

# Front-End Development of Amikom Purwokerto University Finance Website Using Bootstrap

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## Abstract

At Universitas Amikom Purwokerto, the Institute for Research and Community Service (LPPM) faces significant challenges in financial data processing. Currently, financial data is managed using Microsoft Excel, and there is no system in place to properly manage and store this data. This lack of an efficient system hinders effective financial management and data handling. To address these issues, the proposed solution is to develop a website for financial management that supports the tri dharma of higher education. Effective web application development necessitates adherence to standard front-end framework models. Therefore, this study focuses on creating a front-end for the LPPM financial website using Bootstrap, following the waterfall method due to its sequential, structured, and reliable properties. The result of this study is a website-based LPPM financial application front-end. Based on test results, the front-end of this website achieved an SUS (System Usability Scale) score of 80.5, which falls into grade B. This indicates that the application is expected to facilitate the process of managing financial data and enhance user interaction with the system, effectively resolving the identified issues. This research was successful because it had created a front-end system in accordance with the needs that had been complained about by the university.

Keywords: Website; Waterfall Method; Bootstrap; System Usability Scale; Front-End

## 1 Introduction

The use of technology is crucial because it enhances the effectiveness and efficiency of work. Technology automates repetitive tasks, speeds up data processing, and facilitates rapid access to information. This not only saves time but also reduces human error, thereby boosting productivity and the quality of outcomes (Angraini, 2021).

Additionally, technology streamlines communication and collaboration, enabling people to work together seamlessly, regardless of their locations. In education, technology fosters a more interactive and accessible learning environment, enriching the overall educational experience (Damanik et al., 2022).

Currently, at LPPM (Institute for Research and Community Service) at Amikom University Purwokerto, various documentation and performance tasks are still carried out manually. This manual system involves physical paperwork

and face-to-face interactions, which can be time-consuming and prone to errors. Although this system has been functional, it is increasingly seen as outdated and inefficient, especially in the context of a technologically advancing educational institution. This lack of technological integration hinders the institution's ability to manage tasks effectively and to keep up with the demands of modern academic and research environments (Lapu Kalua et al., 2024).

One of the major problems with the current manual system is its inefficiency and the high likelihood of human error. Manual documentation is not only slow but also requires significant physical storage space, making it difficult to retrieve and manage data effectively (Permatahati et al., 2023). Additionally, the lack of a centralized system means that collaboration and communication between students, lecturers, and administrative staff can be cumbersome and



fragmented, leading to delays and misunderstandings. This fragmentation can result in inconsistent data, reduced productivity, and an overall lack of coherence in LPPM's operations (Setiani et al., 2023).

To address these problems, we propose developing a web-based application that will automate and streamline LPPM's documentation and performance tasks. This system will include a user-friendly front-end interface to facilitate easy interaction with the system (Nurmaizal et al., 2023). By leveraging modern web development frameworks such as Bootstrap, the proposed system will ensure that all functionalities are accessible on various devices, thus supporting a responsive and consistent user experience. The automation will significantly reduce the time and effort required for documentation and improve data accuracy and accessibility. This will allow LPPM to operate more smoothly and efficiently, enhancing its overall productivity and service quality.

The implementation plan for this project involves several key steps. First, we will conduct a detailed needs assessment to identify all the functionalities required by LPPM. This will involve consulting with various stakeholders to understand their requirements and challenges (Martani et al., 2022). Next, we will design the system architecture, focusing on a robust and scalable back-end and an intuitive front-end interface. Once the design is finalized, we will proceed with the development phase, utilizing Bootstrap to create a responsive and visually appealing user interface.

After the development, thorough testing will be conducted to ensure the system meets all requirements and is free of bugs. Finally, we will deploy the system and provide training sessions for LPPM staff to ensure a smooth transition from the manual to the automated system. This comprehensive implementation plan aims to ensure that the new system is effective, user-friendly, and capable of meeting LPPM's needs (Terttiaavini et al., 2023).

As for several similar previous studies used as literature review material, a study conducted by Terttiaavini and colleagues in 2023, at the Banda Sakti Police Station, community complaint management issues were identified as the main challenge. Negligence in data management is the

main focus, causing difficulties in managing, searching, and handling whistleblower information. This study aims to design and implement a simple web interface for the public to submit complaints online to the Banda Sakti Police Station. The Bootstrap framework was chosen to build a responsive interface that is easy for the community to use (Terttiaavini et al., 2023).

The second research conducted by Lapu Kalua and his team in 2024, reveals challenges in scholarship data management at the North Sulawesi Education Office. The main problem is the reliance on manual systems that slow down the process of reviewing scholarship data. This research aims to develop a website that facilitates the North Sulawesi Education Office in managing scholarship and legalization programs efficiently. The Bootstrap framework is used to design responsive and visually appealing web interfaces, according to a structured waterfall development methodology (Lapu Kalua et al., 2024).

