ensure systematic design, implementation, and testing. The aim is to provide a practical solution that helps students manage their personal finances effectively, improves financial awareness, and facilitates long-term financial planning. However, existing mobile financial management applications generally focus on personal use and lack alignment with academic administrative contexts, particularly at the study program level.

2. Methods

This study uses a Design and Creation research method with a qualitative approach. The aim is to develop an Android-based financial management application specifically for the Information Technology Study Program students[11]. The system development follows the Waterfall model, which allows a structured and systematic approach to software development. The Waterfall model includes the stages of requirement analysis, system design, implementation, testing, and system maintenance. Each stage is described in detail below.

2.1. System Development Model

The Waterfall model is a linear and sequential software development methodology in which each stage must be completed before proceeding to the next[12]. This model is chosen for its systematic workflow and clear structure, which ensures that the application development follows a well-organized process. This model is chosen for its systematic workflow and clear structure, which ensures that the application development follows a well-organized process. The stages of the Waterfall model applied in this study are illustrated in Figure 1.

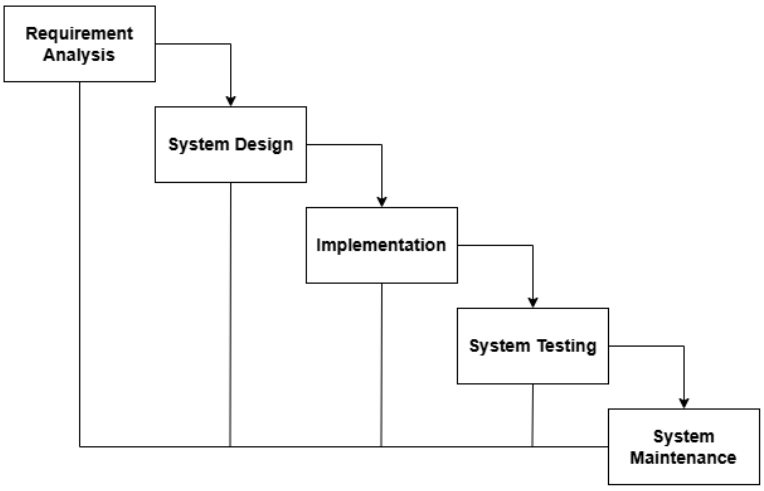

Fig. 1: System Development Model Waterfall

Figure 1 shows the sequential stages of the Waterfall model used in this study, starting from requirement analysis, system design, implementation, testing, and ending with system maintenance.

2.1.1 Requirement Analysis

In this stage, the functional and non-functional requirements of the financial management application are identified. Data is collected through literature review, journal studies, and observation of user behavior to ensure that the application meets the needs of students in managing their personal finances.

2.1.2 System Design

The system design stage involves creating the structure and interaction flow of the application using Unified Modeling Language (UML). Diagrams such as use case diagrams and activity diagrams are developed to visually represent the interactions between the user and the system.

2.1.3 Implementation

During implementation, the application is developed using Android Studio with the Kotlin programming language. Kotlin is chosen for its concise syntax, safety features, and compatibility with Android platforms. The implementation follows the designs produced in the previous stage.

2.1.4 Testing

System testing is conducted using Black Box Testing, which focuses on verifying the functionality of the application based on input and expected output without considering the internal code structure.

2.1.5 System Maintenance

System maintenance involves activities to ensure the application continues to operate effectively after deployment. This includes fixing bugs, updating features, and improving system security based on user feedback. Maintenance ensures that the application remains reliable and useful for long-term personal financial management.

2.2. Data Collection

The data collection method in this study is conducted through a literature review and scientific journal analysis. The literature review is used to understand fundamental concepts, supporting theories, and recent developments related to financial management and information technology. Meanwhile, the analysis of scientific journals is carried out to examine previous research findings, research methods, and relevant empirical results. These two methods complement each other in providing a strong theoretical and empirical foundation to support the accuracy and relevance of this research.

2.3. Tools and Materials

To support the development and testing of the Android-based financial management application, several hardware and software tools were utilized. These tools play an important role in ensuring that the system is developed efficiently, tested properly, and operates according to the intended specifications. The hardware and software components used in this study are summarized in Table 1.

Table 1: Tools and Materials

Name	Specification
Lenovo Ideapad Gaming 3 Laptop	8GB RAM, 512GB SSD, NVIDIA GeForce RTX 3050 4GB
Visual Studio Code	Lightweight code editor supporting multiple programming languages
Android Studio	Official IDE for Android application development
TablePlus	Database management tool compatible with MySQL, PostgreSQL, SQLite
XAMPP	Package including Apache, MySQL, and PHP for server simulation

As shown in Table 1, all tested features performed as expected, demonstrating that the application operates according to its specifications.

