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Design of a Web-Based Monitoring and Evaluation Application for Mentoring Using the Rapid Application Development Method at The Faculty of Computer Science UNIKA Santo Thomas Medan

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Abstract

The academic and thesis supervision processes at the Faculty of Computer Science, UNIKA Santo Thomas Medan, currently face various challenges, including a lack of clear structure in scheduling and difficulties in monitoring student progress. To address these issues, this research aims to develop a web-based application that supports monitoring and evaluation of the supervision process. The application is designed using the Rapid Application Development (RAD) method, which facilitates flexible and responsive development tailored to user needs. With features such as supervision scheduling, student progress tracking, and automatic evaluation, this application is expected to enhance the effectiveness of supervision, facilitate communication between lecturers and students, and support more structured academic management within the faculty. The implementation of this application has successfully improved the efficiency of the supervision process and ensured that students receive more structured guidance.

Keywords: *Web-based application, Academic supervision, Thesis supervision, Rapid application development(RAD), Monitoring and Evaluation*

1. Introduction

The rapid development of information technology has significantly influenced various sectors, including education. In higher education, monitoring and evaluation of academic progress are essential to ensure the quality of learning and guidance provided to students. One of the major challenges faced by educational institutions is the efficient management of student guidance, particularly in academic and thesis supervision. At the Faculty of Computer Science, Universitas Katolik Santo Thomas Medan, guidance for students is divided into two main categories: Academic Guidance and Final Project (Thesis) Guidance. However, the absence of a structured and integrated system for managing these processes often leads to issues such as communication gaps between students and supervisors, irregular progress monitoring, and delays in the completion of tasks.

Currently, guidance activities are carried out without a structured schedule, which causes inefficiencies. Students often face difficulties interacting directly with their supervisors, while supervisors encounter challenges in monitoring and evaluating student progress effectively. Additionally, the absence of a dedicated feature for guidance in the academic information system hinders the process, leading to further delays and inefficiencies.

To address these challenges, this research proposes the development of a web-based Monitoring and Evaluation Application for Student Guidance using the Rapid Application Development (RAD) method. This method allows for flexible and user-responsive system development, ensuring that the application can be continuously improved based on user feedback. The main objective of this application is to facilitate structured monitoring of student progress and to provide a more efficient communication channel between students and their supervisors. By doing so, it is expected to enhance the overall quality of guidance and support provided to students, ultimately contributing to their academic success.

This research focuses on the Faculty of Computer Science, Universitas Katolik Santo Thomas Medan, which offers three main programs: Informatics Engineering, Information Systems, and Data Science. These programs aim to produce competent graduates who are ready to face the challenges of the information technology industry. The proposed application will help the faculty in organizing and improving the student guidance process, ensuring that students receive the necessary support to complete their academic requirements on time.

2. Research Method

The application was developed using the Rapid Application Development (RAD) methodology, which emphasizes rapid and iterative development [1]. This method allows developers to quickly create software prototypes, enabling user feedback to be obtained promptly and incorporated into the development process [2]. The framework used on this website is CodeIgniter 3 and uses a MySQL database. The aim of this research is to build a web-based for monitoring and evaluating academic and thesis guidance.

2.1. Identify the problem

To complete this research the author carried out several research methods in collecting reference data including:

a. Observation
The objective is to gain a better understanding of the mentoring process at the Faculty of Computer Science (FIKOM) at Universitas Katolik Santo Thomas Medan, as well as the needs of users (lecturers and students). The steps involve directly observing the mentoring process at FIKOM, including meetings between lecturers and students, interacting with lecturers and students to understand the challenges they face in the mentoring process, and recording the processes that occur during observation to understand the existing workflow. The expected outcome is a comprehensive understanding of the needs and challenges faced in the mentoring process at FIKOM, as well as relevant information for designing an appropriate monitoring and evaluation application.

b. Literature review
The objective is to understand the fundamental concepts related to the development of monitoring and evaluation applications, the RAD method, and the technologies that will be used. The steps involve analyzing literature on monitoring and evaluation applications in the context of higher education, studying theories and concepts related to web-based application development, and investigating previous research conducted in the development of web-based applications in academic settings. The expected outcome is an in-depth understanding of the concepts and principles necessary to design and develop a web-based monitoring and evaluation application using the RAD method.

2.2. System Development Model

The system development model used in this research is Rapid Application Development (RAD), which is one of the models within the System Development Life Cycle (SDLC)[3]. Rapid Application Development (RAD) is a linear sequential software development process model that emphasizes a highly shortened development cycle[4]. The stages of RAD, as shown in Figure 1.

