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# Design and Development of Student Attendance and Academic Consultation Information System in Bussiness Administration Department of Politeknik Negeri Banjarmasin

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## Abstract

The role of academic information systems is of utmost importance in the education sector, specifically in managing both academic and non-academic data and activities. The integration of information technology has become an essential requirement in developing valuable information systems to meet the academic service needs within a university campus. The provision of prompt and transparent services is vital for establishing a reputable institution with high value. However, many campuses still rely on traditional methods and have yet to fully harness the potential of technology as a source of information to enhance student services. By leveraging technology, students can conveniently access attendance records, receive academic consultation, and express their concerns without being constrained by time and location. To address the challenges faced by academic departments in handling a significant volume of student complaints, a reliable, user-friendly, and transparent information system is necessary. Web-based academic services serve as one feasible option for streamlining the management and resolution of student issues on campus, accessible through mobile devices and computers with internet connectivity. A web-based academic information system will be designed to cater encompassing academic services, administration, and suggestions. Through the implementation of such a system, it is anticipated that academic services on campus will become more effective, efficient, and transparent.

*Keywords:* student attendant, academic consultation, information system, academic, web

## 1 Introduction

Currently, information plays a vital role in every organization. The interconnectedness of information across different departments means that the information shared by one department has a significant impact on the operations of other departments. The availability of timely, accurate, and integrated information facilitates smooth workflow and efficiency among interconnected departments within a company. [1]

Academic information systems play a crucial role in the field of education, particularly in handling academic and non-academic data and tasks. By implementing such systems, educational institutions can enhance the effectiveness and efficiency of academic management. [2] Moreover, these information systems serve as a valuable tool for addressing student concerns, including complaints related to academic services, [3] administration [4], and campus facilities [5].

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The integration of information technology is vital in developing an effective information system for academic services on college campuses. Swift and transparent service delivery in the education sector is a fundamental prerequisite for establishing a distinguished institution with a strong market standing. The rapid advancements in technology and the growing need for implementation have led to a heightened demand for academic services, prompting the establishment of an information system that benefits both students and the institution itself.

However, it is worth noting that many campuses have yet to leverage technology as an information source to enhance student services, instead relying on traditional methods to address the aforementioned issues. The adoption and utilization of technology enable students to access information and voice their concerns without being constrained by physical limitations or time constraints. Additionally, students can easily track the progress of their attendance and track the record of their academic consultations. To address the challenges faced by academic departments in managing numerous complaints from a significant number of students, the implementation of a reliable, easily accessible, and transparent information system is imperative.

Several academic information systems have been developed, and a few of them are built specifically for Android platforms [6]. This Android-based academic information system offers the advantage of seamless integration with mobile phones, which greatly aids students in utilizing the system. Nevertheless, the Android-based information system has a drawback when it comes to usage flexibility since not all members of an educational institution possess Android-based mobile phones.

As an alternative, web-based academic services present an opportunity to streamline the management, facilitation, and resolution of student issues, accessible through mobile phones or computers with an internet connection. Within this system, a web-based academic information system will be created to accommodate academic services, and administration. Implementing this system is expected to enhance the effectiveness, efficiency, and transparency of academic services within the campus.

## 2 Methods

The research conducted in this study is classified as applied research, which aims to effectively solve practical problems or enhance existing conditions in a timely manner. [7] The approach utilized to create this information system is the System Development Life Cycle (SDLC), which is a systematic procedure employed by system analysts to develop an information system encompassing requirements, validation, training, and system ownership. SDLC is commonly linked to the waterfall system development technique, as its stages advance in a sequential manner from the top to the bottom. The following are the stages of SDLC :

a. Planning / Initiation: This stage involves describing the system globally and setting goals for the planned system development.

b. Requirement Gathering and Analysis: In this stage, the analyst attempts to articulate the system's problems and depict the current situation. Additionally, the analyst designs a solution to be provided to the users.

c. Design: At this stage, the solutions outlined in the requirement gathering and analysis stage are elaborated in detail, including diagrams, layouts, business rules, and other necessary documentation.

d. Build or Coding: This stage involves the construction or development of the system. It is associated with creating application programs to support the system or implementation.

e. Testing: During this stage, the built or developed system is tested by a testing team or users to ensure its functionality and performance. [8]

The stages of system development used for this information system using the SDLC method are as follows:

