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# Development of a Web-Based Correspondence Information System to Enhance Administrative Services in Higher Education

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**Abstract**

The administrative services for higher education have been greatly affected by the COVID-19 pandemic. This has also impacted STT-NF. Services to students, such as handling documents that previously required physical presence on campus, now transitioned to an online method. STT-NF has utilized the G-Suite service to facilitate online administrative services for students. However, G-Suite has its limitations, necessitating the development of a Document Submission Information System. The chosen development method for this system is a website employing the Waterfall methodology. After conducting observations and interviews with relevant stakeholders, we identified five issues that the document submission information system had experienced. There are three actors involved. From the previously identified issues, we derived eight solution analyses. Testing was conducted using the Blackbox method for the 11 document submission information system features. The testing results indicate that all features are functioning as intended and have passed successfully.

## A. Introduction

Service is essential to an institution operating in the service industry [1]. The existing information technology plays a significant role in various aspects, including service delivery. Information technology's presence can facilitate access to services many need, including educational institutions like universities [2]. Flexibility is critical in how technology transforms services, making them more accessible and efficient. Administrative services in universities involve high-frequency routine activities, making them susceptible to errors without technological assistance [3]. Using academic information systems can address these challenges, ensuring that data and information can quickly reach users [4].

Online academic administrative services have been influenced by the COVID-19 pandemic. The limitations on interpersonal interactions have made online services an alternative option for campuses, as implemented by Sekolah Tinggi Teknologi Terpadu Nurul Fikri (STT-NF). Services to students, such as handling document submissions that were previously done manually by directing submission forms to relevant departments, have now transitioned to an online method. Students who wish to submit documents need to identify the responsible parties for each type of document, such as Biro Administrasi Akademik dan Mahasiswa (BAAK), UPT Perpustakaan, Bagian Keuangan, and Bagian Kemahasiswaan. The shift from manual or offline methods to online methods requires an adaptation process, which still experiences many errors. Inadequate information communication and slow processes remain the main challenges of online administrative services [5].

STT-NF utilizes technology to streamline student administrative services through the Google Suite service. Google Suite, commonly abbreviated as G Suite, is a Google-owned service designed to enhance user productivity with features such as professional email, calendars, document editing and storage, video conferencing, and other services [6]. In the administrative services at STT-NF, G Suite has positively impacted online services for students. The document submission department can efficiently process documents submitted by students using only G Suite. Technology streamlines the document submission process, allowing efficient use of time and service systems.

However, G Suite has its limitations. Being an open-access system, it cannot guarantee user security, potentially leading to data leaks. The lack of customizable interfaces means the web interface cannot be adjusted or modified to meet user needs. Premium features create limitations for users [7].

An integrated information system is the solution to the limitations of online administrative services at STT-NF. Developing an information system as a website improves the existing system to enhance efficiency. A computerized system on the website is equipped with user-friendly features for students to input data for academic-related document submissions [8]. The website used can process data into accurate information by identifying, collecting, managing, and providing administrative services for joint access [9].

## B. Research Method

In this research, there are several stages in its implementation. The method used in this research is the Waterfall method [10]. These stages are depicted in Figure 1 below.

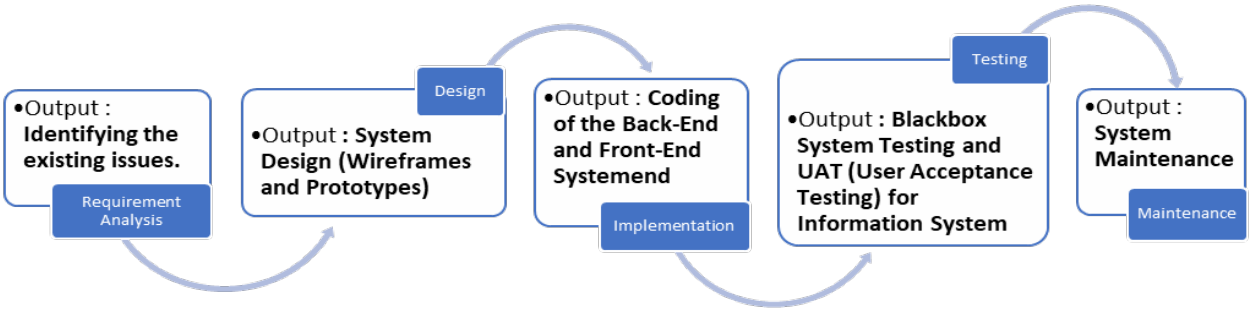


**Figure 1.** Waterfall Method

Based on Figure 1 above, it can be explained as follows.

