



School of Computer Sciences

CAT404 Software Engineering Major Project

Analysis Report

CAT404: Scholarship Management System (SMS)

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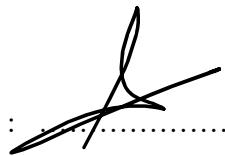
Academic Session

2023/2024

DECLARATION

“I declare that the following is my own work and does not contain any *unacknowledged* work from any other sources. This report was undertaken to fulfill the requirements of the Undergraduate Major Project for the Bachelor of Science in Computer Science (Honors) program at Universiti Sains Malaysia”.

Signature



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.....

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Date : 18/12/2023

ABSTRAK

Sistem Pengurusan Biasiswa (SMS) merupakan satu penyelesaian perisian untuk memodenkan pentadbiran biasiswa. Walau bagaimanapun, sistem semasa tidak mempunyai platform bagi penyedia biasiswa untuk menguruskan proses permohonan dengan berkesan. Selain itu, ia tidak menyediakan fungsi bagi pemohon untuk memohon biasiswa dengan mudah dan menerima kemas kini tepat pada masanya mengenai status permohonan mereka. Matlamat utama SMS adalah untuk membangunkan platform bagi penyedia biasiswa untuk mengawasi maklumat biasiswa mereka dan memudahkan proses pemilihan permohonan. Selanjutnya, SMS bertujuan untuk membina platform yang membolehkan pemohon mengemukakan dan menguruskan permohonan mereka. Sistem ini juga merangkumi platform bagi pentadbir untuk mengesahkan pendaftaran pengguna sebagai penyedia biasiswa. Tambahan pula, ia memastikan bahawa pemohon menerima pemberitahuan secara langsung yang mengemaskini mereka mengenai status permohonan biasiswa. Projek ini mengikuti metodologi Agile, khususnya kerangka kerja Scrum, untuk peningkatan ketelusan dan bolehskalabiliti. Sistem ini menyusun permohonan pelajar untuk biasiswa yang berkaitan dengan usaha akademik dan membolehkan penyedia biasiswa menguruskan tawaran secara dalam talian. Semua proses dijalankan dalam talian, mengurangkan penggunaan kertas, dan memberi manfaat kepada alam sekitar.

ABSTRACT

The Scholarship Management System (SMS) is a software solution to modernize scholarship administration. However, the current system lacks a platform for scholarship providers to effectively manage the application process. Additionally, it does not offer functionality for applicants to easily apply for scholarships and receive timely updates on the status of their applications. The primary goals of SMS are to develop a platform for scholarship providers to oversee their scholarship information and facilitate the selection process for applications. Subsequently, SMS aims to establish a platform enabling applicants to submit and manage their applications. The system also includes a platform for administrators to verify the registration of users as scholarship providers. Furthermore, it ensures that applicants receive real-time notifications updating them on the status of their scholarship applications. The project follows the Agile methodology, specifically the Scrum framework, for enhanced transparency and scalability. This system streamlines student applications for scholarships related to academic pursuits and allows scholarship providers to manage offerings online. All processes are conducted online, reducing paper usage, and benefiting the environment.

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LIST OF ABBREVIATIONS AND SYMBOLS

HTML	- Hypertext Markup Language
HTTP	- HyperText Transport Protocol
HTTPS	- HyperText Transport Protocol Secure
SMS	- Scholarship Management System
AES	- Advanced Encryption Standard Algorithm
DES	- Data Encryption Standard Algorithm
CV	- Curriculum Vitae
SWOT	-Strength, Weakness, Opportunities, Thread
RAM	- Random access memory
GB	- Gigabytes
OS	- Operating System
IDE	- Integrated Development Environment
VCS	- Version Control System
IMS	-Internship Management System

1 INTRODUCTION

1.1. Background

A scholarship is a financial award or grant given to students to help them pursue their education, typically at a college or university. Scholarships are typically awarded based on various criteria, including academic merit, financial need, athletic or artistic talent, community involvement, or specific demographics (such as being a member of a particular ethnic or cultural group) [1]. Scholarships can come from various sources, including educational institutions, government programs, private organizations, foundations, and corporations. They are a form of financial aid that does not need to be repaid, making them a valuable resource for students to help cover the costs of tuition, fees, books, and other educational expenses. [2]

The specific eligibility criteria and application processes for scholarships vary widely, so students must research and apply for scholarships that align with their qualifications and goals. Scholarships can be crucial in making higher education more accessible and affordable for many students.

A Scholarship Management System (SMS) is suggested to assist applicants in finding and applying for the most advantageous scholarships. Additionally, empowers scholarship providers to efficiently handle applicant applications and streamline the scholarship process online. Moreover, it allows system administrators to control and manage the entire scholarship management system from a centralized platform.

1.2. Problem Statements

Through the advancement of technology, particularly the internet has significantly impacted human life and activities in every aspect [3][4]. One area that has also experienced changes is the management of scholarships. In the contemporary educational landscape, scholarships play a pivotal role in facilitating access to quality education for deserving students. However, effective, and efficient management of scholarships is a challenge in systems that still use process the data manually and lack information integration [7]. Thus, the Scholarship Management System (SMS) aims to

address these challenges by providing a web-based management system that enables the scholarship provider to manage their scholarship processes, such as providing information about the scholarship and managing the process of selecting the student scholarship application. This will increase the efficiency of the scholarship application and awarding process while also enhancing transparency and accessibility.

Additionally, the current scholarship application processes often involve manual, paper-based procedures [5]. Applicants are required to complete application forms and physically submit them to the relevant office. In cases where issues arise during the processing of these applications, both the reviewing committee and the applicants face challenges in communicating and rectifying errors, leading to potential delays in the overall procedure [5]. Furthermore, various scholarship search engines, such as Scholarship2U, Biasiswa Malaysia, and Afterschool.my, assist students in identifying relevant scholarship opportunities based on their qualifications and interests. However, these platforms solely provide information about scholarships rather than offering a direct application platform for applicants. To address this issue, the SMS has introduced a platform that enables applicants to submit their scholarship application documents to their chosen scholarships and monitor the status of their applications.

Moreover, the rise of the internet has left a profound impact on communities, bringing about both positive and negative consequences. As reported by Forbes, 50% of those awarded scholarships experience scholarship displacement. Furthermore, findings from a survey indicate that 16% of respondents and 22% of scholarship recipients have encountered fraudulent activities related to scholarships, such as scams involving application fees, taxes, or other charges [6]. To address this issue, SMS provide a platform for the administrators to verify the legitimacy of users registering as scholarship providers. This verification process is essential for ensuring the authenticity of scholarship opportunities and protecting individuals from falling victim to deceptive practices.

Furthermore, the issue of applicants missing out on interviews and scholarship updates is a significant concern that can adversely affect the fairness and transparency of the scholarship application process. Several factors may contribute to this problem, and addressing these challenges is crucial for ensuring that all qualified applicants have an

equal opportunity to participate in the selection process. One possible reason for applicants missing interviews and updates could be inadequate communication channels. If the communication mechanisms are not well-established or if applicants are not promptly informed about interview schedules and updates, it can lead to confusion and missed opportunities. Thus, SMS introduced a real-time update notification for the applicant to receive an update regarding the status of the scholarship application.

1.3. Motivation

The inception of this project is rooted in my personal experience when I embarked on my degree studies. Throughout this period, I frequently found myself in the unfortunate situation of missing out on numerous scholarship opportunities due to my lack of awareness regarding the organizations and institutions offering financial aid to university students. This predicament prompted me to consider a solution to address not only my challenges but also those faced by countless other students like me who may be unaware of scholarships that are the best for their courses and frequently miss crucial application deadlines.

Furthermore, the status of the scholarship application can be easily overlooked since it will be delivered via email, and it sometimes gets buried amidst the numerous emails I receive, including those related to studies, job offers, and other matters. Hence, the suggested system will serve as a centralized hub for scholarship applications, aiding students in discovering the most advantageous scholarships for their needs. It will simplify the application process and the ability to track the status of their scholarship applications.

1.4. System Objectives

1. To design a platform for the scholarship provider to manage their scholarship information and process in selecting the scholarship application.
2. To create a platform for the applicant to apply and manage their scholarship application.
3. To design a platform for the administrator to verify the user registered as a scholarship provider.

4. To design a system that allows the applicant to receive a real-time update notification regarding the status of the scholarship application.

1.5. Proposed Solutions

The Scholarship Management System (SMS) is a comprehensive platform that centralizes information on all available scholarships in Malaysia, providing a unified and standardized approach to the application process. This centralized system aims to streamline and harmonize the procedures for applying for scholarships, ensuring efficiency and accessibility for scholarship providers and applicants. (Figure 1) (Figure 2)

The SMS system offers functionality that assists applicants in applying for the best scholarship with the most favorable package. The system enables applicants to manage and update their personal information. Additionally, through SMS, applicants can select and bookmark available scholarships from the provided list. Moreover, the system allows applicants to apply for a scholarship by entering personal information, uploading required documents, and completing the provided application form. Furthermore, the system provides a document management platform where applicants can upload frequently required documents for scholarship applications, reducing the need to use file explorers. Lastly, SMS includes functionality for applicants to monitor their application status, bookmarked scholarships, and the history of applied scholarships and view an interview schedule by the scholarship provider.

Furthermore, SMS assists scholarship providers in streamlining the online management of scholarships. The system allows scholarship providers to manage and update their information and upload necessary documents easily. Additionally, scholarship providers can view a comprehensive list of applicants and access detailed application information, including applicant details and uploaded documents. After reviewing applications, scholarship providers can update the status of each applicant, marking them as pending, shortlisted, rejected, or accepted. If necessary, the scholarship provider can also provide a link to schedule an interview with the applicant. SMS also provides a feature for scholarship providers to add remarks for applicants, offering valuable feedback on their applications. After completing the process, SMS will send a notification via WhatsApp to alert the applicant about the scholarship application

update. Scholarship providers are also able to oversee any upcoming interview to prevent any interviews being overlooked.

Next, SMS also allows the administrator to manage the scholarship management system. SMS allows the administrator to verify that the user is registered as the scholarship provider. This is to ensure the integrity of the data in the system. Furthermore, SMS allows the administrator to manage the content in the system, such as disabling and hiding website content or website pages if the website is under maintenance.

