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Decision Support System For Determining The Best Lecturers And Students In The Information Technology Study Program, UM Palembang Using The Multi Attribute Utility Theory Method

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ABSTRACT
Evaluation of lecturer performance and student achievement is an important step to maintain academic quality in higher education. The Information Technology Study Program at Universitas Muhammadiyah Palembang requires an efficient and objective system to select the best lecturers and students, considering their role in improving academic quality and institutional reputation. This study aims to develop a technology-based decision support system (DSS) to improve the automation and accuracy of the selection process. Using the Multi Attribute Utility Theory (MAUT) method, various assessment criteria are processed into standardized scores, allowing for objective assessment of lecturers and students. The Rapid Application Development (RAD) method is used in system development to ensure the process is fast and effective. This system is designed using various modeling diagrams, such as flowcharts, use case diagrams, and class diagrams, to ensure a clear, structured, and easily understood workflow for users, including administration and academics.The test results show that this system facilitates the selection process, reduces processing time, and minimizes errors that often occur in manual assessments. In addition, this system increases the transparency of assessments, provides objective, accurate, and accountable results, and encourages healthy competition among lecturers and students. The success of this implementation is expected to become a standard for periodic assessment in higher education. In addition, this system has the potential to be developed into a web-based application, which allows wider access for the entire academic community and increases the accessibility and effectiveness of the selection process in the future.

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INTRODUCTION

Advances in information technology have brought about major changes in various sectors, including higher education (Maritsa et al., 2021). This technology enables effective processing of academic and administrative data, thus facilitating decision making (Mondial et al., n.d.). In

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the context of education, Decision Support Systems (DSS) play an important role in assisting more accurate and relevant academic evaluations, as well as improving the quality of educational services in higher education (Huda et al., 2024). In higher education, DSS enables objective assessments of lecturers and students and reduces the subjectivity that often occurs in manual assessment methods (Marpaung1 et al., 2018). This technology supports the provision of comprehensive and transparent academic information, which not only facilitates evaluation but also helps study programs determine the quality of graduates more accurately (Keterbukaan et al., 2018).

Websites as information media play an important role in distributing academic data. This platform allows lecturers and students to easily access assessment data, accelerate the communication process, and increase information transparency in educational institutions (Ummah, 2019). The development of a Rapid Application Development (RAD)-based system in a web-based application increases efficiency by reducing development time and facilitating access for users (FURAT, 2023). In the application of DSS, the Multi Attribute Utility Theory (MAUT) method has proven effective in handling various assessment criteria. MAUT allows for more measurable and objective assessments through value weighting, which provides consistent and transparent results in selecting the best alternative (Dwitasari, 2024). In the Information Technology Study Program, Muhammadiyah University of Palembang, the MAUT method is applied to assess lecturers and students based on various predetermined performance indicators, such as teaching quality, discipline, and achievement (Ermawati &Hidayat, 2017).

Based on these problems, this study aims to design a MAUT-based decision support system to determine the best lecturers and students in the Information Technology Study Program, Muhammadiyah University of Palembang. It is expected that this system can increase transparency and efficiency in the assessment process, as well as support better decision making in managing the quality of education.

Literature Review

No	Researcher	Research Title	Research result
1.	Wayan Sutrisna Yansa, Komang Tri Werthi, I Putu Satwika	Decision Support System best decision making	Researchers created a decision support system for determining the best lecturer which was developed and implemented using the (AHP) method.
2.	Yogi Setiawan, Sularso Budilaksono	Decision Support System for Selecting the Best Graduates	This study designs a system for determining the best graduating students developed using the (MAUT) method.

METHODS

The RAD (Rapid Application Development) model is used by the author in this study as a system development model. The RAD method is a software development process that emphasizes a short development cycle (Maharrani et al., 2021). The RAD (Rapid Application

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Development) model is often referred to as a fast and flexible development cycle, making it easy to adjust to changing needs during the process (Pricillia & Zulfachmi, 2021).