a. Requirement Analysis

The problem identification stage is the initial phase of the research. In this stage, the researcher delves into the issues experienced within the research object through direct observations and interviews. The research object being observed is the student letter submission process at the STT-NF campus.

b. Design

The results of the previous needs analysis were used to create a system design in the form of a prototype based on the findings from the system requirements identification.

c. Implementation

In this phase, programming code is generated based on the prototype design.

d. Testing

The letter submission website undergoes a testing process. Testing is conducted using the black-box testing method to ensure that the features and business processes of the website are functioning according to user requirements.

e. Maintenance

We are performing system maintenance and improvements after the system has been launched to users. Maintenance processes are conducted periodically to ensure the system operates without any issues.

## C. Result and Discussion

### 1. Problem Analysis

The development of the letter submission information system is based on direct observations and interviews with the parties involved. From the interview and observation results [11], a problem analysis regarding the letter submission process is conducted. Table 1 describes the problem analysis found in the letter submission process at STT NF.

**Table 1.** Problem Analysis

| Problem | Description |
|---|---|
| Students find that the letter submission process at STT NF | There needs to be centralized information regarding the letter submission procedure. |

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| needs to be clarified regarding its procedures. | The responsible parties for different types of letters need to be more consistent. |
| The current letter submission process still experiences data errors. | The data students enter into the Google Form still contains errors, possibly due to human error. Consequently, the data entered into the letters needs to be corrected. |
| The letter submission process exceeds the admin's processing time limit. | The current letter submission system is still ineffective because incoming data is mixed with other departments, leading to situations where admins may need to realize there are incoming letter submissions. |
| | The processed letters must be downloaded and signed with a separate letter number. As a result, there are often human errors where the completed letters are accidentally omitted from being sent to the students. |
| | Students have difficulty finding letters sent by the admin via email because sometimes processed letters end up in the spam folder. |
| Some letters are still processed manually. | The existing system only accommodates new letters, requiring students to manually submit certain letters by coming to the campus. |
| The security of data is not guaranteed. | The current system is based on Google Suite, where the system can be accessed by anyone, even those without authorization. |

## 2. System Requirements Analysis

Based on the problem analysis in Table 1, the researcher conducted a system requirements analysis, including actor identification, solution analysis, requirements analysis, and an Activity Diagram.

a. Actor Identification

The actors involved in the letter submission system can be identified as three actors [12], as described in Table 2.

**Table 2.** Actor Identification

| Actor | Description |
|---|---|
| Admin | Admin is an actor who can monitor and manage student letter submissions. |
| Student | Students act as actors who can submit letters, check submission statuses, and download processed letters. |

The depiction of how each actor interacts with the letter submission system can be illustrated in a use case diagram, which can be seen in Figure 2.

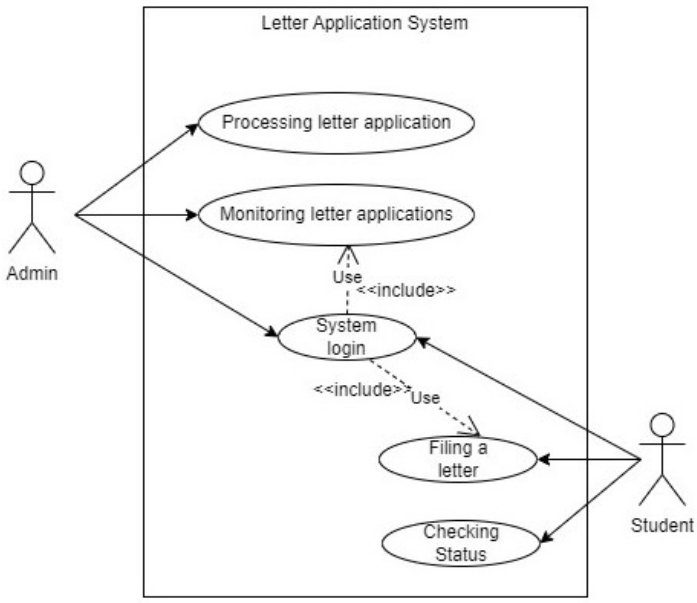


**Figure 2.** Primary Use Cases of the Letter Submission System

b. Solution Analysis

From the problem analysis explained in Table 1, the researcher conducted a solution analysis, as outlined in Table 3 below.

