Design and Development of Management Information Systems at the University of Lampung Library Repository Using the Laravel Framework.

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Abstract

The University of Lampung has a library that is used to support the university's academic activities. One of the services at the Unila library is a digital library service that is used to upload scientific works into the repository, but there are still manual processes that are carried out repeatedly such as collecting requirements files, giving accounts and coordinating with students who require to come to the library continuously. so that the process carried out is not efficient. This study aims to build a management information system on the repository using the Laravel framework which can be used as a solution for the Unila library to make it easier for users to upload scientific works into the digital library repository. The development of this application uses the kanban method, which includes the process of analyzing system requirements, designing, developing to testing. The results of this study succeeded in providing a file upload service for account application requirements and uploading a repository link that was validated by the admin. The service is then tested using the blackbox method which produces the expected output so that it can be concluded that the application passes the test.

Keywords: system; repositories ; digital libraries ; blackbox testing; laravel; kanban.

I. Introduction

Lampung University has a library that is used to support academic activities managed by the Unila Library Unit. This library serves the borrowing of libraries such as books, scientific works and so on. At this time, the Unila library has a service for uploading scientific papers into the Digilib Unila repository, but there are still manual processes that are carried out repeatedly such as collecting requirements files, giving accounts and coordinating with students who require to come to the library continuously so that the process is carried out continuously. implemented inefficiently. In addition, the Unila library has problems in monitoring student applications which are difficult to track and there is no reporting on the administration side.

Based on the problems that have been described, in this study create an information system that is used to manage the process of uploading scientific papers with the title "Design of a Management Information System at the University of Lampung Library Repository Using the Laravel

Framework". With the development of this system, it is hoped that it can be a solution for the administrative process of the University of Lampung library in providing services for uploading scientific works to the repository of the University of Lampung.

II. Materials and Methods

2.1 Materials

2.1.1 Library

Libraries based on their duties and functions are places for storing, managing and searching for information in the form of printed reading materials such as books, journals, references, and other printed library materials, as well as reading materials in electronic form such as electronic books, electronic journals, and reading materials in electronic form. others [1].

2.1.2 Digilib Unila Repository

Repository is one of the services provided by the university to the academic community for the management and dissemination of digital materials

created by the campus community [2]. The University of Lampung has a repository called Digilib (digital library) with a function as an online storage place for final work data used by students and lecturers at the University of Lampung. Digilib University of Lampung uses Eprints publishing software in its system. Final works that are usually uploaded in the University of Lampung are theses and theses. With the Digilib repository, it can assist the campus community in accessing, downloading and citing the results of theses and theses that are available online. The Digilib Unila repository is an important means to publish theses and theses made by the campus academic community.

2.1.3   Management information System

Management information system is a process to process data, analyze and display data so that it has meaning and is useful for decision making needs. Management information systems are also very useful in supporting management in making decisions in controlling the activities of an agency. There are several purposes for using a management information system, but the main purpose is to collect data and process the data to produce information to facilitate the agency in improving service quality and making decisions to increase company productivity [3].

2.1.4   PHP

PHP or Hypertext Preprocessor is one of the programming languages used to create websites [4]. PHP programming language can be inserted among other languages such as HTML. In PHP programming, the system applied is on the server side side .

2.1.5   Framework

Framework is a framework used to develop websites. The framework contains a collection of basic commands and functions that form certain rules and interact with each other [5]. By using a framework, website creation must follow the rules of the framework used. The goal of using a code writing framework will be much easier, faster, and neatly structured.

2.1.6   Composer

Composer is a dependency tool manager for the PHP programming language. Composer can be used to help developers install and declare libraries from outside. Additionally Composer can be used to manage library updates in one command. Composer can be used on Windows, Linux and macOS [6].

2.1.7   Laravel

Laravel is a PHP-based Website application framework using the concept of model view and controller (MVC). Laravel is licensed under the MIT License. Laravel is also open source, meaning that developers or users can use Laravel's source for free [7]. The Laravel framework is built with the MVC concept, namely Model Controller and View. The MVC concept is a separation between information (model), program interaction (controller) and declaration of information to users (view) [8].

