Implementation of the Laravel Framework in the Administration of Letter Submission and Issuance Information System

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A B S T R A C T

Administrative management of the Faculty of Islamic Economics and Business (FEBI) at State Islamic University of Sjech M. Djamil Djambek Bukittinggi is still ineffective, where mail management is still done manually or semi-automatically. However, the number of letters published is still limited. The situation in this faculty often results in long queues when students need to collect their letters. Students have to come directly to the faculty to check whether the letters they have submitted have been issued or not. However, there is currently no specific information system in place to manage administrative difficulties linked to letter submission and issuance at FEBI. As a result, improvements in this area are required to boost the efficiency and convenience of administrative procedures at the faculty. The purpose of this research is to create an Administration System for Letter Submission and Issuance at the Faculty of Economics and Islamic Business, UIN Bukittinggi, utilizing the Laravel framework and the MySQL database. This technology enables users to manage correspondence online, making it more productive and efficient. This study uses the Research and Development (RnD) version of the Pressman waterfall model. The system was built using Visual Studio Code software and using the Laravel framework as the back end and CSS bootstrap as the front end. The system can help students in managing correspondence effectively and efficiently.

1. Introduction

A Higher Education Institution is the most prestigious formal institution where members of the community can get an education. This institution implements educational programs that include a variety of components. Students are one of the most significant aspects of a higher education institution. The amount and quality of students, who are the backbone of every higher education institution, might indicate its success or failure [1]. Student academic activities cannot be separated from administration, one of which is submission and publishing services [2]. The current development of technology also has a significant impact on various aspects of life, including the field of education. In this context, the application of technology in higher education administration becomes increasingly important. One area where technology can play a role is in the process of document submission and issuance, which can optimize efficiency and the quality of services provided to students.

The importance of administration is also regulated in Government Regulation Number 4 of 2017 concerning the Organization and Management of Higher Education. In this regulation, it is explained that higher education institutions are regulators, planners, supervisors, monitors, evaluators, and providers of

guidance and coordination for the implementation of various levels and types of higher education by the minister to achieve the goals of higher education [3]. The explanation of the verse can be interpreted that universities play a role as both education providers and administrators. In a university, student activities cannot be separated from administration, starting from the registration of new students to the process of academic activities, handling application submissions, and issuing letters. These are all part of academic administration that should be managed by staff in each faculty. One of the administrative services is student letters. A letter is a type of written communication media that is used to deliver information, assertions, or messages to other parties who have unique demands or activities with other individuals. It is a written communication tool sent from one party to another to convey news or a comparable document used as a medium of written communication between the first and second parties on a specific-sized piece of paper [4]. Correspondence is classified into numerous sorts based on its side and purpose, as well as its shape and character [5]. A letter is a type of communication used to deliver written information from one person to another.

The Administration Information System for letter requests and issuance is one system that can help with this procedure. An information system is an organization that combines the needs and processing of everyday transactions, supports administrative operations, and generates the required reports [6]. This system is a web-based application that employs the PHP programming language, which is an open-source language noted for its simplicity and built-in features beneficial for managing common online application development requirements [7], and MySQL database, using a Database Management System (DBMS) for its management which will assist in database management [8]. and online-based internet so it can be accessed anywhere. With the usage of a system, students who will manage the letter merely need to access it via the internet, whether on a PC or a smartphone.

2. Method

2.1. Type of Research

This research falls under the category of Research and Development (R&D). In simple terms, the research and development method is a research approach used to create a specific product and test the effectiveness of that product [9]. In system development, this research uses the waterfall model.

2.2. Research Procedure

The Waterfall model, often referred to as the sequential linear model or the classic life cycle model, provides a sequential or ordered approach to software development, starting from analysis, design, coding, testing, and support phases. According to Pressman in the journal by Permadi Setiawan, the Waterfall model implies a systematic and sequential approach to system development. System development begins with determining requirements specifications and proceeds through stages of planning, modeling, construction, and delivering the system to customers or users (deployment), concluding with ongoing support for the resulting system [2]. The stages of this research can be described as in Figure 1.
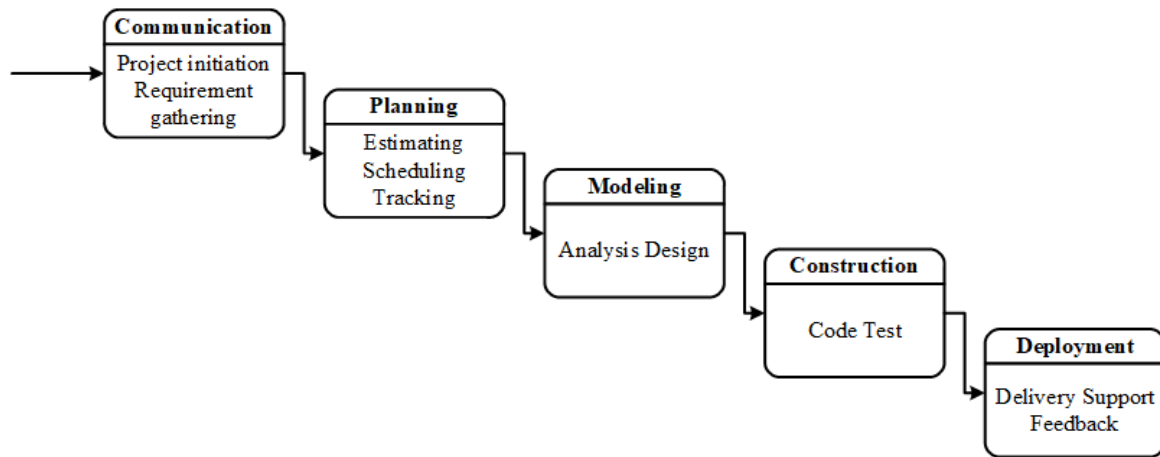
Figure 1. Research Stage