**Table 3.** Solution Analysis

| Problem | Solution |
|---|---|
| Students feel that the letter submission process at STT NF still needs to be clarified. | Create multiple admin roles for BAAK, *UPT Perpustakaan*, *Bagian Kemahasiswaan*, and *Bagian Keuangan* to ensure that students ensure everything is correct when submitting different types of letters. |
| The current process of submitting letters is still experiencing data errors. | Student data is sourced directly from the academic information system, ensuring that the data incorporated into the letters matches the student's academic records. |
| The letter submission process exceeds the allotted time limit set by the administration. | In the system, administrators will be configured according to their roles, allowing each department's administrator only to access and view letter submissions within their respective departments. |
| | There are submission dates and execution dates in place, enabling the administrative staff to evaluate each letter submission to ensure compliance with the stipulated processing time. |
| | There is a letter submission status menu available for students. Within this menu, students can view the status of their letter submissions and access documentation related to the outcome of their letter submissions. |
| Some letters are still being processed manually. | The Super Admin has the capability to add new types of letters. This allows for the inclusion of additional letter types in the future, ensuring that the letter submission |

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| | process can be conducted through the system for newly added types as well. |
| Data security is not guaranteed. | Users must have accounts, ensuring that only authorized individuals can use the system. This enhances security and access control. |

c. Requirements Analysis

The system requirements analysis in this research is the process of identifying the needs of the actors for the letter submission system. The requirements analysis is described in Table 4.

**Table 4.** Requirements Analysis

| Actor | Requirements |
|---|---|
| Student | • Students can log in.<br>• Students can submit letters as needed.<br>• Students can view the status of their letter submissions.<br>• Students can download processed letter outcomes.<br>• Students can upload files for various forms that require attachments. |
| Admin | • Admins can log in.<br>• Each department can only view letter submissions that are relevant to their respective department.<br>• Admins can view the details of letter submissions.<br>• Admins can reject letter submissions if the data is found to be invalid after verification.<br>• Admins can upload files if there are attachments required for a letter.<br>• Admins can provide notes on each execution page.<br>• Admins can approve letter submissions.<br>• Admins can view the outcomes of letters that have been sent to students.<br>• Admins can download summary reports of letter submissions. |

d. Activity Diagram

In this research, the design of the activity diagram for the letter submission process is created based on each department, name BAAK, UPT Perpustakaan, Bagian Keuangan, and Bagian Kemahasiswaan [13]. The results of the design of the activity diagram for the letter submission information system are as follows.

- In Figure 3, Type 1 Letters depicted are the Activity Diagrams for the following types of letters: Surat Keterangan Mahasiswa, Surat Pengantar Kerja Praktik, Surat Pengantar Penelitian Tugas Akhir, Surat Pengantar Penelitian Tugas Kuliah, Surat Pengajuan Pengnduran Diri, Surat Bebas Keuangan, Surat Keterangan Beastudi, Surat Keterangan Mahasiswa Aktif dan Berkelakukan Baik dan Surat Rekomendasi. Type 1 letters refer to letters in the process of generating downloadable documents for students within the system. Type 2 letters are a type of letter in which, during the process, students only require information about whether their application is accepted or rejected. Type 2 letters depicted are the Activity Diagrams for the following types of letters: *surat pengajuan cuti* and *surat pengajuan pindah program studi* or *pindah kelas.*