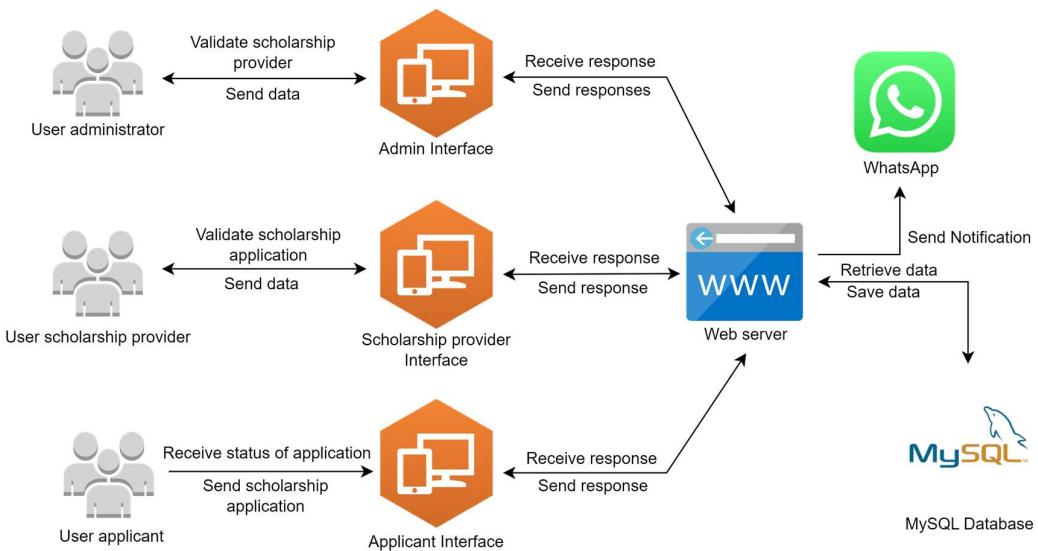


Figure 1: System architecture diagram

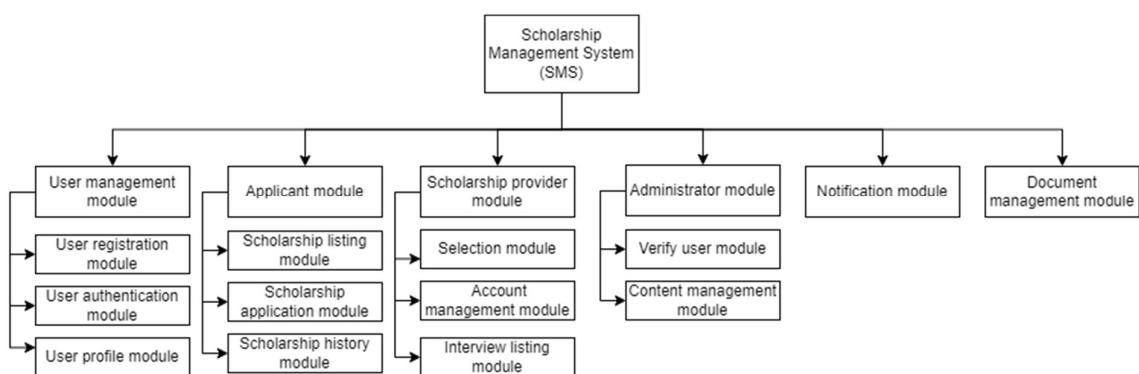


Figure 2: Overall module diagram

1.6. Benefits and Uniqueness of the Proposed Solutions

The scholarship management system acts as a catalyst for making educational funding opportunities more visible, reachable, and equitable for students, regardless of their backgrounds or locations [1]. The online scholarship management system plays a pivotal role in democratizing access to scholarship opportunities for students. By leveraging digital platforms, this system facilitates seamless and widespread access to a diverse range of scholarships. Students can easily explore and discover various scholarship programs, breaking down barriers to information and ensuring that opportunities are readily accessible.

The scholarship management system (SMS) introduces an innovative solution by allowing users to search and apply for scholarships directly within the system. Additionally, the platform offers a useful feature that enables applicants to bookmark scholarships for future reference and conveniently keep track of their application history. Furthermore, applicants can receive timely updates on their scholarship status through WhatsApp, enhancing alertness as WhatsApp is a more actively used messaging platform compared to email. This not only streamlines the application process but also ensures users stay well-informed about their scholarship applications in a way that aligns with their preferred mode of communication.

Next, SMS also provides a scholarship provider to automate the scholarship process online by reviewing the information and documentation detailed by the applicant and updating the status of an application or remarking on the applicant's application. Additionally, the system enables scholarship providers to categorize applications as either shortlisted, accepted, or rejected. The SMS further organizes applicants based on the earliest date of application within these categories. This systematic approach facilitates efficient tracking of applications, allowing scholarship providers to easily identify and manage outdated applications. Moreover, the scholarship provider can keep track and view the list of scheduled meetings with the applicants to avoid any overlooked interview.

Finally, the SMS includes a feature designed to assist the system administrator in verifying users who register as scholarship providers. The system implements robust security measures to safeguard sensitive information, thereby minimizing the risk of

data breaches or unauthorized access. Verifying the scholarship provider upon registration instills confidence in applicants regarding the integrity and confidentiality of their information. Additionally, the administrator can enable or disable the website's content during maintenance mode. This precautionary measure prevents applicants and scholarship providers from uploading or updating any data while the system is in a vulnerable state, ensuring the security and stability of the system.

1.7. Organization of the Report

The report is organized into two main sections which are background and related work, and system requirements and design. In the first section, the status of project development is identified, specifying that the Scholarship Management System (SMS) is a new initiative project. This section then provides a comprehensive summary of the existing systems, offering context, key terms, and concepts to facilitate the objective of the study. Additionally, it compiles details on existing algorithms, methods, and theories, critically assessing their strengths and weaknesses. The introduction to the proposed work is succinctly presented, paving the way for the subsequent section.

Moving on to the system requirements and design section, the report systematically outlines the scope of SMS, the capabilities, and limitations of the system. Project management aspects, including the work breakdown structure (WBS), a Gantt chart, and a SWOT analysis, are thoroughly covered. The development methodology using the Scrum method in agile development will also be explained. The analysis of the new system was performed by using UML modeling such as use case diagrams, use case descriptions, and system sequence diagrams.

The proposed system's detailed description includes the purpose and functionality of each module, and an architecture diagram illustrating the system's workflow. Further details encompass the technology deployed, covering hardware specifications, software tools, operating systems, programming languages, and relevant algorithms. This structured approach ensures a comprehensive and coherent presentation of the project's background, related work, system requirements, and design elements.

2 BACKGROUND & RELATED WORK

2.1. Status of project development

The Scholarship Management System (SMS) is considered as a new project because it provides a functionality that does not exist in the other existing scholarship system nowadays, which consists of five modules which are user management module, administrator module, scholarship provider module, applicant module, notification module and document management module.

2.2. Summarize of relevant projects

This project is similarly related to the University Science Malaysia (USM) Internship Management System (IMS) [8]. This system centralized all the job vacancies in one platform. The student can apply for an internship through the system while the company can promote their job vacancies into the system. The process of internship requires the student to upload their CV and resume into the system. Next, the company will contact the student for an interview session and update the status of the student vacancies to see whether the student is eligible for the job or not. The IMS also provides the students with a record of their job applications.

2.3. Existing algorithms and methods

Scholarship websites typically use a variety of algorithms and technologies to manage and optimize their operations. While specific implementations may vary, these are some common algorithms and techniques used in scholarship websites. Firstly, some of the scholarship web applications use the Web Scrapping method [9]. Web scraping techniques are crucial for creating personalized scholarship recommendations. This involves automatically gathering scholarship data from various websites and databases, enabling the rapid compilation of a comprehensive scholarship database. Afterward, algorithms can be applied to process and analyze this data, allowing for the generation of customized recommendations tailored to individual students.

Next, the scholarship management system incorporates robust encryption algorithms such as AES, Triple DES, and Blowfish to safeguard documents from cyber threats,

leaks, and other digital risks [10]. The software offers control over document access throughout the scholarship application process. Administrative users can determine permissions for viewing, modifying, sharing, or deleting documents based on their role and department within the system.

Lastly, classification of applicant using decision tree algorithm [11]. A decision tree is a diagram that shows the potential results of several connected options [10]. It enables the system to compare potential courses of action based on the applicant's possibilities and returns. They can be used to plan out an algorithm that makes a mathematical prediction of the best option or to stimulate informal conversation [12][13]. Usually, a decision tree begins with a single node and branches into other alternative outcomes. Every one of those results produces more nodes, which then branch out into different directions.

2.4. Strengths and weakness of the existing system

However, figure 3 shows the current scholarship website application, Uni Enroll, which offers all the scholarships available in Malaysia. However, when the applicant clicks on any scholarship from a private university, it provides the list of scholarships available (Figure 3). However, when the applicant clicks the list of scholarships available, it provides only the information, overview, and criteria. It does not emphasize guiding applicants through the scholarship application process within the system (Figure 4).

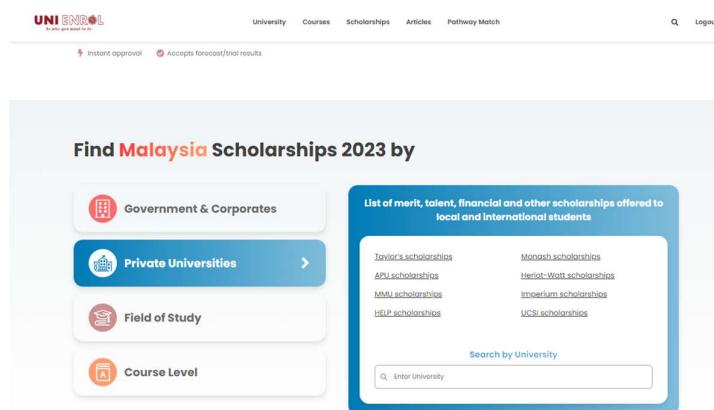


Figure 3: Uni Enroll scholarship offers by type

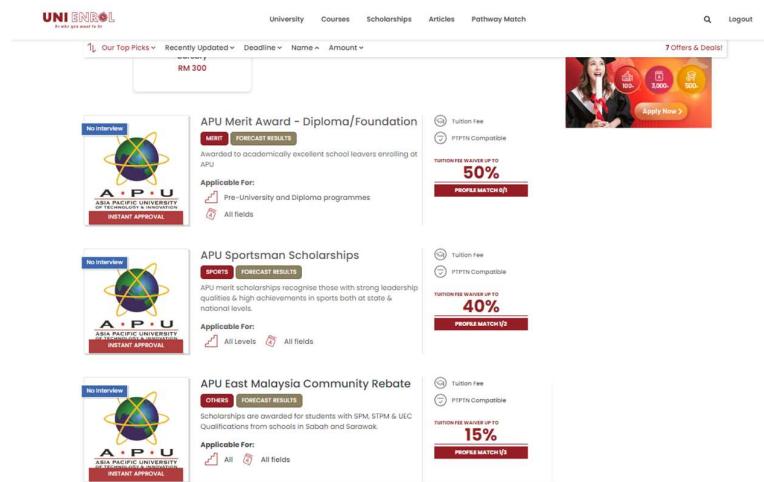


Figure 4: List of information of scholarship in Uni Enroll by selected type

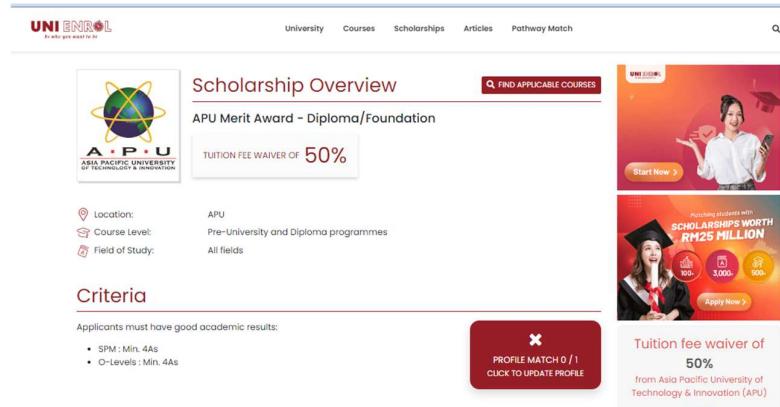


Figure 5: Information provided by Uni Enroll website

Furthermore, the scholarship provider cannot effectively manage the information on the existing scholarship website. We Make Scholar website application contains a link that directs students to the scholarship provider's website. For instance, the view and apply button (Figure 6) will redirect the user to the scholarship details (Figure 7). Next, when the apply button is clicked, it will redirect the applicants to the 404-error webpage, signifying that the webpage cannot be located because of the outdated link (Figure 8). This diminishes the accuracy of the information and can negatively impact deserving applicants whose scholarship applications are rejected due to incorrect information provided.

