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Design of a Mobile-Based Entrance Exam Test Application Using the Agile Method

Feriani Astuti Tarigan[1], Leony Hoki[2], Dandy Stevanus Tarigan[3*]

[1]*Information Systems,* STMIK Time, Medan, Indonesia
[2, 3]*Informatics Engineering*, STMIK Time, Medan, Indonesia
ferianiastutitime@gmail.com[1], leony.hoki@gmail.com[2], Dandystv36@gmail.com[3]*

Abstract

The rapid development of information technology has encouraged various educational institutions to innovate, including in the student admission selection process. The selection process, which is still conducted manually, often takes time, is inefficient, and prone to errors. Therefore, this study aims to design and develop a mobile-based entrance examination application that can be accessed flexibly by prospective students from anywhere. The methodology used in the development of this application is the Agile method, which allows the development process to be carried out iteratively and adaptively to changing user needs. The application is equipped with features such as question management, exam implementation, and automatic calculation of exam results. System testing was conducted using the black-box testing method to ensure that all functions run according to requirements. The results of this development show that the application can run well on the Android platform, providing convenience for administrators in managing questions and improving time efficiency in the assessment process. With this application, it is expected that the student admission selection process will become more effective, transparent, and easily accessible.

Keywords: *Mobile Application, Entrance Examination, Agile, New Students, Question Management*

1. Introduction

Along with the rapid development of information technology, the education sector has also undergone significant changes. One of the major changes is the management of student admission examinations. Many universities have started to shift from paper-based exams to computer-based and mobile application-based exams to improve efficiency and effectiveness in managing exam participant data. The use of mobile-based applications in the student admission process can help manage exam data more effectively and provide easier access for participants to obtain information related to schedules, materials, and exam results [1]. Therefore, the design of a mobile-based examination application becomes highly relevant to enhance the quality and efficiency of the student admission system.

However, despite the increasing adoption of technology-based examinations by universities, several issues remain to be addressed. One of the main problems frequently encountered is the lack of user-friendly design in the application's home screen. Many mobile-based exam applications have non-intuitive interfaces, making it difficult for participants to find essential information such as exam schedules, exam materials, or announcements related to their examinations. In addition, poor management of exam schedules or confusing schedule displays often result in participants not receiving accurate information about their exam times. Another important issue is related to security aspects. Mobile-based exam applications are often vulnerable to cyberattacks that may compromise personal data of participants, such as exam results and other private information, if adequate security measures are not implemented. These problems indicate a gap between the current examination systems and user expectations, highlighting the need for more effective solutions [2].

To address these issues, one of the approaches that can be applied is designing mobile-based examination applications using the Agile method. Agile allows software development to be carried out in stages and iteratively, where user feedback is continuously gathered so that the application can be adapted to user needs and the problems faced. With this approach, the development process can become more flexible, faster, and more easily adaptable to meet changing user requirements. Previous studies have shown that Agile-based application development can produce products that are more responsive to user needs and easier to adapt [3].

By applying the Agile method in the development of mobile-based examination applications, it is expected that an application can be created that is more efficient, secure, and user-friendly. The expected outcomes of this design are an application with an easy-to-understand interface, better-structured exam schedule management, and stronger security systems to protect participants' personal data. Based on the above explanation, the problems encountered in the current entrance examination system encourage the author to propose the design of a mobile-based entrance examination application using the Agile method as the topic of this thesis [4].

2. Literature Review

2.1 Design

Design is a crucial process in various fields, such as product design, architecture, information systems, and even business strategy planning. Essentially, design is a series of well-planned activities aimed at creating solutions or products that meet specific needs while maximizing the use of available resources. Design is not merely about creating something aesthetically pleasing but also involves a deep analysis of functionality, efficiency, cost, and the long-term impact of the proposed solution. Therefore, design requires a structured approach, creativity, and a comprehensive understanding of the problems and needs that must be addressed.