The third research conducted by Wijaya and colleagues in 2022, faced the challenge of lack of available information about the admission process at STITQI Indralaya due to the absence of a website. This study aims to improve the effectiveness of the new student admission process by improving the existing system using the RAD methodology. The Bootstrap framework was chosen to design a responsive and user-friendly interface (Wijaya et al., 2022).

The fourth research conducted by Hantoro in 2021, problems in village financial management due to limitations of the manual system were identified. This study aims to create a website that facilitates village treasurers in managing village finances using waterfall methodology. The Codeigniter framework was chosen to build a systematic and structured system (Hantoro, 2021).

The fifth study, identifies problems in increasing crop yields in Bangladesh's agricultural sector. One of the main obstacles is the difficulty of farmers in identifying and treating plant diseases early and appropriately, which results in crop damage and decreased yields. This research aims to develop a web application "Smart Farming System" to help farmers in Bangladesh in increasing knowledge, so as to overcome various obstacles in farming. The web application allows farmers to learn and share information about various plant diseases, preventive solutions, and

best agricultural practices. The development of the "Smart Farming System" system uses a combination of modern web technologies, including HTML5, CSS, Bootstrap, and JavaScript. Meanwhile, the user interface (front-end) on the "Smart Farming System" system is built using a bootstrap framework to produce a responsive and user-friendly interface, so as to provide a pleasant and easy-to-use user experience for farmers when accessing the "Smart Farming System" web application. Thus, the "Smart Farming System" web application is expected to make it easier for farmers to identify and deal with plant diseases (Shamrat et al., 2020).

Based on the problems that have been described, this study aims to offer concrete solutions by creating a Front-End on the LPPM financial website of Amikom Purwokerto University using Bootstrap. Through this step, it is expected that user interaction with the system will be easier, while LPPM's financial management process will be more facilitated. This research has significant relevance because it faces real challenges in the financial management of LPPM Universitas Amikom Purwokerto. With this research, it is expected to be able to provide concrete and practical solutions to improve the efficiency and effectiveness of LPPM financial management.

This study differs from previous research in several ways. First, this research specifically leverages the Bootstrap framework to build a responsive and user-friendly Front-End, which has not been widely discussed in the context of LPPM financial management. Second, this study focuses on the specific needs of LPPM Universitas Amikom Purwokerto, which is different from other institutions and requires a customized approach. Third, the updates offered in this study are the integration of modern web technologies that not only improve user appearance and interaction but also speed up the process of system development and maintenance.

Some of the reasons why this research is important are because it can improve efficiency, accessibility, transparency, and productivity in financial management. Using a web-based application, LPPM's financial information can be accessed easily from various devices, including computers, laptops, smartphones, and tablets. Web-based applications offer convenience and

efficiency because they can be accessed from anywhere and anytime. Thus, this research has a significant impact in improving the performance and efficiency of LPPM Universitas Amikom Purwokerto in financial management, as well as making a positive contribution to improving the quality of academic and non-academic services offered by universities.

## 2 Method

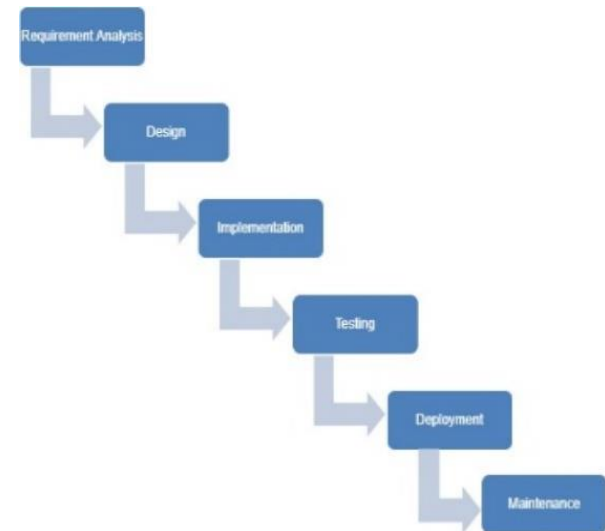


Figure 1. Research Flow

### 2.1 Requirement Analysis

A needs analysis is carried out to identify the initial problem. This process is essential in determining the specific requirements and challenges that need to be addressed. In this study, the analysis was conducted through observation and interviews. By observing the environment and interactions, researchers gathered firsthand data on the context and issues faced by users. Interviews provided additional insights, allowing participants to express their needs, preferences, and experiences directly.

The collected information is then thoroughly analyzed to gain a deep understanding of user needs. This involves categorizing and interpreting the data to identify common themes and patterns. The analysis helps in pinpointing the root causes of the problems and highlights areas for improvement. By understanding user needs at a granular level, more effective and targeted solutions can be developed. This comprehensive approach ensures that the final outcomes are tailored to address the

specific challenges identified during the needs analysis.