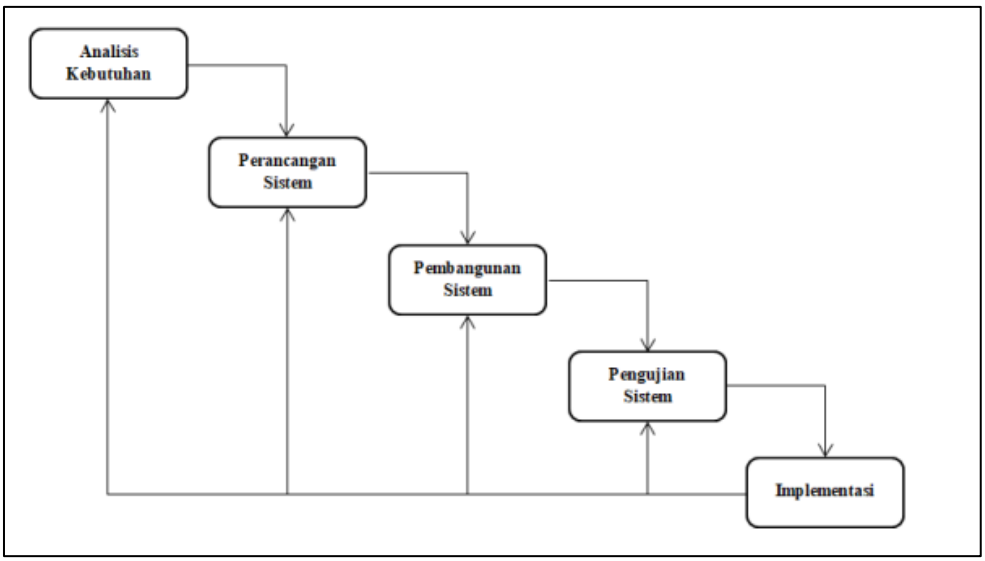


Figure 1: SDLC Waterfall Model

1. Requirement Analysis

   The requirements obtained from the observation results in the Department of Business Administration are analyzed to identify system requirements. These system requirements are then used as references for system design.

2. System Design

   After obtaining the system requirements, the database is designed using Entity Relationship Diagram (ERD). The process is then designed using Data Flow Diagram (DFD).

3. System Development

   The application is developed as a web-based application using the PHP programming language and the CodeIgniter framework. The MySQL database is used for storage.

4. System Testing

After the system is built, structured testing is conducted to evaluate the functionality and performance of the developed system.

5. Implementation

Implementing the final output of the system development on the computer, making the system ready to replace the old system and be used effectively.

# 3 Results

A. System Requirement Analysis

System Requirement Analysis plays a critical role in the initial stage of system development, providing a solid foundation. By examining the weaknesses of the existing system, it becomes possible to recommend system requirement analysis and identify the necessary functionalities for the new system. The analysis comprises two primary components: functional requirement analysis and non-functional requirement analysis. The former aims to collect information regarding the processes that the information system will execute, while the latter focuses on acquiring details about the system's properties and behaviors. The main objective of system requirement analysis is to gain a comprehensive understanding of the new system's needs, which can be summarized as follows:

1. Clearly defining the tasks and objectives the system must fulfill.

2. Identifying the specific characteristics and attributes the system should possess.

Functional requirement analysis aims to gather information about the needs that encompass the processes performed by the information system. This system involves three user roles: admin, lecturer, and student. Here are some of the functional requirements necessary for this information system:

1. User Authentication: The system should include a login feature that allows each user to verify their identity.

2. User Management: The system should provide functionalities to manage user accounts, including creating, updating, and deleting user profiles.

3. Attendance Tracking: The system should enable lecturers to record and monitor student attendance for each class session.

4. Academic Consultation: The system should facilitate communication between students and lecturers for academic advisory purposes.

5. Reporting and Analytics: The system should generate reports and offer data analytics capabilities to analyze student performance, attendance trends, and other relevant metrics.

6. System Administration: The system should have administrative features to manage system settings, permissions, and overall system maintenance.

## B. System Design

System Design is a problem-solving approach that works alongside system analysis to reconstruct and enhance the components, resulting in a more refined and comprehensive system. It entails making adjustments, additions, and removals to the existing system's elements. During the process and data model design, the system requirements are specified, and a coding framework is established. The documentation produced during this design phase is highly beneficial for future system development, particularly in cases where there are alterations to user requirements. [9]

Data Flow Diagram (DFD) is a system model used to illustrate the division of a system into smaller modules. A context diagram, also known as a level 0 DFD (Data Flow Diagram), is a visual representation of the scope and boundaries of a system. It provides a high-level overview of the system and its interaction with external entities. In a context diagram, the system being analyzed is depicted as a single process box in the center, surrounded by external entities. Below is an image of the context diagram for the Information System:

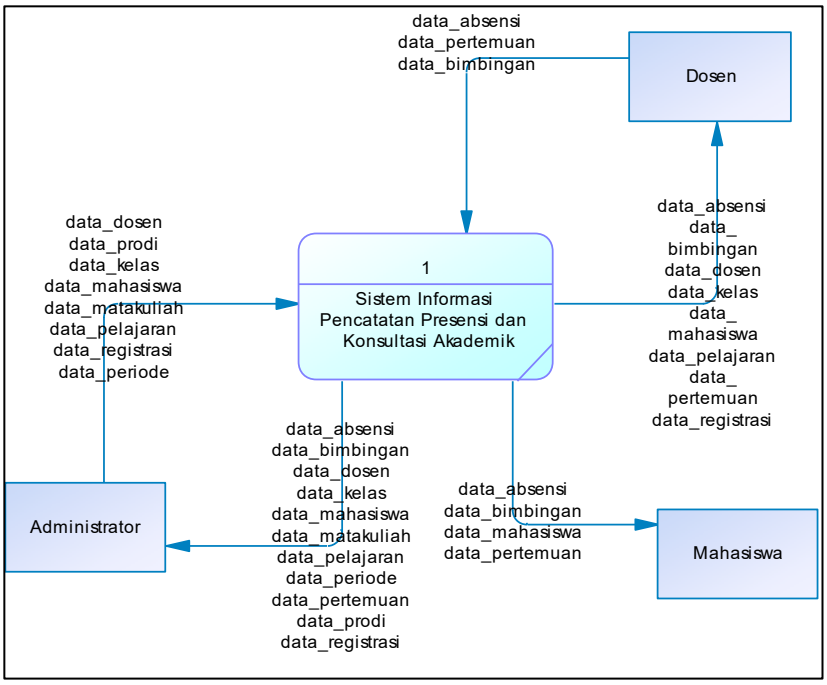


Figure 2: Context Diagram

A level 1 DFD (Data Flow Diagram) is a more detailed diagram that expands on the context diagram or level 0 DFD. It provides a deeper understanding of the system by breaking down the processes and data flows identified in the context diagram into more specific sub-processes and data flows.

In a level 1 DFD, the system is represented as the main process, and it is further decomposed into multiple sub-processes. Each sub-process represents a specific function or task within the system. The data flows between processes and external entities are depicted using arrows, indicating the flow of data between different components of the system.

The level 1 DFD provides a more granular view of the system's functionality, showing how data is transformed and processed within different processes. It helps to identify the interactions and dependencies between various components of the system and serves as a foundation for more detailed analysis and design. Below is an images of the level 1 DFD for each external entity :

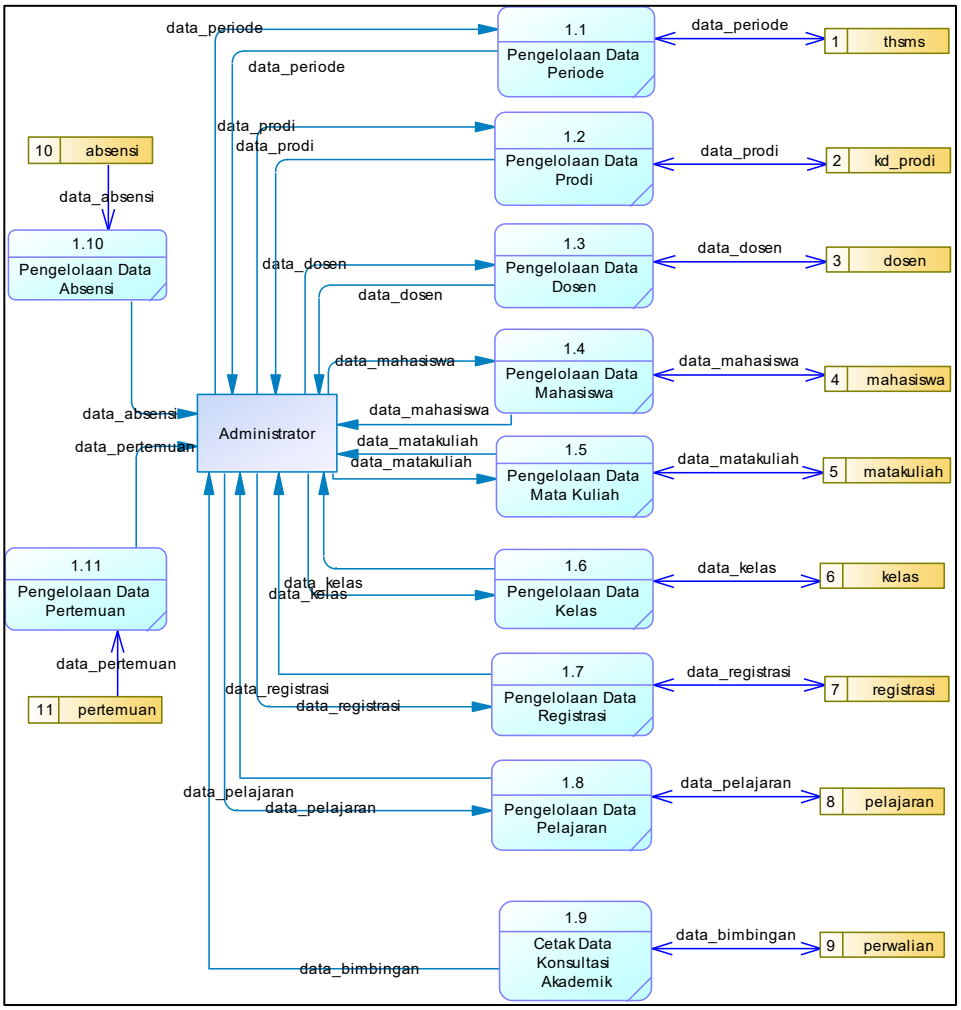


Figure 3: Level 1 DFD of Administrator

In the Level 1 DFD, the administrator is depicted as being able to manage and view the following data: active periods, program of study, faculty, students, courses, classes, student registration, subjects, academic consultations, student attendance, and student learning meetings.