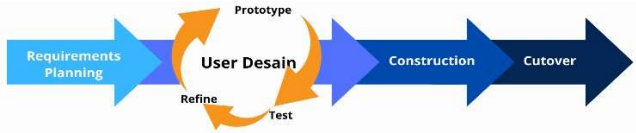

Figure 1 RAD Method

To understand the software according to user needs, interactive and thorough requirements gathering is carried out (Annisa Amalia & Santoso, 2021). Software design is a process consisting of various steps that focus on the design of a software program created in a repetitive cycle, including coding, interfaces, and data structures, so that the design results can be immediately implemented into functioning code (Ayoub et al., 2020). After the software is developed, testing is carried out to ensure that each component functions as intended, minimizes errors, and maintains quality. In addition, the maintenance stage in RAD allows for continuous development based on user input and changing needs (Ramadhan & Angelia, 2023).

In this study, the authors developed a technology-based decision support system (DSS) to improve automation and accuracy in the selection process (Setiawan & Budilaksono, 2021). Using the Multi Attribute Utility Theory (MAUT) method, this system converts various assessment criteria into standardized scores, allowing for a more objective assessment (Aldo, 2019). The MAUT method produces a ranking of the best alternatives based on an analysis of various criteria that serve as guidelines for decision making (Faran & Aldisa, 2023). In summary, the steps of the MAUT method are as follows:

a. Collecting some of the existing attributes
b. Determining the weight for each attribute.
c. Collecting each existing alternative.
d. Enter the utility for each alternative according to its attributes.
e. Multiply the utility by the weight to determine the value of each alternative.

Matrix normalization:

$$U(x)b = \frac{a-b^-}{b^+-b^-} \dots\dots\dots\dots\dots\dots$$

Where :

$U(x)$: Normalization of alternative weight X
a : Alternative value
b^- : Minimum alternative value of criterion a
b^+ : Maximum alternative value of criterion b

The overall evaluation value can be defined by the equation:

$$A(x) = \sum_{a=1}^{n} Wa.U(x) \dots\dots\dots\dots\dots\dots$$

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Where *A(x)* is the evaluation value to (*a*) and (*Wa*) is the weight of several elements to *(a)* against other elements. While n is the number of elements. The total of the weights is 1. The flow of the MAUT method process is described as follows:

Figure 2 MAUT method flow stages

RESULTS AND DISCUSSION

Overview of the running system

Figure 3 explains the process of determining the best lecturers and students is done manually. The overview of the running system is: First, the admin creates the requirements needed, after creating the requirements, the admin provides information to the lecturers and students, after which the students prepare the required files. Next, the admin processes and summarizes the results of the scores, and the admin makes a report.

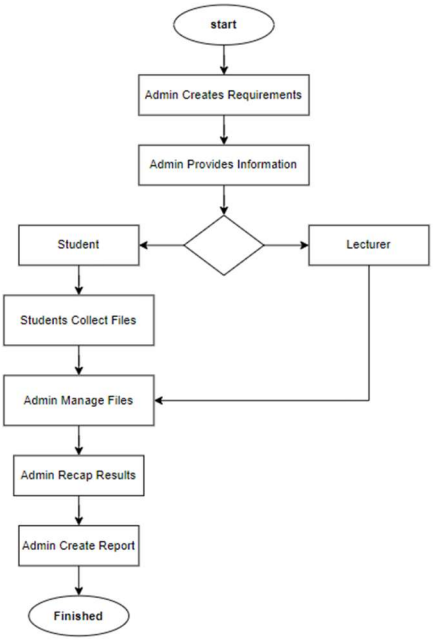

Figure 3 Running System

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Description of the proposed system

The description of the proposed system is a description to determine a system flow where the admin can directly access the dashboard page or login first. After the user logs in, the user will be redirected back to the dashboard page. The admin manages the criteria data and manages the criteria sub-data. After managing the data, the admin manages the lecturer and student data. Furthermore, the admin inputs the lecturer and student values according to the existing data.

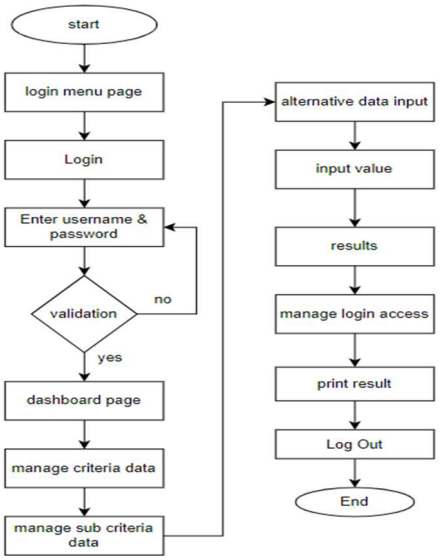

Figure 4 The proposed system

System Design

a. Use Case Diagram

Figure 5 below explains the use case diagram in the system design that the author created. There are 3 actors who can access the system which is determined based on the account level, including:

1. Admin has login access, manage access rights data, manage criteria data, manage sub data, manage lecturer and student data, manage value data, view ranking results and print data.
2. Lecturers have login access, view ranking results.
3. Students have login access, view ranking results.