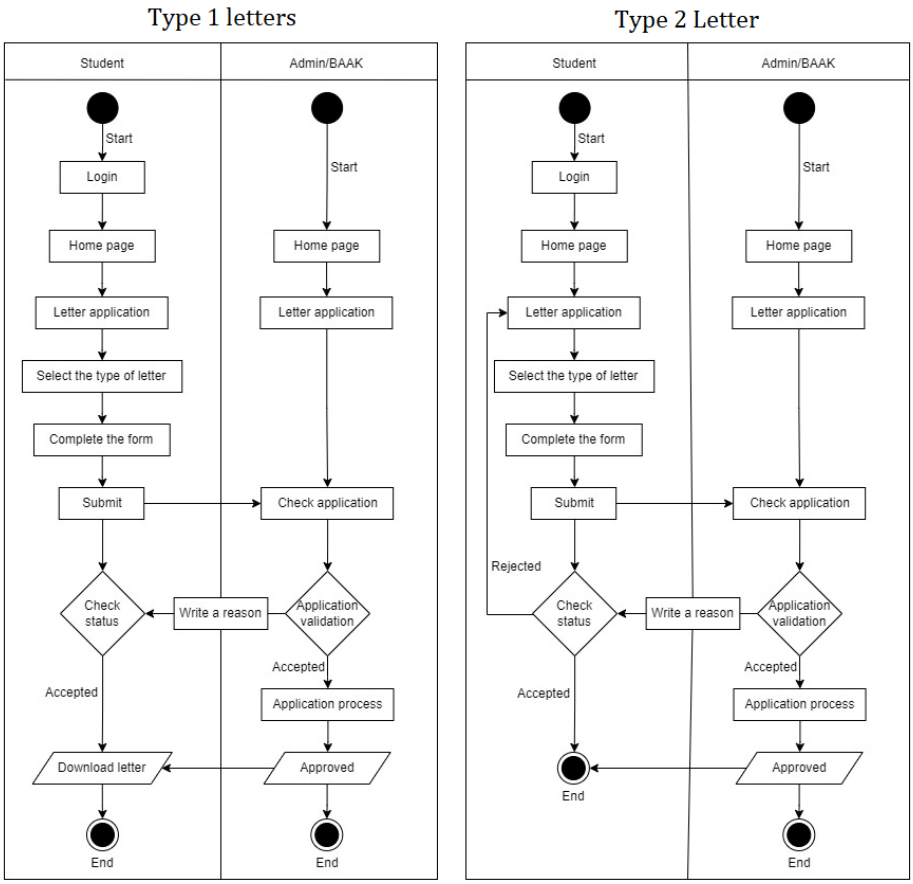


**Figure 3.** Activity Diagram for Type 1 and Type 2 Letter Submission

## 3. Results of the Implementation of the Letter Submission Information System

The implementation phase of the system involves developing the letter submission application system based on the prior analysis and design stages that have been conducted.