2.1.8   Database

The database is a collection of one or more tables stored in certain storage media that are interconnected with one another. In the database has a relationship that is indicated by primary key and foreign key of each stored data. Data is a file that involves objects, events, activities, or transactions that can be in the form of text, images, sound, video and formatted data such as hours, dates, currency values [9].

2.1.9   MySQL

MySQL is a DBMS (Database Management System) application that is widely and familiarly used by website application programmers. MySQL is also a very popular type of database server [10]. MySQL uses SQL or Structured Query Language as the base language for accessing the database. MySQL database is a relational database system, so it can group information into tables or groups of information [11].

2.1.10   SMTP

SMTP or Simple Mail Transfer Protocol is a protocol or bridge that is used to communicate to the server. SMTP aims to send email from local email to the server. After the email enters the server then the server will be sent to the recipient. The process of sending and receiving is controlled by the MTA or Mail Transfer Agent on the mail server. The ports commonly used in SMTP are port 25 without encryption and port 426 SSL/TLS. The advantage of the SMTP service is that the process of sending email can be done quickly so that it can be said to be efficient and effective in sending email [12].

2.1.11   Whatsapp API

WhatsApp is one of the most popular messaging applications today. WhatsApp can be accessed using smartphones and desktops . WhatsApp is an application that allows exchanging messages using an internet data plan. At this time WhatsApp has features for sending messages, groups, calls, and voice messages. Apart from that WhatsApp has other features like WhatsApp API . This WhatsApp API allows the system to be integrated with other software systems such as websites and so on [13].

2.1.12 Yajra Datatables

DataTables is a jQuery Javascript library plugin . DataTables can be used to display data in a very flexible table. DataTable performs operations in a server - side manner so that not all data is sent to the view at the same time. In addition, Datatable uses ajax so that the information system can update and display new data from the server without the need to reload [14]. Yajra DataTable in its implementation can use Eloquent ORM in relation between the tables in the database.

2.1.13 Laravel Excel

Laravel Excel is a PHP library that can manage excel files in Laravel. Laravel excel is open source and under the MIT license. Users can use Laravel Excel for free, but when the source code is modified, the original copyright author must still be entered into the system. By using laravel Excel, users can import files , export excel files and so on [15].

2.1.14 Unified Modeling Language

UML (Unified Modeling Language) is a method used to model system requirements made from graphs, diagrams and images to visualize, specify, build, and document a system. . Some of the diagrams focus on object oriented theory and the rest focus on design and development details . UML models many requirements, but does not convey what and when the model should be executed [16].

2.1.15 Kanban

Kanban is a popular workflow management method for defining, managing, and improving services. Kanban in the process is used to visualize work, maximize efficiency, and continuously improve [17]. In the process, the Kanban method usually uses Kanban boards which allow the team to optimize the work that is important to the work that is not too important.

The Kanban method has five principles that need to be presented, namely workflow virtualization, limiting workflow progress , managing workflows , making clear process policies and repeated [18].

2.1.16 Blackbox Testing

Blackbox Testing is one of the testing methods that focuses on the needs of the functionality and design specifications of the software. Blackbox Testing can be used to find some problems in the system being developed, such as malfunctions, requirements, design and so on [19].

Black-box testing has several techniques , among which the most familiar are Equivalence Partitioning, Boundary Value Analysis, Robustness Testing , Behavior Testing , and Cause-Effect Relationship Testing . The Equivalence Partitioning technique is one technique that is widely used by developers to make decisions. This technique is a test based on the input of each form which produces invalid output [20].

2.1.17 Previous Research

In a study entitled The Use of Whatsapp Gateway for Automatic Notification System written by Yulianto and his friends discusses automatic messages using Whatsapp. Messages will be sent to system users using the Whatsapp Gateway. This system is applied to the school notification system, this system will send a message to the student's parent number. When students take home attendance using finger print, the machine sends data to the whatsapp gateway [21].