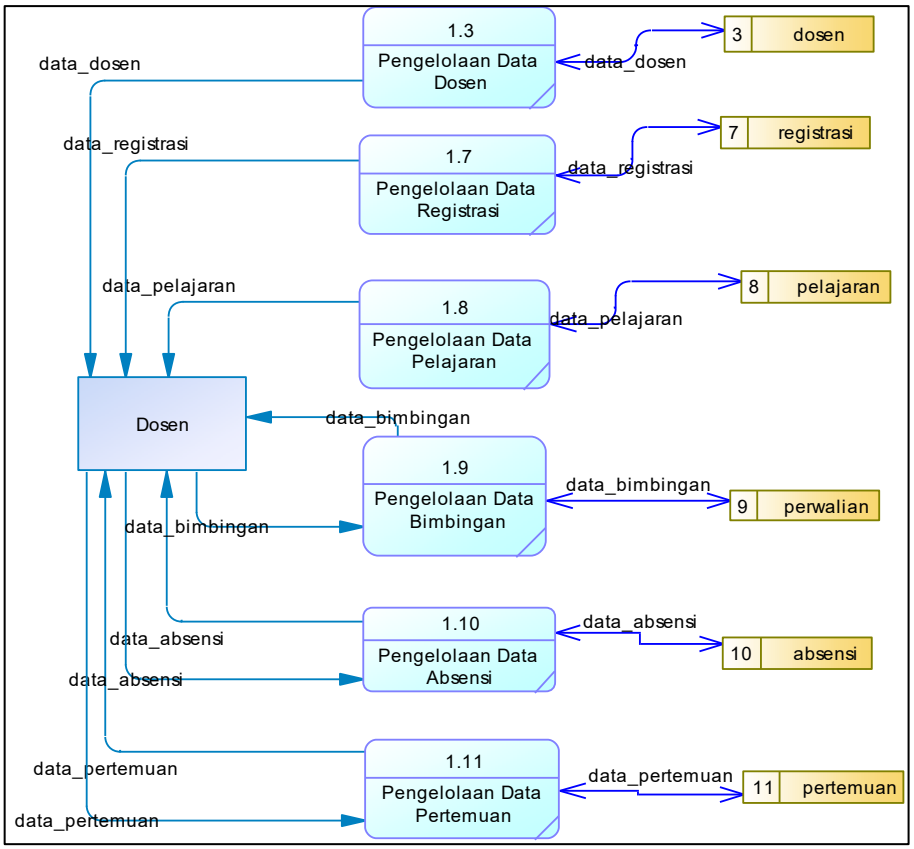


Figure 4: Level 1 DFD of Lecturer

In the Level 1 DFD, the lecturer is depicted as being able to view lecturer data, student registration data, subject data, manage academic consultations data, manage student attendance data, and manage student learning meeting data.

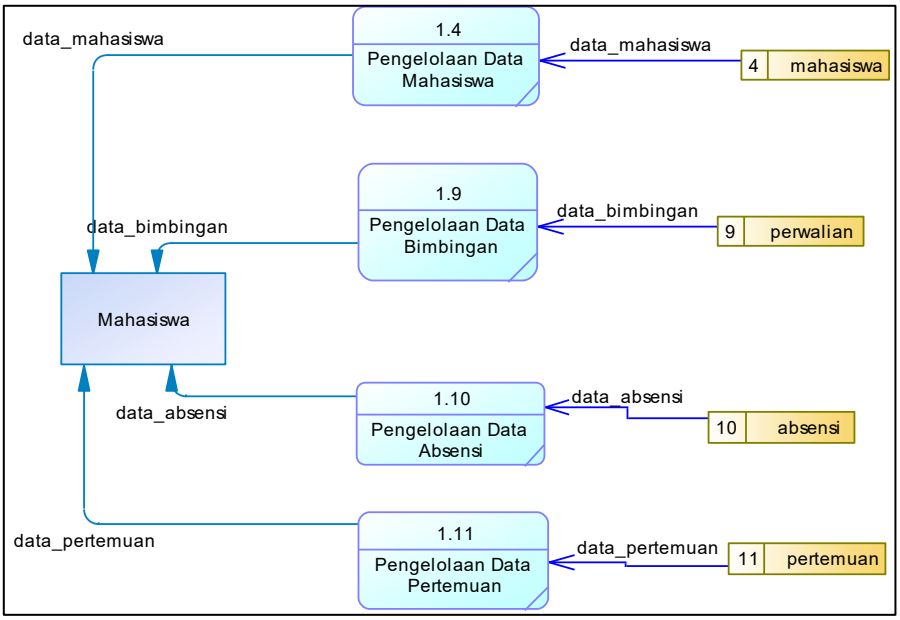


Figure 5: Level 1 DFD for Student

In the Level 1 DFD, the student is depicted as being able to view student data, view academic consultation data, view student attendance data, and view student learning meeting data.

