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ANDROID APPLICATION DESIGN BASED ON COMPUTER SCIENCE ACADEMY TERNATE COURSE SCHEDULING

Muhammad Ridha Albaar [1], M. Kasyif Gufran Umar [2], Halimatus Syakdiyah [3]
[1] Faculty of Engineering, Informatics Study Program, Khairun University
[2]Computer Engineering, Ternate Computer Science Academy
[3]Setu 2 Public High School, Bekasi

Abstract

The provided introduction highlights the pressing issue faced by AIKOM Ternate due to the absence of an efficient scheduling system, leading to recurrent student rescheduling challenges at the beginning of each semester. The development approach involves the utilisation of a Use Case Diagram to illustrate the comprehensive course scheduling process, encompassing initial scheduling, learning activities, and examination schedules. Additionally, an Entity-Relationship Diagram (ERD) featuring four tables is crafted to underpin the creation of a robust database for the application. The scheduling system primarily addresses the coordination of space, time, and classes at AIKOM, emphasising the prevention of conflicts with both lecturers and students. The Android application's user interface is tailored to streamline the scheduling process, delivering a personalised output schedule that details courses explicitly. The efficacy of the application is intricately linked to the performance of the BAAK schedule concierge service, which plays a pivotal role in entering accurate data into the central database. It is crucial to note that the application's ability to furnish timely and precise schedule information hinges on the consistent and reliable execution of data updates by the BAAK; any lapses in this process result in a lack of updates within the application.

Keyword: Android, Schedule, Design, Use Case Diagram, AIKOM

INTRODUCTION

The effective scheduling of classes is a crucial component of academic planning, especially within higher education institutions. Beyond simply organizing courses and resources, efficient scheduling is pivotal in helping students manage their time effectively. Yet, the intricacies become apparent as universities, boasting diverse teaching staff spanning various fields, strive to devise conflict-free schedules aligned with educational objectives. The university timetable, allocating courses to specific time slots and classrooms, presents many challenges [1,2]. A significant obstacle arises in accommodating distinct student groups, each potentially enrolled in different courses simultaneously. Navigating this dynamic environment requires meticulous planning to avoid conflicts such as overlapping class

schedules or the inconvenience of students being compelled to attend multiple locations concurrently [3]. Developing scheduling systems for colleges and universities is not merely a logistical necessity but a fundamental aspect of implementing national talent development strategies and enhancing teaching management [4.6]. At its core, lecture scheduling seeks the optimal utilisation of teaching resources to ensure the seamless delivery of essential courses in higher education. The design of such systems must navigate multiple constraints, including considerations of time, space, and personnel, aiming to preempt conflicts and disruptions. Challenges extend beyond logistical aspects, embracing humane considerations such as ensuring reasonable teaching hours for lecturers and imposing limitations on the number of hours per course for a given student group [5,7]. The conventional reliance on manual scheduling methods, grounded in past experiences, is no longer tenable in the contemporary higher education landscape. Academic environments' evolving demands and complexities necessitate more sophisticated and efficient scheduling systems. As universities grapple with these challenges, the development and implementation of modern scheduling solutions emerge as imperative for ensuring the seamless functioning of educational institutions [8].

This approach can no longer be applied effectively in today's higher education institutions. For some majors and specific categories of courses (introductory courses, special courses, required courses, and elective courses), many students must complete various teaching schedule arrangements each semester. If course management is done manually, the workload is very large and will require a lot of energy and time from teaching organizers. It is difficult to provide a better, reasonable schedule, and can make maximum use of teaching resources [9].

The academic system for scheduling courses at a university is a system that every campus must have, because a good course scheduling system will be able to increase the effectiveness of teaching and learning activities, especially at AIKOM Ternate. The novelty in this research is producing an Android-based application that makes it easier for lecturers and students to access lecture schedules and minimize conflicting lecture schedules.