## 2.2 Design

At the design stage, researchers will further identify user needs based on observations and direct interviews. Where interviews and observations were conducted at Amikom Purwokerto University. The design phase contains the creation of use case diagrams, Activity diagrams and finally User Flow. A use case diagram is a type of UML (Unified Modeling Language) diagram used to illustrate the interaction between users (actors) and the developed system (Penerapan et al., n.d.). These diagrams help in visualizing the functions present in the system as well as who interacts with those functions. Activity diagram is a type of UML diagram that describes a workflow or activity in a system. These diagrams are used to model business processes or workflows in a system and highlight activities and their execution sequences (Informasi Pendaftaran Pendampingan Legalisasi Produk UMKM Provinsi Banten Berbasis Web et al., 2021). User flow is a graphical representation of the user journey while interacting with a digital product or service. User flow shows the steps taken by a user from start to finish in completing a specific task. This helps designers understand the user experience and identify potential bottlenecks in the process (Izhari et al., 2023).

## 2.3 Implementation

At the implementation stage, the main focus is on writing source code to realize the design and architecture of the system that has been designed before. In this stage, the source code is written to implement the desired functionality according to technical specifications. For the front-end appearance of the website, researchers used the Bootstrap Framework, which provides ready-to-use components and tools to create responsive and modern user interfaces. Bootstrap helps speed up display development by providing CSS styles and JavaScript scripts that can be easily integrated into projects (Widyastuti et al., n.d.).

## 2.4 Testing

The testing phase aims to ensure the functionality and usability of the website's front-end interface functions properly and in accordance

with user needs. Testing is carried out using the System Usability Scale (SUS) method is a test method designed to evaluate the usability of a system or product. Developed by John Brooke in 1986, SUS is a simple yet effective tool for assessing user experience (Yoga & Ardhana, 2022). SUS is a Likert scale-based questionnaire consisting of 10 statements used to measure the usability of a system, product, or service. Each statement has five answer choices that range from "strongly agree" to "strongly disagree" (Oktaviani, 2020). This scale gives an idea of how easy and enjoyable a system is to use by its users. Then there is the interpercence of SUS scores ranging from 0-50, this score indicates that the system or product has very poor usability and requires major improvement. 51-70, Indicates that the system has moderate usability and may require some improvement. 71-85, The system is considered quite good and the majority of users are comfortable using it. 86-100, This score indicates that the system has excellent usability and is very well received by users (Hamzah, 2021).

## 2.5 Deployment

At the deployment stage, the system application that has been created undergoes a thorough integration process. This step involves combining the new application with the existing system components to ensure seamless operation. The integration includes setting up databases, configuring servers, and ensuring compatibility with other software and hardware components within the system.

## 2.6 Maintenance

In the maintenance phase, which is the last phase in software development, researchers continuously monitor the front-end performance of the software and fix any problems that arise. This monitoring involves regular checking of the system to identify and fix bugs or errors that may not have been detected during the initial testing phase. In addition, maintenance also includes feature updates and system adjustments according to user feedback and changing business needs. The main goal of this stage is to ensure that the system continues to function properly and optimally, so as to provide a consistent and satisfactory user experience. With effective maintenance, software can continue to





evolve and adapt to changing technologies and user needs.

### 3 Result

#### 3.1 Requirement Analysis

Based on the results of interviews conducted by the team with LPPM, it is known that the Chairman of LPPM is responsible for financial management, while the LPPM Treasurer is in charge of submitting expenditures and disbursement of funds. Thus, it can be illustrated in the flow of the system to be designed, the head of LPPM has the responsibility to compile and determine the allocation of funds for the research budget. Furthermore, the chairman of LPPM is also tasked with determining the type of research activities to be carried out. After the type of research activity is determined by the Chairman of LPPM, the Treasurer then submits a request for disbursement of funds appropriate to the type of research. The request

#### 3.2 Design

##### 3.2.1 Use Case Diagram

The use case diagram in this study will illustrate the interaction relationship between users and the system. Figure 2 is a use case between the chairman of LPPM and the treasurer of LPPM.

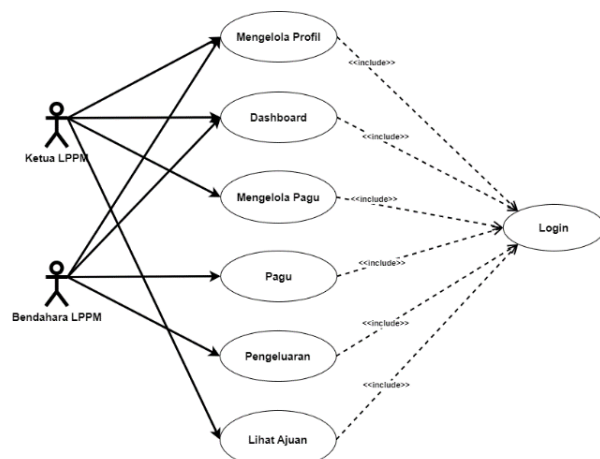


Figure 2. Use Case Diagram

##### 3.2.2 Activity Diagram

In this study there are several activity diagrams such as, *Login*, Process of determining the allocation of research funds, Downloading the allocation of research funds, submitting expenses and finally confirming expenses. The activity diagram can be seen in figures 3 through 7.