The Entity Relationship Diagram (ERD) is a modeling technique used to illustrate the connections between data elements in a database. It represents the relationships between entities, which are the fundamental data objects. ERD is employed to visualize the data structure and the relationships between entities, employing a range of symbols and notations.

The Entity Relationship Diagram (ERD) is a method employed to depict the data needs of an organization, commonly utilized by Systems Analysts during the analysis stage of a system development project. It forms the basis for designing a relational database that serves as the underlying structure for the created information system. The ERD, along with its accompanying specifics, represents a model or concept that describes the relationships or associations between these entities.

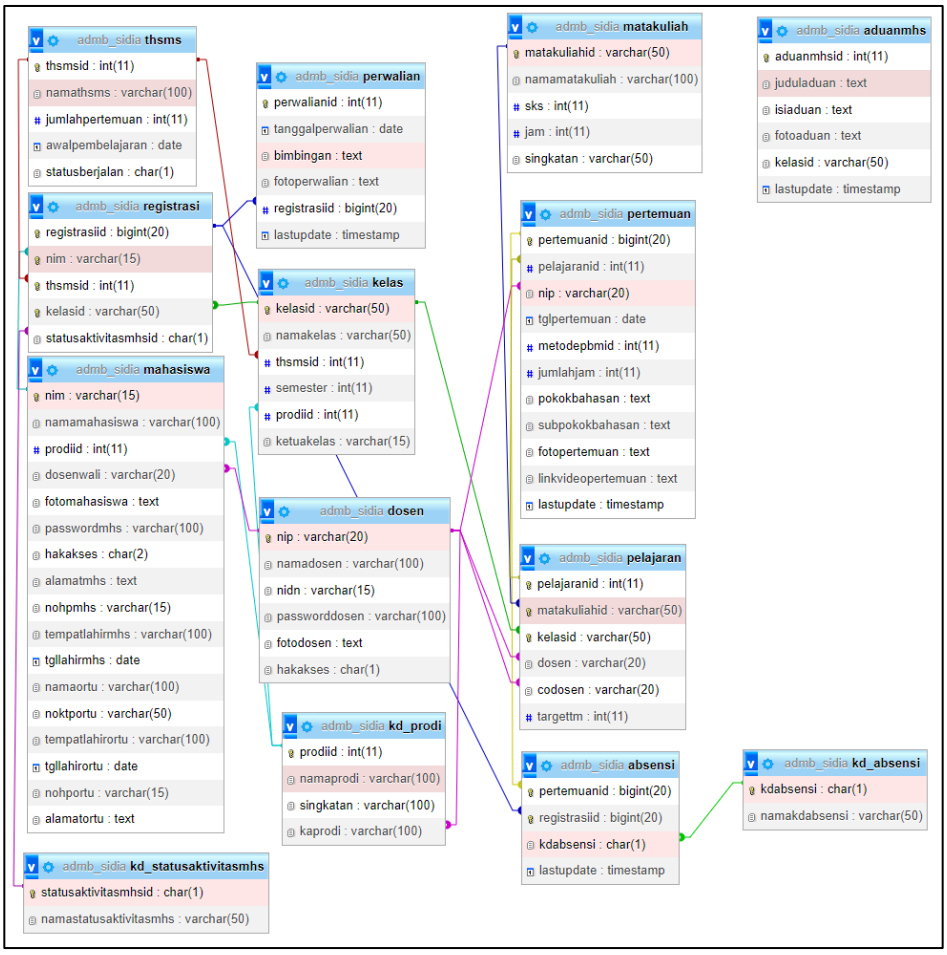


Figure 6: Entity Relationship Diagram

## C. System Development

Prototype is one of the widely used methods in software development. It can also be built using various development tools to simplify the process. Prototyping involves user participation in analysis and design. Prototypes are used to illustrate the functionality of the entire system.