LITERATURE REVIEW

Mobile devices, characterized by their useful, easy-to-use and accessible properties, have become a primary and irreplaceable tool for meeting basic human needs. This

phenomenon is characterized by the exponential increase in the use of smartphones, especially on the Android and iOS platforms, which are not only easy to use but also have the computing power to handle various complex applications that attract millions of global users. However, along with this popularity, security concerns have emerged regarding mobile applications. Mobile software developers are encouraged to release products on time and within a predetermined budget. In this context, software estimation plays a key role in providing the most accurate measurement figures. This is necessary to build trust between developers and stakeholders. In the face of the dynamics of mobile application development, many approaches originally used in traditional software estimation have been adapted and adopted to meet the specific needs of mobile application development and testing. [10,11].

Choosing a programming language that is beginner-friendly is considered the main step, because this acts as a catalyst on the journey to becoming a programmer. The importance of choosing an uncomplicated language is very apparent, considering that the complexity of a programming language can influence a beginner's interest and motivation in this field. With object-oriented concepts that can be implemented easily, Python appears as a very suitable choice. Python, as a general-purpose programming language, provides support for various programming paradigms. The specialty of this language lies in its high-level nature, allowing the writing of more concise code compared to other programming languages. This advantage is very useful, especially for beginners, because it can increase their attraction to the world of programming. Python is recognized as one of the easiest programming languages to get started with, thanks to its very user-friendly writing style. Furthermore, the presence of a large number of built-in methods in its standard library further strengthens its position as the top choice for beginners starting a career in programming. [12,13].

Scheduling not only involves time management, but also includes a variety of tasks, such as gathering and delivering information and monitoring the status of resources. These scheduling tasks become intertwined in the organizational structure, making it a very complex process and highly dependent on the context. In the educational context, class scheduling has become a critical element that requires attention before registration, and plays an important role in providing students with a clear picture of time management [1,14].

The various SDLC methodologies offer different approaches with their own advantages and disadvantages. Intensive developments in software development methodologies over the past few decades have brought significant changes. SDLC includes activities such as defining, developing, testing, delivering, operating, and maintaining software or systems, and the quality and productivity of the development team depends on effectiveness in defining and analyzing software process metrics during SDLC. Defect detection in the early stages of SDLC is considered as a critical resource towards project success. Although the initial stage classification may vary depending on the methodology used, the methods for assessing and evaluating the quality of software processes are tailored to the company's preferences. SDLC aims to minimize risks and failures while maximizing product quality, and to achieve this, different methods of evaluating and measuring quality can be applied. This paper covers the classification of SDLC phases, a focus on the initial stages, software quality evaluation methodology, and a series of relevant measurements throughout the evaluation process. With the SDLC as a guide, software development can occur efficiently and effectively, leading to project success[15-17].

UML is recognized as a widely accepted visual language in software development, facilitating the identification of system requirements and scope by providing a visual model. In software engineering, UML serves as a tool for developing systems, providing a visual language that defines and documents the structure and interactions in a system. UML is used to represent requirements in scenarios, which explain how users use the system. Through UML, system boundaries can also be shown clearly. Thus, UML serves as an effective communication tool between developers and stakeholders, providing a clear and standardized picture of the structure and behavior of the system under development. By adopting UML in software engineering, professionals can efficiently design, develop, and document systems in a clear and structured manner[19-23].

In the context of an ER model, platform-related information and implementation-specific details, such as procedures, are not included. This reflects the main focus of ER diagrams, namely presenting the structure and relationships between entities without paying attention to certain technical aspects related to the implementation or platform used. With this approach, an ER diagram provides a clear and focused view of the conceptual structure of a

system or database, facilitating communication and understanding between stakeholders who may have different backgrounds and needs [20].

In exploring the analysis of a system's high-level requirements, using use case diagrams is essential to capture the dynamic aspects. These diagrams serve not only as a tool to gather system requirements and functionality through use cases, but also as a means to identify internal and external agents interacting with the system. This use case diagram's main focus is defining the relationships between pairs of use cases, with expanding relationships as a key element. In particular, the 'Perform Computation' option involves significant roles from InformUsers and StoreResults. Covering the range from Performance Computing to AcquireInputs, the diagram provides a comprehensive picture of the state of the computational demands required to obtain value from sensors [21-25].

