

Design Of A Decision Support System For The Graduation Of New Student Candidates Based On MVC

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Abstract

The selection process for new students in the field of education is crucial and warrants careful consideration. IT Telkom Purwokerto has a dedicated division, the Admission Unit, responsible for the selection of new students. However, this process often encounters errors, such as miscalculations in the average scores of three subjects, discrepancies between new student data and graduation guideline data, and prolonged simulation processes for graduation. This study proposes a solution to these issues through the implementation of an MVC-based Decision Support System (DSS) for determining the eligibility of new student admissions. The Prototype methodology was chosen to develop an MVC-based system as a resolution to these issues. The criteria used in this research to determine new student admissions involve various factors, including the chosen high school major, interest in the offered majors, average mathematics scores, and the average scores of three main subjects: mathematics, Bahasa Indonesia, and English. The outcomes of this research include the development of an MVC-based decision support system that aims to determine the admission status of new students. It is anticipated that the implementation of this decision support system based MVC will not only aid relevant personnel in the admission decision process but also mitigate potential issues that may arise. The research contributes to the enhancement of the efficiency and accuracy of the new student selection process at IT Telkom Purwokerto.

Keywords: Decision Support System, Prototype, Selection Process, Graduation Determination

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1. Introduction

Institut Teknologi Telkom Purwokerto (ITTP) is a private university with a focus on the development of knowledge based on information technology in the fields of Health, Agro-industry, Tourism, and Small-Medium Enterprise (HATS). The university offers 14 study programs distributed across three faculties: the Faculty of Communication and Electrical Engineering, the Faculty of Informatics, and the Faculty of Industrial Engineering and Design. These programs cater to a diverse range of academic interests and career paths. The Faculty of Communication and Electrical Engineering, for instance, provides a platform for students to delve into communication technologies and electrical engineering. Meanwhile, the Faculty of Informatics offers programs that explore the vast world of information technology. The Faculty of Industrial Engineering and Design focuses on equipping students with the skills needed for innovation and design in the industrial sector.

Prospective new students who are interested in becoming part of ITTP can register through the official

website at daftar.ittelkom-pwt.ac.id. After accessing the site, prospective new students will be guided to fill in the required data, including personal biodata, school information, and selection of study programs of interest. After completing the registration data, the next step is to purchase a registration token and make payment. This payment process ensures that the data submitted by prospective new students can enter the selection stage. Thus, prospective new students can ensure the smoothness of their registration process and get the opportunity to take part in the selection set by ITTP.

The selection and admission process of new students in the world of education is a crucial stage that needs to be done [1]. The selection process of prospective new students aims to select those who have the potential and appropriate qualifications [2]. IT Telkom Purwokerto understands the importance of this stage, and for that, they appointed the Admissions Unit as a special division responsible. At the beginning of each academic year, the Admissions Unit actively selects thousands of prospective students, ensuring that they meet the predetermined criteria. The selection process includes

several stages, such as data filtering, data matching with graduation criteria, study program placement based on the interests of new prospective students who pass the selection, and graduation announcement via email.

The selection process for admitting new students frequently incurs multiple errors [3]. According to conducted interviews, typical mistakes during the admission simulation comprise miscalculations in the average scores of three subjects and inaccuracies in correlating new student data with the predetermined graduation standards. Moreover, the process takes an extended period due to drawn-out graduation simulations. The Admission Unit's errors lead to several problems, including parents protesting abrupt changes in their child's admission status and placement in a program that does not align with their interests.

The solution to the stated problems is to develop a website for a Decision Support System (DSS) based MVC architecture. This platform would assess the potential for accepting new student. This system aims to streamline the approval process for new students and match them with programs that align with their abilities and areas of expertise. Administrators who conducted graduation simulations were interviewed to establish these criteria. Eligibility for new student admissions is determined by multiple criteria, including the student's high school major, the average scores in mathematics, Bahasa Indonesia, and English, as well as the average mathematics scores. The student's chosen specialization is also considered.

Developing a decision support system application accessible through the web to assess the graduation of future students uses the prototype approach. This method is preferred because it aligns the system development with user demands, as these users are involved in identifying problems and testing the system. Through the implementation of prototypes, researchers can identify potential issues or risks in the early stages of the process through the examination and testing of prototypes [4]. Furthermore, this technique can lead to cost and time savings by enabling changes to be made in the initial stages rather than waiting until the development of the system is close to completion or has already finished [5]. This research project aims to develop a web-based decision support system utilizing the prototype method for system development. The existence of this system is expected to help related officers in graduating new student candidates and minimizing the problems that occur.