The design process generally involves several interrelated steps. The first step is identifying the problem or need. At this stage, the designer seeks to fully understand the issues, whether they stem from market demand, shortcomings of existing products or systems, or the specific needs of users. Without a clear understanding of the problem, the design outcomes are unlikely to meet expectations or objectives.

Once the problem is identified, the next stage is information gathering. At this stage, designers conduct research, such as reviewing literature, conducting market surveys, interviewing users, or making direct observations in the field. The aim is to collect data that will serve as the foundation for subsequent design activities. During this process, designers also begin to establish criteria or constraints that the proposed solution must meet.

The next stage is idea generation, where designers start to create several concepts or potential solutions to address the identified problems. Brainstorming or group discussions are commonly used methods to generate multiple alternatives. One frequently applied approach is iterative design, where ideas are tested, evaluated, and refined repeatedly until the most suitable solution is found.

After gathering ideas, the next step is design development. In this stage, the chosen concept is transformed into a more concrete form, such as sketches, models, or more detailed prototypes. The developed design must take into account various aspects, including visual aesthetics, functional effectiveness, user convenience, and available resources. Simultaneously, evaluations are conducted to ensure the design can be produced within reasonable costs and timelines.

Once the initial design is complete, the next step is prototyping or trial modeling. Prototypes are valuable for testing and evaluating the design before full production or implementation. They allow designers to observe how the design performs under real conditions and to identify potential issues. At this stage, feedback from users or stakeholders is essential for refining and improving the design.

The final step in design is implementation and production. Once the design has been tested and refined, this stage involves producing the product or fully implementing the system. For physical products, this includes preparing necessary materials and tools. For systems or strategies, it involves deploying the solution in practice or within organizations.

Several approaches to design exist depending on the project type and objectives. A widely used method is user-centered design, which focuses on user needs and experiences throughout the design process. For more complex projects, collaborative design methods may also be applied, involving multiple stakeholders or disciplines working together. This collaborative approach is particularly useful for large-scale projects, as it integrates diverse perspectives and expertise to produce more innovative and comprehensive solutions.

Despite its importance, design is not without challenges. Limited resources such as time, budget, and expertise often constrain the process, potentially affecting quality and depth. Additionally, design frequently faces uncertainty or unforeseen changes in technology, markets, or policies. Another challenge lies in complexity: in today's interconnected world, design solutions often involve multiple interrelated factors that must be considered. For example, in designing an information system, designers must account for technical, functional, and security aspects, as well as user impacts.

Sustainability is also an important consideration in design. When designing products, systems, or buildings, designers must consider long-term environmental impacts and the ability to maintain or repair the design over time. Increasingly, design trends are moving toward environmentally friendly materials and technologies that optimize resource use.

Overall, design is a critical and complex process that requires technical skills, creativity, and deep problem understanding. A good design process must consider cost efficiency, functionality, time, and long-term impact. In a rapidly changing world, the ability to design with innovative, sustainable, and user-focused approaches is essential for creating solutions that deliver optimal and lasting benefits.

2.2 Agile Method

The Agile method is known for its iterative and flexible approach to software development, often employing the spiral model as one of its core frameworks. This model allows for revisions based on feedback gathered from users throughout the development cycle. According to Schwaber (2004), iterative cycles in the spiral model are central to the process, with each cycle encompassing interdependent activities such as planning, risk analysis, application of techniques, and evaluation of results. This enables teams to continuously assess and adjust outcomes to better align with user needs.

The key to Agile's success lies in effective interaction among team members. Without strong communication, the software development process becomes hindered, making smooth collaboration essential to achieving goals. The success of software development is not measured by the completeness of documentation but by the software's ability to function effectively and deliver solutions needed by users. Hence, Agile also emphasizes collaboration with clients to ensure the software developed truly meets their expectations.