The SDLC waterfall model is often also referred to as the linear sequential model or the classical life flow which is systematic, sequential in building software [10]. This model provides a sequential or organized approach to software development, beginning with analysis, design, coding, testing, and support. According to Pressman in Permadi Setiawan's publication, the Waterfall model indicates a methodical and sequential approach to system development. System development begins with identifying requirements specifications and progresses through stages of planning, modeling, construction, and providing the system to customers or users (deployment), culminating with continuing maintenance for the resulting system [11]. The following is an explanation of the stages carried out in the Waterfall Model according to Pressman [12] :

Communication. This first stage is an important stage, because at this stage data will be collected regarding user needs and defines system specifications in detail.

Planning. Following the completion of the communication process, the next stage is to plan the system work, which comprises the technical tasks that will be completed, the risks that may occur, the resources and data required, the work schedule, and the results that will be produced.

Modeling. During this stage, the plans that were established earlier are translated into a system design before the actual development process begins. This phase focuses on designing the data structure, the architecture of the system to be built, the user interfaces, and the detailed procedures within the system.

Construction. The coding process takes place throughout the construction phase. This level depicts the actual construction of a system. This indicates that during this time, computer utilization is maximized. Following the completion of the coding process, testing will be performed to find any flaws (bugs) in the system, which may then be corrected. This step is critical for assuring the system's functioning and reliability.

Deployment. The final stage of the system development process is deployment. The system is deployed and used by users when the creation and analysis phases are done. The designed system will be subjected to periodic maintenance as needed to ensure its sustained functioning and effectiveness. This upkeep may include updates, bug fixes, and enhancements to satisfy changing requirements or handle any difficulties that develop throughout the operational phase.

3.   Results and Discussion

The result of the research on the administration information system for letter requests and issuance in the Faculty of Islamic Economics and Business has produced a system that is useful for simplifying administrative processes related to letter requests and issuance for students. This system allows students to handle their letter requests through a specialized system that deals with the issues of requesting and issuing letters without the need to physically visit the campus. For administrators, it also facilitates document

archiving and generates reports for tracking incoming and outgoing student letter data within the faculty. With the existence of an administrative information system for submitting and issuing letters at the Faculty of Islamic Economics and Business for both students and administrative staff who are on campus, this system can help in the process of administering letters to be more effective and efficient. System development refers to the following waterfall stages :

3.1. Communication

3.1.1. Project initiation

Before developing the system, the author conducted interviews at the Faculty of Islamic Economics and Business, identifying various concerns, such as letter handling, which is still done manually or semi-automatically. The number of letters issued is still limited. When students want to pick up letters from the faculty, there is a big line.

3.1.2. Requirement gathering

This stage consists of two requirements, namely functional requirements and non-functional requirements. Functional requirements for super admin, some of the things needed by the super admin in the system are as follows: First, the need for Create, Read, Update, Delete (CRUD) features to manage users at the admin and student levels. Second, the need for features to download and upload a large amount of data that will be entered into the database. Third, the need for features to export and import data in Excel format for data summary and report generation.

Functional requirements for admin, some of the things needed by the Admin in the system are as follows: First, the need for a feature to display the status of a letter's process (in progress, rejected, and completed). Second, the need for Create, Read, Update, Delete (CRUD) buttons for letter management. Third, the need for features to download and upload completed processed letters. Fourth, the need for a feature to display reports of letters that have been processed, with options for monthly and yearly reports for data summary.

Functional requirements for student, some of the things needed by student users in the system are as follows: First, the need for a feature that can automatically generate a letter of request for letter submission. Second, the need for a feature that provides forms/textareas/fields for filling in data other than student data (NIM, Name, Faculty). Third, the need for features to download processed letters and upload additional files/documents if the submitted letter requires supplementary documents other than the request letter. Fourth, the need for a feature to monitor the progress of submitted letters.

Non-functional requirements, these requirements consist of properties stored by the system. For the successful implementation of the generated system, two components of information technology are required: hardware and software.

3.2. Planning

3.2.1. Estimating

The initial step is to collect the data required to develop this system. This data includes information on letter types, processes for submitting student letters, and requirements for submitting letters for each letter type until the letter is issued. Second, the author creates the system's logic, such as input and output logic, as well as submission and letter logic. Third, use the Laravel framework to incorporate the logic design that has been created into the PHP programming language. Fourth, create the display that appears when the user accesses the system. Fifth, put the system through its paces to evaluate if it lives up to expectations. Sixth, do maintenance or fixes on various errors that were not noticed during the system's construction.