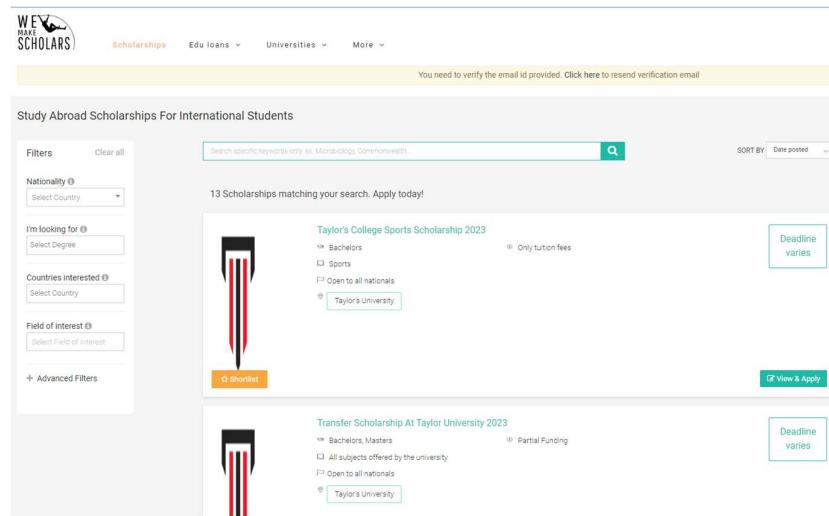


Figure 6: List of scholarship available in We Make Scholar website

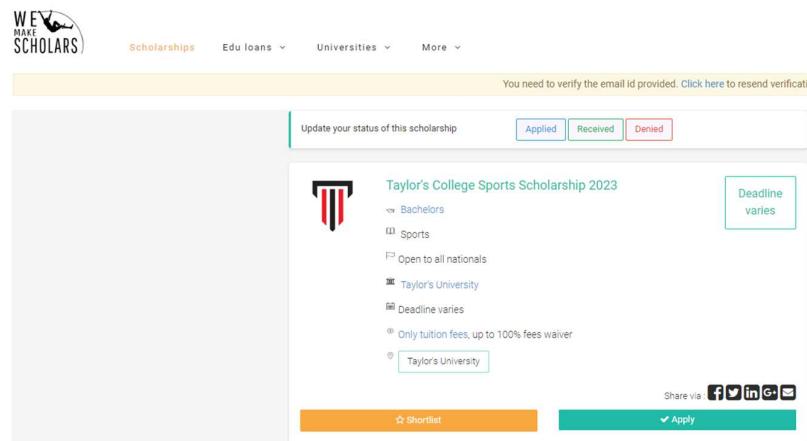


Figure 7: Details on the scholarship from We Male Scholar website

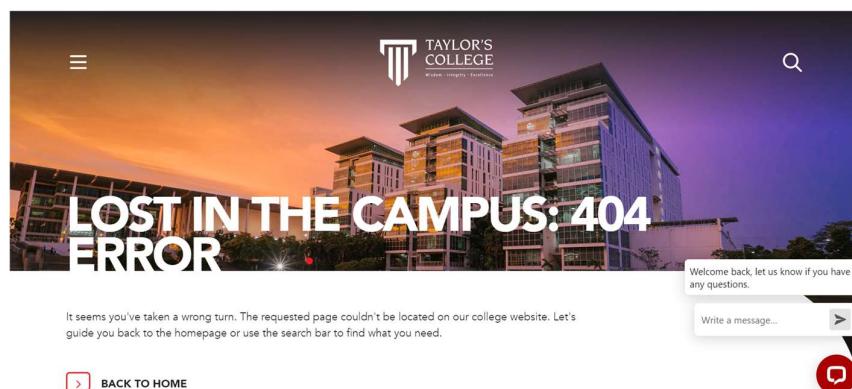


Figure 8: Page error due to outdated link form the Taylor's College website

Existing web application	Uni Enroll [15]	We Make Scholar [16]
Advantages	<ol style="list-style-type: none"> 1. Provide all available scholarships in Malaysia. 2. Performing a profile match algorithm based on the applicant's course and selected university to match with the best scholarship available (Figure A.1). 3. All services are free (Figure A.2). 4. The scholarship application is fully handled by the system (Figure A.2). 	<ol style="list-style-type: none"> 1. Provide all available scholarships from all over the globe. 2. Any user is allowed to publish a scholarship by submitting a form (Figure A.3). 3. Provide a variety of scholarship categories (Figure A.4).
Disadvantages	<ol style="list-style-type: none"> 1. The scholarship provider is not able to manage and update the scholarship in the system. 2. Did not provide any designated platform for the applicant to apply for the scholarship. 3. The applicant cannot keep track of the status of the scholarship application in the system. 	<ol style="list-style-type: none"> 1. Did not provide any designated platform for the applicant to apply for the scholarship. 2. The status of the scholarship is managed by the applicant itself (Figure 7). 3. Use email as the primary communication between the system and the applicant.

Table 1: Advantages and disadvantages of existing website

2.5. Introduction of proposed work

In the ever-evolving landscape of education, ensuring accessibility and affordability is crucial to fostering academic excellence and promoting inclusivity. The aims of this project are to develop a platform for scholarship providers to oversee their scholarship information and facilitate the selection process for applications. Subsequently, it aims to establish a platform enabling applicants to submit and manage their applications. The system also includes a platform for administrators to verify the registration of users as scholarship providers. Furthermore, it ensures that applicants receive real-time notifications updating them on the status of their scholarship applications.

The proposed Scholarship Management System aims to achieve several key objectives to enhance the overall efficiency and transparency of the scholarship application process. Firstly, the system will implement a feature for the applicants to submit a scholarship application. Secondly, it allows the scholarship provider to seamlessly manage, and update information related to their scholarship processes. The system will also incorporate a robust user verification and administration module, providing secure access control for the system administrator. Additionally, a document management feature will be introduced, enabling applicants to efficiently upload and manage the necessary documents for their scholarship applications. Lastly, a cutting-edge notification system will be integrated, leveraging the WhatsApp application to deliver real-time updates to applicants, thereby improving communication and keeping them informed about the progress of their scholarship applications. Collectively, these objectives aim to create a comprehensive and user-centric platform that revolutionizes the scholarship management process, benefiting both applicants and providers alike.

This proposed Scholarship Management System holds immense significance in promoting educational inclusivity, efficiency, and fairness. By addressing the limitations of existing systems, we aspire to empower educational institutions, scholarship providers, and students alike, fostering a conducive environment for academic growth and achievement.

3 SYSTEM REQUIREMENTS / ANALYSIS

3.1. Project scope, system capabilities, and system limitations.

The scholarship management system is a system that allows the applicant to apply for the scholarship, a scholarship provider to manage the scholarship process, and an administrator to administer the scholarship system. This project mainly helps students in Malaysia to have the accessibility to engage in higher education level and increase the transparency in gaining information regarding the available scholarship in Malaysia. The people that are involved in this project are the developer, administrators, scholarship providers, and the applicant. The SMS project is expected to be completed in one year.

The SMS will support various types of scholarships, including merit-based, need-based, and special achievement. Each type will have specific eligibility criteria and documentation requirements. The process of the application will require the applicant to access the portal update information and upload the required document through the system online. Moreover, a designated evaluation team will evaluate the scholarship application in the evaluation process by using predefined criteria proposed by the scholarship provider. The SMS will be accessible via mobile devices, allowing applicants to submit and track their applications on smartphones and tablets. The mobile interface will be user-friendly and responsive.

However, SMS can only be accessed by those who have internet access. The SMS interface is not fully accessible to individuals with visual impairments. This poses challenges for applicants with disabilities, limiting their ability to independently complete the application process. The scholarship provider lacks comprehensive reporting tools within the SMS. They cannot analyze the effectiveness of various scholarships or track trends in application demographics and success rates.

3.2. Project management

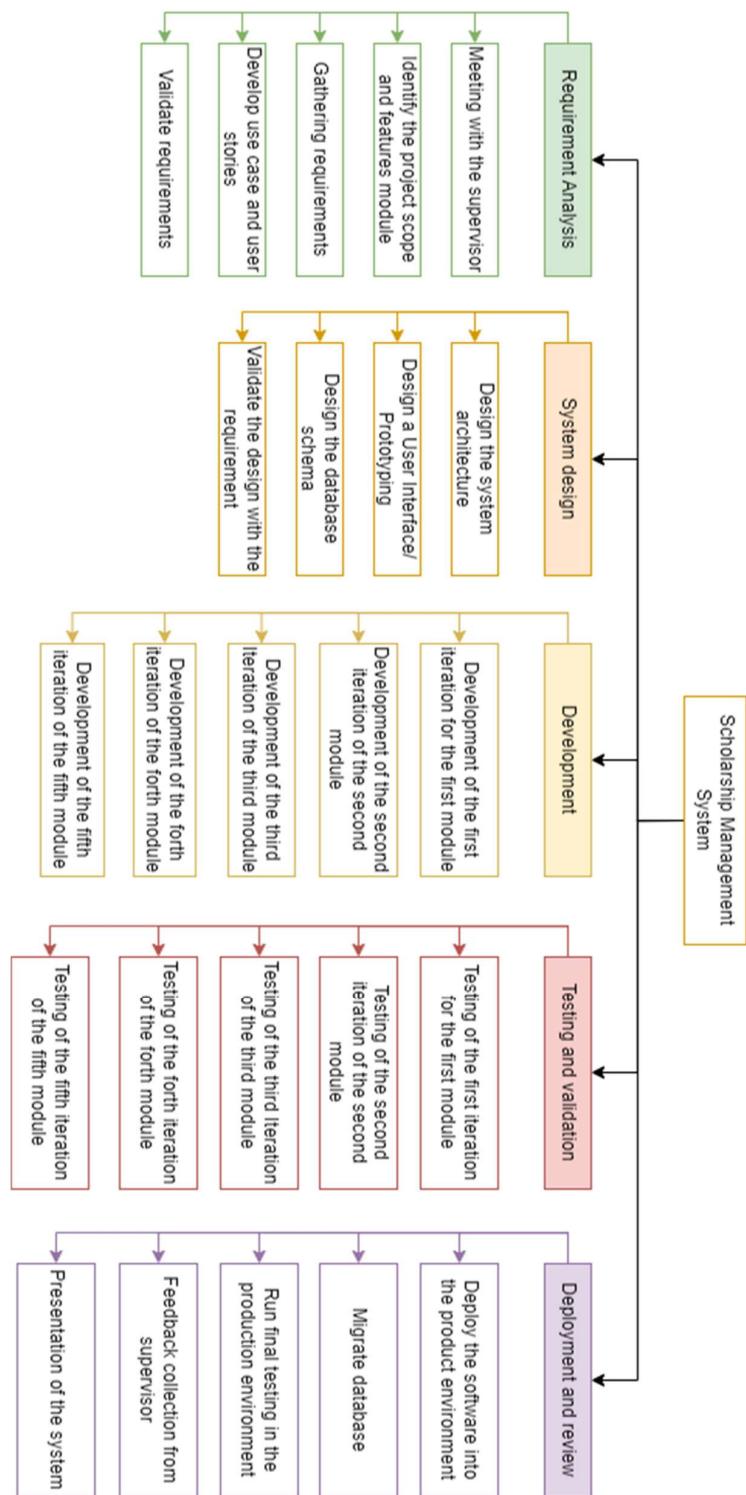


Figure 9: Work Breakdown Structure (WBS)