2. Research Methods

There are several stages involved in conducting this research, beginning with planning, carrying out a literature review, system design, design, implementation and system testing as the final stage.

2.1. Planning

The initial stage of the research process involves planning [6]. This step is taken to identify the issues that will serve as the foundation of the study. The study's planning stage involved meeting with the head of admissions and an officer responsible for simulating the graduation of potential new students. The purpose was to ensure realistic and accurate simulation of the admissions process.

2.2. Literature Study

The literature review stage aims to enhance understanding of the challenges in this research, specifically the decision support system utilizing the AHP technique for decision-making. Sources of literature can be retrieved from national and international printed books and journals.

2.3. Analysis

The process of analysis commences with gathering comprehensive user data to ensure that decision-making support user requirements. The data collection process entails several methods, including observation and interviews. The observation technique is employed to obtain general data [7]. Meanwhile, to gather comprehensive data, interviews can be conducted with those who possess in-depth knowledge of this issue, including the head of Admissions and the employees responsible for simulating the graduation of new student candidates. The collected data will undergo a detailed analysis to establish decision-making criteria that are precise and effective.

2.4. Design

The design stage of this application is done through understanding the concept of Object Oriented (OO). OO development is recommended and designed using Object Oriented Software Engineer (OOSE) using the Unified Modeling Language (UML) and completed through the design of an Object-Oriented Development (OOD) website based on MVC Laravel [8]. UML design goes through several stages including use case diagram design, sequence diagram design, activity diagram design and class diagram design [9].

2.5. Implementation

This stage of implementation involves coding to prepare a responsive website. This stage of coding involves applying the Controller in the MVC framework. The controller has consequences in the form of a programming language that is used in the system, namely PHP 8.1.25 as core programming. The coding

process utilizes the PHP Laravel programming language to further incorporate the OOD concept.

staff, who assist in managing student data and verifying the graduation data of new student candidates.

2.6. Testing

After building a website, the next crucial step is testing it to check for any bugs or errors. This pre-launch stage of testing is conducted to ensure the system is in good condition before its actual use [10]. This pre-launch stage of testing is conducted to ensure the system is in good condition before its actual use. Our research relies on the Black Box Testing method for this purpose.

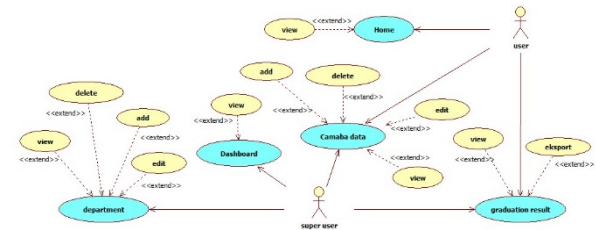


Figure 1. Use Case Diagram

3. Results and Discussion

This website application assists in determining the eligibility status of new student candidates for acceptance. It is designed to aid administrative officers in conducting graduation simulations accurately and efficiently. The web development is structured using the Prototype framework method, which involves dividing each stage:

Figure 1 illustrates the potential interactions that may occur between the super user and user actors. The super user can manage department and student data and view graduation results of new prospective students. Furthermore, within the major management and camaba data management features, the super user can perform tasks such as adding, viewing, editing, and deleting majors. Superusers are restricted to Excel format for both viewing and exporting information when utilizing the graduation results feature. Users can manage data by viewing, adding, editing, and deleting information, as well as accessing graduation results.

3.1. Analysis

The data obtained through observations and interviews with relevant parties will be analyzed to determine the necessary features for each role. The analysis results indicate the system roles for two positions, specifically the head of administration and staff of administration. Super users are expected to have the ability to log in, register, manage department, manage data on potential new students, and view graduation recommendation results for new student candidates. Meanwhile, users are expected to be able to manage data on potential new students and view graduation recommendation results.