3.2.2. Schedulling

The system development process took approximately two months, starting from September to October 2022. It began with data collection from September 1, 2022, to September 7, 2022. The logic design phase followed, starting from September 8 to September 14, 2022. Afterward, the logic was translated into a programming language, which was done from September 15, 2022, to September 31, 2022. The next phase involved building the user interface, which started on October 1 and continued until October 10, 2022. Following that, a rough test of the system was conducted from October 11 to October 20, 2022. Lastly, the author worked on fixing any errors or issues, which was done from October 21 to October 25, 2023.

3.2.3. Tracking

The author conducted research by referring to several journal articles with titles similar to the author's research topic, such as "administration system for letter submission and issuance", "designing an administration system for incoming and outgoing letters", and others. Additionally, references were also drawn from existing applications. However, these applications had some shortcomings, such as differences in the letter submission process compared to the author's case study. As a result, improvements were needed in these applications. The development of this information system involved several stages. The author created the application using the Laravel programming language and the Bootstrap 4 CSS front-end framework.

3.3. Modelling

3.3.1. Data structure

On a system using a database, use the .env file which contains the syntax for connecting to the database. The Laravel framework already has the MVC (Model, View, Controller) mechanism for data preparation. Model contains coding for database activities, View contains coding for the display of the system being constructed, and Controller contains coding to connect the View and Model [9].

3.3.2. Design in general

Use case diagram. Use case diagrams describe the expected functionality of a system. Use cases are used to represent an interaction between actors and the system [13]. Figure 2 is a use case diagram for this research.
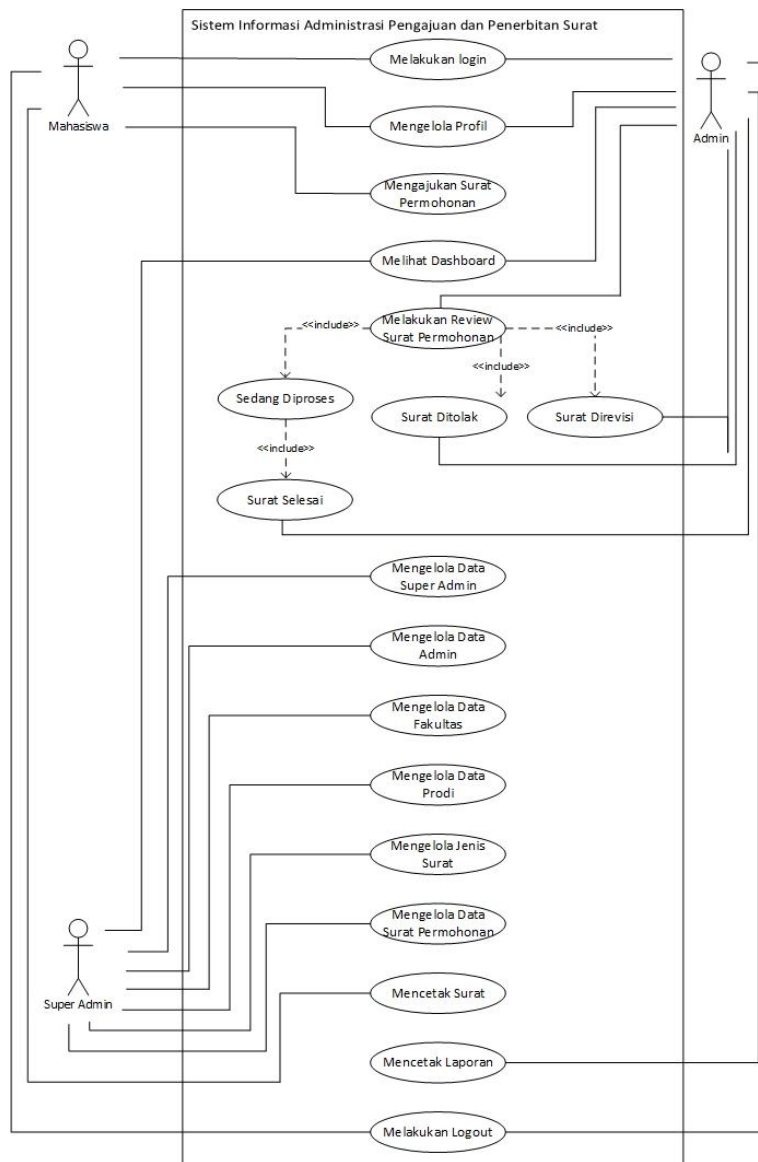
Figure 2. Design Use Case Diagram