In a study entitled "Email Parsing and Sending System with IP Verification using Laravel" written by Jayesh Raju Sonkusare and Rupa Ashutosh Fadnavis, we discuss how to send email using the laravel framework. The result of the research is that Laravel allows automated process development. Given the detailed design and implementation of email processing automation, the Project proved that creating a working Laravel framework to automate email processing aids in scalability, and reliability, enabling improvements in design efficiency [22].

In a study conducted by Faishal Faris Shodikin. In this research, he has designed a Library Management Information System Design in the Reading Room of the Faculty of Computer Science, Universitas Brawijaya, a website -based system using the waterfall development method with library management processes at Brawijaya University. Websites created using the Laravel [23].

The research entitled " Development of a Project Management Application System using the Kanban Framework " conducted by Nurul Faizah and colleagues discusses Kanban which is implemented into the development of a project management application system. This research has a problem with project managers being confused about monitoring the progress of the projects they lead and working on tasks on other projects because each project is led by a different project manager where a project manager on a particular project can be a team member of another project. Building a system that can manage a project by using kanban in its management that can help project managers and team members is a given solution. By

using kanban a project manager can visualize each stage/flow to complete a project [24].

2.2 METHODS

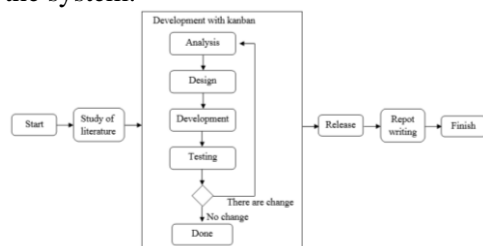This research stage uses the Kanban method in making the system.

Figure 1. Research Stages

2.2.1 Study of literature

The literature study stage is carried out by looking for references related to libraries, Laravel, Whatsapp Gateway, SMPT and so on that can support the research process. Reference sources come from search engines, books, journals and documentation.

2.2.2 System Development

The system development in this study uses the Kanban method which has several stages, including Analysis, Design, Coding and Testing.

2.2.2.1 Analysis

this analysis stage , an analysis related to user needs is carried out by conducting interviews with the Lampung University Library Staff and observations related to the previously available flow or system. Based on the results of interviews and observations that have been carried out, it produces user stories to find out user needs.

Table 1. User Stories

Role	Function	Priority
User	1 User can authenticate before enter the system	Height
	2 User can edit profile and change password	Height
	3 User can upload the requirements file	Height
	4 Users can edit the requirement file	Height
	5 Users can upload the digilib unila link	Height
Admin	1 Admin can authenticate before enter the system	Height
	2 Admin can edit profile and change password	Medium
	3 Admin can edit user data	Low
	4 Admin can insert user	Medium
	5 Admincan check validate and revise	Height

2.2.2.2 Design

At this design stage, system modeling is carried out in the form of use case diagrams, activity diagrams, and entity relationship diagrams using UMLet and system interface design in mockup form using Balsamiq Wireframes.

a. Use Case Diagrams

In the use case, there are two actors who can access the system, namely the user as a student and the admin as an administrator librarian. Users and admins before carrying out activities on the system are required to login first. The admin can manage user requests , in this case the admin has the authority to accept or reject users who submit requirements for submitting a Unila repository account. Admin can manage to check user requests, can perform validation and perform activities create, read, update, on the database user presented in the dashboard. Users can update Profile . Users can upload the requirements for submitting a Unila repository account. Furthermore, the user can edit the request when the user request needs to be corrected. Furthermore, after the user gets an account, he can upload the digilib link.
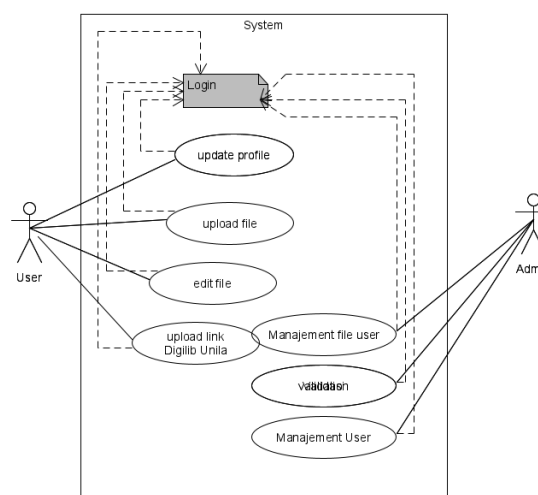