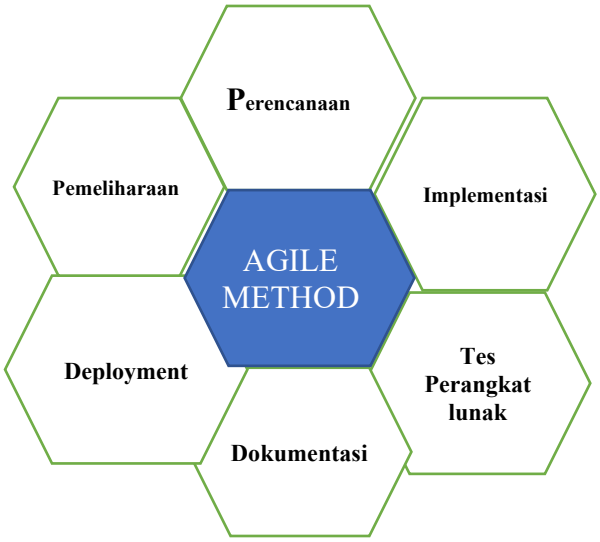
One of the core aspects of Agile is strong interaction among team members. Without effective collaboration, the development process will face significant challenges. This interaction serves as a communication channel that enables teams to quickly address emerging issues and keep projects aligned with plans.

Agile provides numerous advantages, particularly for projects with high uncertainty. When user requirements change or new information arises, the spiral model allows such changes to be accommodated and implemented without disrupting the entire project. Agile enables quick adjustments and iterative testing to ensure product quality, making the developed software more aligned with user expectations. This is especially useful in complex and dynamic software development projects that must adapt rapidly to market or technological changes.

The spiral model emphasizes iterative design cycles, where each round involves stages such as problem analysis, solution design, prototyping, and evaluation. Each iteration aims to review and improve the system design so it better meets evolving user needs. Evaluation and revision can be carried out at every stage based on stakeholder feedback, making the system design more adaptive to changes or new requirements not identified at the outset. This contrasts with traditional design methods, which are often rigid and difficult to adjust once the plan is set.

The iterative cycles of Agile generally involve planning, designing, testing, and continuous evaluation. Thus, Agile ensures that the developed product aligns more closely with user expectations and adapts to ever-changing requirements.

The stages in Agile design include:



2.3 Use Case Diagram

A Use Case Diagram illustrates the system's functionality as a set of units that show how interactions occur between users (actors) and the system being used. In this diagram, actors are depicted as human figures, representing the roles or entities that interact with the system.

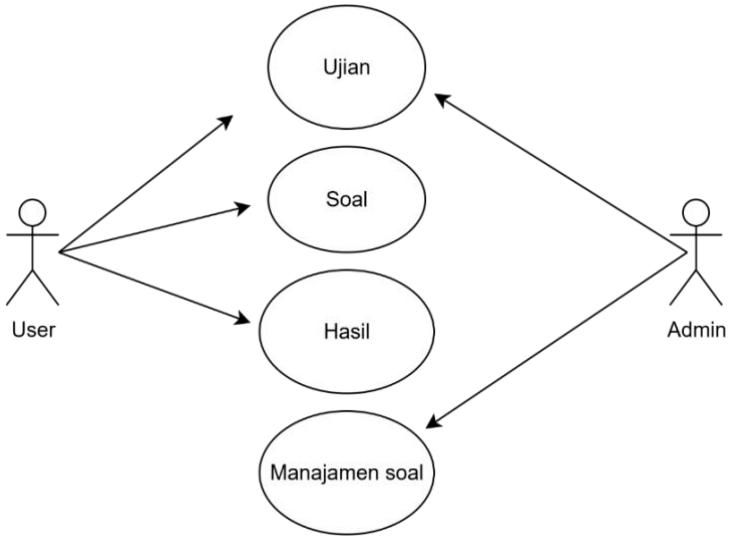


Figure 1: Use case

3. Research Result

The research results are presented in the form of graphs, tables, or descriptive analyses. Interpretation of these results is required before they are discussed in detail. The presentation should be systematic and sequential, following the steps outlined in the methodology, and should lead to key findings.