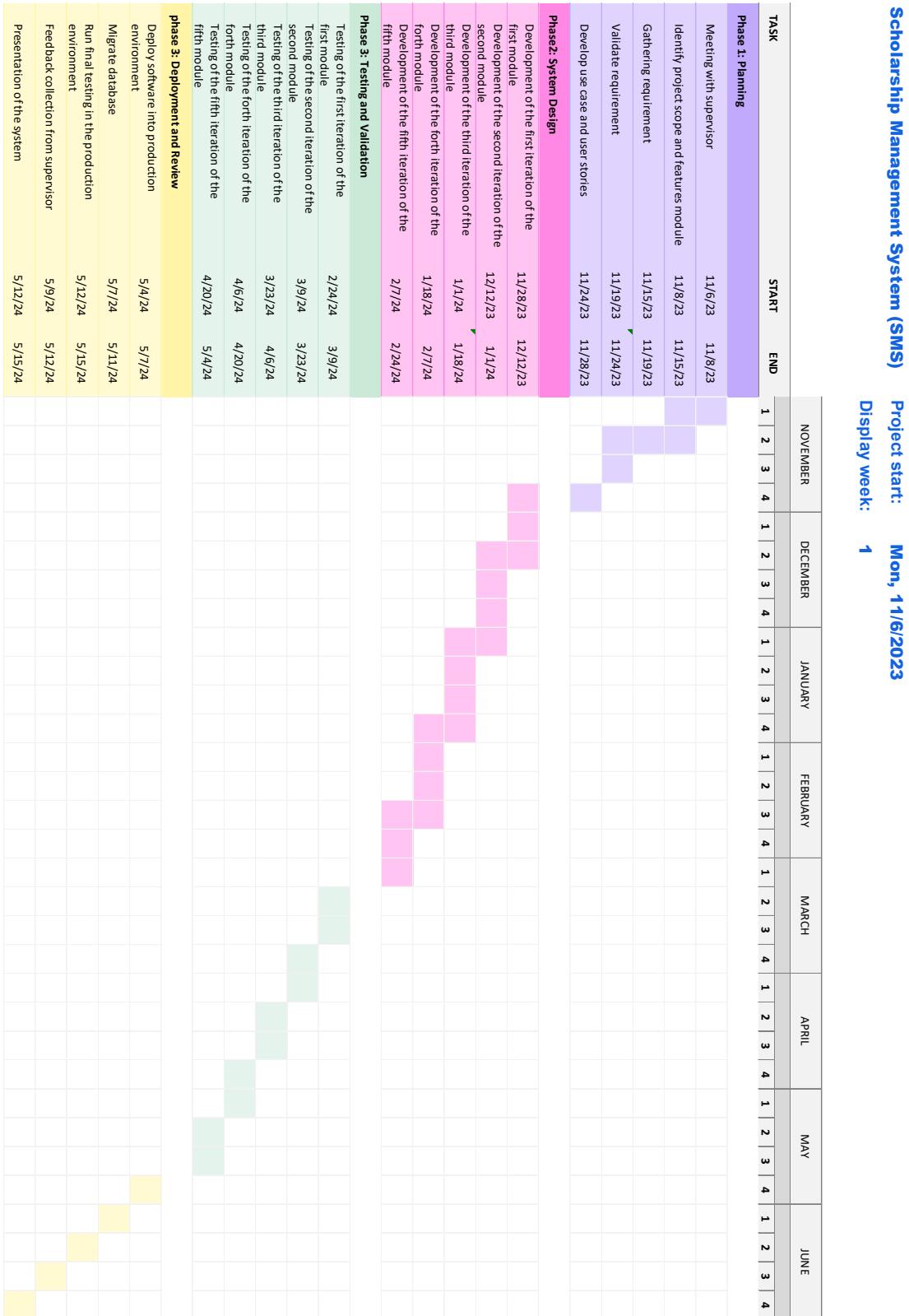


Figure 10: Gantt chart and miles stone timeline

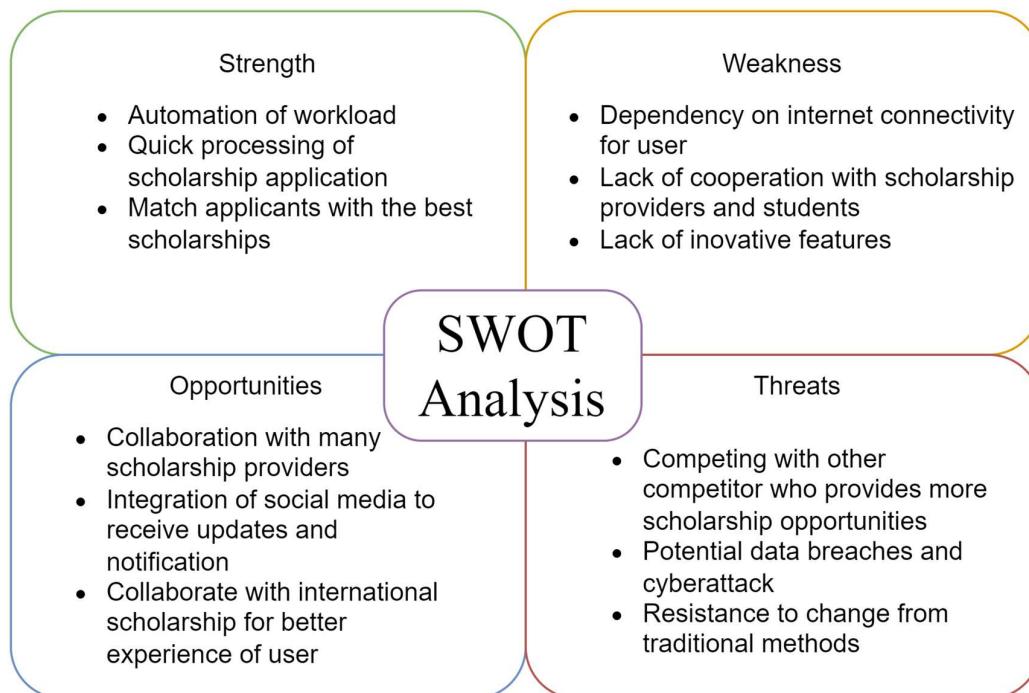


Figure 11: SWOT Analysis

3.3. Development methodology

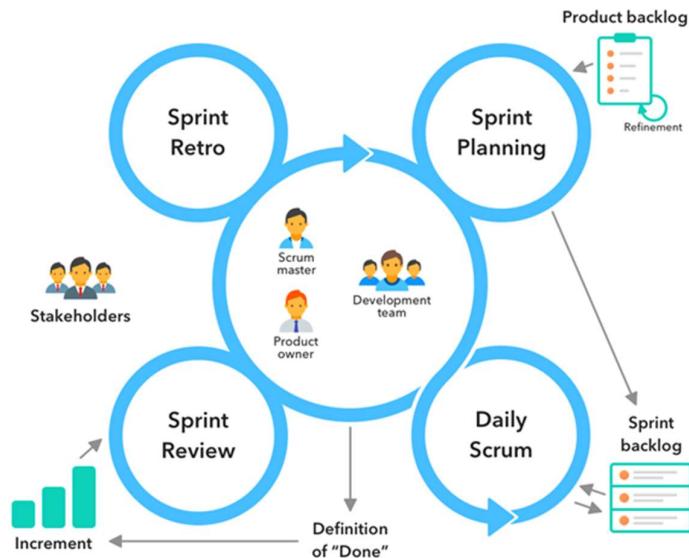


Figure 12: Scrum in software development methodology

The software engineering methodology utilized in this project is the Agile approach using a scrum method. Scrum requires a scrum team. As the project will be done individually, I am responsible as a product owner and development team, while the scrum leader will be my supervisor. The features, user stories, and tasks that need to be completed for the product will be listed as the product backlog, and the list will be arranged based on prioritization. To ensure the project is completed on time, a set of items from the product backlog to work on and commit to completing them within that time frame. During each sprint, a daily scrum meeting will be held with the supervisor if there is any update on the progress. After each sprint, a sprint review will be conducted with the supervisor online to gain feedback. Adjustments would be made for the next sprint process based on the sprint review. A potentially shippable product increment should be produced, and the product produced should be working and tested incrementally. Lastly, a sprint retrospective will be done to reflect on the area of improvement for the next sprint [14] (Figure 12).

4 SYSTEM DESIGN & IMPLEMENTATION

4.1. Detailed requirement

The Scholarship Management System (SMS) is a comprehensive platform that centralizes information on all available scholarships in Malaysia, providing a unified and standardized approach to the application process. This centralized system aims to streamline and harmonize the procedures for applying for scholarships, ensuring efficiency and accessibility for scholarship providers and applicants. Thus, below are the requirements and functionality that SMS offers to their users.

4.1.1. Functional requirements

1. User

Table 2 represents all the functional requirements for the administrator, scholarship provider, and applicant.

Requirement	Description
FR-01	Provide the administrator, scholarship provider and applicant the ability to register into the system.
FR-02	Provide the administrator, scholarship provider and applicant the ability to log in to the system.
FR-03	Provide the scholarship provider and the applicant the ability to change the password if the user forgot the password to log in into the system.
FR-04	Provide the ability for the scholarship provider and applicant to manage their profile.
FR-05	Provide the ability for the scholarship provider and applicant to manage a document frequently used in a scholarship process by adding and deleting documents.

Table 2: List of functional requirements for administrator, scholarship provider, and applicant

2. Administrator

Table 3 represents all the functional requirements for the administrator.

Requirement	Description
FR-06	Provide the administrator with the ability to verify a user who registers as a scholarship provider.
FR-07	Provide the ability for the user to search and view registered scholarships.
FR-08	Provide the administrator with the ability to enable and disable website content if the website is under maintenance.

Table 3: List of functional requirements for the administrator

3. Scholarship provider

Table 4 represents all the functional requirements for the scholarship provider.

Requirement	Description
FR-09	Provide the scholarship provider the ability to view the list and details of applicants who applied.
FR-10	Provide the scholarship provider with the ability to update the applicant's status.
FR-11	Provide the scholarship provider with the ability to give the applicant a remark as to why the application is rejected or accepted.
FR-12	Provide the scholarship provider with the ability to schedule an interview meeting if applicable.

FR-13	Provide the scholarship provider with the ability to add a user role to manage the scholarship.
FR-14	Provide the scholarship provider the ability to view the list of interview schedule.

Table 4: List of functional requirements for the scholarship provider

4. Applicant

Table 5 represents all the functional requirements for the applicant.

Requirement	Description
FR-15	Provide the applicant with the ability to search, bookmark, and view the best scholarship by selecting and filtering the scholarship by category.
FR-16	Provide the applicant with the ability to apply for the best scholarship available.
FR-17	Provide the ability for the applicant to search and view the list of scholarship history that had been applied and bookmarked.
FR-18	Provide the applicant with the ability to view the interview session scheduled by the scholarship provider.
FR-19	Provide the ability for the applicant to receive a notification update through WhatsApp.

Table 5: List of functional requirements for the applicant

4.1.2. Non-functional requirements

1. Performance

Requirement ID	Requirement	Description

QR-01	Response time	The time the system takes to respond to the user request should be 0.1 seconds 99% of the time.
QR-02	Scalability	The system should be scalable to handle an increasing number of scholarship applications, users, and concurrent sessions without significant degradation in performance.
QR-03	Interface	Graphical User Interface (GUI) is used as a standard interface for users
QR-04	Load average	Load on server resources will not be more than 75% on average.

Table 6: List of non-functional requirements for performance

2. Reliability

Requirement ID	Requirement	Description
QR-05	Availability	The website should have a high level of availability, ensuring that it is accessible to users at all times, with minimal downtime for maintenance or unexpected issues.
QR-06	Fault tolerance	The system should be designed to recover gracefully from failures, ensuring minimal impact on users in case of a system failure or error.
QR-07	Rate of error	The error rate of the user submitting information details through the system must not exceed 10%.