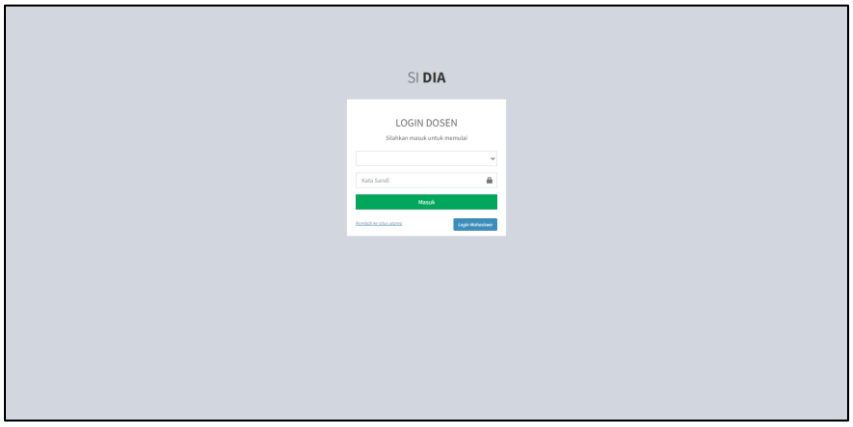


Figure 7: Login Page

The login form is used as a basic security measure in the system to prevent unauthorized access and ensure data security. During the login process, users are required to enter their username and password to access the system.

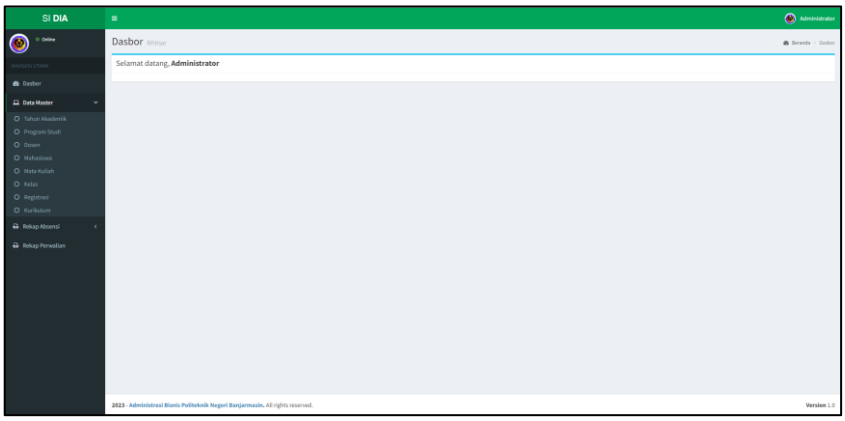


Figure 8: Dashboard Page of Administrator

The dashboard page has different menus based on the login access rights. The access rights include administrator, lecturer, and student.

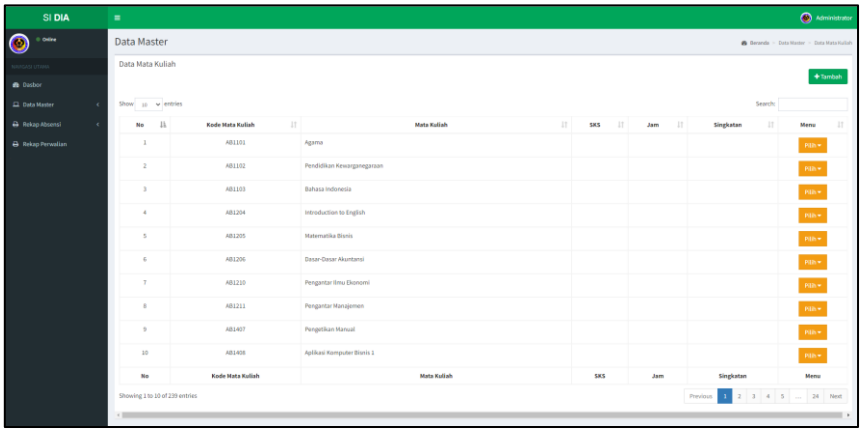


Figure 9: Course Data Management Page

The course data management page is used to manage course data by the administrator. The administrator has the ability to view, add, modify, and delete all courses across all classes within the Department of Business Administration.

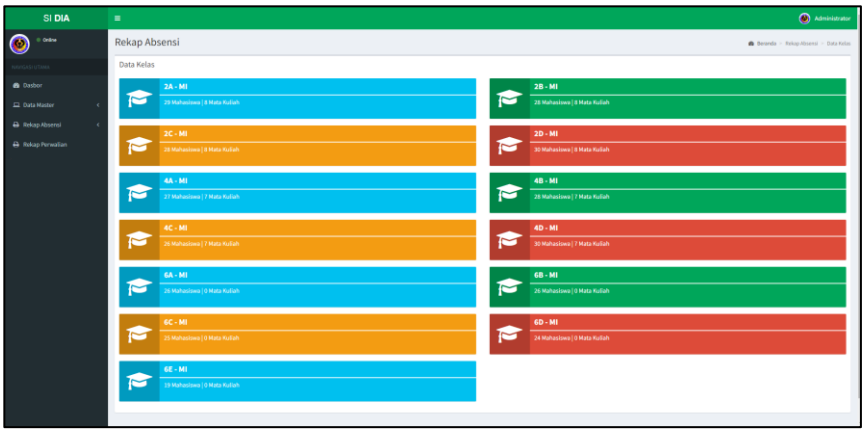


Figure 10: Student Attendance Summary Page

The student attendance summary page, the administrator can view the attendance summary of students in each class.