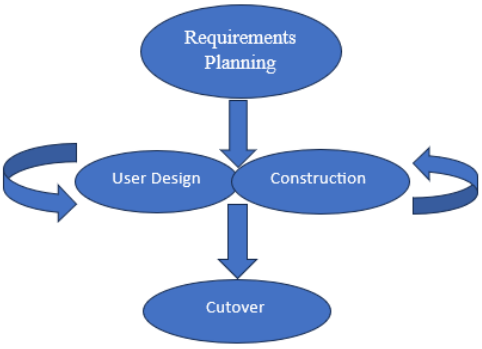

Fig. 1: The Stage of RAD

There are several stages of system development using the RAD model:

a. Requirements Planning
This step begins with problem identification, where the primary issues to be addressed are thoroughly examined [5]. After that, the project scope, necessary resources, and objectives to be achieved are determined. This initial planning helps establish a foundation for the project and ensures that all stakeholders involved have a shared understanding of the project being developed. The output of this stage in this research includes the planning of system functions, development scheduling, and analysis of the system's functional requirements.

b. User Design
This stage focuses on the formation of the system's structure and technical specifications based on the identified requirements[6]. In the context of this research, the system is represented through use case diagrams. The purpose of using use case diagrams is to visualize the interaction between the software and its users in alignment with its functionality. Consequently, the output of this stage is a design in the form of use case diagrams, illustrated using Unified Modeling Language (UML) tools.

c. Construction
The construction phase in the RAD methodology involves developing software based on the approved prototype. The development team utilizes appropriate technologies and development tools to build software components quickly and efficiently [7]. The monitoring and evaluation application for mentoring is developed as a web-based application, using the CodeIgniter 3 framework with PHP as the programming language and MySQL as the database.

d. Cutover
The transition phase in the RAD methodology involves the deployment and implementation of the software into the production environment or to end users. This includes final testing to ensure that the software is ready for operational use [8]. The primary

goal of usability testing is to identify any issues or obstacles users may encounter while interacting with the product or system, enabling developers to make necessary improvements to enhance the overall user experience [9]. This testing refers to the usability elements defined in ISO 9126, which include sub-criteria such as understandability, learnability, operability, and attractiveness [10]. During this phase, a questionnaire is distributed to users to gather feedback on the usability of the decision support system that has been developed.

3. Result And Discussion

The result of this research is the design of a monitoring and evaluation application for the Faculty of Computer Science at UNIKA Medan. The design process began with creating layouts for each entity page. This research produced several pages, including the admin page, dean page, head of study program page, lecturer page, and student page.

3.1. Analyze software requirements

a. Analysis Stages

This stage will discuss the system workflow for each entity. Each entity has a distinct page, which has been designed according to its specific needs. These system rules are used to establish the requirements for a web-based monitoring and evaluation application for mentoring. The following is a description of the tasks that each entity can perform.

1. Admin Page
   a. Admin can manage study program data.
   b. Admin can manage lecturer data.
   c. Admin can manage student data.
   d. Admin can manage faculty academic mentoring data.
   e. Admin can manage faculty final project mentoring data.
   f. Admin can manage faculty evaluation data.
   g. Admin can manage lecturer recapitulation data.
   h. Admin can manage student recapitulation data.
   i. Admin can manage user data.

2. Dean Page
   a. Dean can manage academic mentoring data (as a supervisor for students).
   b. Dean can manage final project mentoring data (as a supervisor for students).
   c. Dean can manage faculty academic mentoring data (as the faculty head).
   d. Dean can manage faculty final project mentoring data (as the faculty head).
   e. Dean can manage faculty evaluation data (as the faculty head).
   f. Dean can manage lecturer recapitulation data (as the faculty head).
   g. Dean can manage student recapitulation data (as the faculty head).

3. Head of study program page
   a. Head of Study Program can manage academic mentoring data (as a supervisor for students).
   b. Head of Study Program can manage final project mentoring data (as a supervisor for students).
   c. Head of Study Program can manage academic mentoring data (as the head of the study program), tailored to the study program.
   d. Head of Study Program can manage final project mentoring data (as the head of the study program), tailored to the study program.
   e. Head of Study Program can access study program evaluations (as the head of the study program), tailored to the study program.
   f. Head of Study Program can access evaluations of lecturers and students (as the head of the study program), tailored to the study program.
   g. Head of Study Program can manage lecturer recapitulation data (as the head of the study program), tailored to the study program.
   h. Head of Study Program can manage student recapitulation data (as the head of the study program), tailored to the study program.

4. Lecturer page
   a. Lecturer can manage academic mentoring data (as a supervisor for students).
   b. Lecturer can manage final project mentoring data (as a supervisor for students).