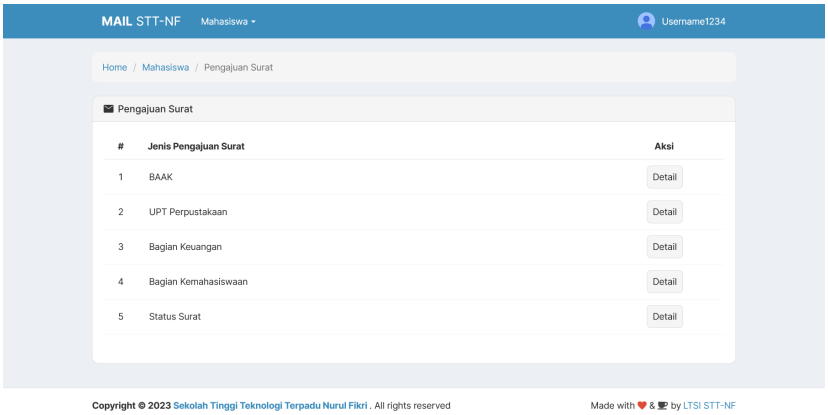


**Figure 4.** Letter Submission Page Interface for Students

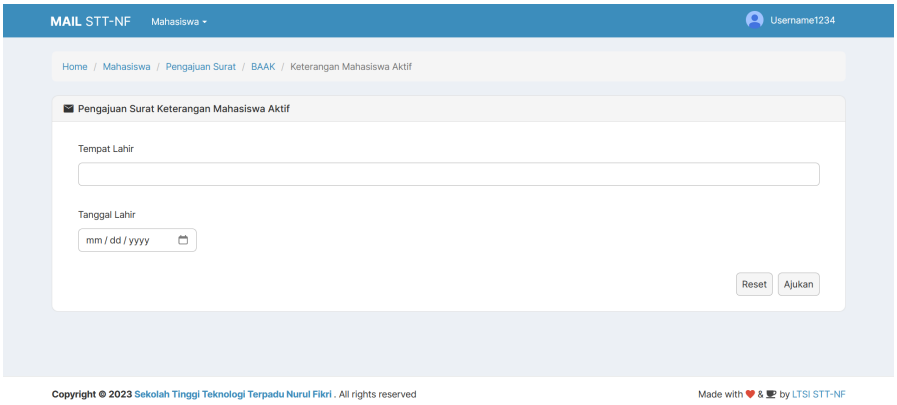


**Figure 5.** Interface of One of the Sample Letter Submission Forms

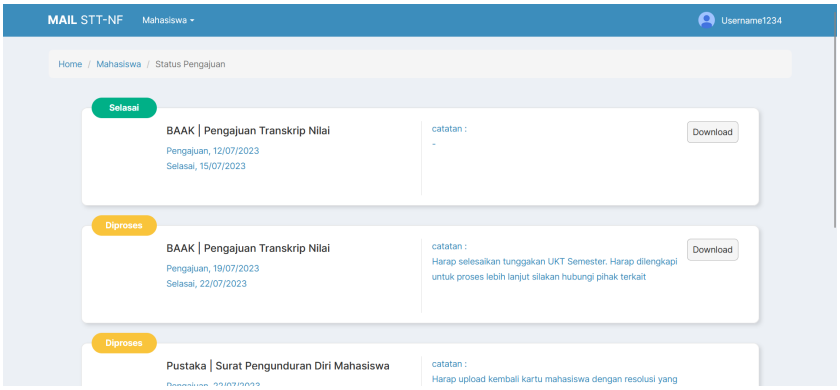


**Figure 6.** Letter Status Page Interface for Students

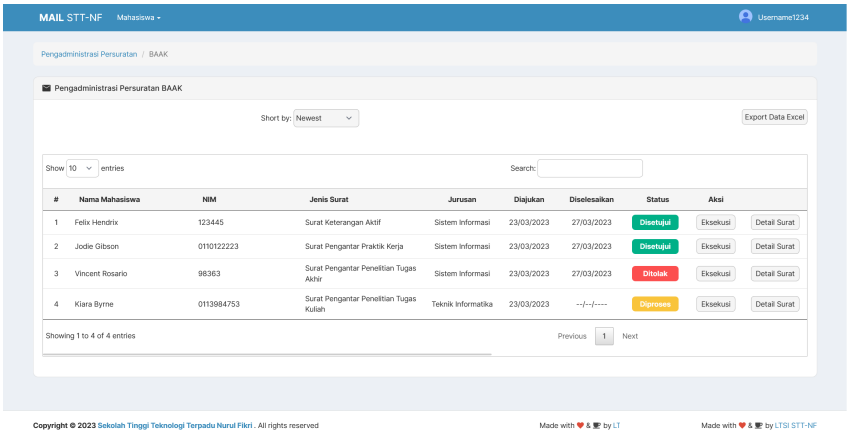


**Figure 7.** Monitoring Page Interface for Admin

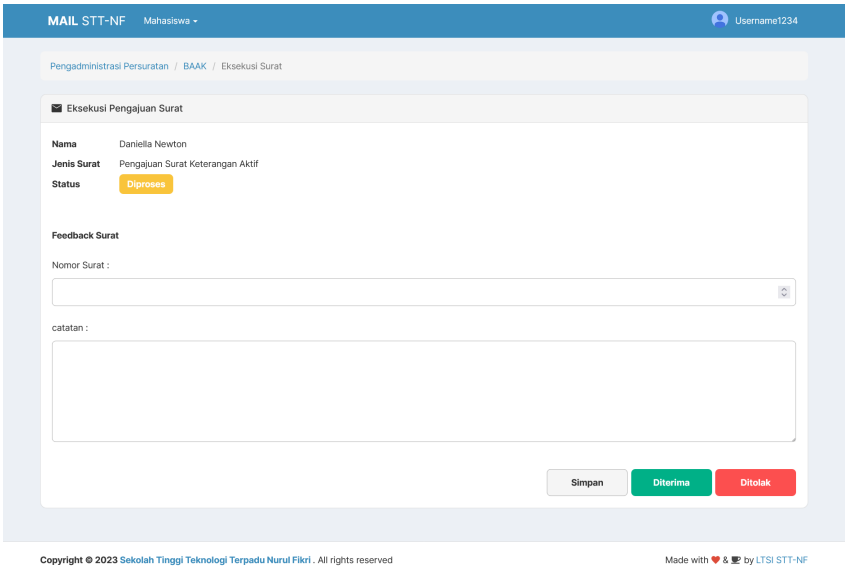


**Figure 8.** Sample Interface of Active Student Certificate Request Execution Page for Admin

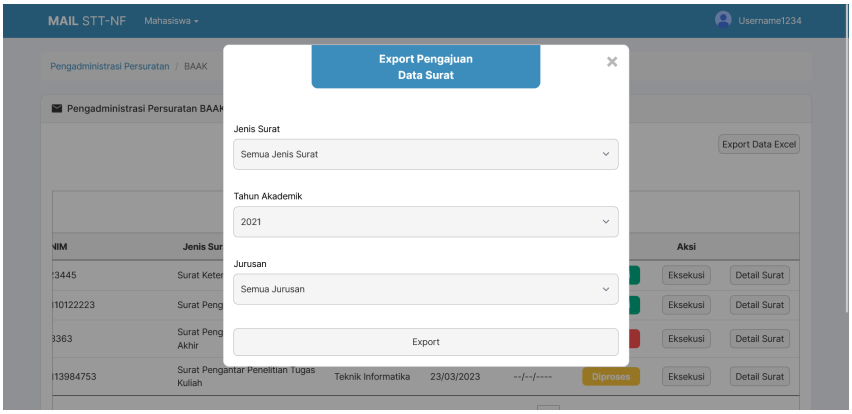


**Figure 9.** Data Export Page Interface for Admin

## 4. Testing Phase

The implementation and testing phase employs two methods: the Blackbox Method. The Blackbox Method tests whether the features in this letter submission system can function and be used as planned. If any discrepancies are found, they will be evaluated and corrected accordingly [14]. The results of the Blackbox testing are presented in Table 5.

Table 5. Blackbox Testing Results

| Testing Scenario | Test Items | Status | Explanation |
|---|---|---|---|
| Login | Validation of students based on their username and password | Success | The user successfully logged in using their STT-NF student account. |
| Main Page the Student | Testing the functionality of the main page in displaying letter submission options, including BAAK, *UPT Perpustakaan*, | Success | Students can select the letter submission based on their needs. |

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| | *Bagian Keuangan*, and *Bagian Kemahasiswaan* | | |
| BAAK / *UPT Perpustakaan / Bagian Keuangan* / *Bagian Kemahasiswaan* Letter Types Page | Testing the webpage's functionality to display the options for all letter submissions. | Success | After the user selects a letter submission type, the webpage will redirect the user to the form page. |