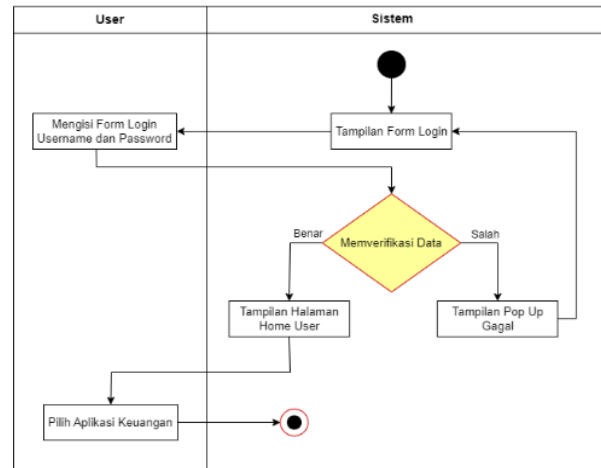


Figure 3. Activity Diagram login

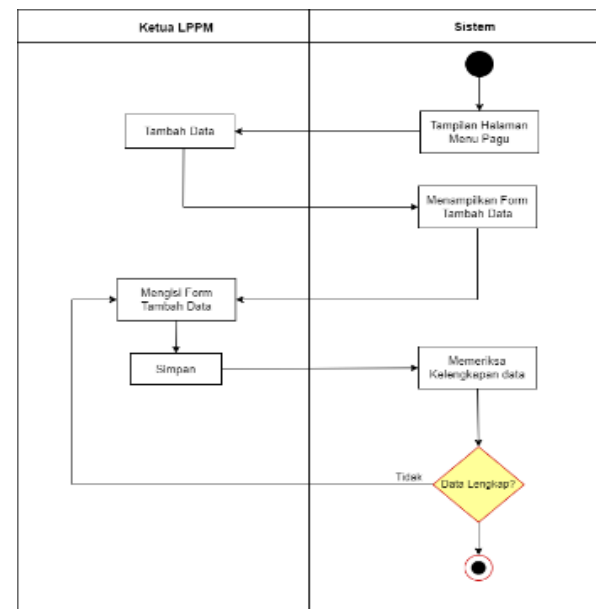


Figure 4. Activity Diagram Fund allocation process

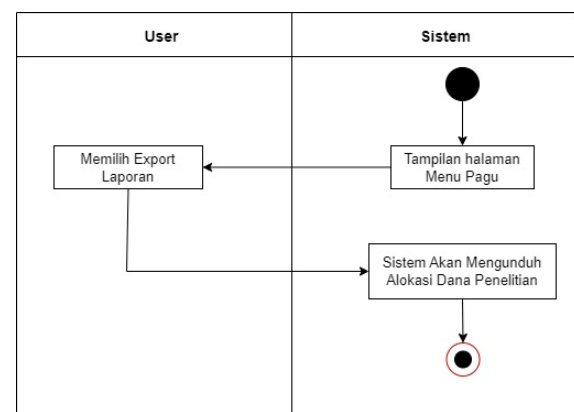


Figure 5. Activity Diagram Download Fund Allocation

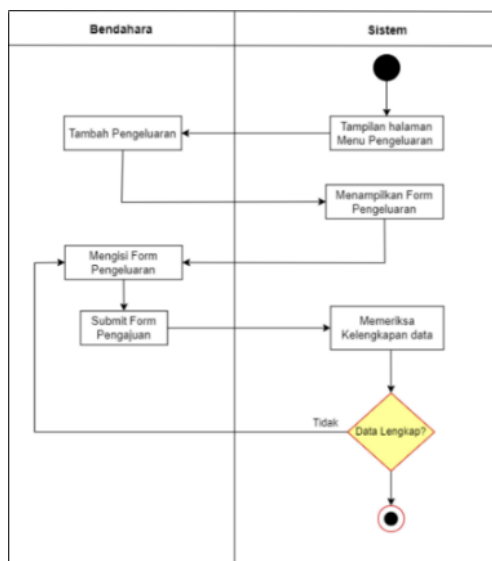


Figure 6. Activity Diagram of Expense Submission

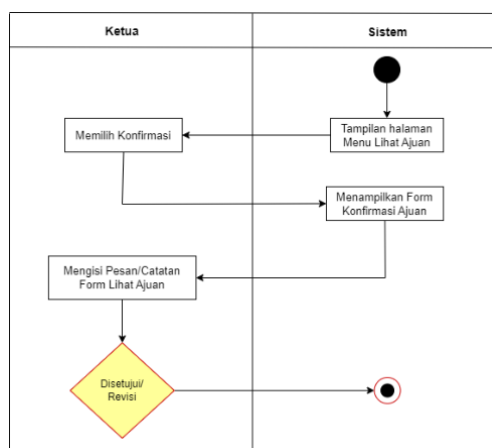


Figure 7. Activity Diagram Expense confirmation

In figure 3 is a series of processes that exist in the system for the login feature where the activity is explained in sequence the explanation of login from beginning to end, then from figures 4 to 7 is also an activity diagram that is explained in detail related to the flow of using the features on the front end system of the LPPM website Amikom University Purwokerto.