5. Student page
   a. Student can input complaints during the academic process in the academic mentoring sub-menu.
   b. Student can input research progress during the final project process in the final project mentoring sub-menu.

b. Use Case Diagram

A use case diagram is a modeling technique used to provide information about the relationships between actors and the application system being developed. Below is the use case diagram for Students, Lecturers, Deans, Heads of Study Programs, and Administrators, as shown in Figure 2.

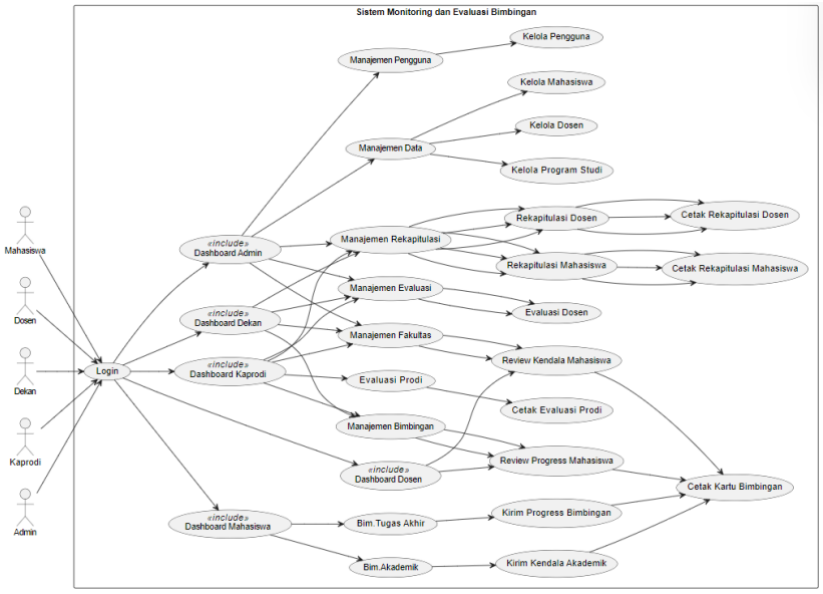

Fig. 2: Use Case

c. Class Diagram

A class diagram is a type of structural diagram within the UML model. It clearly depicts the structure, attributes, classes, relationships, and methods of each object. The class diagram provides information about the relationships among classes rather than describing specific events. The proposed class diagram for the design of this application is shown in Figure 3.