Activity diagram. This diagram depicts the workflow of a system or a menu within the system. It's important to note that this diagram illustrates what is done by the system, not what is done by the actor [14]. Figure 3 , Figure 4, and Figure 5 are a activity diagram for this research.
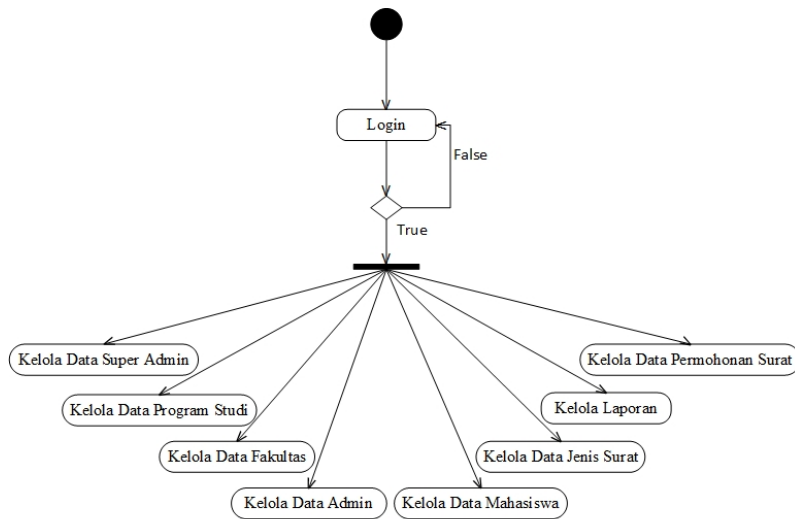
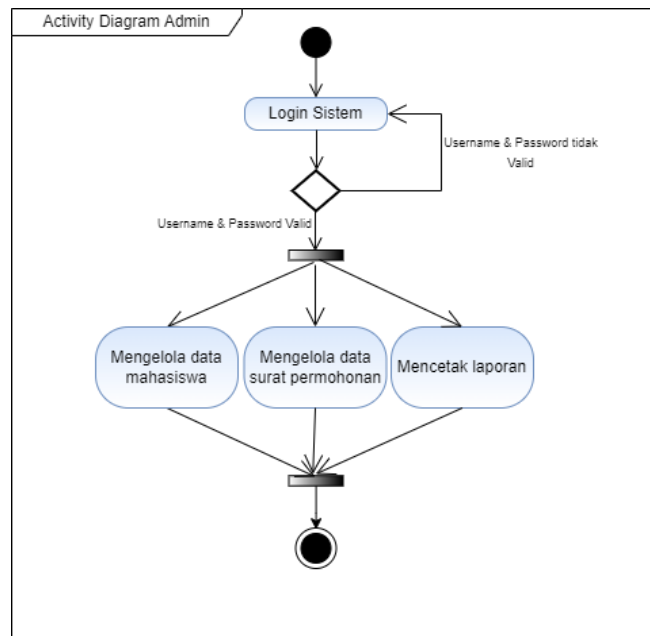**Figure 3. Activity Diagram Super Admin**
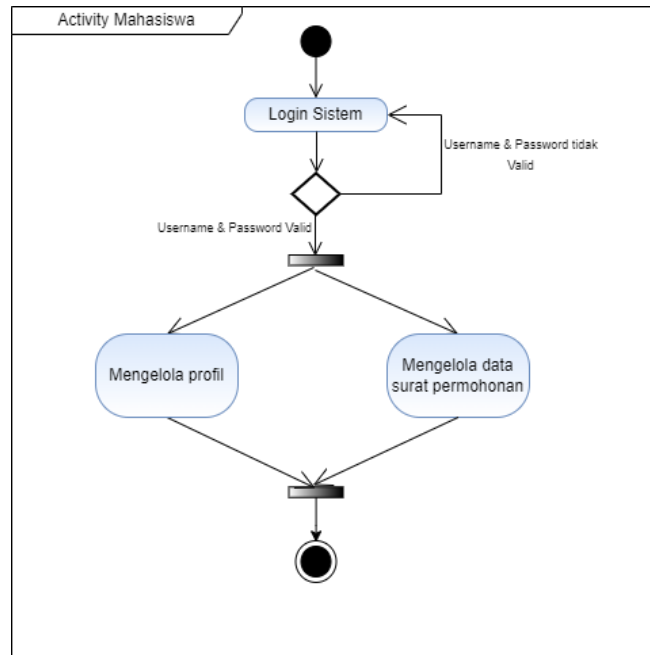
Figure 4. Activity Diagram Admin

Figure 5. Activity Diagram Student

3.3.3. Output design

Figure 6, Figure 7, Figure 8, Figure 9, and Figure 10 are the output design.

Figure 6. Super Admin Output Design

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| Admin | | | | | Add |

ADMIN	EMAIL	NO HP	STATUS	UPDATE AT
X(10)	X(255)	X(255)	X(30)	X(10)
X(10)	X(255)	X(255)	X(30)	X(10)

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Figure 7. Admin Output Design

| Admin | | | | | Add |

ADMIN	EMAIL	NO HP	STATUS	UPDATE AT
X(10)	X(255)	X(255)	X(30)	X(10)
X(10)	X(255)	X(255)	X(30)	X(10)

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Figure 8. Student Output Design

Jenis Surat				Add
KODE	NAMA	STATUS	UPDATE BY	UPDATE AT
X(10)	X(255)	X(255)	X(20)	X(10)
X(10)	X(255)	X(255)	X(255)	X(10)

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Figure 9. Letter Type Output Design

LOGO

Laporan Surat Izin Penelitian

NIM	NAMA	PROGRAM STUDI
X(10)	X(255)	X(30)
X(10)	X(255)	X(30)

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Figure 10. Letter Report Output Design

3.3.4.   *Input design*

Figure 11, Figure 12, Figure 13, Figure 14, Figure 15, and Figure 16 are the input design.