Table 6: List of non-functional requirements for reliability

3. Security

Requirement ID	Requirement	Description

QR-08	Authentication and authorisation	The system should authenticate the user's email and password before giving the user access to the system.
QR-09	Data encryption	All sensitive data, including personal information and documents, should be encrypted during transmission and storage to prevent unauthorised access.

Table 7: List of non-functional requirements for security

4. Usability

Requirement ID	Requirement	Description
QR-10	UI responsiveness	The user interface should be responsive and user-friendly, providing a positive and efficient user experience across various devices and screen sizes.
QR-11	Learnability	The process of managing and applying the scholarship is easy to understand by the users.

Table 8: List of non-functional requirements for usability

5. Maintainability

Requirement ID	Requirement	Description
QR-12	Code readability and complexity	The codebase should be well-documented and follow coding standards to facilitate ease of maintenance and future enhancements.
QR-13	Flexibility	The code must be flexible enough for different programmers to perform debugging and tracing of fault in the system.

Table 9: List of non-functional requirements for maintainability

6. Portability

Requirement ID	Requirement	Description
QR-14	Portable	The software system should be portable, so that there would be no problem to jump from one operating system to another operating system.
QR-15	Browser and other platform	The system should support all versions of a browser and other platforms used by the user, such as Microsoft Edge and Mozilla Firefox.

Table 10: List of non-functional requirements for portability

4.2. Analysis diagrams

4.2.1. Use case diagram

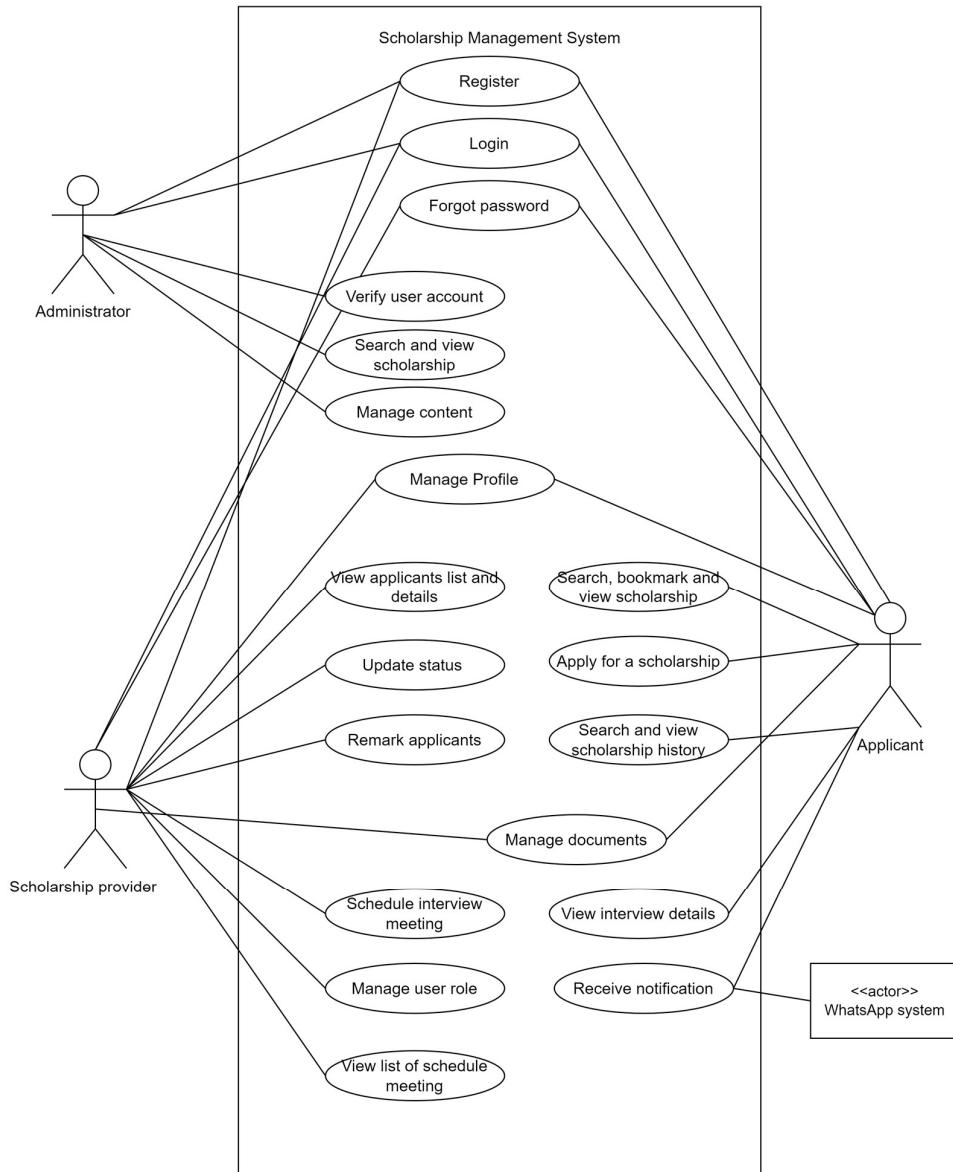


Figure 13: SMS use case diagram

4.2.2. Use case description

1. Users

1.1. Register

Use case ID	UC-01
Name	Register
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	Scholarship provider, applicant and administrator register into their account by inputting first name, last name, email, mobile number, IC number, address, register as applicant, scholarship provider and password.
Trigger event	Users want to register in the system.
Actors	Scholarship provider, applicant and administrator.
Precondition	None
Postcondition	The users pass the Recaptcha verification.
Result	The user's details and information are successfully stored in the database.
Main scenario	<ol style="list-style-type: none"> 1. The users clicks on the “Register” link. 2. The system will display a register page. 3. The users inputs first name, last name, email, mobile number, IC number and password. 4. The users selects to register as an applicant, scholarship provider, or administrator. 5. The system will validate and save user input into the system 6. The system will display a message “Successfully register”. 7. The user has access to all the functionality in the system.
Alternative scenario	None
Exception scenario	A user account with the same email already exists.
Qualities	<ol style="list-style-type: none"> 1. QR-08 (Authentication and validation) 2. QR-09 (Data encryption)

Table 11: Use case for registration

1.2. Login

Use case ID	UC-02
Name	Login
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	Scholarship providers, applicants and administrators log in to their account using email and password.
Trigger event	Users want to log into the system.
Actors	Scholarship provider, applicant and administrator.
Precondition	Users input their email and password.
Postcondition	Users input the correct email and password
Result	Users can access all the functionality in the system based on their roles.
Main scenario	<ol style="list-style-type: none"> 1. The users input their email and password into the system. 2. The system will validate the user input. 3. The system will display the message “Successfully login”. 4. The users have access to all the functionality in the system based on their respective roles.
Alternative scenario	None
Exception scenario	<ol style="list-style-type: none"> 1. Incorrect input of email and password. 2. The user did not register.
Qualities	<ol style="list-style-type: none"> 1. QR-08 (Authentication and validation) 2. QR-09 (Data encryption)

Table 12: Use case for login

1.3. Forgot password

Use case ID	UC-03
Name	Forgot password.
Author	Norsyasya Binti Mohd Nazri
Priority	High

Description	Provide a functionality for the users to change the password if the user forgot the password credentials.
Trigger event	The users forgot password.
Actors	Scholarship provider and applicant.
Precondition	The users already register.
Postcondition	None
Result	The user can log in into the system using the updated password.
Main scenario	<ol style="list-style-type: none"> 1. The user forgot the password. 2. The user click “Forgot password”. 3. The system will display forgot password page. 4. The user input their email. 5. The user clicks submit. 6. The system will send a forgot password link to the email.
Alternative scenario	None
Exception scenario	<ol style="list-style-type: none"> 1. The user input the wrong email. 2. The user did not receive the email.
Qualities	<ol style="list-style-type: none"> 1. QR-05 (Availability) 2. QR-07 (Rate of error)

Table 13: Use case for forgot password

1.4. Manage profile

Use case ID	UC-04
Name	Manage profile.
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	<p>Scholarship provider:</p> <p>Provide a function for the scholarship provider to input the information about the scholarship such as an overview of the scholarship, benefits, criteria needed, dateline of the scholarship and document needed to apply.</p>

	Applicant: The applicant updates their profile by adding and updating personal information such as full name, age, date of birth, address, phone number, IC number and other details. After updating their profile the applicant can view their updated profile.
Trigger event	The users want to manage their information.
Actors	Scholarship provider and applicant.
Precondition	The user's account has been verified.
Postcondition	The users save the changes made.
Result	The correct information about the profile is displayed.
Main scenario	<ul style="list-style-type: none"> 7. The users want to update their profile information. 8. The users input the information needed to update their profile. 9. The users save the changes made. 10. The system saves the changes into the database 11. A notification displayed “Changes successfully applied”.
Alternative scenario	None
Exception scenario	<ul style="list-style-type: none"> 1. Incorrect or outdated information display. 2. Users did not save the changes made.
Qualities	<ul style="list-style-type: none"> 3. QR-05 (Availability) 4. QR-07 (Rate of error)

Table 14: Use case for manage profile

1.5. Manage documents

Use case ID	UC-05
Name	Manage documents.
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	The applicant can view, add and delete documents that are frequently needed to apply for a scholarship.

Trigger event	The user wants to view, add and delete documents.
Actors	Scholarship provider and applicant
Precondition	Only documents in PDF format can be uploaded.
Postcondition	None
Result	The system will show the list of documents that have been uploaded into the system.
Main scenario	<p>To view the document:</p> <ol style="list-style-type: none"> 1. The users click the “view” button to view the documents. 2. The system will display the respective document. <p>To add a document:</p> <ol style="list-style-type: none"> 1. The users want to add a document by clicking the “Add” button. 2. The system will display a document details page for the users to upload documents. 3. The users upload the documents and save them. 4. The system shows a notification “Document uploaded successfully”. <p>To delete a document:</p> <ol style="list-style-type: none"> 1. The users select the document that needs to be deleted. 2. The users click the “delete” icon. 3. The system will delete the document from the database.
Alternative scenario	None
Exception scenario	The users did not save the changes.
Qualities	<ol style="list-style-type: none"> 1. QR-04 (Load average) 2. QR-05 (Availability) 3. QR-07 (Rate of error) 4. QR-09 (Data encryption)

Table 15: Use case for manage documents

2. System Administrator

2.1. Verify user account

Use case ID	UC-06
Name	Verify user account.
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	The administrator wants to verify a user account that had been registered as a scholarship provider.
Trigger event	The administrator wants to verify a user account.
Actors	Administrator
Precondition	None
Postcondition	None
Result	The system verifies the user account.
Main scenario	<ol style="list-style-type: none"> 1. The system displays the list of registered users. 2. The administrator selects and views the details of the user. 3. The system displays the details of the registered user. 4. The administrator reviews the details of the registered user. 5. The administrator verified the user account. 6. The system will update the database and a notification “User successfully verified” is displayed.
Alternative scenario	None
Exception scenario	None
Qualities	<ol style="list-style-type: none"> 1. QR-08 (Authentication and verification) 2. QR-05 (Availability)

Table 16: Use case for verify user account

2.2. Search and view scholarship

Use case ID	UC-07
Name	Search and view scholarship.