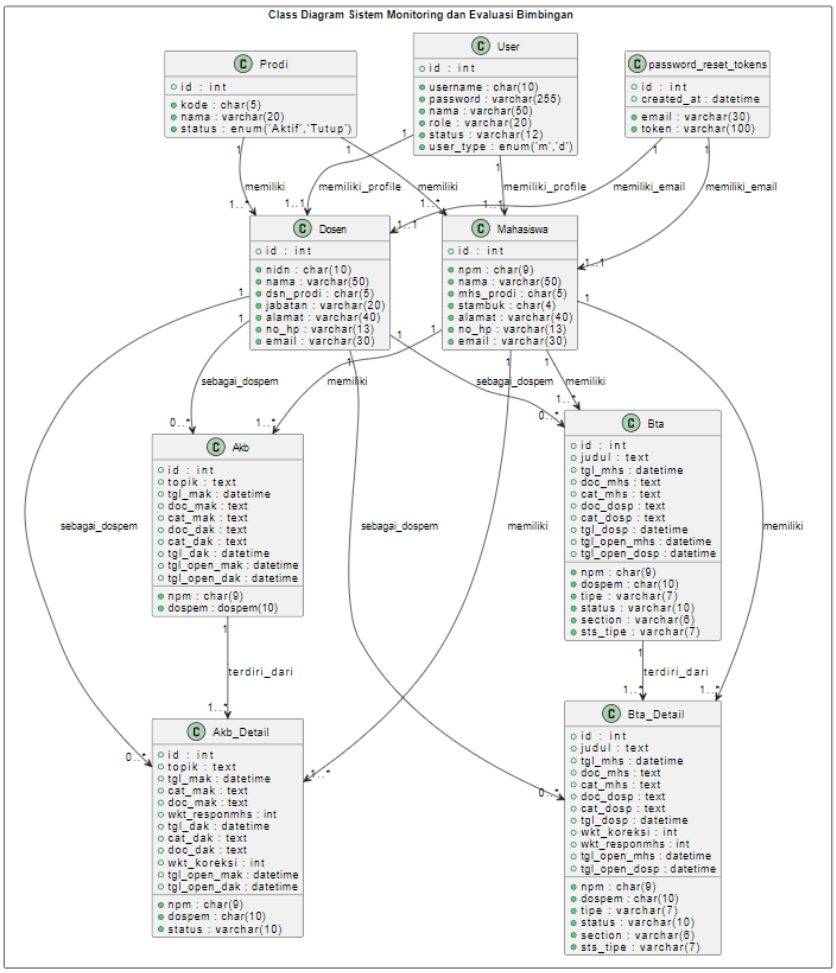

Fig. 3: Class Diagram

3.2. System implementation

1. Login Page
   This login interface is used for all login views across all entities, as illustrated in Figure 4.

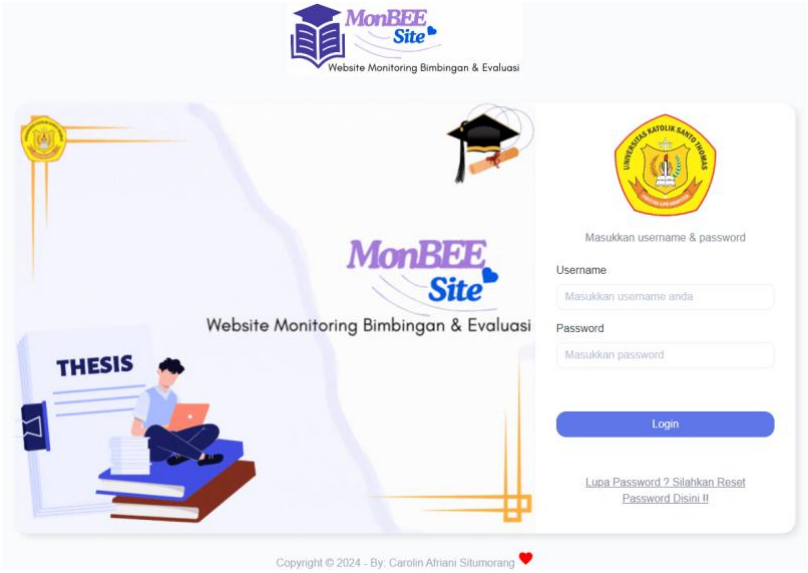

Fig. 4: Login Page

2. Admin Page
   The admin page displays a dashboard with a sidebar that includes several sub-menus, such as Study Programs, Lecturers, Students, Academic Mentoring Data, Final Project Mentoring Data, Evaluations, Student Recapitulation, Lecturer Recapitulation, User List, and About. This is shown in Figure 5.

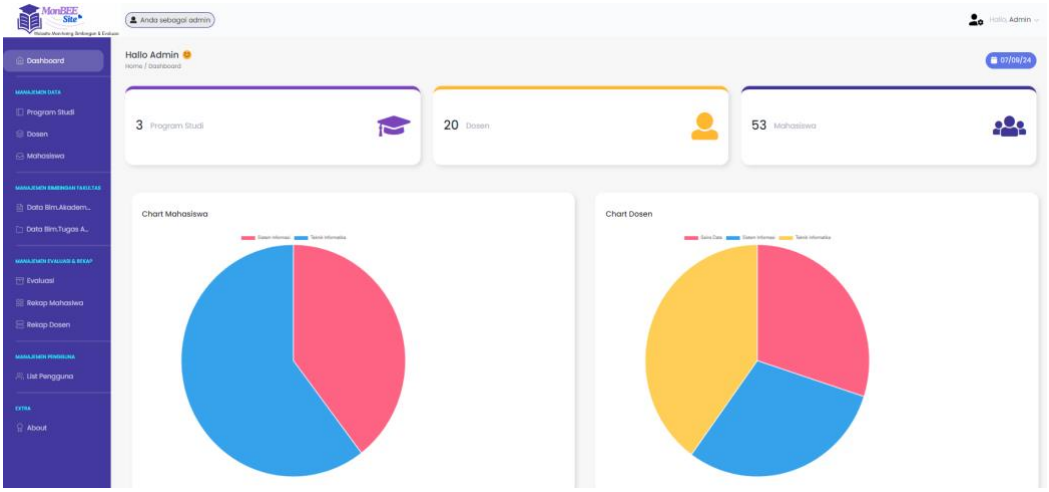

Fig. 5: Admin Page

3. Dean Page
   The Dean page displays a dashboard with a sidebar containing several menus. The Management of Mentoring menu includes sub-menus for Academic Mentoring and Final Project Mentoring. The Faculty Mentoring Management menu includes sub-menus for Academic Mentoring Data and Final Project Mentoring Data. The Evaluation & Recapitulation Management menu includes sub-menus for Evaluations, Lecturer Recapitulation, and Student Recapitulation. This is shown in Figure 6.