| BAAK, *UPT Perpustakaan / Bagian Keuangan* / *Bagian Kemahasiswaan* Form Page | Testing the webpage's functionality to display the form and enable input of student responses. | Success | The student's form responses will be automatically inserted into the letter, and the results can be reviewed by the admin. |
| *UPT Perpustakaan* Form Page | Testing the webpage's functionality to display a link to download the *UPT Perpustakaan* letter template and to upload the letter as a Google Drive link. | Success | The following steps should be followed if a student wishes to fill out the *UPT Perpustakaan* form:<br>• Download the *UPT Perpustakaan* letter template.<br>• Fill out the library letter template.<br>• Upload the completed letter to Google Drive.<br>• Send the Google Drive link to the *UPT Perpustakaan* form. |
| *Bagian Kemahasiswaan* Form Page | Testing the webpage's functionality to display the form and enable input of student responses. | Success | Users must fill out the form if they select a recommendation letter. The student's form responses will be automatically inserted into the letter, and the results can be reviewed by admin. |
| Other Letter Submissions | Testing the webpage's functionality to display the form and enable input of student responses for other letter submissions. | Success | To submit other types of letters. |
| Submission Status Page | Testing the functionality of the webpage to display the submission status. The submission status includes three types: in progress, accepted, and rejected. It | Success | The review results of the letter submission will be displayed on the submission status page, along with other information such as notes, |

