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A Vocational Student Service Information System Using Mobile Technology

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ABSTRACT

Education's purpose at Vocational High School (SMK) PGRI 3 Palembang emphasizes holistic student development, encompassing religious, intellectual, and character aspects. With a significant student body, manual administrative processes hinder effective discipline enforcement and extracurricular management. To address these issues, a mobile-based student information system is proposed to expedite disciplinary actions, attendance tracking, and extracurricular selections. Employing the waterfall model, the study progresses through phases of system development, culminating in the design and testing of a robust system architecture. Utilizing UML diagrams, the system is outlined, featuring actors such as administrators, teachers, and the deputy principal. The client-server model, with a mobile app and web server, facilitates efficient data management and presentation. Black box testing confirmed the system's operational efficacy. This proposed system offers a comprehensive solution to streamline administrative tasks, enhancing decision-making and operational efficiency at SMK PGRI 3 Palembang.

1. Introduction

The purpose of education in schools is a conscious and planned effort to create an atmosphere of learning in the learning process so that students actively develop their potential to have religious spiritual power, self-control, personality, intelligence, noble character, and the skills needed by themselves, society, nation, and country [1], [2]. Vocational High School (SMK) PGRI 3 Palembang is one of the vocational high schools in expertise competencies in the field of accounting that has students as many as 253 people. Consists of 93 male students, and 160 female students. With the large number of students of SMK PGRI 3 Palembang, to implement student discipline, the school has a guideline and gives a score of violations committed by students both intentionally or unintentionally. The current system is in the student at SMK PGRI 3 Palembang conducts the administrative process of student violations, management of student attendance recapitulation, and managing extracurricular activities. This administrative process is carried out manually by the Deputy Principal for Student Affairs. With a high level of violation of Tatat Titib, the Deputy Head of Student Affairs becomes slow in

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processing problems with problems, and reporting student attendance, as well as extracurricular activities.

Based on these problems, mobile-based student information systems can be said to be an appropriate alternative for the preparation of student reports. This mobile application-based student information system can accelerate the student parts in processing problems with problems, recapitulation of student attendance, and students who choose extracurricular. The information system is a scheme consisting of collecting, income, processing, storage, processing, and data control, as well as reporting so that information is produced that supports decision-making to achieve the targets and objectives that have been set. The existence of mobile-based student information system services at SMK PGRI 3 Palembang, will make it easier for schools to take attendance, decisions making for violations committed by students, and better extracurricular management so that information can be faster for users.

2. Method

Figure 1 shows the research method that the author used to achieve the objectives set at the beginning. The system development stage used is the waterfall model. The waterfall model is an SDLC method that has the characteristic that each result in Waterfall must be completed first before proceeding to the next phase. The Waterfall Model is a software development methodology that follows a linear and structured flow [3], [4], [5]. It consists of a series of phases that must be completed sequentially, and each phase is dependent on the completion of the previous phase. Following are some of the main phases in the Waterfall model:

1. Analysis: The stage where system requirements are gathered and thoroughly understood. It involves interaction with users and stakeholders to define functional and non-functional requirements.
2. Design: After the requirements are collected, the next step is to design the system architecture. This includes designing the system structure, identifying algorithms, and preparing the necessary technical specifications.
3. Coding: This stage involves coding the software according to the specifications created at the design stage. The development team creates code based on the approved design.
4. Testing: After implementation, the system is tested to ensure that all requirements have been met and that there are no significant bugs or errors. These tests include functional, performance, and security tests.
5. Delivery/Implementation: Once the system passes all the tests, it is ready to be implemented and released into a production environment or used by end users.

One of the main disadvantages of the Waterfall model is its inability to handle the frequent changes in requirements that occur in the software development cycle. Due to the linear nature of this model, it is difficult to return to a previous phase once a particular phase has been completed.

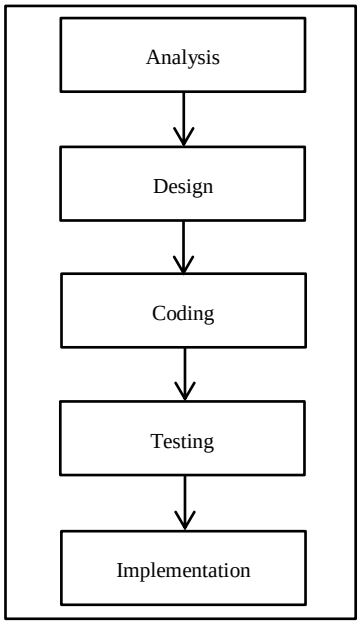

Figure 1 – Simple system development model

System analysis is a description of the system currently running at SMK PGRI 3 Palembang, the administrative process for student violations, the management of recapitulation of student absences carried out by teachers and homeroom teachers as well as guidance counselors, for extracurricular student data and all reports from teachers, homeroom teachers, and BK teachers are processed by the deputy principal for student affairs.

3. Result and Discussion

The author started designing the proposed system by creating a UML diagram [6], [7]. The proposed system design includes Use case diagrams, Activity diagrams, Sequence diagrams, and Class diagrams.