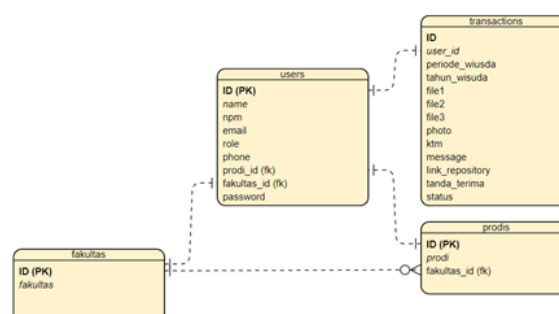Figure 2. Use Case Diagram

b. ERD

Figure 3. Entity Relationship Diagram

In the picture above describes the entity relationship diagram that is used to describe the database. In this system there are four tables, namely users, transactions, faculties, and study programs. The tables above are related to each other, the users table is connected to

transactions, faculties and study programs, the faculty table is connected to study programs.

2.2.2.3 Coding

Next is the coding stage , coding is done with reference to the design and mockup that has been designed in the previous stage. The mockup is implemented into programming language codes using the Visual Studio Code code editor and executed using the Google Chrome browser. This system will be developed using the PHP programming language using the Laravel 8 framework with a MySQL database.

2.2.2.4 Testing

After the coding phase is complete, the testing phase will be carried out on the system that has been developed. The testing stage has the aim of ensuring that there are no malfunctions in the system. The test method used in this study is Blackbox Testing with the Equivalence Partitioning method .

2.2.2.5 Report writing

The stages of this research are report writing, the purpose of report writing is to provide documentation related to the research carried out, so that it can be utilized by readers.

III. RESULTS AND DISCUSSIONS

3.1 Development

In the implementation of activities using the kanban method. This activity was carried out from March 15, 2022, July 2, 2022. During the development of the information system with Kanban, it was started by creating a user story and it would be used as a backlog that would be used as a card that was worked on in Trello.
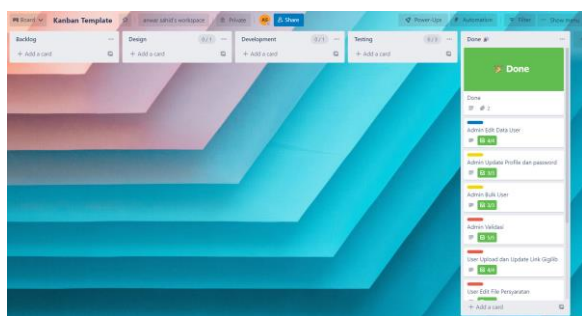

Figure 4. Trello kanban

In the kanban board there are ten cards that represent the features that are being worked on. Each card contains information that the team will work on. Cards that will be processed first are user feature cards with high priority first, then cards with admin features with high priority, then continued with medium and low features.

In this stage it is used to change the design into a website using visual studio code to manage code and navicat to manage databases.
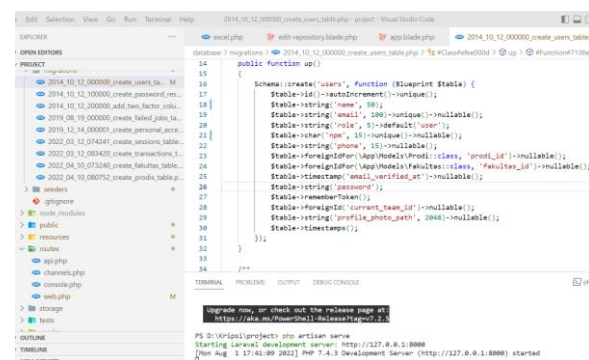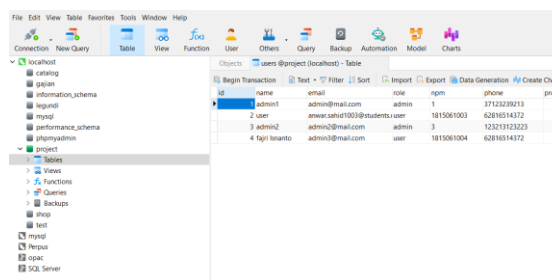

Figure 5. Coding in VsCode

Figure 6. Database Management

From this stage, four database tables are generated, namely user, transaction, study program and faculty. These tables are related to each other as shown in Figure 3. There are three controllers that are used to display views, admin operations and user operations. This controller is used to connect the database with the view that has been created.