Author	Norsyasya Binti Mohd Nazri
Priority	Medium
Description	The administrator can search and view the details of the registered scholarship.
Trigger event	The administrator wants to search and view the scholarship details.
Actors	Administrator
Precondition	The scholarship has been verified and registered.
Postcondition	None
Result	The system will show the list and the details of each scholarship registered.
Main scenario	<ol style="list-style-type: none"> 1. The administrator search for the name of the scholarship from the list of scholarship. 2. The system will display the search results. 3. The administrator selects and views the details of the scholarship. 4. The system displays the details of the scholarship.
Alternative scenario	None
Exception scenario	<ol style="list-style-type: none"> 1. The scholarship has not been verified. 2. The scholarship does not exist.
Qualities	QR-04 (Load average)

Table 17: Use case for search and view scholarship

2.3. Manage content

Use case ID	UC-08
Name	Manage content
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	The administrator can manage the page content by enabling and disabling content and pages when the system is in maintenance mode.

Trigger event	The administrator wants to manage the content of the webpage.
Actors	Administrator
Precondition	None
Postcondition	The administrator saves the changes made.
Result	The content will be displayed or hidden from the applicant.
Main scenario	<ol style="list-style-type: none"> 1. The system will display the details of the scholarship. 2. The administrator will disable or enable the content of the scholarship to be displayed to the applicant. 3. The administrator saves the changes. 4. The system will show a notification “Changes successfully made”.
Alternative scenario	None
Exception scenario	<ol style="list-style-type: none"> 1. The administrator did not save the changes. 2. The content is displayed when the administrator disables it and vice versa.
Qualities	QR-01 (Response time)

Table 18: Use case for manage content

3. Scholarship provider

3.1 View applicant list and details

Use case ID	UC-09
Name	View the applicant list and details.
Author	Norsyasya Binti Mohd Nazri
Priority	Medium
Description	Provide a function for the scholarship provider to view the list and the details of applicants who applied for the scholarship.
Trigger event	The scholarship provider wants to view the list and details of applicants.
Actors	Scholarship provider.
Precondition	None
Postcondition	None

Result	The list of applicants is displayed.
Main scenario	<ol style="list-style-type: none"> 1. The scholarship provider wants to view the list of applicants. 2. The scholarship selects one of the applicants from the list sorted by status. 3. The system displays the applicant's details such as full name, age, date of birth, address, phone number, IC number and other details.
Alternative scenario	None
Exception scenario	No applicant applied for the scholarship.
Qualities	QR-04 (Load average)

Table 19: Use case for view applicant list and details

3.2. Update status

Use case ID	UC-10
Name	Update status.
Author	Norsyasya Binti Mohd Nazri
Priority	Medium
Description	The scholarship provider updates the status of the application either pending, shortlisted, accepted, or rejected.
Trigger event	The scholarship provider wants to update the status of the application.
Actors	Scholarship provider.
Precondition	The applicants view the applicant details.
Postcondition	The scholarship provider save the changes made.
Result	The status of the applicant is updated.
Main scenario	<ol style="list-style-type: none"> 1. The scholarship provider has reviewed the application details of the applicant. 2. The scholarship provider updates the status of the application. 3. The scholarship provider saves the changes made. 4. The system updates the information in the database

	<p>5. The system shows a notification that “changes successfully updated”.</p> <p>6. The system will send a notification update to the applicant through WhatsApp.</p>
Alternative scenario	None
Exception scenario	None
Qualities	<p>1. QR-01 (Response time)</p> <p>2. QR-05 (Availability)</p>

Table 20: Use case for update status

3.4. Remark applicant

Use case ID	UC-11
Name	Remark applicant.
Author	Norsyasya Binti Mohd Nazri
Priority	Medium
Description	The scholarship provider gives a remark to the applicant as to why the application for the scholarship is rejected or pending.
Trigger event	The scholarship provider wants to remark on the scholarship application of the applicant
Actors	Scholarship provider.
Precondition	The applicant details exist in the system.
Postcondition	The scholarship provider saves the changes made.
Result	The applicant can view the remark from the scholarship provider.
Main scenario	<p>1. The scholarship provider has reviewed the application details of the applicant.</p> <p>2. The scholarship provider gives a remark to the applicant.</p> <p>3. The scholarship provider saves the changes made.</p> <p>4. The system updates the information in the database.</p> <p>5. The system shows a notification that “changes successfully updated”.</p>

	6. The system will send a notification update to the applicant through WhatsApp.
Alternative scenario	None
Exception scenario	None
Qualities	<ol style="list-style-type: none"> 1. QR-01 (Response time) 2. QR-05 (Availability)

Table 21: Use case for update applicant

3.5 Schedule interview meeting

Use case ID	UC-12
Name	Schedule an interview meeting.
Author	Norsyasya Binti Mohd Nazri
Priority	Medium
Description	The scholarship provider can schedule an interview meeting with the applicant by adding the meeting details such as date, time and interview link.
Trigger event	The scholarship provider wants to schedule a meeting with the applicants.
Actors	Scholarship provider.
Precondition	<ol style="list-style-type: none"> 1. The applicant details exist in the system. 2. The applicant status is shortlisted.
Postcondition	The scholarship provider save the changes made.
Result	The applicant can view the meeting schedule by the scholarship provider.
Main scenario	<ol style="list-style-type: none"> 1. The scholarship provider has updated the status of the applicants to shortlisted. 2. The scholarship provider input the date, time and link of the interview session. 3. The scholarship provider saves the changes made. 4. The system saves the changes into the database. 5. The system shows a notification that “Changes successfully updated”.

	6. The system will send a notification update to the applicant through WhatsApp.
Alternative scenario	None
Exception scenario	None
Qualities	<ol style="list-style-type: none"> 1. QR-01 (Response time) 2. QR-05 (Availability)

Table 22: Use case for schedule interview meeting

3.6. Manage user role

Use case ID	UC-13
Name	Manage user role.
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	The scholarship provider can add and delete a user who can access and manage the scholarship account.
Trigger event	The scholarship provider wants to manage users.
Actors	Scholarship provider.
Precondition	None
Postcondition	None
Result	<ol style="list-style-type: none"> 1. If the user is added, the user can access the scholarship account. 2. If the user has been deleted, the user cannot access the scholarship account.
Main scenario	<ol style="list-style-type: none"> 1. The scholarship provider clicks the “User” page. 2. The system will display the list of users. 3. The scholarship provider click the “Add” button. 4. The system will display the user details. 5. The scholarship provider fills in the details of the new user such as email, password and role of the user. 6. The scholarship provider saves the changes. 7. The system updates the database and shows a notification “User successfully added”

Alternative scenario	None
Exception scenario	None
Qualities	<ol style="list-style-type: none"> 1. QR-01 (Response time) 2. QR-04 (Availability) 3. QR-07 (Rate of error)

Table 23: Use case for manage user role

3.7 View list of schedule meeting

Use case ID	UC-14
Name	View list of schedule meeting
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	The scholarship provider can see the list of schedule meeting with the applicant such as the date, time and the link of the interview meeting.
Trigger event	The scholarship provider wants to view list of schedule meeting.
Actors	Scholarship provider.
Precondition	None
Postcondition	None
Result	<ol style="list-style-type: none"> 1. The system will display the list of schedule meeting.
Main scenario	<ol style="list-style-type: none"> 1. The scholarship provider clicks “Meeting Schedule” page. 2. The system display the list of schedule meeting, sorted by the recent time and date.
Alternative scenario	None
Exception scenario	None
Qualities	<ol style="list-style-type: none"> 4. QR-01 (Response time) 5. QR-04 (Availability) 6. QR-07 (Rate of error)

Table 24: Use case for view list of schedule meeting

4. Applicant

4.1 Search, bookmark, and view scholarship

Use case ID	UC-15
Name	Search, bookmark and view scholarship
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	The applicant can search for an available scholarship and view the details of the scholarship.
Trigger event	The applicant wants to search and view an available scholarship
Actors	Applicant
Precondition	The scholarship must be valid.
Postcondition	None
Result	The system will display the search results of available scholarships.
Main scenario	<ol style="list-style-type: none"> 1. The applicant inputs the name of the scholarship and clicks “search”. 2. The applicant can also search for a scholarship by filtering by category. 3. The system shows all the search results of the related scholarships. 4. The applicant selects one of the scholarships from the search results. 5. The system will display the details of the scholarship. 6. The applicant clicks on the “bookmark” icon. 7. The system will add the scholarship into scholarship history as a bookmark scholarship.
Alternative scenario	None
Exception scenario	The scholarship name is not valid or available.
Qualities	QR-04 (Load average)

Table 25: Use case for search, bookmark and view scholarship

4.2. Apply for a scholarship.

Use case ID	UC-16
Name	Apply for a scholarship
Authors	Norsyasya Binti Mohd Nazri
Priority	High
Description	The applicant can apply for the scholarship by filling up the details such as full name, age, date of birth, and IC number and uploading the document that is needed to apply for the scholarship.
Trigger event	The applicant wants to apply for the scholarship
Actors	Applicant
Precondition	None
Postcondition	The applicant clicks the submit button.
Result	The system will submit the application to the scholarship provider.
Main scenario	<ol style="list-style-type: none"> 1. The applicant clicks on the “apply” button. 2. The system will display an application form. 3. The applicant will be filling up and uploading all information and documents needed to apply for the scholarship. 4. The applicant submits the form to the system. 5. The system will display a notification “form successfully submitted”. 6. The system will add the scholarship to the scholarship history.
Alternative scenario	None
Exception scenario	<ol style="list-style-type: none"> 1. The applicant did not apply. 2. The document is not in pdf format.
Quality	<ol style="list-style-type: none"> 1. QR-02 (Scalability) 2. QR-05 (Availability) 3. QR-07 (Rate of error)

	4. QR-09 (Data encryption) 5. QR-11 (Learnability)
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Table 26: Use case for apply for a scholarship

4.3. Search and view scholarship history.

Use case ID	UC-17
Name	Search and view scholarship history
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	The applicant can search and view all applied scholarships and scholarships that have been bookmarked by the applicant. The applicant also can view the status of the applied scholarship.
Trigger event	<ol style="list-style-type: none"> 1. The applicant wants to view the status of the applied scholarship. 2. The applicant wants to view the bookmark scholarship.
Actors	Applicant
Precondition	<ol style="list-style-type: none"> 1. The scholarship is valid. 2. The scholarship is bookmarked. 3. The scholarship has been applied.
Postcondition	None
Result	The system will show the history of applied and bookmark scholarships.
Main scenario	<ol style="list-style-type: none"> 1. The applicant searches for the applied and bookmarked scholarship. 2. The system lists all the search results. 3. The applicant selects one of the scholarships from the search results. 4. The system shows the details of the scholarship such as the status, the date of application and the details that have been submitted for the scholarship.
Alternative scenario	None

Exception scenario	1. The applicant did not apply for the scholarship. 2. The applicant did not bookmark the scholarship.
Qualities	QR-04 (Load average)

Table 27: Use case for search and view scholarship history

4.4. View interview details

Use case ID	UC-18
Name	View the interview details.
Author	Norsyasya Binti Mohd Nazri
Priority	Medium
Description	The applicant can view the interview details scheduled by the scholarship provider such as date, time and the interview link.
Trigger event	The applicant wants to view the interview details.
Actors	Applicant
Precondition	The applicant has applied for a scholarship that requires an interview.
Postcondition	None
Result	The system will display the interview details to the applicant.
Main scenario	<ol style="list-style-type: none"> 1. The applicant clicks the “Dashboard” page. 2. The system will display the dashboard page. 3. The applicant selects the interview from the list of interviews. 4. The system displays the details of the interview to the applicant.
Alternative scenario	None
Exception scenario	None
Qualities	QR- 04 (Load average)