### 3.2.3 User Flow

User flow is a visual map that shows the steps that must be taken by users in operating an application or website. The following is the user flow of the LPPM financial system of Amikom Purwokerto University consisting of the

user flow of the chairman of LPPM figure 8 and the User Flow of the LPPM Treasurer can be seen in the figure 9.

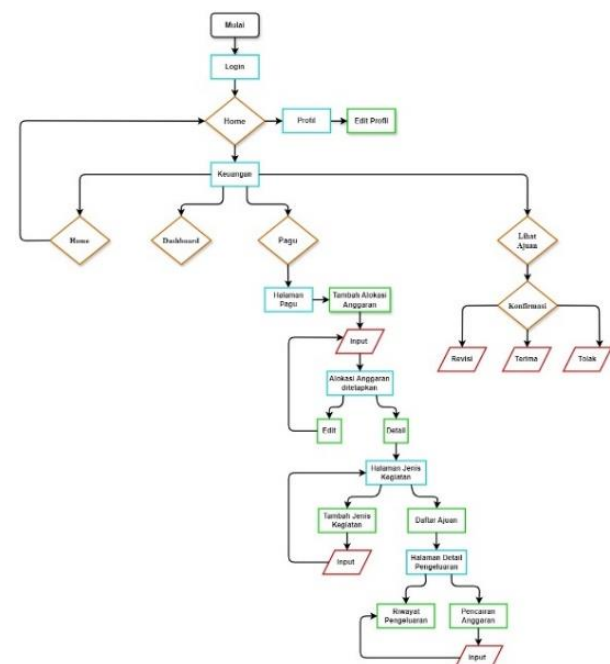


Figure 8. User Flow Chief LPPM

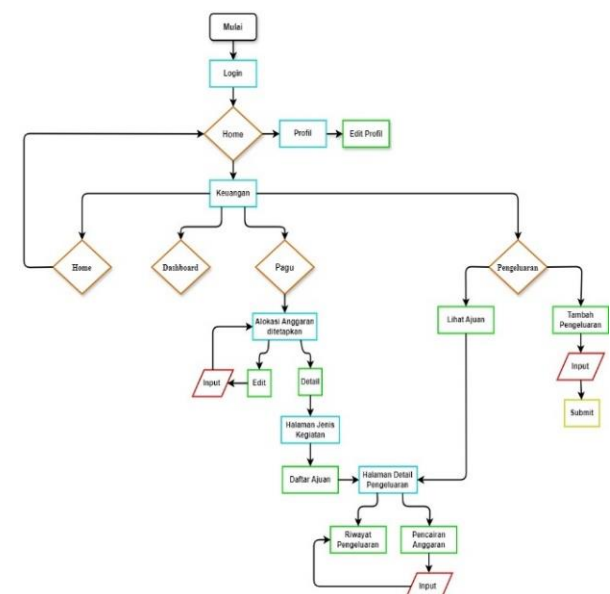


Figure 9. User Flow Treasurer LPPM

In figures 8 and 9 is the user flow in the two images to indicate that the process is completed with a submit so that there is no finishing word in the user flow