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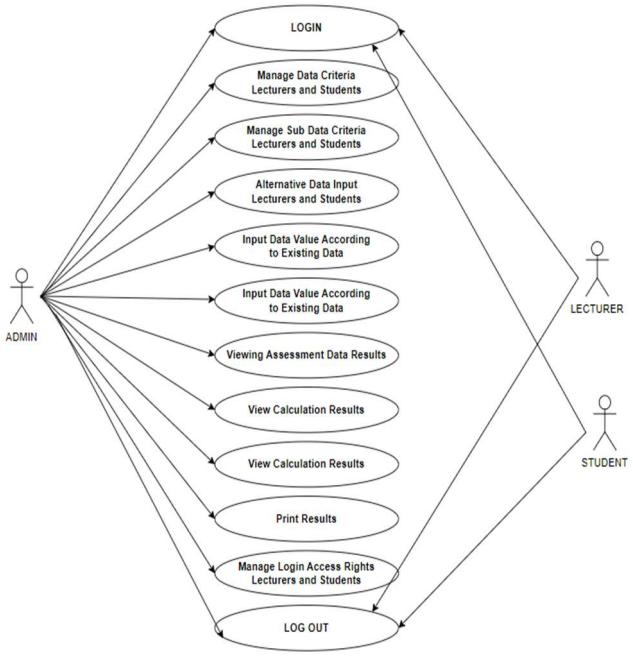

Figure 5 Use Case

b. Activity Diagram

Figure 6 below explains the Activity Diagram flow that is designed when the admin opens the application, a login menu will be displayed to access the admin dashboard page. There are many menus that can be accessed by the admin. The admin can select the menu according to the admin's needs.

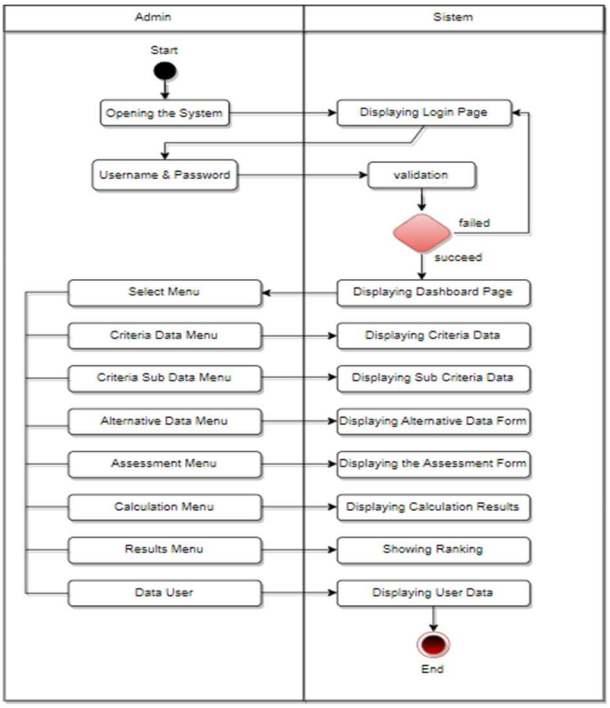

Figure 6 Admin activity diagram

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Figure 7 below explains the flow of the activity diagram designed when the lecturer opens the application, a login menu will be displayed to access the dashboard page. There is a results menu that can be accessed by the lecturer. Figure 8 below explains the flow of the activity diagram designed when students open the application, a login menu will be displayed to access the dashboard page. There is a results menu that can be accessed by students.