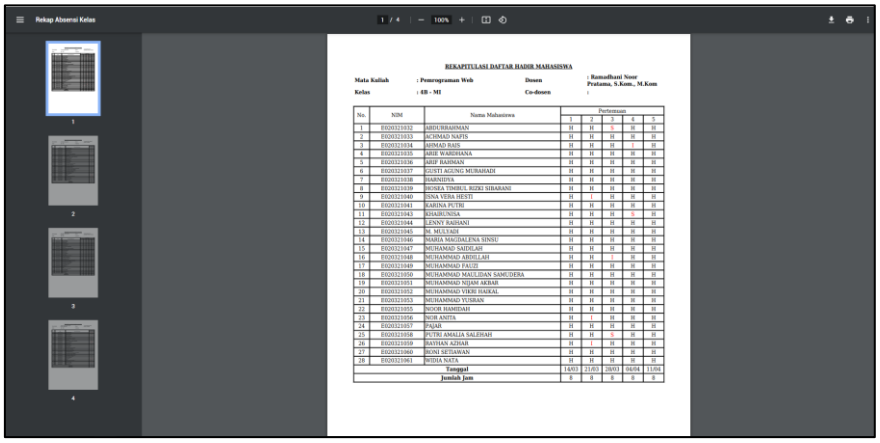


Figure 11: Student Attendance Summary Printout Result

The attendance summary of students can be viewed or directly printed on this page, and it can also be saved in PDF format.

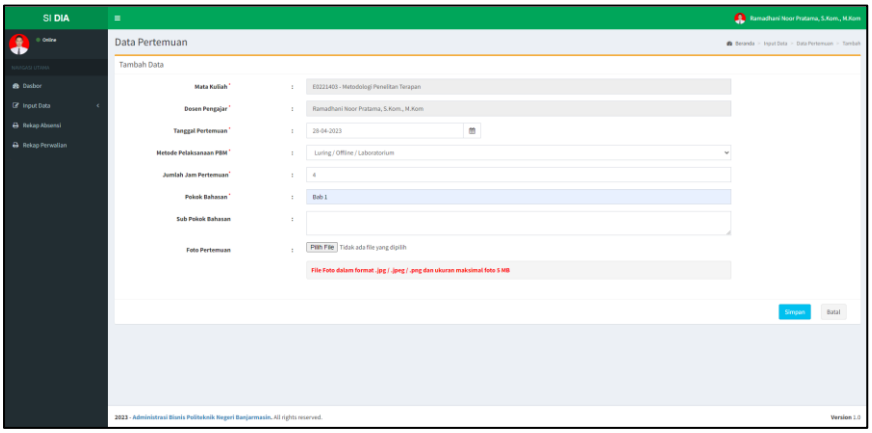


Figure 12: Meeting Data Management Page

The meeting data management page is used for managing course data by lecturers. Lecturers can view, add, modify, and delete all meeting data for the teached classes.

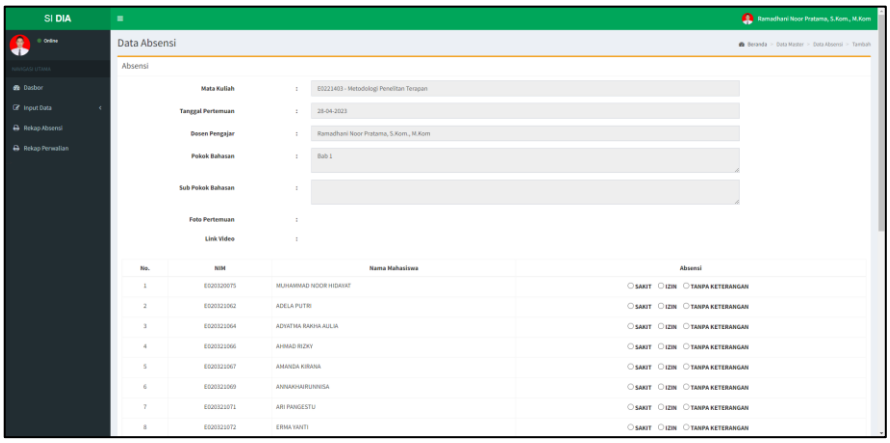


Figure 13: Student Attendance Data Management Page

Lecturers can directly manage student attendance data for the teached classes.