Table 28: Use case for view interview details

4.5. Receive notification

Use case ID	UC-19
Name	Receive notification
Author	Norsyasya Binti Mohd Nazri
Priority	High
Description	The applicant can receive an update notification regarding the status of the scholarship through WhatsApp.
Trigger event	The scholarship provider updates the status of the scholarship application.
Actors	Applicant
Precondition	The applicant has submitted the scholarship application and the process is ongoing within the system.
Postcondition	None
Result	The applicant receives a notification through WhatsApp.
Main scenario	<ol style="list-style-type: none"> 1. The applicant has applied for the scholarship and is waiting for the update of the scholarship application. 2. The system sends an update notification through WhatsApp to the applicant. 3. The applicant receives and opens the message notification and logs into the SMS.
Alternative scenario	None
Exception scenario	<ol style="list-style-type: none"> 1. The applicant receives an invalid message or notification. 2. The applicant did not receive notification due to the wrong number.
Qualities	QR-04 (Load average)

Table 29: Use case for receive notification

4.2.3. System sequence diagram

1. Users

1.1 Users manage profile

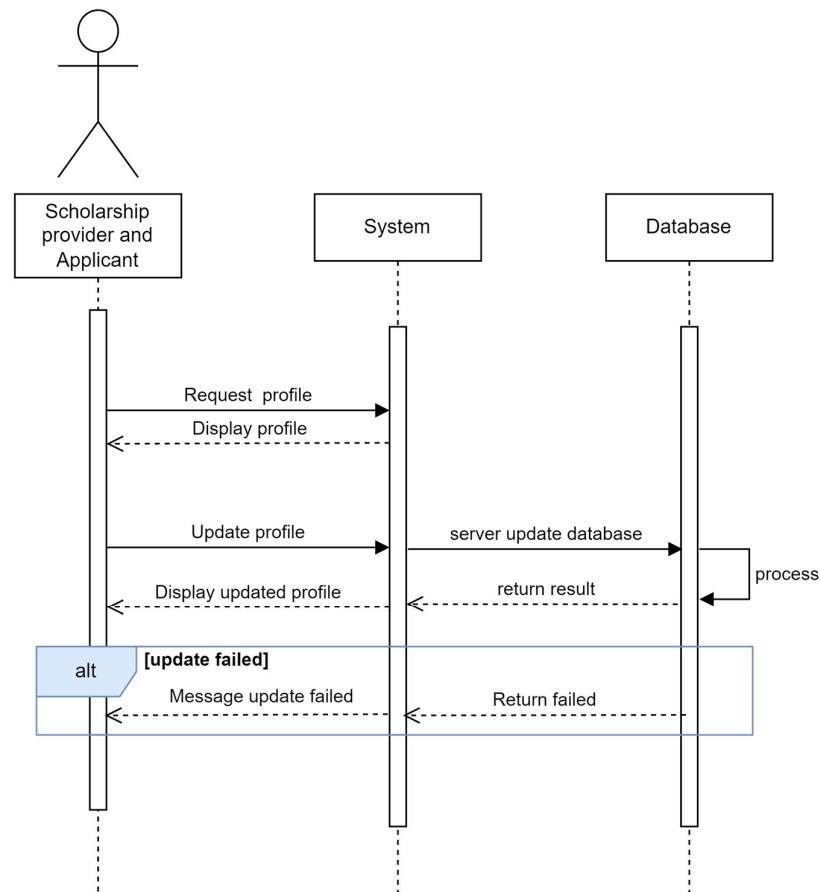


Figure 14: Sequence diagram for the scholarship provider and the applicant to manage profile

1.2 Users manage documents

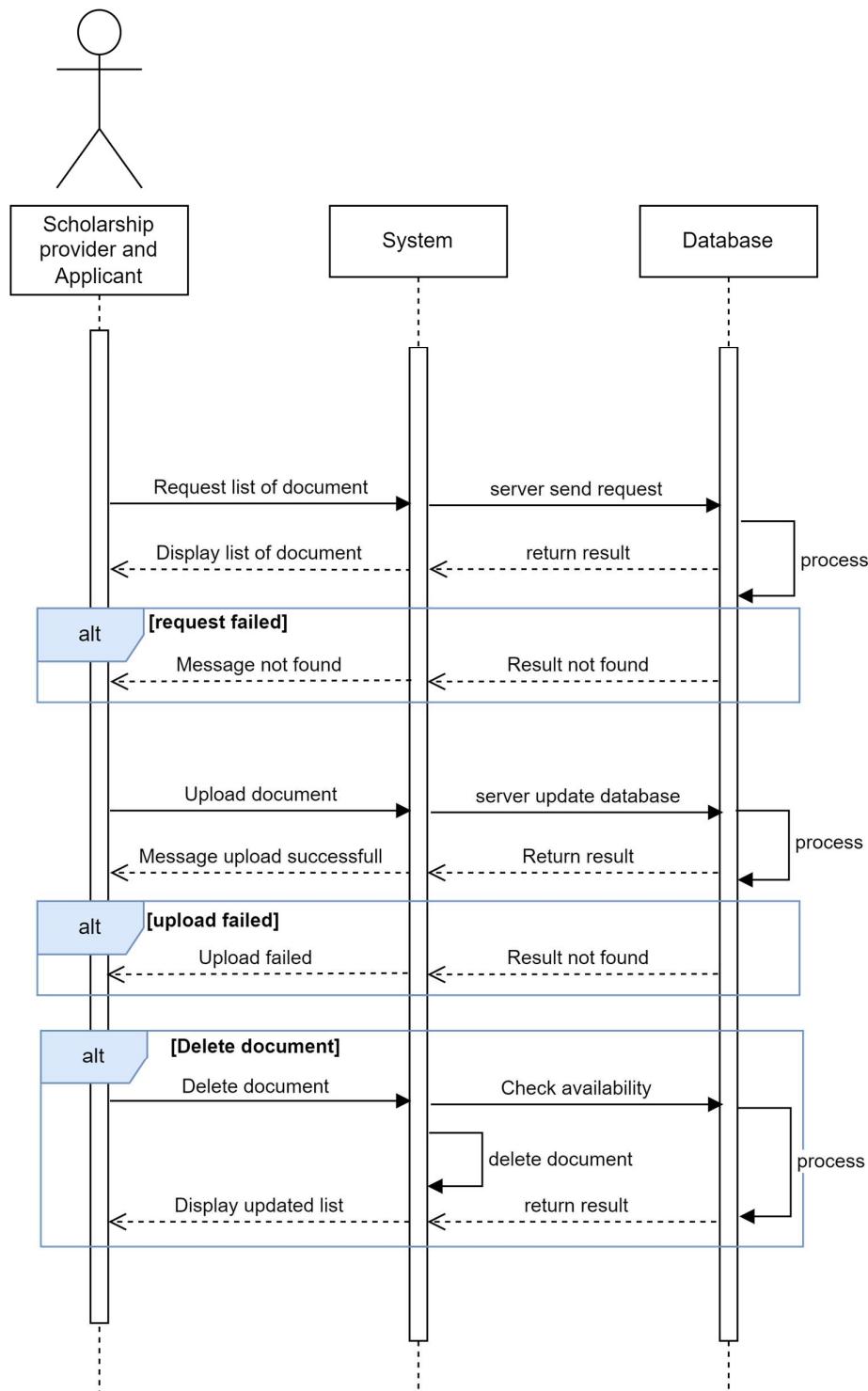


Figure 15: Sequence diagram for the scholarship provider and the applicant to manage documents