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|---|---|---|---|
| | should also display notes, date history, and a download button for the letter. | | date history, and a letter download button. |
| Main Page admin BAAK, *UPT Perpustakaan, Bagian Keuangan, Bagian Kemahasiswaan* | Displays a table of student information who have submitted letters and several buttons. | Success | Information contained in the table:<br>• Student's Name<br>• Student's ID Number (NIM)<br>• Letter Type<br>• Student's Department<br>• Date Submitted<br>• Date Completed<br>• Letter Status<br>Buttons within the table:<br>• Execute<br>• Letter Details<br>Additionally, there are export and search buttons. |
| Excel Export | The Excel export view appears as a pop-up. Admin can export data based on letter type, academic year, and department. | Success | This export pop-up functions to export data into Excel format. |
| Letter Details | Displays the letter result based on student data and form responses. | Success | The letter template is automatically filled in with student profiles and form responses. |
| Execution Page 1 | Testing the web page's ability to execute a letter, provide feedback, and display information related to the executed letter. | Success | The user can provide feedback on this page through a letter number and notes.<br>There are three execution buttons: Save, Accept, and Reject. |
| Execution Page 2 | Testing the web page's ability to execute a letter, provide feedback, and display information related to the executed letter. | Success | This execution page is specifically for students who choose the types of letters *Pengajuan Pengunduran Diri* and *Surat Keterangan Bebas Pustaka Lulus.*<br>The user can provide feedback through a checklist for document completeness and notes on this page.<br>There is a "Transcript of Grades" button to view a student's grades and two execution buttons: Save and Accept. |

| | | | |
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| Execution Page 3 | Testing the web page's ability to execute a letter, provide feedback, and display information related to the executed letter. | Success | This execution page is specifically for students who select the type of letter: *Cuti Akademik* and *Pindah Studi/Kelas.*<br>On this page, the user can provide feedback through notes.<br>There are two execution buttons: Accept and Reject. |
| Execution Page 4 | Testing the web page's ability to execute a letter, provide feedback, and display information related to the executed letter. | Success | This execution page is specifically for students who select the type of letter: *Transkrip Nilai.*<br>The user can provide feedback on this page by uploading the Transcript of Grades and notes.<br>There are two execution buttons: Accept and Reject. |
| Execution Page 5 | Testing the web page's ability to execute a letter, provide feedback, and display information related to the executed letter. | Success | This execution page is specifically for students who choose other types of letters.<br>The user can provide feedback on this page through a letter link and notes.<br>There are two execution buttons: Accept and Reject. |

## D. Conclusion

Based on the discussed results, testing the letter submission information system using the black box method has been successfully conducted for the 23 features within this system. The tested features include the Login Page, Main Page, BAAK Letter Types Page, UPT Perpustakaan Letter Types Page, Bagian Keuangan Letter Types Page, Bagian Kemahasiswaan Letter Types Page, BAAK Form Page, UPT Perpustakaan Form Page, Bagian Kemahasiswaan Form Page, Other Letter Submissions, and Submission Status Page.

The testing results show that the system functions well and complies with the specified specifications. However, to ensure that the system is truly ready for use by end-users, additional testing is necessary, including User Acceptance Testing (UAT). UAT is a crucial testing phase involving end-users directly evaluating the system. Through UAT, we can measure user satisfaction levels with the system and identify potential improvements that need to be made.

Furthermore, this research also holds the hope that the development of the web-based Letter Submission Information System will continue and be enhanced. Further development could involve adding new features that users may require, enhancing system security, and improving system performance to make it more efficient and beneficial.

## E. Acknowledgment

Appreciation is extended to all parties involved in this research. Special thanks are given for the excellent teamwork that has allowed the successful implementation of this study, aligning seamlessly with the planned objectives.

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