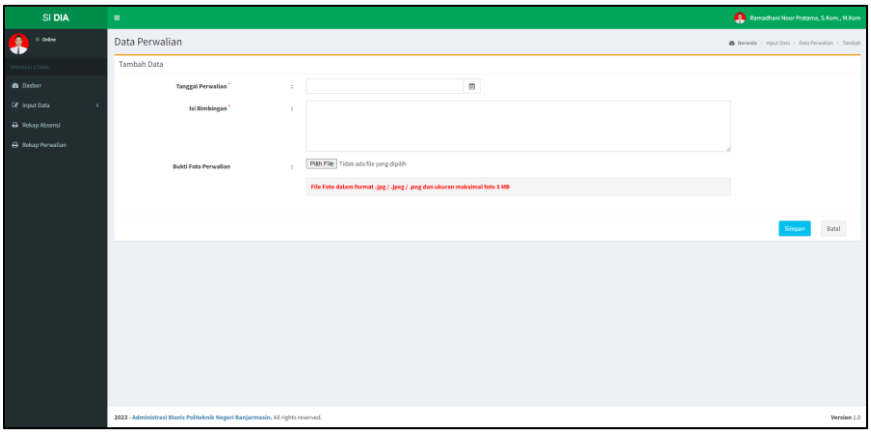


Figure 14: Academic Consultation Data Management Page

The academic consultation data management page is used to manage consultation data by lecturers. Lecturers can view, add, modify, and delete all consultation data for each supervised student.

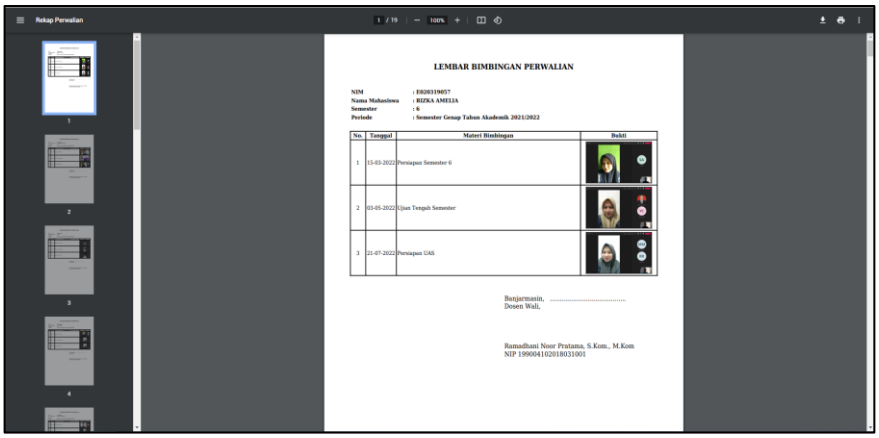


Figure 15: Academic Consultation Summary Printout Result

The summary of academic consultation data for students can be viewed or printed directly and can also be saved in PDF format.

## D. System Testing

Black box testing is a method of testing that centers on assessing a system's functionality without delving into its internal structure or implementation specifics. Test cases are constructed based on the anticipated behavior of the system, and inputs are fed into it to examine its outputs. The primary aim of black box testing is to verify that the system adheres to predetermined requirements and operates as anticipated from the end user's standpoint. [10] The results of black box testing on this information system can be seen in Table 1 :

Table 1: Result of Black Box Testing

| Test Case | Input | Expected Output | Actual Output | Result |
|---|---|---|---|---|
| 1 | Valid username and password | Successful login | Successful login | Pass |
| 2 | Clicking on "tahun akademik" menu | Successfully accessing the year period data management page | Successfully accessing the year period data management page | Pass |
| 3 | Clicking on "program studi" menu | Successfully accessing the study program data management page | Successfully accessing the study program data management page | Pass |
| 4 | Clicking on "dosen" menu | Successfully accessing the lecturer data management page | Successfully accessing the lecturer data management page | Pass |
| 5 | Clicking on "mahasiswa" menu | Successfully accessing the student data management page | Successfully accessing the student data management page | Pass |

| | | | | |
|---|---|---|---|---|
| 6 | Clicking on "mata kuliah" menu | Successfully accessing the subject data management page | Successfully accessing the subject data management page | Pass |
| 7 | Clicking on "kelas" menu | Successfully accessing the course data management page | Successfully accessing the course data management page | Pass |
| 8 | Clicking on "registrasi" menu | Successfully accessing the student registration data management page | Successfully accessing the student registration data management page | Pass |
| 9 | Clicking on logout menu | Successful logout | Successful logout | Pass |

## E. Implementation

This information system has been deployed and can be accessed with web-browser at link address http://admbisnis.poliban.ac.id/sidia.

# 4 Conclusion

The developed information system can record student attendance and academic consultations, making the administration process of academic data easier and faster. All data is stored in a computerized manner, reducing costs and ensuring secure document storage in a single database. The system is equipped with password protection for added security. Manual information searching is no longer necessary, as the required information can be obtained directly. This information system is built using the SDLC waterfall model. It utilizes PHP programming language with CodeIgniter as its framework and MySQL as the database.

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