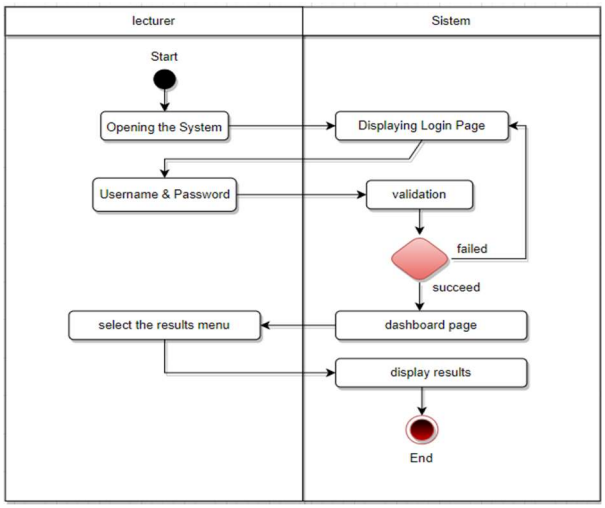

Figure 7 Lecturer activity diagram

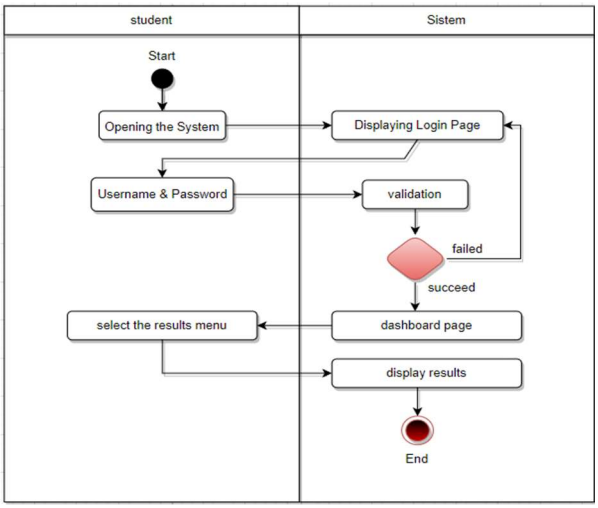

Figure 8 Student activity diagram

c. Class Diagram

Figure 9 is a class diagram design for the Decision Support System for Determining the Best Lecturers and Students in the Information Technology Study Program, UM Palembang Using the MAUT Method.

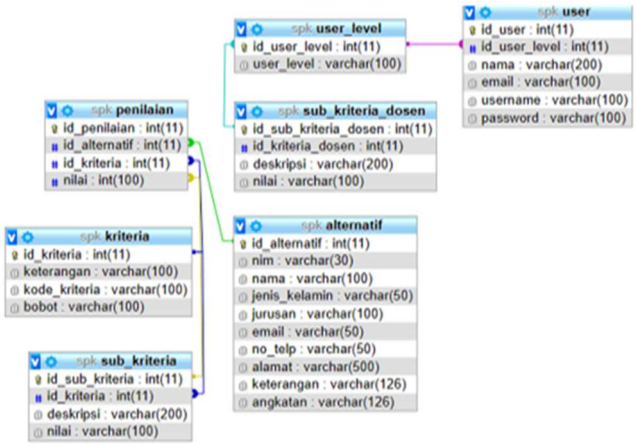

Figure 9 Class diagram

d. Interface Implementation

The login page functions as a login form input to enter the dashboard page.

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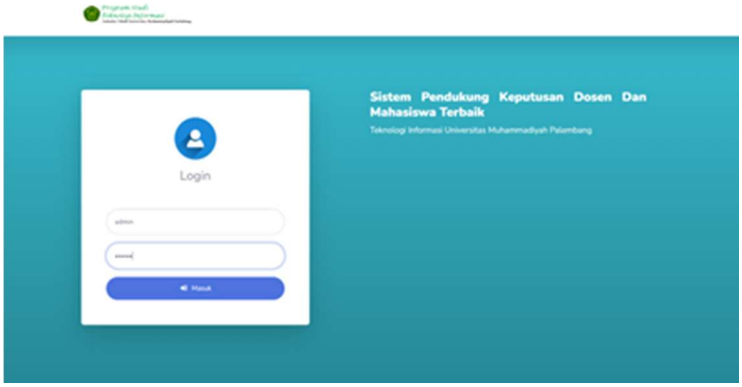

Figure 10 login page

The admin dashboard page consists of menus that each have their own function.