3.1. Use diagram

Several things need to be described, namely actors and use cases. Actors are users who are connected to the system and can be people (indicated by their role and not their name/personnel). The actor is symbolized by the figure of a stick man with a noun at the bottom that states the role/system. Use cases are depicted with an ellipse symbol with the name of the active verb inside which states the activity from the actor's perspective [8], [9]. The system that the author proposes consists of four actors, namely admin, deputy principal, homeroom teacher, and teacher.

3.2. Activity diagram

An activity diagram is a description of function paths in an information system [10]. In full, the activity diagram defines where the system process starts, where it stops, what activities

occur during the system process, and what sequence these activities occur in.

3.3. Sequence diagram

Based on the use case that has been created, a sequence diagram is obtained which describes the behavior of objects in the use case by describing the lifetime of the object and the messages sent and received between objects.

3.4. Class diagram

Class diagrams describe the types of objects in the system and the various static relationships that exist between them [11]. Class diagrams show the properties and operations of a class and the boundaries contained in the object relationships.

3.5. System architecture

The system consists of two parts, namely a mobile phone application that functions to display information in the form of violation reports, student data input, and extracurricular activities and a server as an information center that will send information to clients regarding violation reports, student data, and extracurricular activities. The system architecture being worked on can be seen in Figure 2.

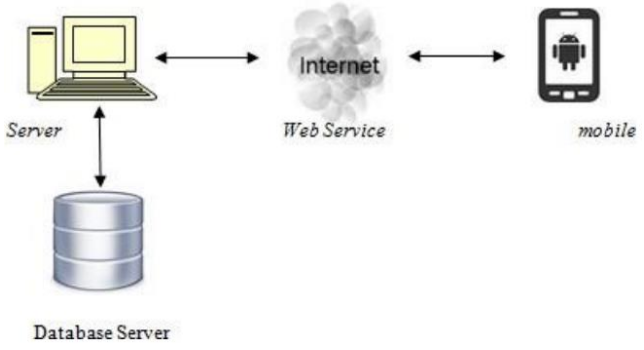

Figure 2 – System architecture

The system has a client-server architecture where the client is a mobile application and the server is a web server application. The mobile application and web server are connected via the internet network [12], [13]. The web server stores information data in the server database. This architecture was chosen to simplify the data updating process. All information and location data are stored in the server database. By using a database server it is possible to store large amounts of data. Mobile applications and web servers are tasked with managing data traffic, namely adding, changing, or deleting data in the database, as well as displaying information stored in the database server.

Meanwhile, mobile applications will have less scope of tasks compared to web server applications, because mobile applications are more specialized in displaying information obtained by users. Communication between the mobile application and the web server uses web services technology. Web services allow the size of this application to be very small because most of the data will be taken from web services so it doesn't need to be stored in the mobile device's memory. Web services also make it easier for us to update data in applications because changes only need to be made in web services and all applications that are installed locally and access to these web services will automatically follow the changes.

3.6. System Interface

The mobile-based information system interface at SMK PGRI 3 Palembang has a form that can be used by admins or users as shown in Figure 3 and Figure 4.

Figure 3 – Login page

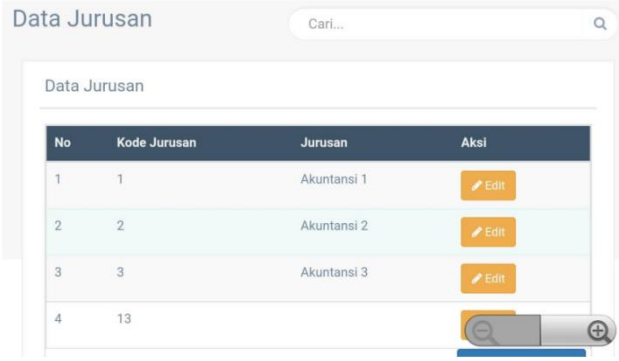

Figure 4 – Department data page

Next, the author carries out black box testing as an initial stage of evaluation of the system that has been created. The test results show that all functions and interfaces of the proposed system can run well.

4. Conclusion

The introduction outlines the challenges faced by Vocational High School (SMK) PGRI 3 Palembang in managing student violations, attendance records, and extracurricular activities due to the manual administrative process. It proposes a mobile-based student information system as a solution to streamline these processes, improve decision-making regarding student violations, and enhance extracurricular management. The methodology section describes the system development using the waterfall model, detailing its sequential phases: analysis, design, coding, testing, and delivery/implementation. It highlights the limitations of the waterfall model in handling frequent changes in software requirements.

In the results and discussion section, the author presents the system design through UML diagrams (use case, activity, sequence, and class diagrams) and describes the system architecture, a client-server model comprising a mobile application and a web server connected via the internet. The mobile application focuses on displaying information while the server manages data storage and updates through web services. The system interface screenshots demonstrate a login page and department data display. The initial black box testing indicates the proper functionality and interface operation of the proposed system. Overall, the study proposes a mobile-based student information system as a solution to the manual administrative challenges faced by SMK PGRI 3 Palembang, presenting a systematic methodology and design process along with initial testing results to support its feasibility and functionality.

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