Furthermore, analysis of Android phone software highlights the importance of simultaneously releasing software development and core applications. In this context, the Java programming language is crucial, facilitating interaction between diverse programs. Nonetheless, software developers need to consider the security aspects of the framework and maintain the integrity of the main structure, while considering the potential replacement of the main application with efficiency through the first mock exam [26,28]."

METHODOLOGY

This research adopts the development research method as its primary basis. The research and development approach carried out in this research includes activities generally carried out by companies and governments, to create innovation in the form of products, services and procedures. Despite the diversity of product development methodologies, prototyping is a key element in many development processes today. The function of a prototype is not only limited to facilitating concept testing and validation, but also makes a significant contribution in generating more accurate data.

Special attention was given to selecting research locations in the data collection aspect. Appropriate places, such as nerve locations, are essential in ensuring that participants have complete freedom in providing responses. This is essential to ensure that the reactions given reflect true views, avoiding potential biases that may arise if participants feel limited or uncomfortable.[27,29,30] As a concrete example, this research was carried out at AIKOM Ternate, and

the prototype research diagram can be identified in Figure 1.

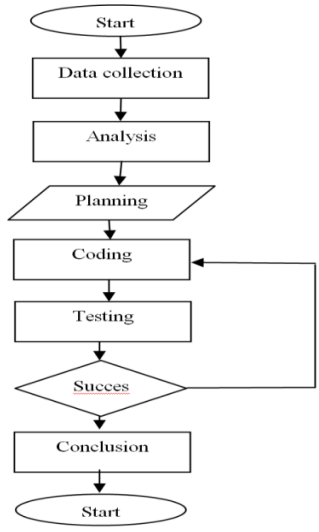

Fig. 1. Prototype research diagram

After data has been collected and before analysis is carried out, various choices and assessments must be implemented. These aspects involve dealing with outliers, applying corrections for statistical and methodological artefacts, and considering changes that may be needed to the data that has been collected. This research mainly focuses on collecting primary data, which can be carried out through qualitative or quantitative approaches. The primary data collection methods include questionnaires, interviews, focus groups, observation, surveys, case studies, and experimental methods. By carefully understanding and taking these steps at the data preparation stage, researchers can ensure that the data used for analysis is representative, accurate, and reliable to support research findings.

Interviews are a basic form of social interaction that involves asking respondents questions directly and producing direct data. Although this method can provide in-depth insight, it requires special expertise to ensure the accuracy of the data obtained. In the context of data analysis, there are different methods, including relational, physical, and digital analysis. This analysis method can be based on digital data, such as that obtained from websites, and can be applied in a network context. This approach reflects the complexity of how data obtained from interviews and other digital sources can be processed and analysed to gain a deeper and more targeted understanding.

It is also important to note that the software testing process plays a vital role in ensuring the quality and performance of the program. This process is divided into several stages, namely unit testing, integration testing, system testing, and acceptance testing. Each level involves testing program components separately to ensure the overall quality of the software. Choosing the correct testing technique is also a key factor in achieving effective testing, with various techniques covering different aspects of the software to

assess its quality. Thus, software testing is not only a routine step, but also a carefully planned strategy to ensure that every software component and function operates as expected.

RESULTS AND FINDINGS

In the ongoing system analysis stage, the focus is on gaining a deeper understanding of the system's operation and identifying problems that may be encountered. This analysis is an essential basis for designing more effective systems. The analysis process is carried out by examining the sequence of events in the sub-parts of the system and detailing their functions. From this sequence, various visual representations are obtained, such as document flow diagrams (flow maps), context diagrams (context diagrams), and data flow diagrams (data flow diagrams).

Analysis of the current system is considered crucial to revealing its weaknesses, both in terms of operations and implementation by the relevant parties. This step is crucial so that the author can design a new information system with a more programmed and structured approach, as reflected in Figure 2. The figure may depict a visual representation of the proposed information system design, showing the key elements and their relationships.