Tambah Surat

Kode

bigint(20)

Nama

varchar(255)

Data yang wajib di isi

Judul Skripsi			≡
Lokasi Penelitian			≡
Label	Value		≡

+ Add Data Required

Template

Drag and drop a file here or click

Please ensure the file should be in blade.php !

Status
○ Active   ○ Inactive

Submit   Cancel

Figure 11. Letter Input Design

Tambah Super Admin

Username

varchar(255)

Email

varchar(255)

Kata Sandi

varchar(255)

Ulangi Kata Sandi

varchar(255)

Nama

varchar(255)

Nomor Hp

varchar(255)

Alamat

varchar(255)

Required image with aspect ratio 1:1

text   Browse

Status
○ Active   ○ Inactive

Submit   Cancel

Figure 12. Super Admin Input Design

Figure 13. Admin Input Design

Figure 14. Student Input Design

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Figure 15. Faculty Input Design

Figure 16. Study Program Input Design

3.3.5.   Database design

Table 1, Table 2, Table 3, Table 4, and Table 5 are database designs.

Table 1. Study Program Database Design

No	Field Name	Type	Width	Description
1	Id	Bigint	20	User ID
2	auth_id	Bigint	20	Login ID authentication to determine user level
3	faculty_id	Bigint	20	Faculty ID
4	Code	Varchar	255	Study program code
5	Name	Varchar	255	Name of study program
6	remember_token	Varchar	100	
7	State	Smallint	6	status
8	created_at	timestamp		
9	updated_at	timestamp		

Table 2. Super Admin Database Design

No	Field Name	Type	Width	Description
1	Id	Bigint	20	User ID
2	Email	Bigint	20	User Email
3	Name	varchar	255	User Name
4	No_hp	varchar	255	User phone number
5	Address	Text		User address
6	Photos	Text		User photo
7	Email_verified_at	timestamp		Verify user e-mail
8	created_at	timestamp		
9	updated_at	timestamp		

Table 3. Database Admin Design

No	Field Name	Type	Width	Description
1	Id	Bigint	20	User ID
2	Email	Bigint	20	User Email
3	Name	Varchar	255	User Name
4	No_hp	Varchar	255	User phone number
5	Address	Text		User address
6	Photos	Text		User photo
7	Email_verified_at	timestamp		Verify user e-mail
8	created_at	timestamp		
9	updated_at	timestamp		

Table 4. Student Database Design

No	Field Name	Type	Width	Description
1	Id	Bigint	20	User ID
2	auth_id	Bigint	20	id login untuk menetukan level user
3	program_study_id	Bigint	20	Id program studi
4	Nim	varchar	255	
5	Email	varchar	255	User Email
6	Name	varchar	255	User Nama
7	no_hp	varchar	255	User phone number
8	date_of_birth	Date		
9	place_of_birth	varchar	255	
10	Address	varchar	255	User address
11	Photos	Text		User photo
13	created_at	timestamp		
14	updated_at	timestamp		

Table 5. Mail Database Design

No	Field Name	Type	Width	Description
1	Id	Bigint	20	Letter Id
2	owner_id	Bigint	20	Student Id
3	editor_id	Bigint	20	Editor/admin Id
4	type_id	Bigint	20	
5	student_id	Bigint	20	Student Id
6	submitted_date	datetime		Date submitted
7	Data	Text		
8	Comment	Text		
9	State	Smallint	6	

10	created_at	timestamp
11	updated_at	timestamp

3.4. Construction

This stage contains the syntax used in making this system, the syntax has been arranged in divided folders according to what is explained in the theory above with the MVC method [15]. There are several stages involved. First, Testing is the phase where the completed information system is evaluated after it has been built, and if any issues are identified during testing, they will be addressed. Second, Testing using the Black Box method. Table 6 below is the rusult of black box testing.

Table 6. Black Box Testing Result

No	Design And Process	Which are expected	Conclusion
1	Open login page	The admin login page appears	Succeed
2	Open main page	The main menu page appears	Succeed
3	Click the super admin data menu	The super admin page appears	Succeed
4	Click the super admin input form	The super admin input form appears	Succeed
5	Click the admin data menu	Show admin page	Succeed
6	Click admin input form	The admin input form appears	Succeed
7	Click the faculty data menu	The faculty page appears	Succeed
8	Click the faculty input form	The faculty input form appears	Succeed
9	Product data menu	Show product page	Succeed
10	Click the product input form	The study program input form appears	Succeed
11	Click the student data menu	The student data page appears	Succeed
12	Click on the student input form	The student data input form appears	Succeed
13	Click the letter type menu	The letter type page appears	Succeed
14	Click the letter type input menu	The letter type input appears	Succeed
15	Click the application menu	The application page appears	Succeed
16	Click the application input menu	Show input application	Succeed

The following are some views of the system that has been designed. Figure 17 is main page.

Figure 17. Main Page

Figure 18 is profile menu.