In the code development process, there are several things that need to be configured, such as SMTP, WhatsApp, and Laravel Excel.

3.1.1 SMTP Configuration

SMTP configuration is quite easy to do in laravel framework . To change the SMTP configuration , simply go to ENV and change some of the variables in it as shown below.

```
MAIL_MAILER=smtp
MAIL_HOST=smtp.gmail.com
MAIL_PORT=587
MAIL_USERNAME= verifikasi.kki.unila@gmail.com
MAIL_PASSWORD=fwkeoqdneveecimw
MAIL_ENCRYPTION=tls
MAIL_FROM_ADDRESS=verifikasi.kki.unila@gmail.com
MAIL_FROM_NAME="${APP_NAME}"
```

Figure 7. SMTP configuration

After configuring SMPTP it can be used. The delivery process will be sent using the controller as shown below.

```
$details = [
    'title' => 'UPT Perpustakaan Unila',
    'body' => $message,
];

\Mail::to($email)->send(new \App\Mail\MyMail($details, $filename));
return redirect()->route('request.list')->with('message', ' Data telah Divalidasi!');
```

Figure 8. Email function

3.1.2 WhatsApp API Configuration

In this study using a third party WhatsApp API, namely Whatspie. To use this service, you must subscribe and configure it first.
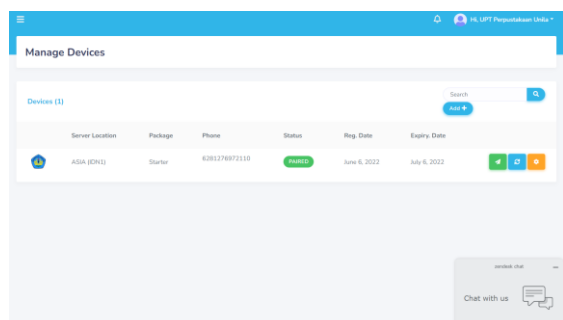

Figure 9. Whatspie configuration

Next is writing the code used to send messages to students. The code written shows the Client will send json data to https://app.whatspie.com /api/messages. The data that is sent has two parts, namely the header section which contains the form of the data sent, the content type and the authorization which contains the API key , then next is the parameter that contains receiver, device, message and type .

Receiver in the parameter contains the whatsapp number that will be the recipient of the message. The phone variable on the receiver is taken from user data in the database. The device in the parameter contains the number from the Lampung University library UPT which is used as a message sender and the last is the type of message sent is chat.

```
$client = new Client();

$url = "https://app.whatspie.com/api/messages";

$request = $client->post(
    $url,
    [
        'headers' => [
            'Accept' => 'application/json',
            'Content-Type' => 'application/x-www-form-urlencoded',
            'Authorization' => 'Bearer ' . 'dILnerPytl0wC1Psjs19uQUG8CgbGP6tCZXjAhnzbdpQDrlUpB'
        ],
        'form_params' => [
            'receiver' => $phone,
            'device' => '6281276972110',
            'message' => $message,
            'type' => 'chat'
        ]
    ]
);
```

Figure 10. Code to send a message using Whatspie

3.1.3 Excel Insert User Configuration

```
public function ImportUser(Request $request)
{
    $this->validate($request, [
        'file_user' => 'required',
    ]);
    $path = public_path('storage/user');
    $fileuser = $request->file('file_user');
    $name = $fileuser->getClientOriginalName() . '.' . $fileuser->getClientOriginalExtension();
    $fileuser->move($path, $name);
    $filename = $path . '/' . $name;
    Excel::import(new ImportUser, $filename);
    return redirect()->back()->with('success', ' User telah ditambahkan!');
}
```