3. Result and Discussion

This section presents the results of system design, implementation, and testing of the Android-based financial management application. The discussion focuses on how the developed system meets the research objectives and addresses the identified problems.

3.1. System design results

The system design in this study is conducted as an initial stage prior to the implementation of the application. The system is designed using Unified Modeling Language (UML) to visualize process flows and interactions between users and the application. The use of UML aims to provide a clear representation of the system structure, thereby minimizing errors during the implementation stage.

3.1.1 Use case diagram

The use case diagram illustrates the user as the main actor who interacts with the financial management application. The user is provided access to several core features, including income recording, expense recording, and asset management. The use case diagram of the financial management application is presented in Figure 2.

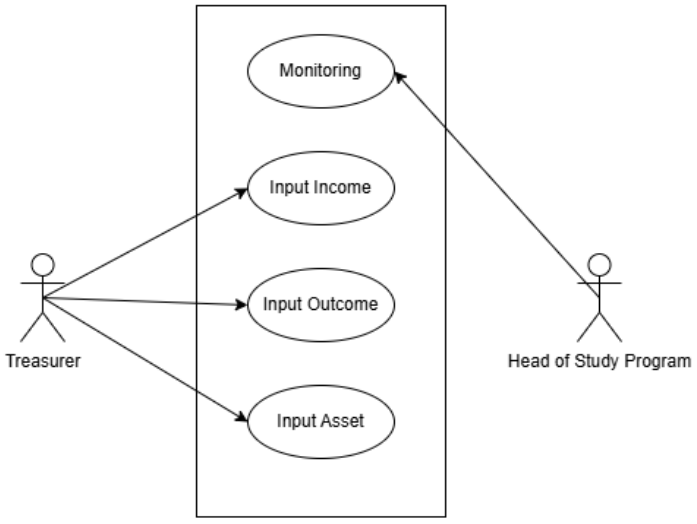

Fig. 2: The Use Case Diagram

Figure 2 shows a clear separation of roles between the Head of Study Program and the Treasurer, ensuring proper financial control, accountability, and transparency within the Information Technology Study Program.

3.1.2 Activity diagram of login and registration

The login and registration process begins when the user accesses the system and enters a username and password. If the entered data is valid, the system immediately displays the main menu. If the data is invalid, the user is given the option to retry logging in or proceed with registration. During the registration process, the user fills in the required account information. If the user confirms data submission, the

system stores the user information in the database and displays the main menu. Conversely, if the registration process is canceled, the system returns the user to the initial stage. The activity diagram illustrating the login and registration process is shown in Figure 3.

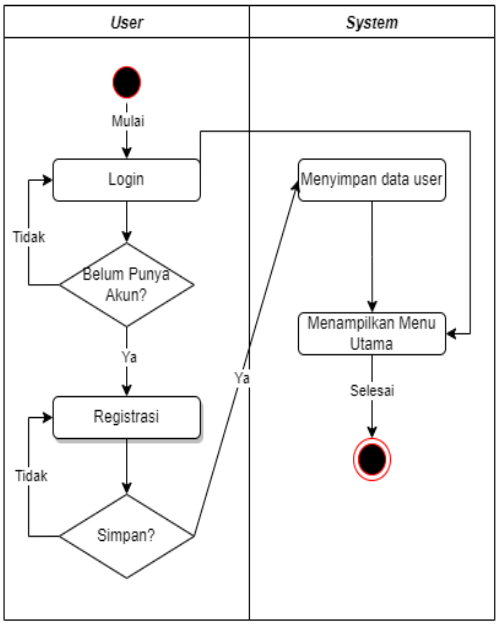

Fig. 3: Activity Diagram Loigin/Reigister

Figure 3 demonstrates that the authentication process is designed to ensure data validation and secure access to the system.

3.1.3 Activity diagram of income

The income recording process starts when the user selects the Income menu in the application. The system then displays an input form containing nominal value, category, and description. The user enters the income data and decides whether to save or cancel the input. The activity diagram for the income recording process is presented in Figure 4.