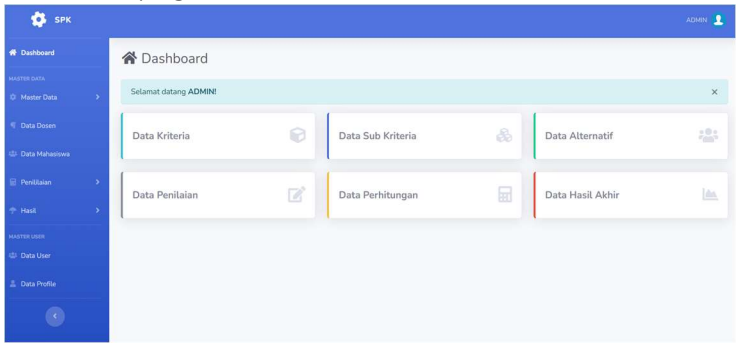

Figure 11 Admin dashboard page

This criteria data list page functions to input values on the sub-data page

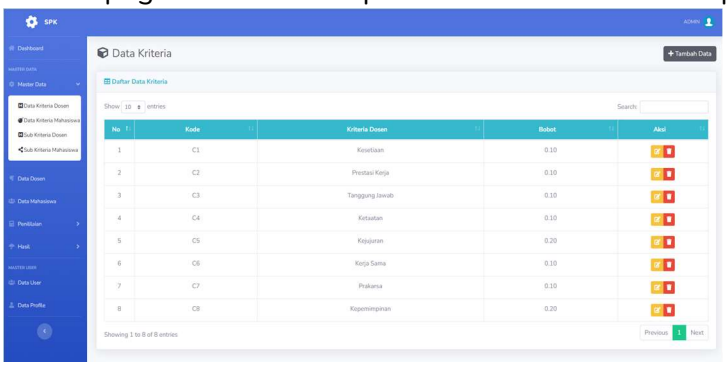

Figure 12 Lecturer criteria data

This lecturer assessment page has a function for inputting lecturer grades according to existing data.

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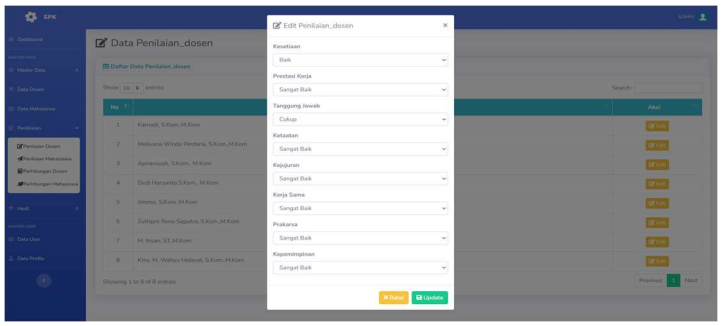


Figure 13 Lecturer assessment page

This student assessment form display has a function for inputting values according to existing data

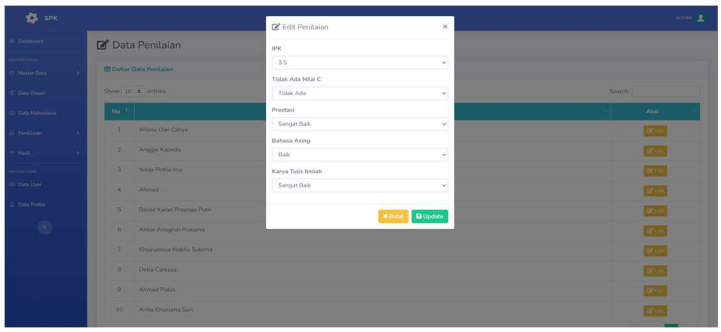
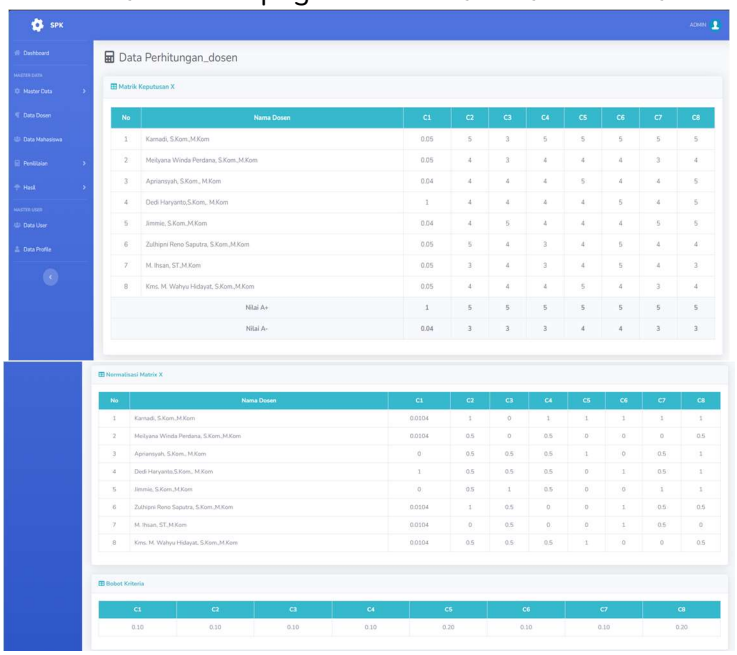