Figure 11 . Function Import

In performing the Insert User requires the Laravel-Excel package in its use. Laravel-Excel allows the system to import data with the extensions used by excel. However, the use of laravel excel in this library system is only limited to importing users using the CSV extension. In the image above it is used to accept file uploads containing user data. The data is then imported using the classes below.

```
class ImportUser implements ToModel
{
    /**
     * @param array $row
     *
     * @return \Illuminate\Database\Eloquent\Model|null
     */
    public function model(array $row)
    {
        return new User([
            'name' => $row[1],
            'email' => $row[2],
            'npm' => $row[4],
            'password' => bcrypt($row[9]),
        ]);
    }
}
```

Figure 12. Class Import user

3.2 Test

Information system testing is done to find bugs or errors in the information system . Testing is done by testing blackbox testing with Equivalence Partitioning. Blackbox testing is carried out to test the features in the information system from the User page to the admin page. This test is carried out by the admin and the user concerned to determine whether there is an error or not.

Table 2. Test Results

Functional List	Account Type	Test result
Login	Admin, User	Success
Profile Update	User	Success
Update password	Admin , User	Success
Upload File Requirements	User	Success
Edit requirements file	User	Success
Upload Repository Link	User	Success
Search List transactions	Admin	Success
Requirements Validation	Admin	Success
Search user	Admin	Success
Manage User	Admin	Success

From the test results that have been tested to the library admin, it can be concluded that the series of tests were successfully carried out and successfully passed the test. In addition, based on the statements of the examiners given, it can be concluded that this system can help and facilitate the admin in being able to simplify and shorten the work of library employees.

3.3 Results

The development of this system is carried out based on the needs that have been determined in the design. This information system has features based on roles which are grouped into two, namely admin and user features. The admin feature is different from the user feature.

3.3.1 Login Page

Figure 13. Login page

This page is used by library admins and students to enter the library system. On this login page there is a forgot menu password for admins who forgot the password that was previously created.
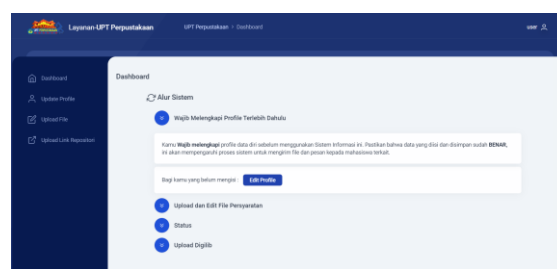
3.3.2 Dashboard Page

Figure 14. User Dashboard

This dashboard page contains information on procedures for system users such as the flows that must be carried out in the system.
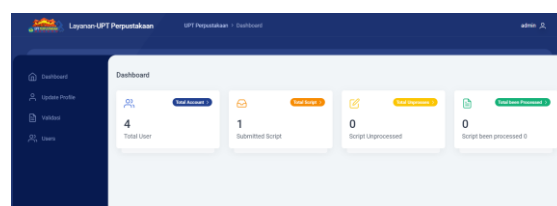

Figure 15. Admin Dashboard

This dashboard page contains system user information such as the number of users registered to the system, the number of users who have uploaded, the number of users who have been processed and the number of users who have not been processed.

3.3.3 Edit Profile Page

Figure 16. User Edit Page

This edit profile page is used by the user to change the identity data of the user, in this case a student. Users can change identities such as names, student ID numbers, email addresses, whatsapp numbers, faculties and study programs with a predetermined format. Student ID must be completed in order to be able to upload. If there is an empty identity can not upload files.
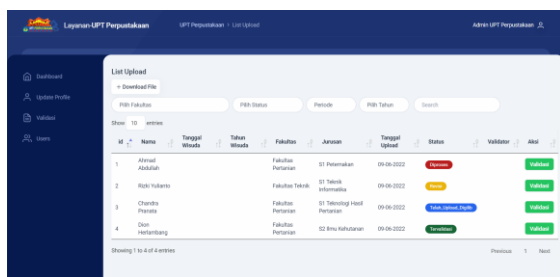
3.3.4 Upload List page