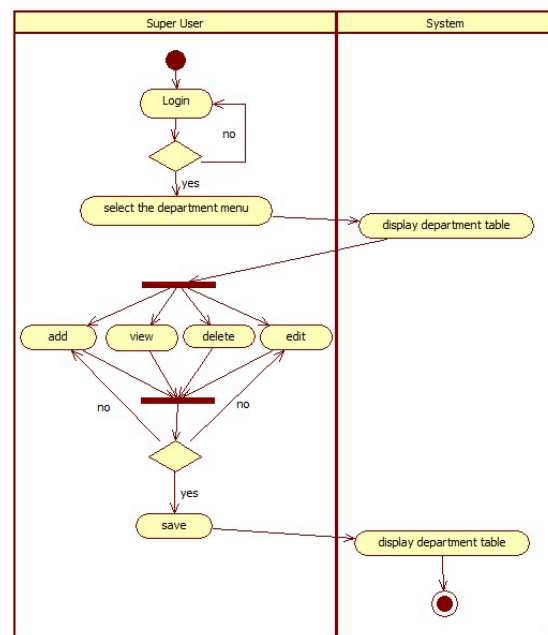


Figure 2. Activity Diagram of Department

3.2. Design

The application design stage is attained through abstraction and then actualized into a product. This model delineates the tangible outcomes of the preceding analysis process. Familiarity with Object Oriented (OO) principles plays a vital role in materializing this application design stage. Typically, OO development is executed with Object Oriented Software Engineering (OOSE) utilizing the Unified Modeling Language (UML). At this stage, the UML design carried out includes designing use case diagrams and designing activity diagrams. The use case and activity diagrams are essential to illustrate the operational processes of the information system. The system consists of two interconnected actors: the administrative head, who acts as the super user managing department data, camaba data, and camaba graduation, and the administrative

The above diagram illustrates the steps to utilize the department management feature. This feature is intended for super users to interact with the system. To use this feature, super users must first log in. If successful, they will be directed to the main page for the super user role. The following steps may be taken by the super user to manage the department: firstly, they must select the "Department" menu, which will then present them with a page displaying a table listing the departments, as well

as various buttons. These buttons include the add, edit, and delete options. When the super user engages in activities that involve adding or editing data, they will be directed to the form where they can fill out or edit the necessary information before saving the changes by clicking the "save" button. If the user wishes to delete data, they can simply click the "delete" button, and an alert will appear confirming the successful deletion of the data.

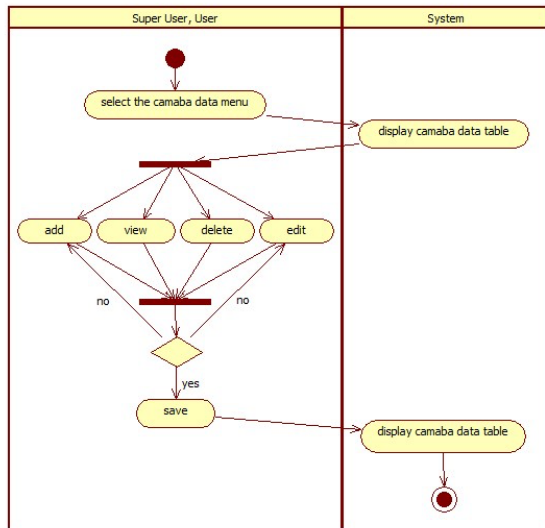


Figure 3. Activity Diagram of Camaba Data

Figure 3 provides an overview of how to use the Camaba data management feature. This function will be overseen by two user roles, specifically the super user and user. To use this function, select the "camaba data" menu, and the system will present a table containing information about potential new students who have registered through the registration portal. Moreover, the system will provide several buttons, including the "add" button to input new student data, the "edit" button to modify existing data, and the "delete" button to remove prior data. When deleting data, the system will prompt a warning indicating that the data has been successfully removed.

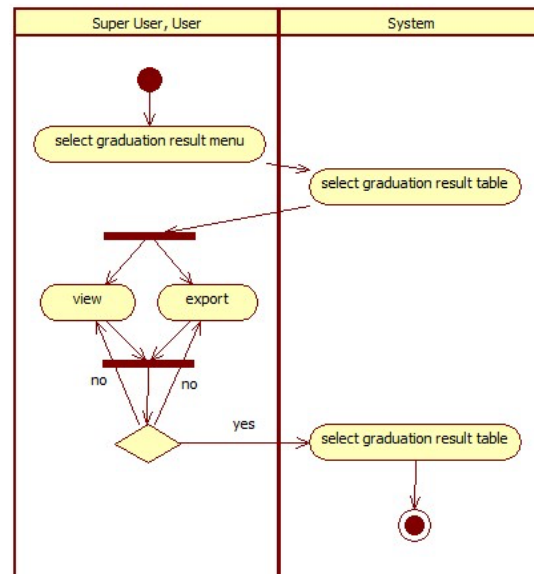


Figure 4. Activity Diagram of Graduation Result

The final diagram provides a guide of the steps that users must follow to navigate the graduation results menu. This menu can be operated by the super user or the user. To begin, select the graduation results menu located in the navbar. When the user requests this menu, the system will display a list of decisions regarding prospective new student data inputted into the system. On this page, the system presents data on prospective students, including their full names, school origins, selected majors, grades, and graduation status of related children. However, the services available on this page are limited to viewing tables and exporting data in Excel.