Figure 14 Student assessment page

This lecturer's calculation menu page has an automatic calculation function



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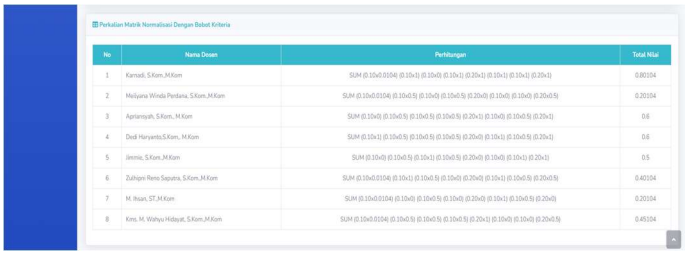

Figure 15 Lecturer grade calculation page

This student calculation menu page has an automatic calculation function.

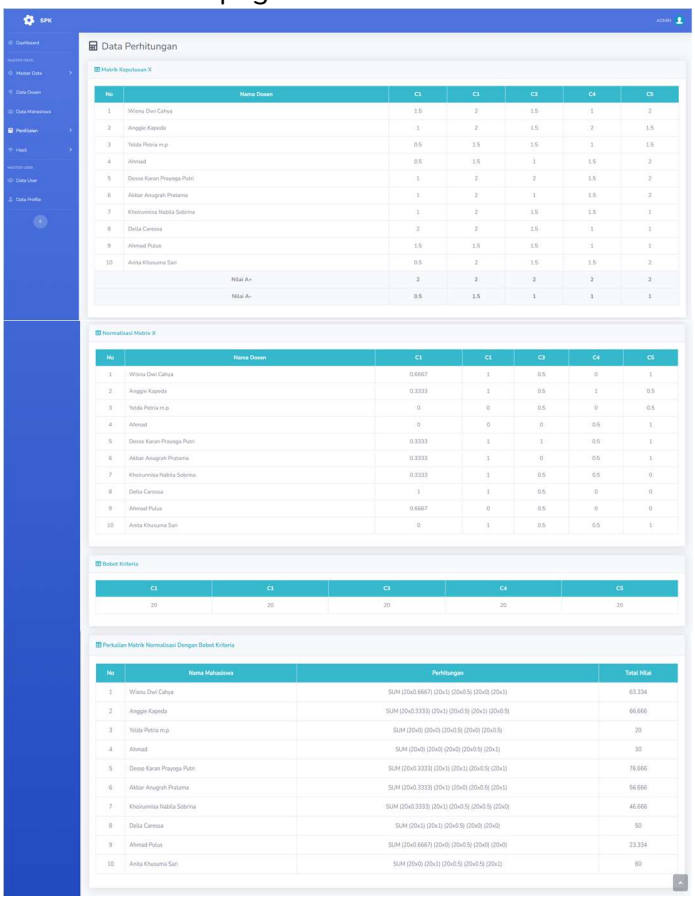

Figure 16 Student grade calculation page

The lecturer ranking results page functions to display the best lecturer ranking results

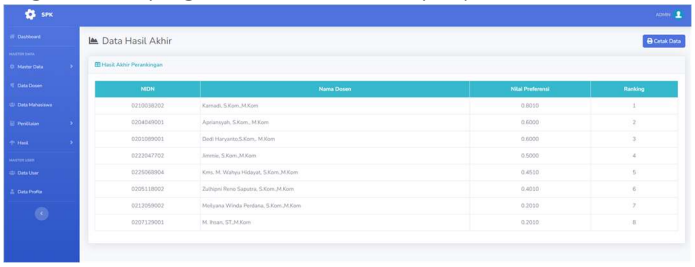

Figure 17 Lecturer Ranking Results Page

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The student ranking results page functions to display the best lecturer ranking results.