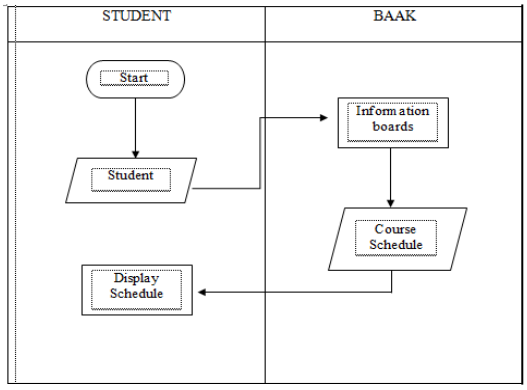

Fig 2. Analysis of the Current System

From the system analysis that has been carried out, it can be seen that data processing in the current system consists of input, process and output stages. However, there is a need to make improvements in data processing because the system has negative impacts, such as:

1. The information produced is less accurate.
2. When looking for student lesson schedules, you need enough time and you have to look at the information board.

As a solution to this problem, a system analysis is proposed which involves creating a new system. The new system is expected to be able to solve the problems that exist in the current system. Reference to Figure 3 indicates that the diagram may be a visual representation of the proposed system, highlighting the main elements involved in the improvement process.

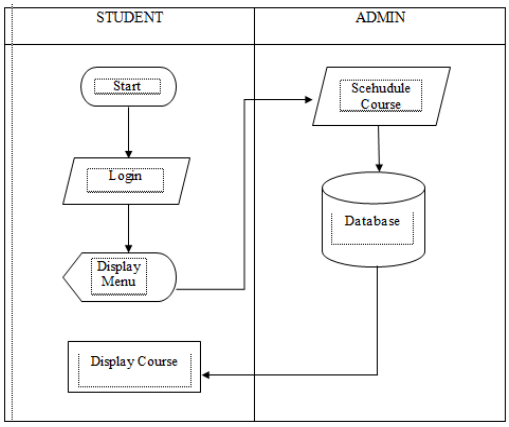

Fig 3 Analysis of the Proposed System

In this specific context, BAAK (Academic and Student Affairs Administration) is mentioned as an actor who has certain responsibilities regarding data management through the schedule application on the Android platform. BAAK's duties include entering data, making data changes, and ensuring the continuity of current data in the data storage center. Reference to Figure 4 indicates that a BAAK use case diagram may provide a visual depiction of BAAK interactions and responsibilities in the context of the application's use.

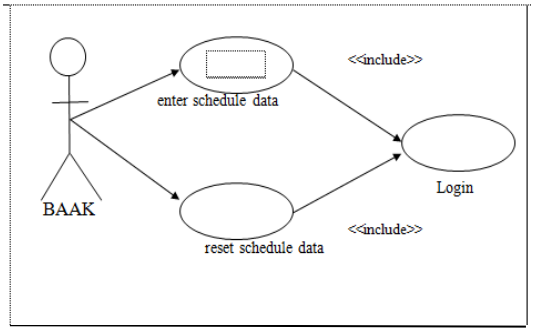

Fig 4. BAAK Use Case Diagram

Students are required to log in to the system to access the content provided by the application. The statement also emphasised that Figure 5 represents a use case diagram designed to focus on the interaction between users, especially students, and the mobile application. This use case diagram is intended to provide an overview of the main functionality available to students in the context of using a mobile application.

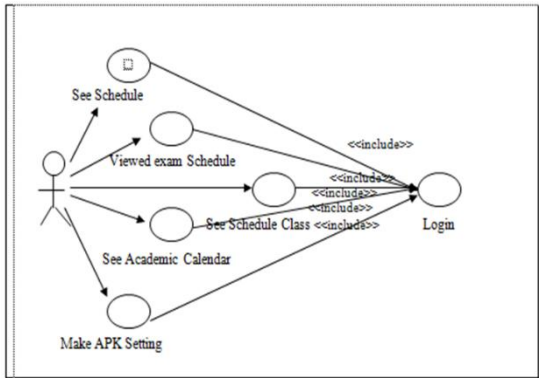

Fig 5: Student Use Case Diagram

Database models or designs utilise ER diagrams to more easily present data that has relationships or connections. With the help of ER Diagrams, the formed database system can be explained in a structured and neat manner, making it easier to understand entities, attributes and the relationships between them. Reference to Figure 6 may refer to a visual example that supports the design of an Entity-Relationship Diagram (ERD) for an Android-based course scheduling system. This shows that ERD is helpful in general database design, but can also be explicitly applied in

the context of specific system development, such as Android-based course scheduling.