Database Structure
The database structure is designed to support the process of storing and managing data in the mobile-based student entrance examination application. This database is designed in a relational model, where each entity has relationships that are interconnected with one another. The explanation of the database structure is as follows:

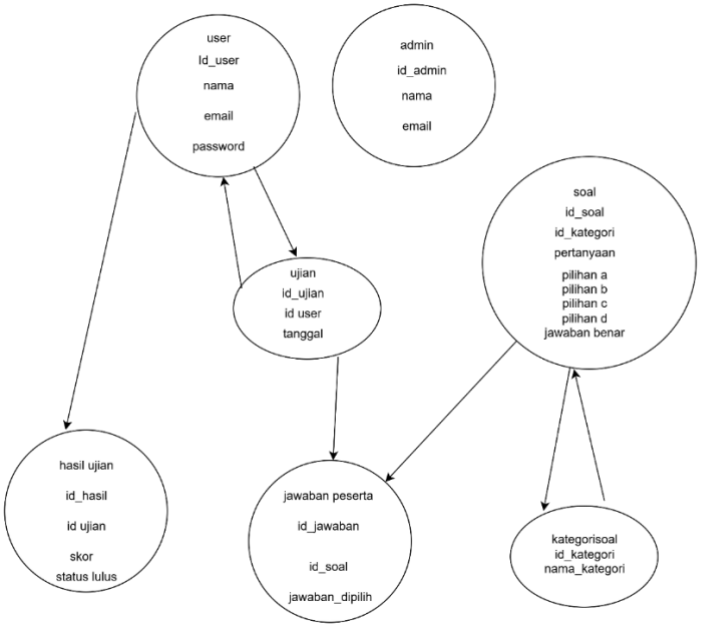


Figure 2: Database

4. Discussion

This application is designed to facilitate prospective students in taking the entrance examination online, while also assisting the university in managing exam data more efficiently.

Figure 3: Home Page Display

The home page contains a collection of questions that can be answered directly through a mobile device, with a simple and easy-to-understand interface.

Figure 4: Question Page Display

The system automatically displays the participant's final score after completing the exam. The system calculates the number of correct and incorrect answers, then converts them into a score according to the predetermined weight.

Figure 5: Examination Result Page Display

This section is used by the university or exam administrators to manage the system. On this page, administrators can manage participant data, create and configure exam questions, add question categories, and monitor participants' exam results.

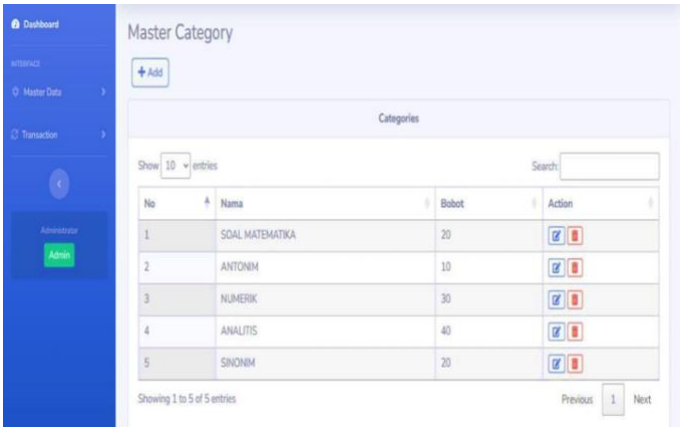


Figure 6: Admin Page Display

5. Conclusion

In this section, the researcher presents the level of achievement of the research objectives. It is also necessary to describe the alignment between the problems, needs, or challenges addressed and the methods applied. The conclusion serves as a hypothetical answer that leads to the objectives of the research activities. The researcher should also highlight the implications of the research findings.

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