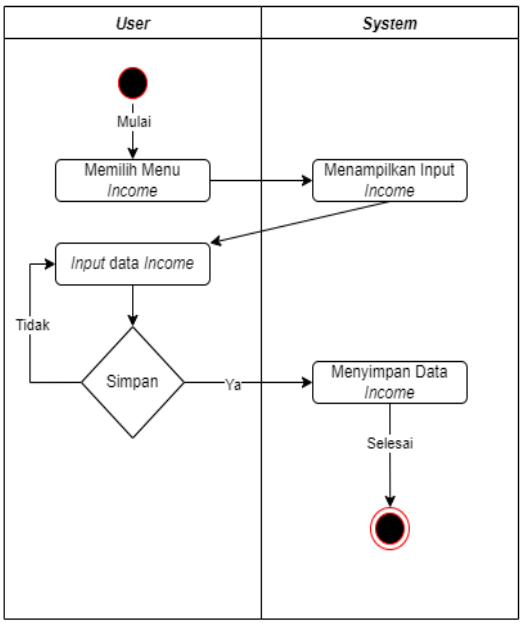

Fig. 4: Activity diagram of income

Figure 4 indicates that the income recording workflow is structured and straightforward, ensuring accurate data storage and ease of use.

3.1.4 Activity diagram of outcome

The expense recording process begins when the user selects the Outcome menu. The system displays an expense input form consisting of nominal value, category, and description. The user fills in the data and chooses to save or cancel the input. The activity diagram of the expense recording process is shown in Figure 5.

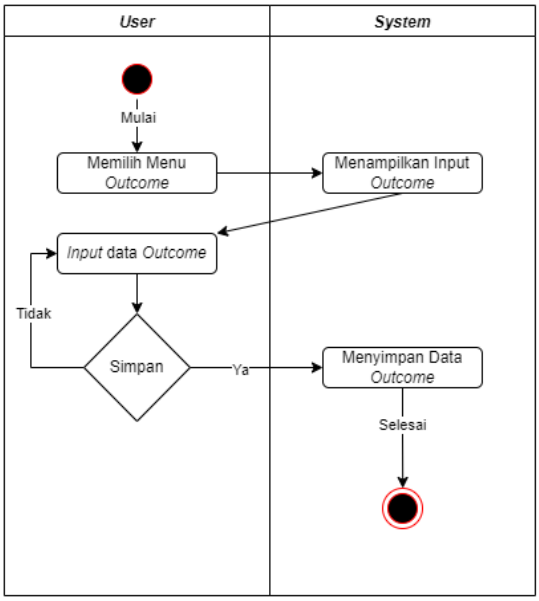

Fig. 5: Activity diagram of outcome

Figure 5 illustrates that the expense recording process follows a logical sequence, enabling effective financial tracking.

3.1.5 Activity diagram of asset

The asset recording process starts when the user selects the Asset menu. The system provides an input form containing nominal value, category, and description. After the data is saved, the system stores the asset information in the database and returns the user to the main menu. The activity diagram of asset management is presented in Figure 6.

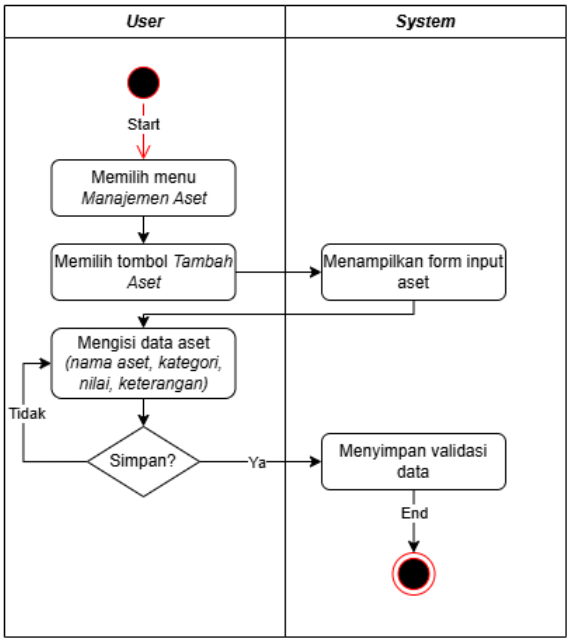

Fig. 6: Activity diagram of asset

Figure 6 shows that the asset recording process is designed to support systematic asset management within the application.

3.2. Application implementation results

The system implementation is carried out based on the system design that has been developed previously. The application is built using Android Studio as the development environment and Kotlin as the programming language. Kotlin is selected due to its efficiency in code writing, security features, and strong compatibility with the Android platform. The resulting financial management application includes several main features, namely user registration and login, income recording, expense recording, asset management, and financial summary display. All user-input data are stored in the database and presented in a clear and easily understandable format. The user interface is designed to be simple and intuitive to ensure that users can operate the application without requiring special guidance. This approach aligns with usability principles, where ease of use is a crucial factor in user acceptance.

3.2.1 Login Interface Implementation

The login interface enables users to securely access the application by entering a registered username and password. The system validates the input data before granting access to the main menu. The login interface of the application is shown in Figure 7.