Figure 18. Profile Menu
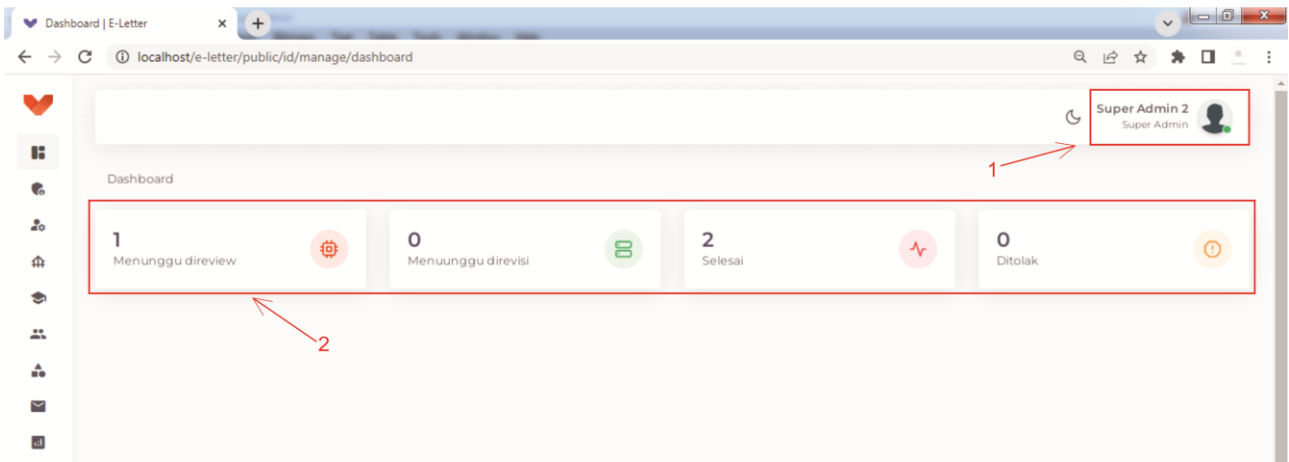
Figure 19 is super admin menu.

Figure 19. Super Admin Menu

Figure 20 is admin menu.

Figure 20. Admin Menu
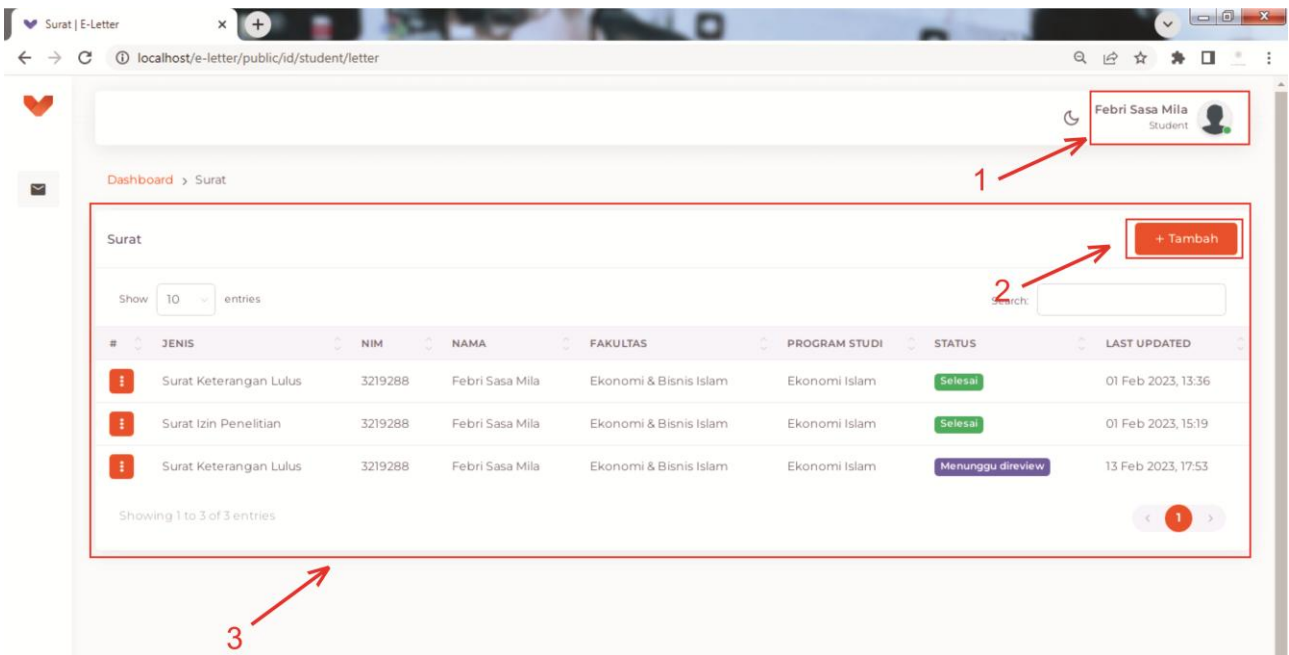
Figure 21 is student menu.