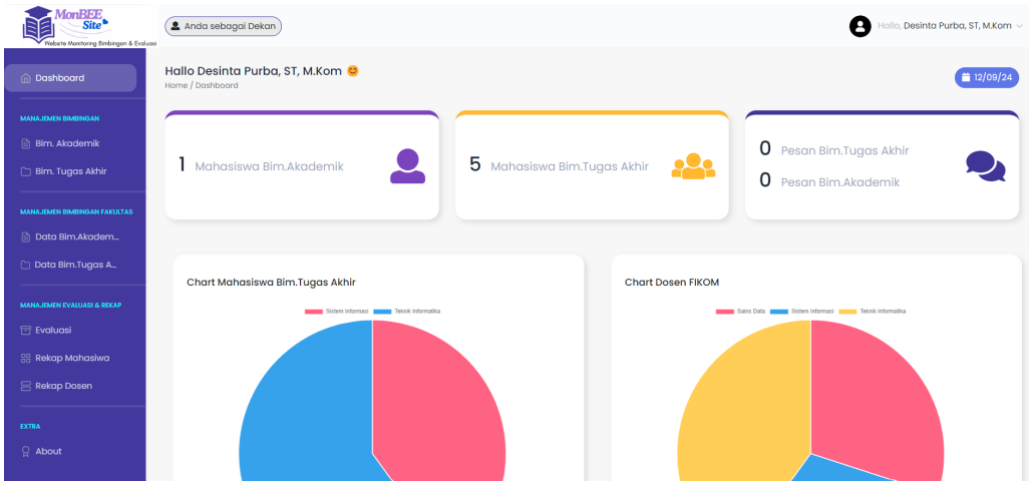

Fig. 6: Dean Page

4. Head of study program page
The Head of Study Program page displays a dashboard with a sidebar containing several menus. The Mentoring Management menu includes sub-menus for Academic Mentoring and Final Project Mentoring. The Study Program Mentoring Data menu includes sub-menus for Academic Mentoring Data and Final Project Mentoring Data. The Evaluation Management menu includes sub-menus for Program Evaluation and Lecturer & Student Evaluation. The Study Program Recapitulation Management menu includes sub-menus for Lecturer Recapitulation and Student Recapitulation. This is shown in Figure 7.

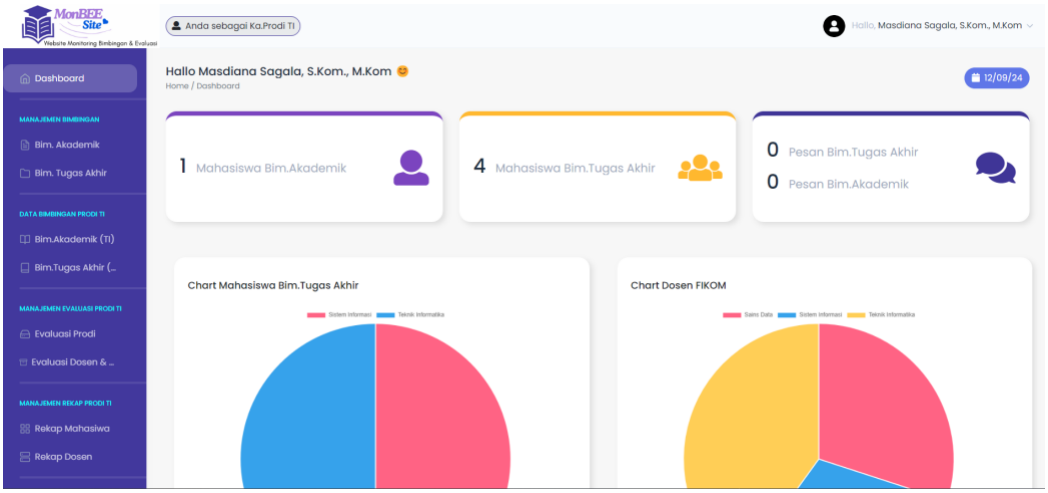

Fig. 7: Head of study program page

5. Lecturer Page
The Lecturer page displays a dashboard with a sidebar containing several sub-menus, including Academic Mentoring and Final Project Mentoring. This is shown in Figure 8.