### 3.3 Implementatiton

In the implementation stage, making a front-end website, researchers use a bootstrap framework to facilitate the implementation of the design. To implement the front-end using bootstrap combined with Visual Studio Code software. Visual Studio Code offers a variety of features that support developer productivity, from syntax highlighting, to code autocomplete, to version control integration. In figures 10 and 11 is the source code and the login appearance of the website.

```
app > Views > auth > index.php > ...
1 <?=$this->extend('auth/template') ?>
2 <?=$this->section('css') ?>
3 <style>
4     .login-box {
5         position: absolute;
6         top: 50%;
7         left: 50%;
8         transform: translate(-50%, -50%);
9     }
10 </style>
11 <?=$this->endSection() ?>
12 <?=$this->section('content') ?>
13 <div class="login-box">
14     <div class="login-logo font-weight-bold">
15         <?=$configWeb()['name_app'] ?>
16     </div>
17     <div class="card bg-dark text-light shadow-none">
18         <div class="card-body login-card-body bg-dark ">
19             <p class="login-box-msg">Sign in to start your session</p>
20             <form action="<?=$base_url('login') ?>" method="post" id="form-login">
21                 <div class="input-group mb-3">
22                     <input
23                         type="text"
24                         name="username"
25                         id="username"
26                 />
27             </div>
28             <div class="input-group mb-3">
29                 <input
30                     type="password"
31                     name="password"
32                     id="password"
33                 />
34             </div>
35             <div class="text-center">
36                 <button type="submit" value="Masuk" class="btn btn-primary">Masuk</button>
37             </div>
38         </div>
39     </div>
40 </div>
41 </section>
42 </div>
43 </div>
44 </div>
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46 </div>
47 </div>
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93 </div>
94 </div>
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97 </div>
98 </div>
99 </div>
100 </div>
```

Figure 10. Source Code Login



Figure 11. Login View

```
app > Views > index.php > ...
1 <?=$this->extend('layout/template') ?>
2 <?=$this->section('css') ?>
3 <style>...
65 </style>
66 <?=$this->endSection() ?>
67 <?=$this->section('content') ?>
68 <?=$session()->role_active ?>
69 <div class="row">
70     <div class="col-md-4">
71         <div class="card card-banner card-banner-1">
72             <div class="card-body">
73                 <div class="card-icon position-relative">
74                     <div class="hexagon text-center">
75                         <i class="fas fa-dollar-sign"></i>
76                     </div>
77                 </div>
78                 <div class="title">
79                     Total Anggaran
80                     <?=$session()->year ?>
81                 </div>
82                 <div class="text">
83                     <?=$getFormatRupiah($total_apb) ?>
84                 </div>
85             </div>
86         </div>
87     </div>
88 </div>
89 </div>
90 </div>
91 </div>
92 </div>
93 </div>
94 </div>
95 </div>
96 </div>
97 </div>
98 </div>
99 </div>
100 </div>
```

Figure 12. Source Code Dashboard

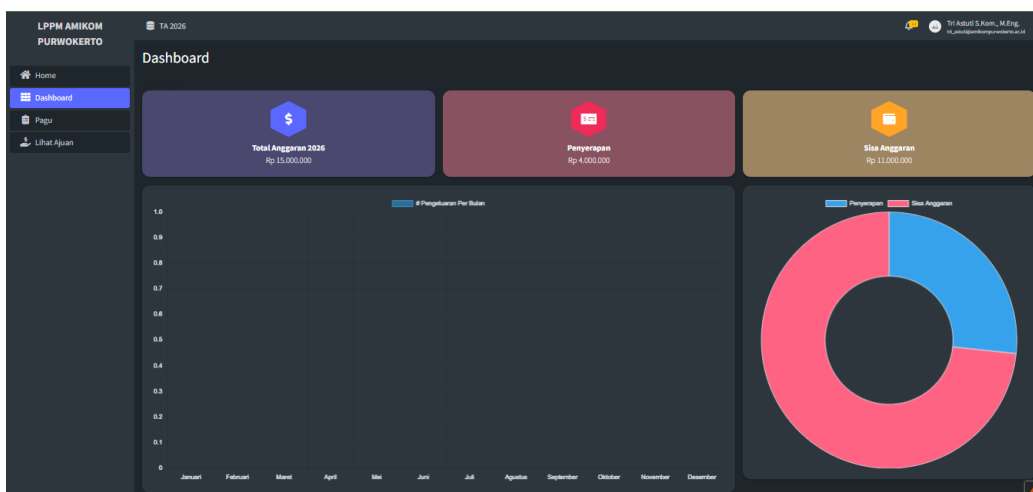


Figure 13. Dashboard View



Next, Ceiling Menu Display To display the ceiling menu, researchers use pre-prepared elements. These elements are inside a "ceiling" folder and a file named "index.php". Some of these elements come from the Bootstrap framework,

such as cards, tables, buttons, and dropdowns. These components are then combined to form the ceiling menu program code, as shown in figure 14 is the result for the ceiling menu page.