Figure 21. Student Menu
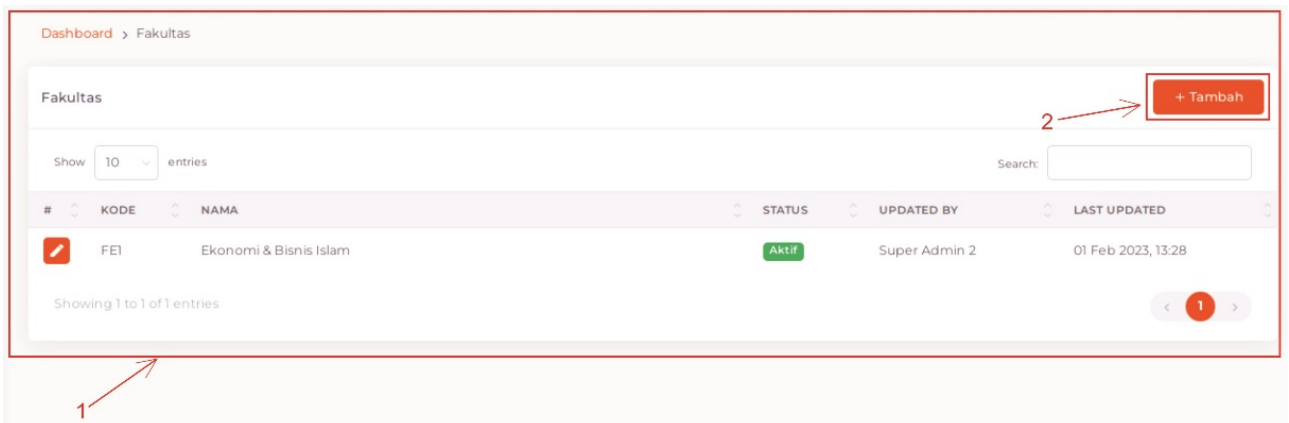
Figure 22 is faculty menu.

Figure 22. Faculty Menu
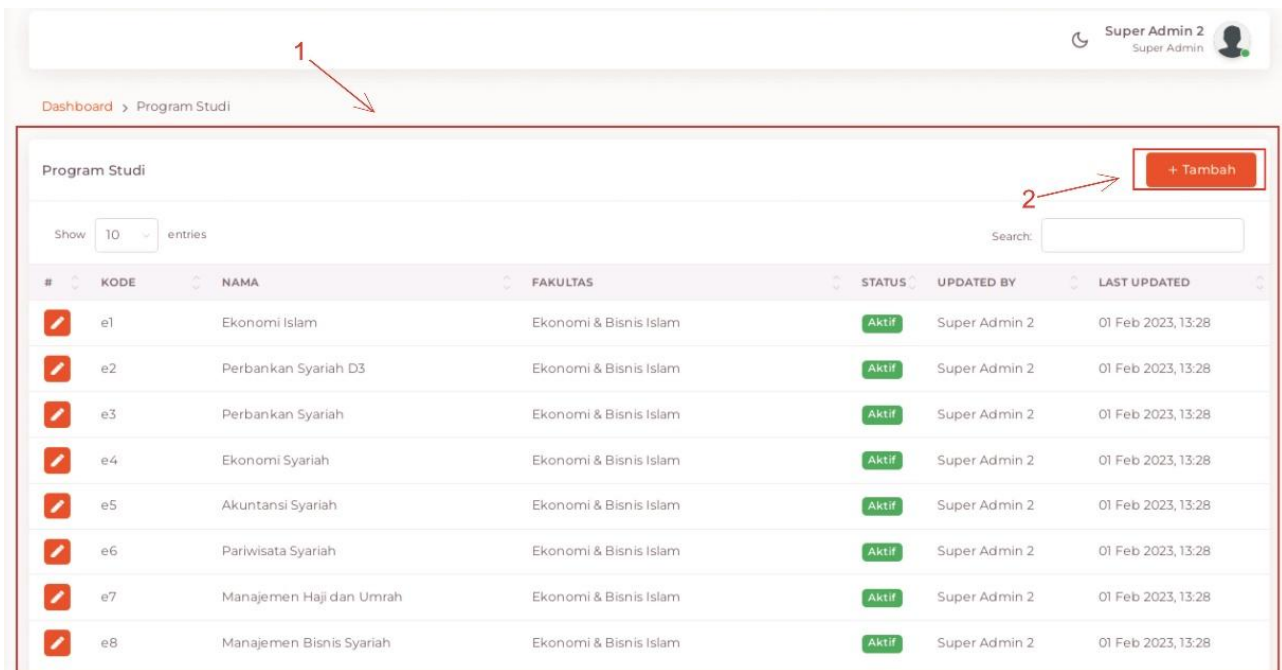
Figure 23 is study program menu.