Fig. 7: The login interface

Figure 7 illustrates that the login interface is designed to provide secure and straightforward access to the application.

3.2.2 Registration Interface Implementation

The registration interface allows new users to create an account by entering required personal information, such as name, email, username, and password. Once the data are submitted, the system stores the information in the database and enables users to access the application. The registration interface is presented in Figure 8.

Fig. 8: The registration interface

Figure 8 shows that the registration process is designed to support efficient user onboarding.

3.2.3 Main Menu Interface Implementation

The main menu serves as the central dashboard of the application. It displays a financial summary, including total income, total expenses, and current balance. The main menu also provides navigation to the core features of the application and user account options. The main menu interface is illustrated in Figure 9.

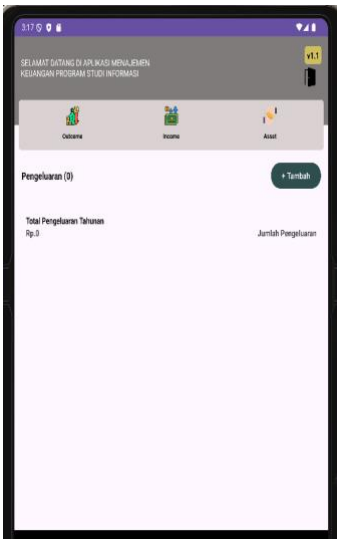

Fig. 9: The main menu interface

Figure 9 demonstrates that the main menu is designed to provide a clear overview of the user's financial condition and easy access to system features.

3.2.4 Income, Expense, and Asset Input Interface Implementation

The input interface for income, expense, and asset data allows users to record financial transactions by entering details such as date, amount, category, and description. After submission, the data are stored in the system database and reflected in the financial summary. The input interfaces for income, expense, and asset management are shown in Figure 10.

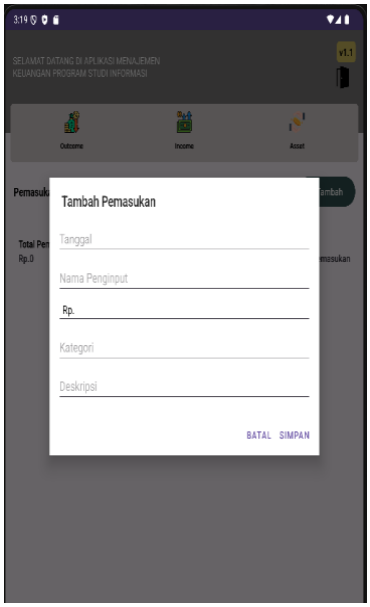

Fig. 10: The input interfaces for income, expense, and asset management

Figure 10 indicates that the input interfaces are designed to facilitate accurate and efficient financial data entry.

3.3. System testing

System testing is conducted using the Black Box Testing method, which focuses on application functionality by evaluating the conformity between input and output without considering the internal program structure. This method is applied to ensure that all features of the

financial management application operate according to predefined specifications. The results of Black Box Testing are summarized in Table 2.

Table 2: Black Box Testing

No	Tested Feature	Testing Scenario	Expected Result	Test Result	Remarks
1	Registration	User registers a new account	The system stores user data and displays the main menu	Valid	100
2	Login	User logs into the system	The system displays the main menu	Valid	100
3	Main Menu	User accesses the main menu	The system displays the financial dashboard	Valid	100
4	Income Input	User inputs income data	Income data is successfully stored in the system	Valid	100
5	Outcome Input	User inputs expense data	Expense data is successfully stored in the system	Valid	100
6	Asset Input	User inputs asset data	Asset data is successfully stored in the system	Valid	100

Based on the Black Box Testing results, all main features of the financial management application functioned properly and met the expected system specifications.

4. Conclusion

The development of an Android-based financial management application for the Information Technology Study Program has successfully demonstrated the effective integration of mobile technology to support structured and transparent financial management. The main novelty of this study lies in the application's ability to unify income, expense, and asset management within a single mobile platform that is simple, intuitive, and aligned with academic operational needs.

The implementation results show that the application functions reliably, with all core features operating according to system specifications as verified through Black Box Testing. The use of Kotlin and Android Studio contributes to efficient application performance, data consistency, and ease of maintenance. In addition, the system design based on Unified Modeling Language ensures logical workflows and minimizes implementation errors.

Overall, the proposed application provides a practical and effective solution for improving financial data management, monitoring, and accessibility at the study program level. This research contributes to applied information system development by demonstrating how mobile-based financial applications can enhance operational efficiency and support decision-making in academic institutions. Future improvements may focus on data analytics features, role-based access expansion, and integration with institutional financial systems to further enhance functionality and scalability.

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