3.3. Implementation

A website-based decision support system for potential new student graduates was developed upon concluding the design stage. The design outcomes will be integrated into programming languages, encompassing HyperText Markup Language (HTML), Cascading Style Sheets (CSS), and PHP. Subsequently, the Laravel framework will be utilized with the Model-View-Controller (MVC) approach as the front-end, and MySQL as the database for the backend. Below is a visual representation of the MVC-based graduation decision support website for prospective new students.

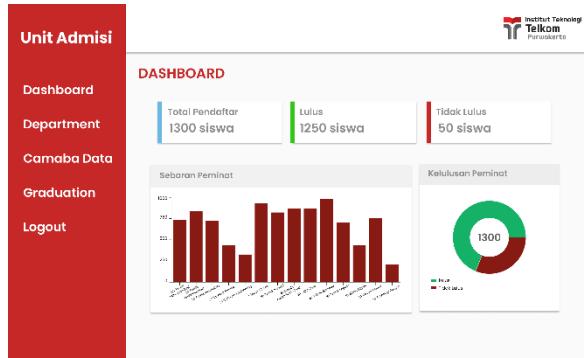


Figure 5. Dashboard Page

Figure 5 depicts the dashboard page's design implementation explicitly tailored to the super user's role. This page delivers detailed data concerning the total number of newly registered potential pupils, those who have passed and failed, as well as registration distribution based on their respective majors' specialization. This data is presented not only in numerical form but also in the form of graphs.

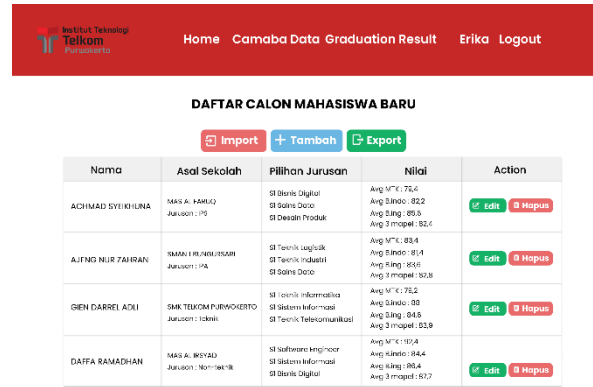


Figure 7. Camaba Data Page

The Camaba data page exhibits information from every new potential student who registers. Management of this data is facilitated by two groups, namely super users and users. There are two ways to add data: manually by entering it one by one or by importing data from Excel into the system using the provided import button. Data that can be input on the camaba data page includes the full name, high school attended, high school major, selected majors, math grades from semesters one through five, Indonesian language grades from semesters one through five, and English language grades from semesters one through five. These values will be computed by the system to determine the average grade for each subject, which will be used to determine the prospective student's graduation status.

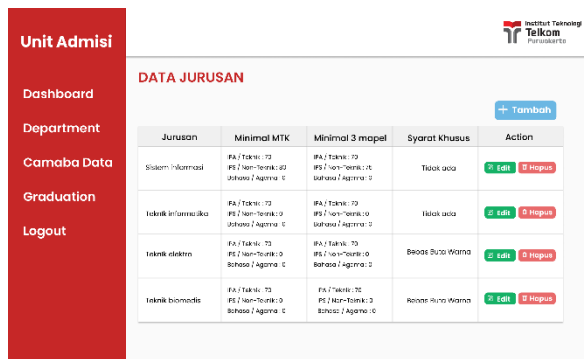


Figure 6. Department Page

This page is exclusive to super users with permissions to add department data for the majors available on the new student registration website. Super users can establish limit values that determine the eligibility of applicants for IT Telkom Purwokerto based on their high school department of origin. For instance, in the Information Systems program at the S1 level, students from science or engineering majors must achieve a minimum score of 70 in mathematics and an average of 70 in three subjects (mathematics, Indonesian language, and English). On the other hand, students from social or non-engineering majors must obtain a minimum score of 80 in mathematics and a minimum average of 75 in the same subjects.