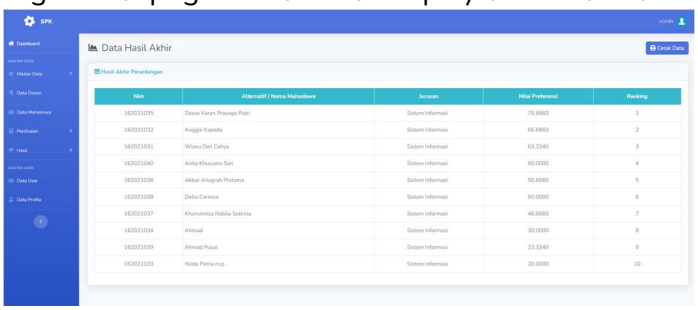

Figure 18 Student Ranking Results Page

This user data menu page displays user data

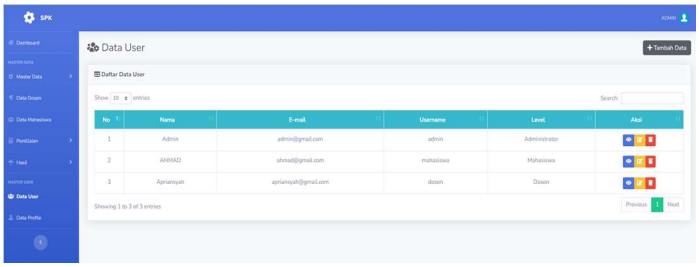

Figure 19 User Data Menu Page

The lecturer dashboard page consists of a results menu which has the function of viewing the best lecturer prank results.

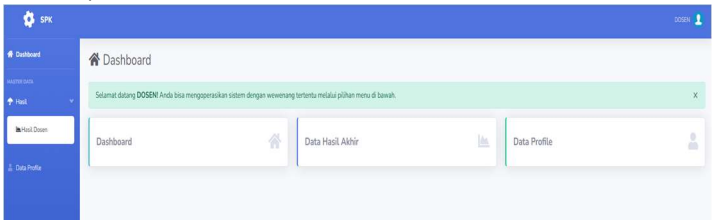

Figure 20 Lecturer dashboard page

The student dashboard page consists of a results menu which has the function of viewing the best lecturer prank results.

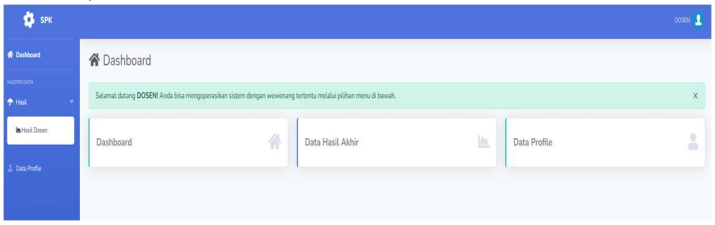

Figure 21 Student dashboard page

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Print Data Menu Display

FAKULTAS TEKNIK
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UNIVERSITAS MUHAMMADIYAH PALEMBANG
2023

LAPORAN DATA DOSEN

NIDN	Nama Dosen	Nilai Preferensi	Ranking
0210038202	Karnadi, S.Kom.,M.Kom	0.8010	1
0204049001	Apriansyah, S.Kom., M.Kom	0.6000	2
0201089001	Dedi Haryanto,S.Kom,. M.Kom	0.6000	3
0222047702	Jimmie, S.Kom.,M.Kom	0.5000	4
0225068904	Kms. M. Wahyu Hidayat, S.Kom.,M.Kom	0.4510	5
0205118002	Zulhipni Reno Saputra, S.Kom.,M.Kom	0.4010	6
0212059002	Meilyana Winda Perdana, S.Kom.,M.Kom	0.2010	7
0207129001	M. Ihsan, ST.,M.Kom	0.2010	8

Figure 22 Print Data Menu Display

CONCLUSION

This MAUT-based Decision Support Application provides convenience for educational institutions in selecting the best lecturers and students more objectively and efficiently. In addition to saving time, this system also supports transparency in the assessment process, resulting in more accurate decisions. As a recommendation, further development can include continuous monitoring of lecturer and student performance features, which will provide greater benefits in improving the quality of education at the institution.

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