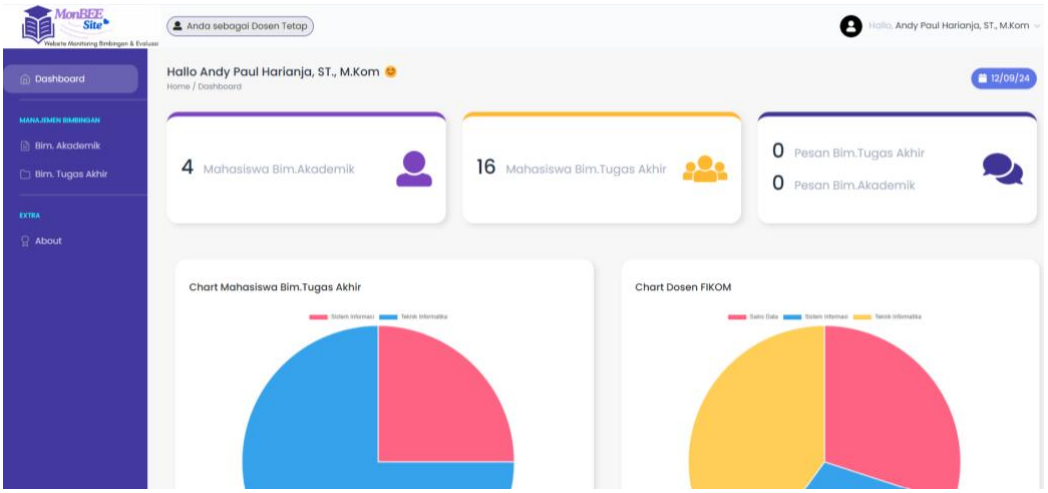

Fig. 8: Lecturer Page

6. Student page
The Student page displays a dashboard with a sidebar consisting of several sub-menus, including Academic Mentoring for input forms and Final Project Mentoring for progress input forms. This is shown in Figure 9.

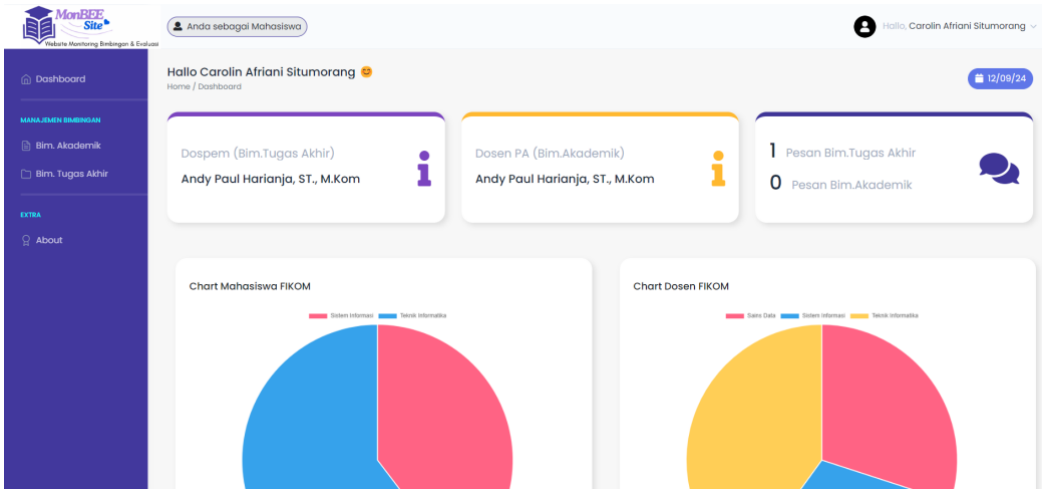

Fig.9: Student page

7. Monitoring Page
The monitoring page can be accessed via the "History" button found on both the Academic Mentoring and Final Project Mentoring forms. The history form allows for the tracking of each mentoring progress between students and their advisors. The display is shown in Figure 10.