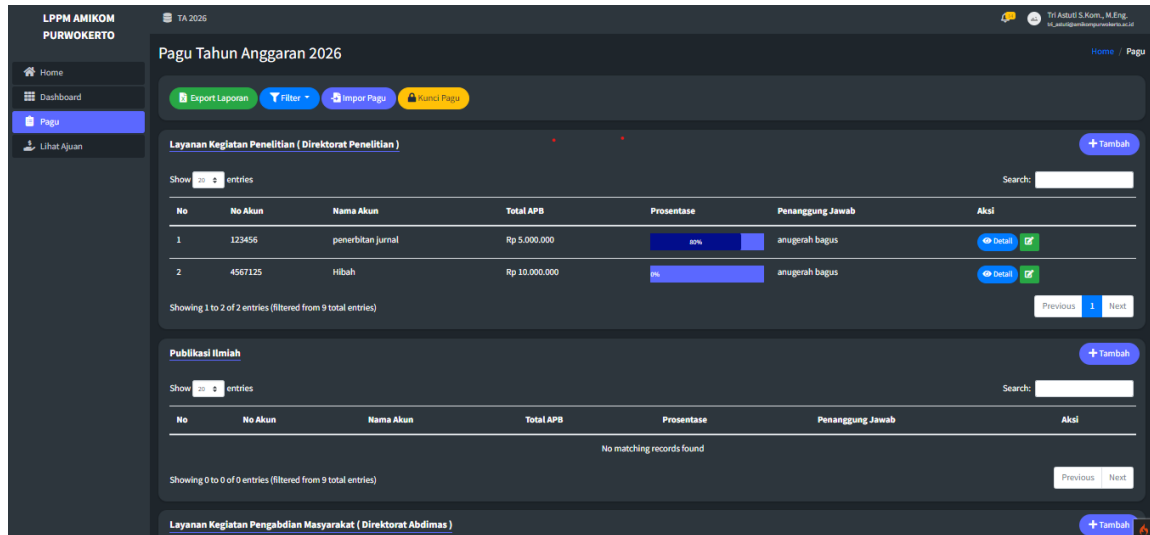


Figure 14. Ceiling Menu Display

To display the application detail page, researchers use pre-prepared elements. These elements are inside the "disbursement" folder and the file is named "detail.php". Some of these elements come from the Bootstrap framework, such as modal components (modal-dialog). These components are then combined to form the program code according to the example shown in Figure 15 and for the results of the application details page shown in Figure 16.

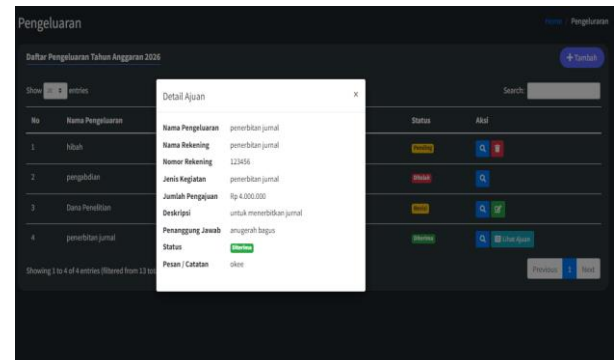


Figure 16. Results from the application details page

```

app > Views > disbursement > modal > detail.php > div#1 .modal.fade
2 <div
9   aria-hidden="true"
10 <div class="modal-dialog modal-dialog-centered"
11   <div class="modal-content"
12     <div class="modal-header"
13       <h5 class="modal-title" id="staticBackdropLabel">Detail Ajuan</h5>
14       <button type="button" class="close" data-dismiss="modal" aria-label="Close">
15         <span aria-hidden="true">&times;</span>
16       </button>
17     </div>
18     <div class="modal-body"
19       <dl class="row"
20         <dt class="col-4">Nama Pengeluaran</dt>
21         <dd class="col-8">?</dd>
22         <dt class="col-4">Nama Rekening</dt>
23         <dd class="col-8">?</dd>
24         <dt class="col-4">Nomor Rekening</dt>
25         <dd class="col-8">?</dd>
26         <dt class="col-4">Jenis Kegiatan</dt>
27         <dd class="col-8">?</dd>
28         <dt class="col-4">Jumlah Pengajuan</dt>
29         <dd class="col-8">?</dd>
30         <dt class="col-4">Deskripsi</dt>
31         <dd class="col-8">?</dd>
32         <dt class="col-4">Penanggung Jawab</dt>

```

Figure 15. Source Code Application Details

After the detailed stage of the application, a confirmation form is displayed To display the confirmation form, researchers use elements that have been prepared before. These elements are inside the "see-proposal" folder and a file named "confirmation.php". Some of these elements come from the Bootstrap framework, such as modal components (dialog-modal), grid layouts (rows/columns), forms, and buttons. Figure 17 is the source code while figure 18 is the result of the display of the confirmation form





```

1 <div>
2   <div class="modal-dialog modal-dialog-centered">
3     <div class="modal-content">
4       <div class="modal-header">
5         <h5 class="modal-title" id="staticBackdropLabel">Konfirmasi Ajuan</h5>
6         <button type="button" class="close" data-dismiss="modal" aria-label="Close">
7           <span aria-hidden="true">&times;</span>
8         </button>
9       </div>
10      <div class="modal-body">
11        <div class="form-group">
12          <label for="message">Pesan / Catatan :</label>
13          <textarea
14            name="message"
15            id="message"
16            class="form-control"
17            onkeyup="return checkLength()"></textarea>
18        </div>
19      </div>
20    </div>
21  </div>
22  <div class="row">
23    <div class="col">
24      <button
25        type="submit"
26        class="btn btn-success btn-block"
27        id="btnDiterima"
    
```