Figure 23. Study Program Menu

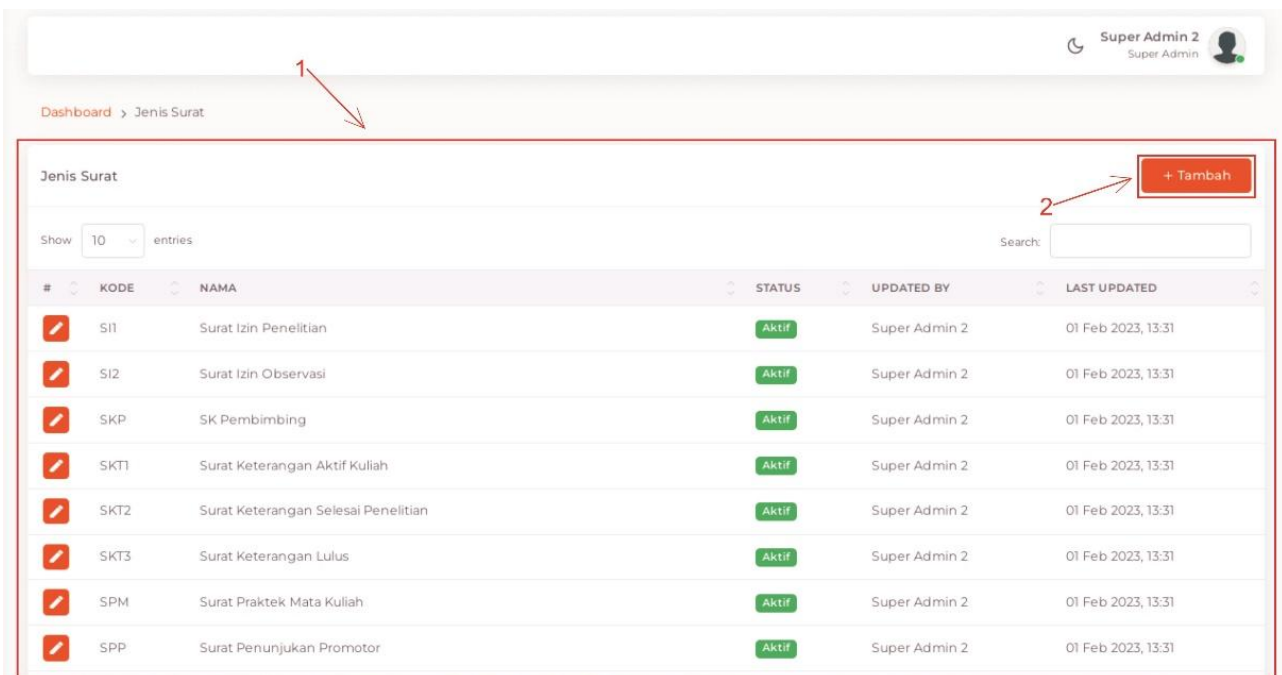Figure 24 is letter type menu.

Figure 24. Letter Type Menu

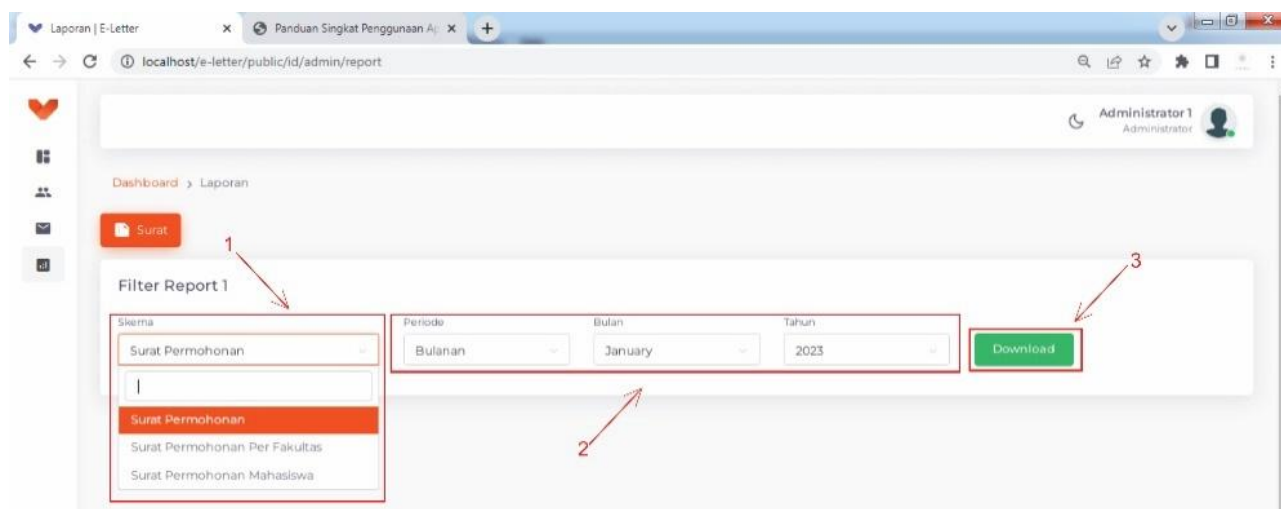Figure 25 is print letter report menu.

Figure 25. Print Letter Report Menu

3.5. Deployment

3.5.1. Delivery

Product delivery to users is accomplished by sending links from the system to students via social media, and for the web admin, it can be viewed by professors via the network by entering the url provided.

3.5.2. Support

The system offers benefits to the Faculty of Islamic Economics and Business, as it operates effectively, is user-friendly, attractive, efficient, and innovative. The system can be used anytime and anywhere.

3.5.3. Feedback

In this phase, updates are made to the system and corrections are applied to address various shortcomings that were identified during the system testing phase.

4. Conclusion

Based on the discussion presented in the previous explanation and the results of the conducted research on the e-letter system using the Laravel and Bootstrap frameworks, it can be concluded that this administrative information system can facilitate the process of letter submission and issuance for students. It also allows for monitoring the status or progress of a submitted letter. Likewise, it benefits administrators/staff at the faculty by enabling them to monitor letters, generate summary reports using predefined schemes, and ultimately simplifies their work.

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