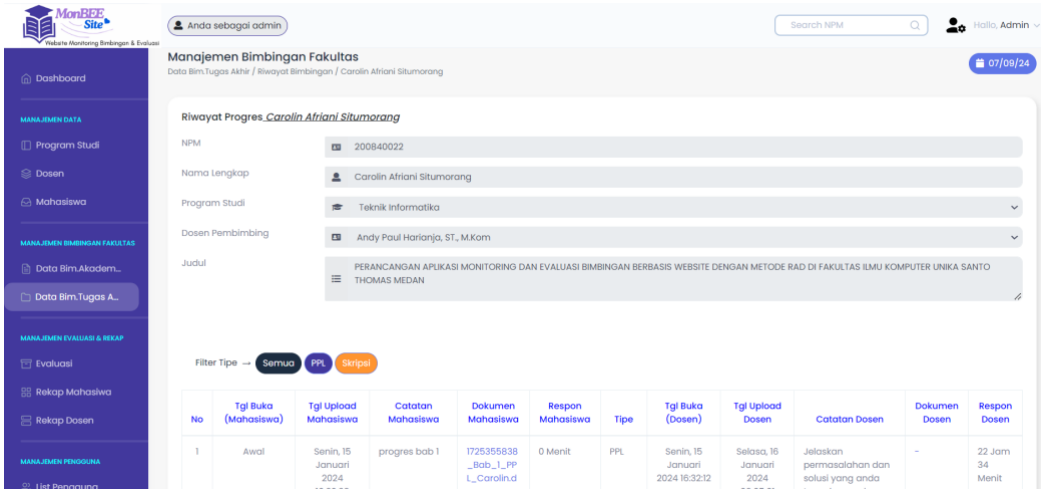

Fig. 10: Monitoring Page

8. Mentoring Card
The printed output of the Mentoring Card, the display is shown in Figure 11.

Fig. 11: Mentoring card

9. Evaluation Page

The Evaluation page can be accessed from the "Program Evaluation" sub-menu if the logged-in user is the Head of Study Program, as shown in Figure 12. If the logged-in user is an Admin or Dean, the Evaluation page can be accessed from the "Evaluation" sub-menu, the display is shown in Figure 13.

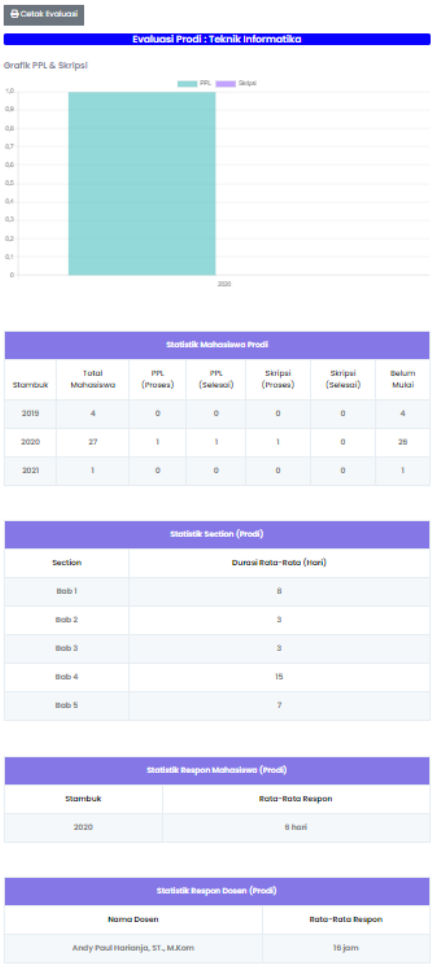

Fig. 12: Study program evaluation page

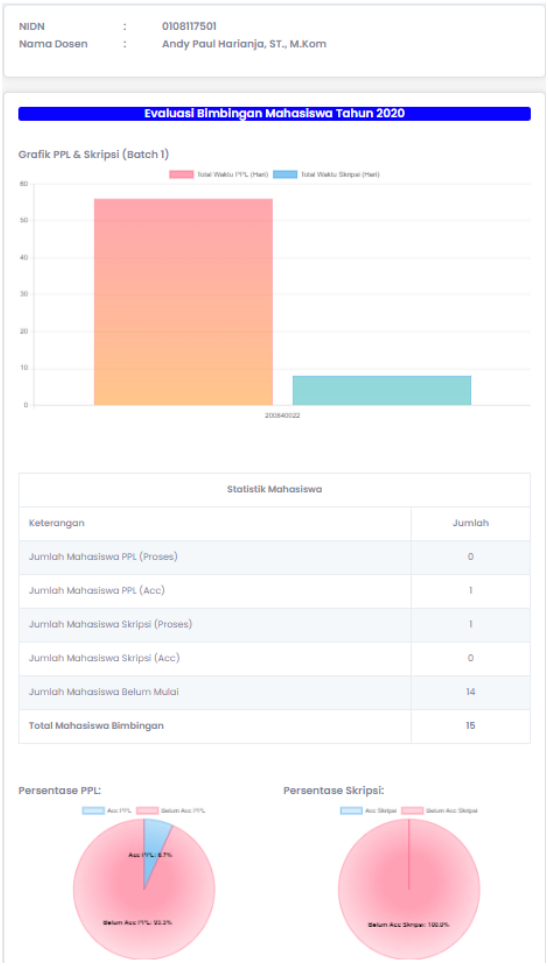

Fig. 13: Lecturer evaluation page

10. Student Recapitulation page

The student recap page can be accessed by the admin, dean, and head of the study program (for the head of the study program, the data is adjusted according to the study program), the display is shown in 14.