Figure 17. Form view page source code

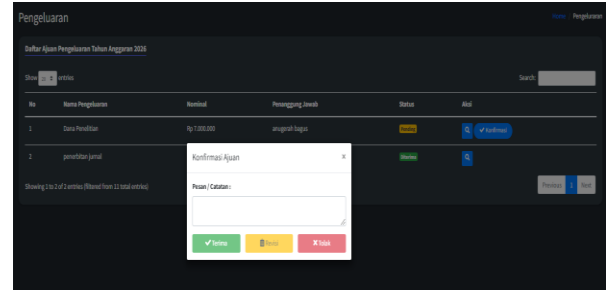


Figure 18. Results from form views

### 3.4 Testing

After the design and source code are implemented, the next stage is testing. In this stage testing is carried out using the SUS (System Usability Scale) method where in this test the questionnaire is distributed to twenty respondents because and the SUS method is responded to testing at least five so that this study is fulfilled to conduct testing, namely with twenty respondents. For test results can be seen in table 1.

Table 1. Result Responden and Score SUS

Respond	Question										Total	Score SUS
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
R1	3	4	3	3	4	3	3	3	4	3	33	82,5
R2	4	3	3	4	3	3	3	4	3	4	34	85
R3	3	4	3	3	3	3	3	4	4	3	33	82,5
R3	4	3	3	3	2	3	4	3	3	3	31	77,5
R5	4	3	3	3	4	3	3	2	3	4	32	80
R6	3	4	4	3	4	3	3	3	3	2	32	80
R7	3	4	3	3	3	3	3	3	4	3	32	80
R8	4	3	3	3	3	3	3	4	3	4	33	82,5
R9	3	4	3	4	3	4	3	3	2	3	32	80
R10	3	4	3	3	3	3	3	4	4	3	33	82,5
R11	4	3	3	3	2	3	4	3	3	3	31	77,5
R12	4	3	3	3	4	3	3	2	3	4	32	80
R13	3	4	4	3	4	3	3	3	3	2	32	80
R14	3	4	3	3	3	3	3	3	4	3	32	80
R15	4	3	4	4	4	4	4	3	2	2	34	85
R16	4	2	3	3	3	4	3	2	3	4	31	77,5
R17	3	4	4	2	2	2	3	4	3	4	31	77,5
R18	4	3	3	4	2	2	3	4	4	4	33	82,5
R19	2	3	3	4	4	2	3	3	4	4	32	80
R20	4	3	3	3	2	3	4	3	3	3	31	77,5
Average SUS Score												80,5
Acquisition Grade												B

Based on the test results that can be seen in table 1, the front end for the LPPM website at Amikom Purwokerto University obtained a score of 80.5. This score belongs to grade B, which indicates that the quality of the developed front end is quite good and meets the expected standards.

Therefore, it can be concluded that the study was successful in achieving its goals. The creation of the front end for the LPPM website has met the criteria set and can be used properly by users. The evaluation carried out covers important aspects in front end development, so that these results provide



confidence that the application is ready to be implemented within Amikom Purwokerto University.

#### 4 Conclusion

Based on the results of research related to front-end design on the financial website of LPPM Universitas Amikom Purwokerto using Bootstrap, there are several conclusions that can be conveyed. First, the use of Bootstrap for the implementation of interface elements, such as typography, forms, buttons, tables, grids, and navigation in front-end design on the LPPM Universitas Amikom Purwokerto website in accordance with high fidelity design. Second, based on the results of the tests that have been done, the front end for the LPPM website obtained a score of 80.5, which is included in grade B. This score shows that the use of Bootstrap in front-end website design is in accordance with the system needs set by LPPM Amikom Purwokerto and functions well on both types of accounts used to manage finances at LPPM Amikom Purwokerto. In this study, the author realizes that front-end design on the financial website of LPPM Universitas Amikom Purwokerto using Bootstrap still has room for improvement. For further research development, suggestions that can be given are combining or integrating existing systems with the website of Amikom Purwokerto University. This will make the system more systematic and can also be developed in mobile platforms. This research makes a significant contribution in today's digital age by showing how the use of Bootstrap can improve efficiency and effectiveness in front-end website design. The implementation of this technology not only improves the appearance and function of the website, but also facilitates more structured and modern financial management. This is very relevant in today's era where technology integration and ease of access to information are major needs in various fields, including education and administration.

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