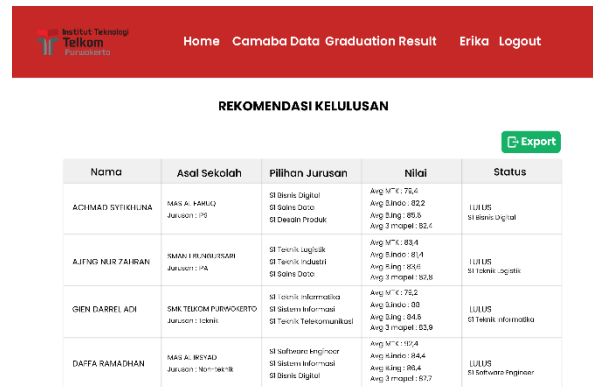


Figure 8. Graduation Result Page

Figure 8 shows the implementation of the graduation results page for potential new students. This page can be accessed by both super users and regular user actors. Users can only view a list of graduation results for new student candidates based on inputted data. Furthermore, actors can export the data into an Excel format for backup purposes.

3.4. *Testing*

System testing utilized in this study takes the form of blackbox testing. This testing method focuses on testing each feature's system functionality. This method offers an overview of system behavior in different circumstances and verifies that every feature operates in compliance with predefined expectations and specifications.

Table 1. Table software and supporting hardware
Bites of Joy Website Blackbox Testing

User									
Feature	Test Case	Testing Method	Results	Test Result					
Home	Successful web access	Users access the website	Launch home page	success	Button "import" can be accessed	1. user open camaba data page 2. user click import button	Redirect to the camaba data import page	success	
	Button "login" can be accessed	1. user open home page 2. user click login button	Redirect to login page	success	Successful access graduation result table	User accesses graduation result page	Launch graduation result page	success	
	Button "register" can be accessed	1. user open home page 2. user click register button	Redirect to register page	success	Graduation Result	Button "export" can be accessed	1. user open graduation result page 2. user click export button	Redirect to the graduation result export page	success
	Button "home" can be accessed	1. user open home page 2. user click home button	Redirect to home page	success	Dashboard	Button "camaba data" can be accessed	1. user open dashboard page 2. user click camaba data button	Redirect to graduation result page	success
	Button "Camaba Data" can be accessed	1. user open home page 2. user click camaba data button	Redirect to camaba data page	success	Button "department" can be accessed	1. user open dashboard page 2. user click department button	Redirect to department page	success	
	Button "graduation result" can be accessed	1. user open home page 2. user click graduation result button	Redirect to graduation result page	success	Button "graduation result" can be accessed	1. user open dashboard page 2. user click graduation result button	Redirect to graduation result page	success	
Camaba Data	Successful access camaba data table	User accesses camaba data page	Launch camaba data page	success	Successful access department page	User accesses department page	Launch department page	success	
	Button "add" can be accessed	1. user open camaba data page 2. user click add button	Redirect to the camaba data addition form page	success	Button "add" can be accessed	1. user open department page 2. user click add button	Redirect to the department addition form page	success	
	Button "edit" can be accessed	1. user open camaba data page	Redirect to the camaba data edit	success					

Button "edit" can be accessed	1. user open department page 2. user click edit button	Redirect to the department edit form page	success
Button "deleter" can be accessed	1. user open department page 2. user click delete button	Alert data will be deleted	success

4. Conclusion

The website-based decision support system application for new student candidate graduation was effectively built to meet client needs using the Prototype method. This project addresses issues within the IT Telkom Purwokerto Admissions Unit by providing a platform for decision-making support. Frequent human errors such as mismatches in new prospective student data with predetermined graduation criteria and excessive time consumption due to lengthy graduation simulation processes pose significant problems. However, employing a decision support system can mitigate these issues. It streamlines the simulation of prospective student graduation, enabling officers to make informed acceptance decisions in a more efficient manner.

This website for the decision support system was developed based on object-oriented web principles. The system's design utilizes Object Oriented Software Engineering (OOSE) according to the Unified Modeling Language (UML) and Object-Oriented Development (OOD) using Laravel for software development. Additionally, the graduation website undergoes Black Box testing to verify the functionality of each feature. This allows the website to be utilized as a tool for simulating the graduation process for potential new students.

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