Figure 17. Upload list page

This page contains data files have been uploaded by user . These data are taken from the transaction table which is related to the user table . There are several statuses in this system, including processed, revised, uploaded to digilib, user validation, updated and validated. In this page the admin can filter the table such as by faculty, by status, by period by year of graduation.
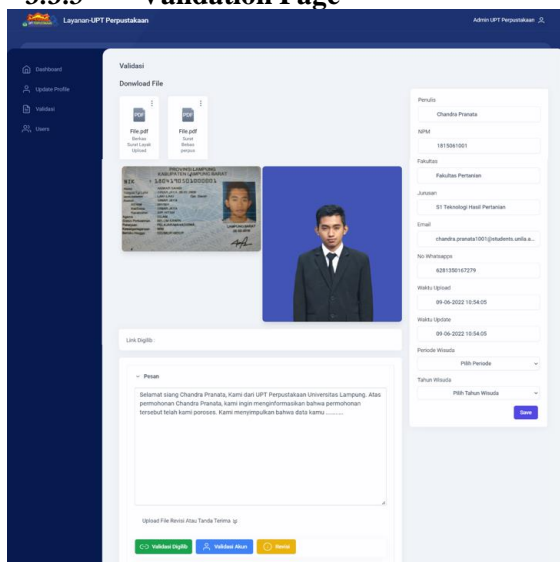
3.3.5   Validation Page

Figure 18. Validation page

This page displays all user data selected by the admin to check the file users . This page presents data such as letters suitable for uploading, free letters from photo library ktp/ktm, personal photos and links the relevant digilib which has been uploaded by the student. After checking the admin can decide whether the upload request files user can be accepted or not. The admin can write a message that will be delivered to the student in the textbox that has been provided then there are three buttons that the admin can use to determine the status and send messages.
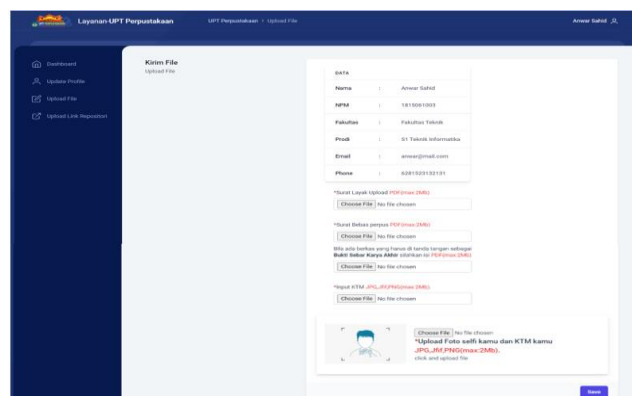
3.3.6   Page Submit File Requirements

Figure 19. Page Submit File Requirements

On the submit file page , there is information on the student who will send the . The information presented is student personal data such as name, NPM, faculty, study program, email and phone . Users can submit files on the form provided. The files needed are a proper upload letter, a free letter from the library, input KTM and a photo of the student's self along with the student ID card.
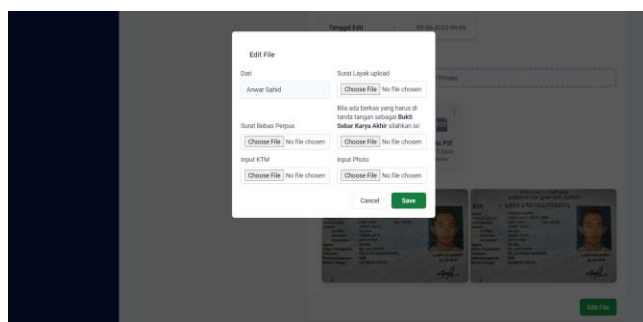
3.3.7   File Edit Page