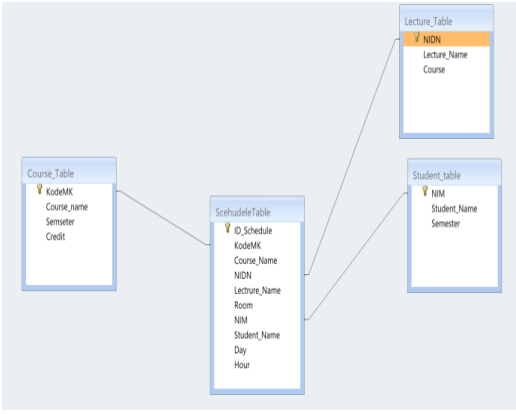

Fig 6. ERD of Android-Based Course Scheduling Design

The user interface design process aims to balance the technical aspects of functionality and visual elements, including paying attention to the user's mental model. This approach seeks to create a system that is not only capable of operating technically well, but also can be used and adapted to user needs. Figure 7, mentioned in the text, may refer to an illustration or visual example that supports the interface design process. Overall, these statements emphasise the importance of considering user experience and interaction in developing various Technologies to ensure that the system functions well and meets user needs and expectations.

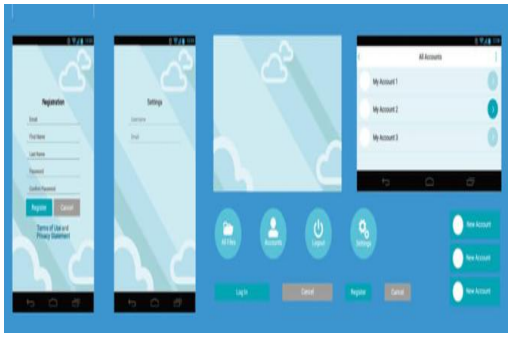

Fig 7. User Interface Design

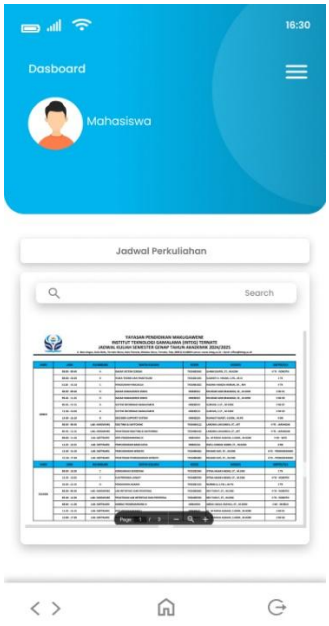

Fig 8. Lecture Schedule View

CONCLUSION

Developing an Android-based course scheduling application at AIKOM Ternate. The primary focus is on the convenience and efficiency that this application provides for students to access the latest lecture schedule. The automatic data presentation feature is highlighted as a significant advantage, making it easy for students to get the latest

schedule information. Notifications are also recognized as a feature that plays an essential role in reminding students of their schedules. The statement highlights the link between the functionality of the Android app and the performance of BAAK's schedule concierge service in entering data into a central database. The importance of timely and accurate data entry by BAAK officers becomes clear, considering the impossibility of updating applications when data is not entered into a central database. The benefits of this application are not only felt by students but also by lecturers, helping the teaching and learning process by providing complete information about the lecture schedule. The introductory statement illustrates that this application not only provides practical benefits such as information about rooms, working hours, and lecturers, but is also integrated with the course planning system, providing students with insight into the courses being programmed. Overall, this statement provides a basis for further explanation regarding the functionality of the Android application and its positive impact for the entire AIKOM Ternate.

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