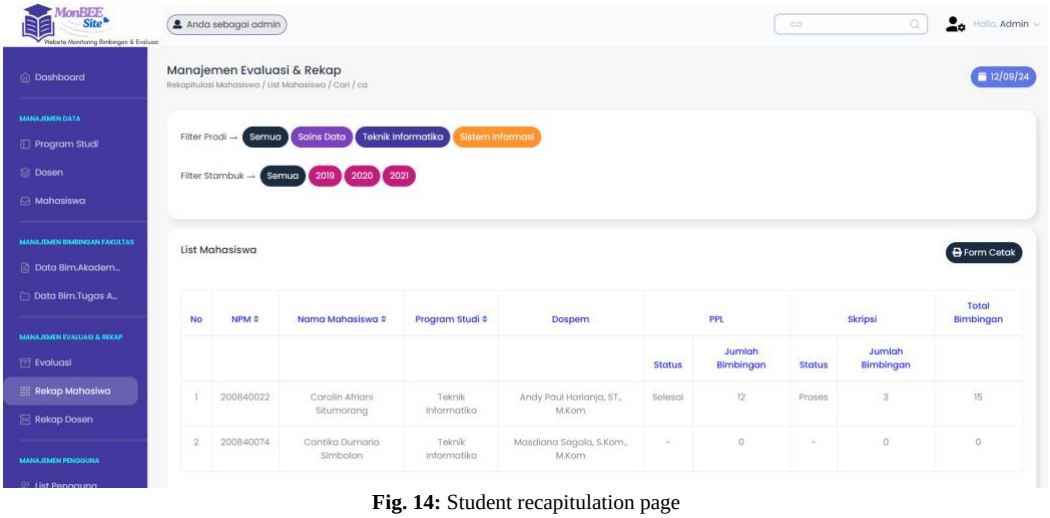

Fig. 14: Student recapitulation page

11. Lecturer Recapitulation page
    The lecturer recap page can be accessed by the admin, dean, and head of the study program (for the head of the study program, the data is adjusted according to the study program), the display is shown in 15.

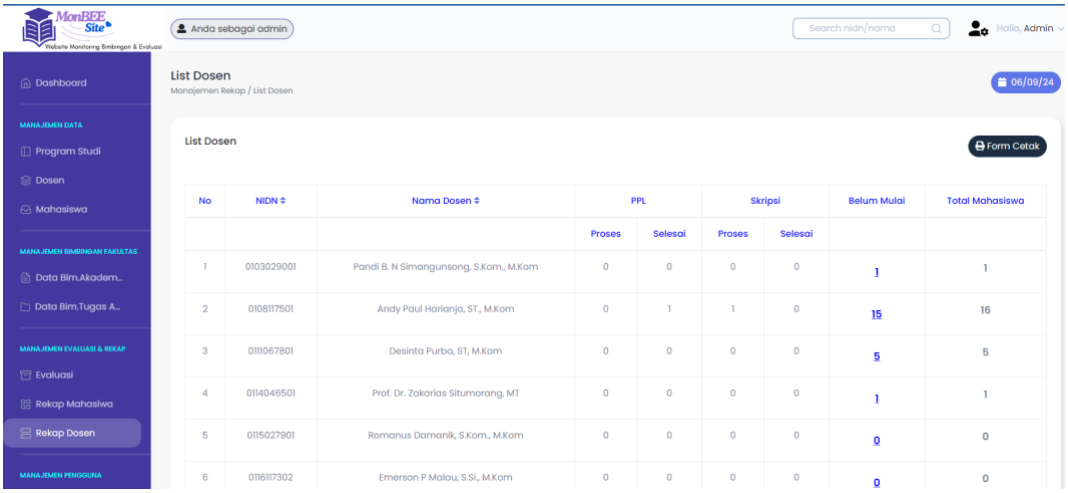

Fig. 15: Lecturer recapitulation page

4. Conclusion

The Web-Based Monitoring and Evaluation System for Academic Guidance, created using the Rapid Application Development (RAD) approach, has effectively solved the challenges of managing student supervision at the Faculty of Computer Science, UNIKA Santo Thomas Medan. This system introduces a structured and practical way to improve communication between students and their supervisors, making it easier to track progress and provide feedback in real time. What sets this system apart is its useful features like automatic notifications and detailed progress tracking, which have made the academic guidance process more efficient. The RAD method allowed for quick development and adjustments, ensuring the system meets the specific needs of its users.

This research has greatly improved the efficiency and organization of academic guidance. It highlights the importance of developing user-friendly, flexible systems that can adapt to the needs of both students and supervisors, setting a solid foundation for future improvements in academic support technology.

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