Figure 20. File Edit Page

After uploading the file, you will be directed to the edit file page. Students cannot return to the upload page file to prevent users from being able to upload more than once. On this page the user can view upload information such as the student's personal data who uploaded, status, validator, upload time and edit time. Students can see messages sent by admins. In addition, students can download files that have been uploaded.
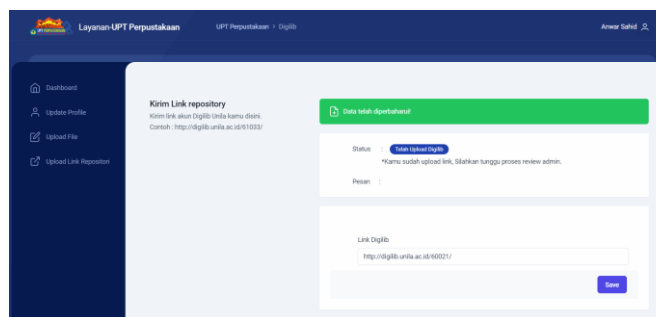
3.3.8   Page Send Digilib Unila Link

Figure 21. Digilib Send Link Halaman

Unila digilib link send page is used to send links that have been uploaded at http://digilib.unila.ac.id/ to the information system on this page .

3.3.9 Whatsapp Notifications

Figure 22. Whatsapp notifications

Whatsapp notifications are obtained when the admin is checking the file users. The message sent is taken from the text written by the admin then the message will be sent to the Whatsapp API and then sent to the number used by the student concerned.
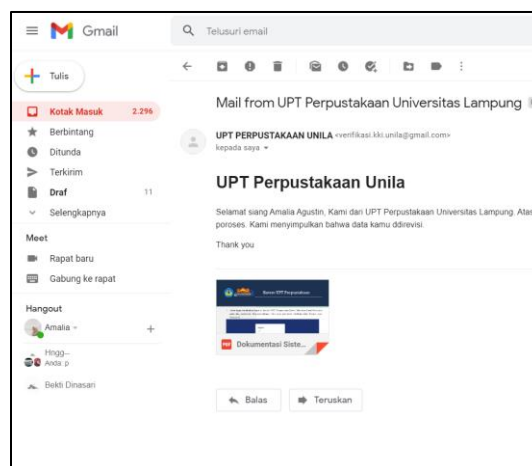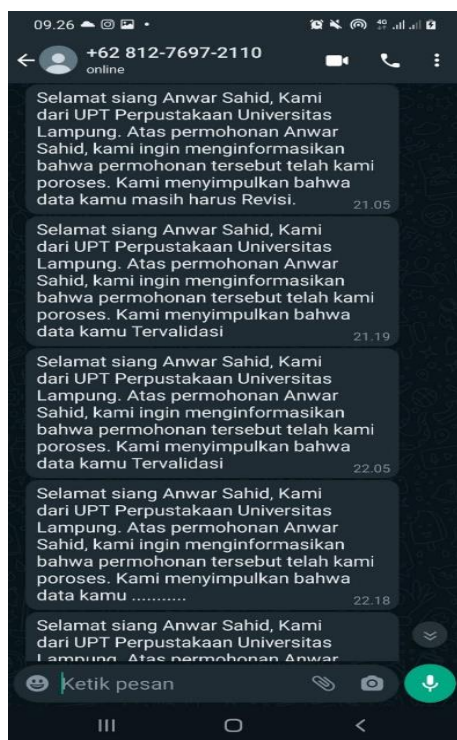
3.3.10 Email Notification

Figure 23. Email Notifications

The sending of this email coincides with the WhatsApp notification. This email notification uses the same text as the text sent to WhatsApp. The difference between Email notifications and Whatsapp notifications is that email notifications can embed attachments in the form of images or documents.

IV. CONCLUSIONS

1. The Kanban method used in making this system simplifies the process of making the system because in this method it is easy to accept requests for changes by library employees and with the existence of a limit each stage can limit the process being carried out, this makes the process more focused on working.
2. The Library Management Information System has successfully provided services for logins , how to use the system, updates Profile , Upload and edit Files , upload and update The unila digilib link and on the admin side can login , download student files, provide a digilib account and validate digilib.
3. In the process of making an information system that has been created using the Laravel Framework, there is an ease in making it compared to native. With laravel framework, code that should be a lot and complex can be written easily and with little code.
4. Based on interviews from users, this system can simplify and shorten the work of library employees in the process of giving digilib accounts compared to before this system existed.

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