2. Administrator

2.1 Administrator verify user

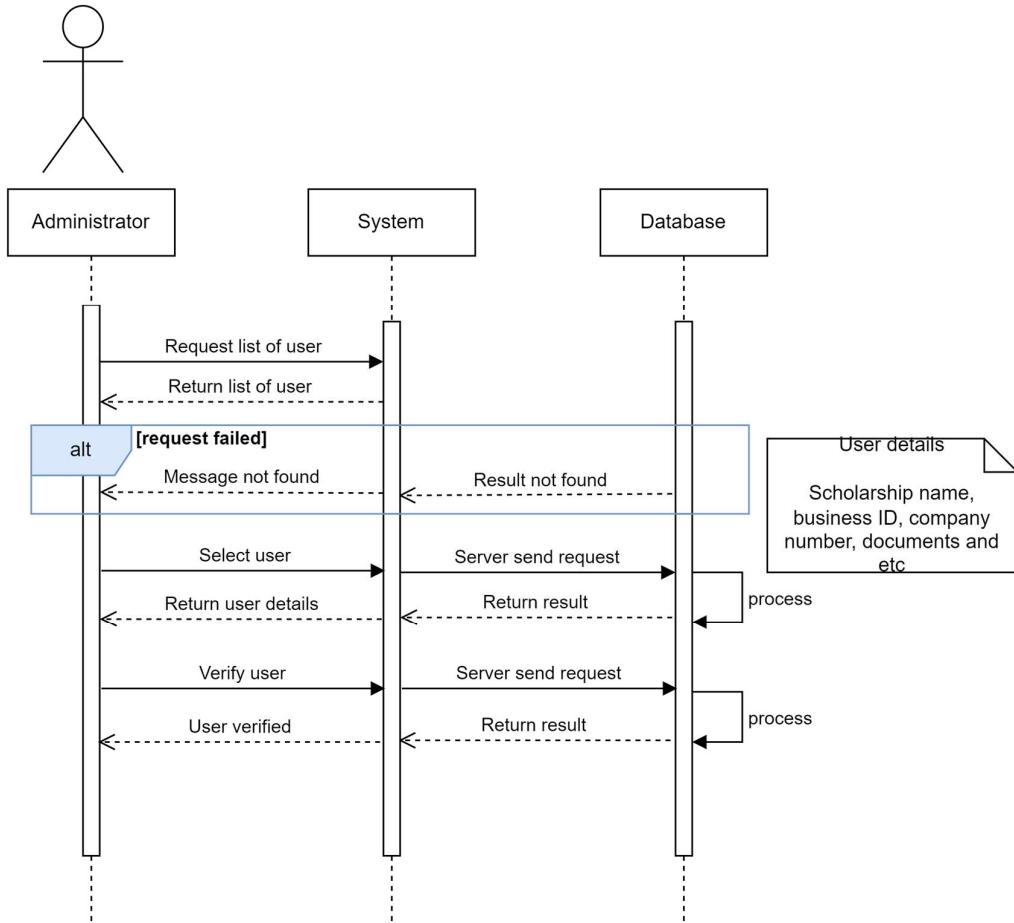


Figure 16: Sequence diagram for the administrator to verify user

2.2 Administrator disable or enable content of the system

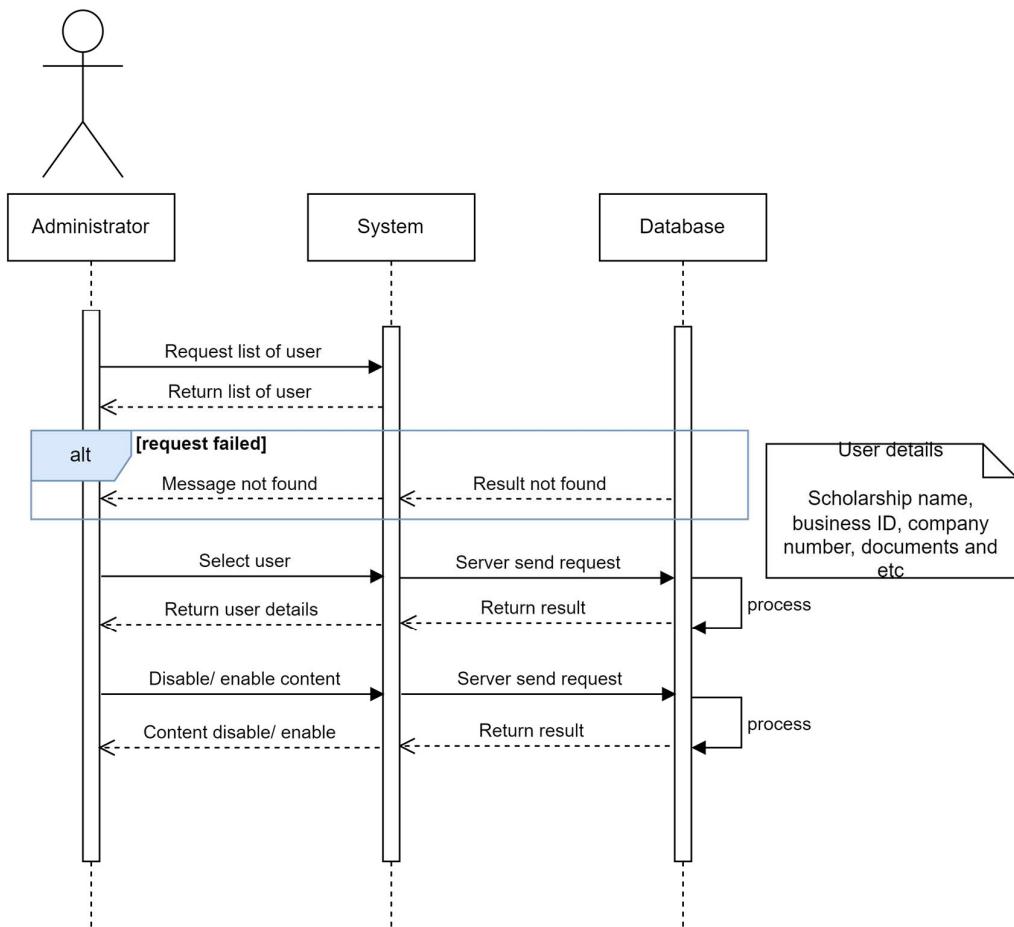


Figure 17: Sequence diagram for the administrator to disable or enable content of the system

3. Scholarship provider

3.1 Review applicant scholarship application

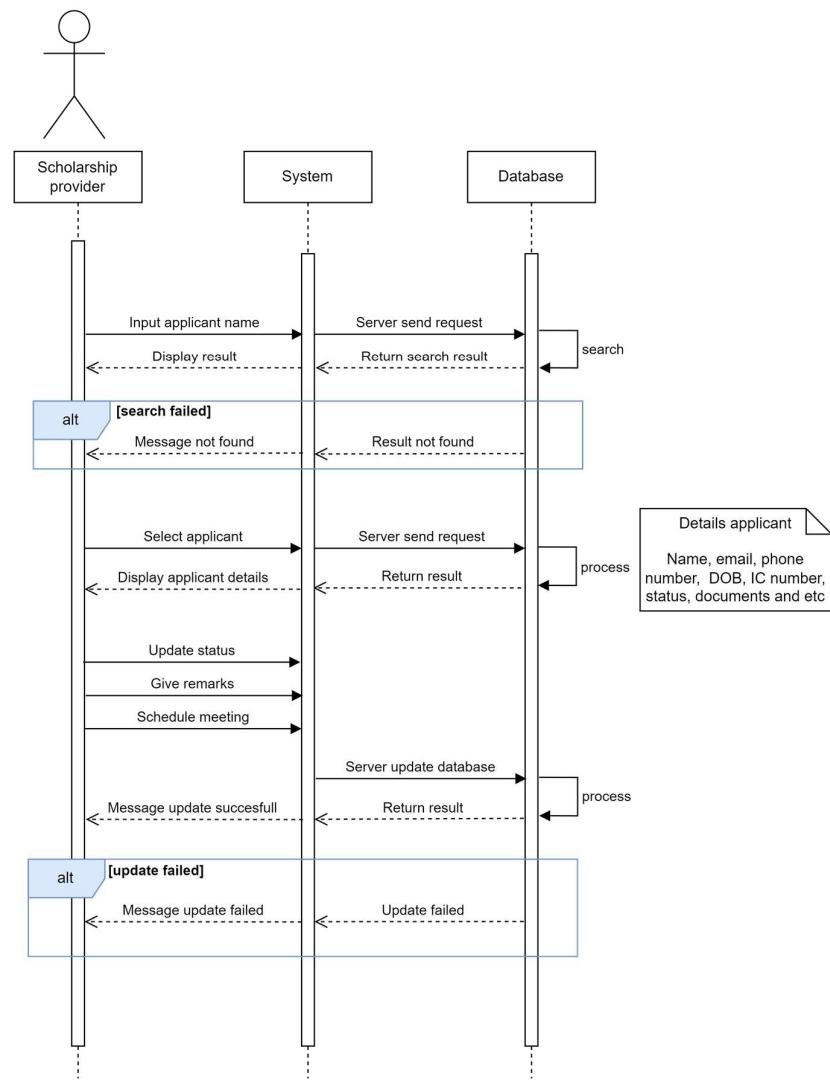


Figure 18: Sequence diagram for the scholarship provider to review applicant scholarship application

3.2 Scholarship provider manage user account

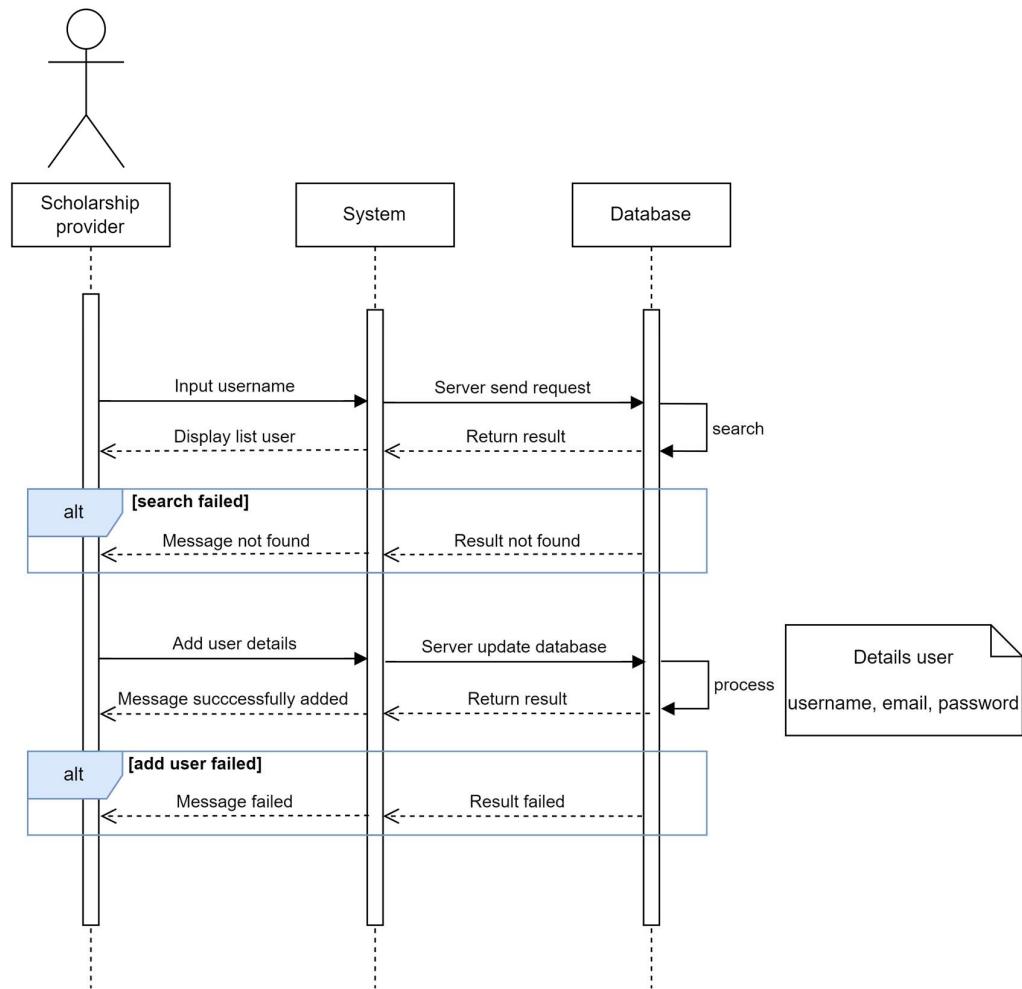


Figure 19: Sequence diagram for the scholarship provider to manage user account

3.3 Scholarship provider view list of interview meeting

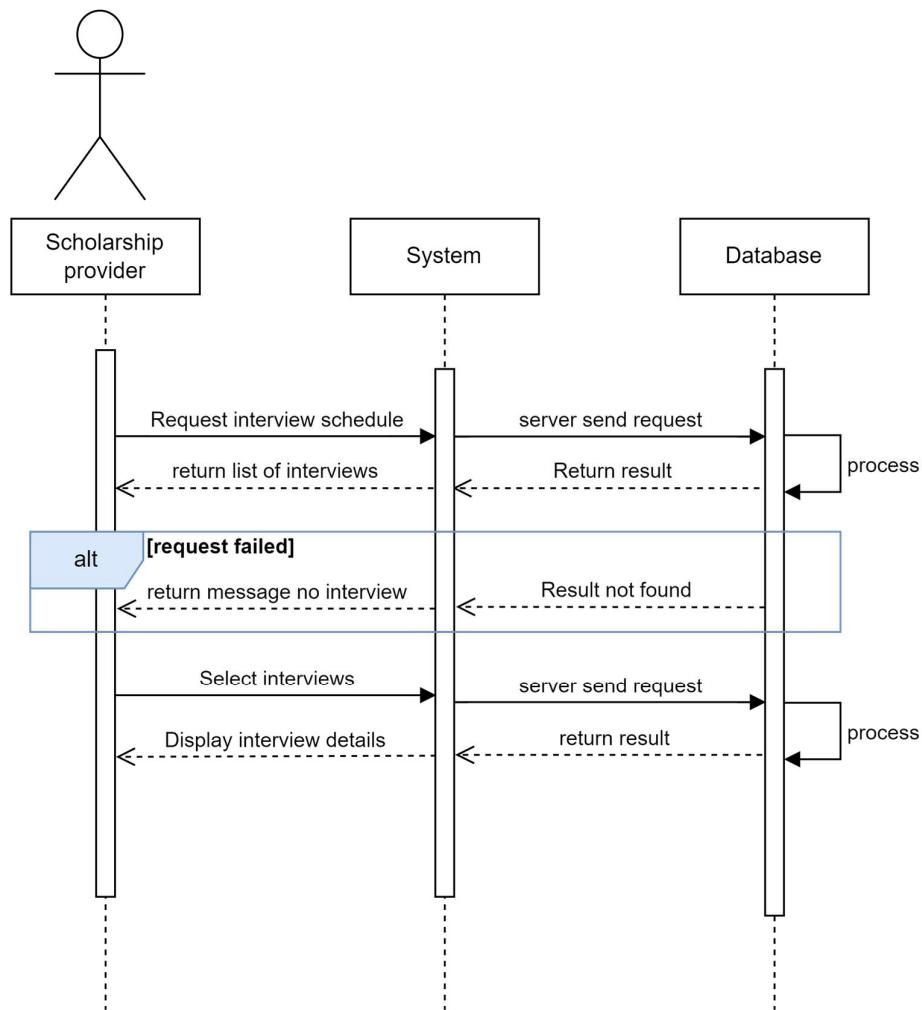


Figure 20: Sequence diagram for scholarship provider to view list of interview meeting

4. Applicant

4.1 View list and details of scholarship

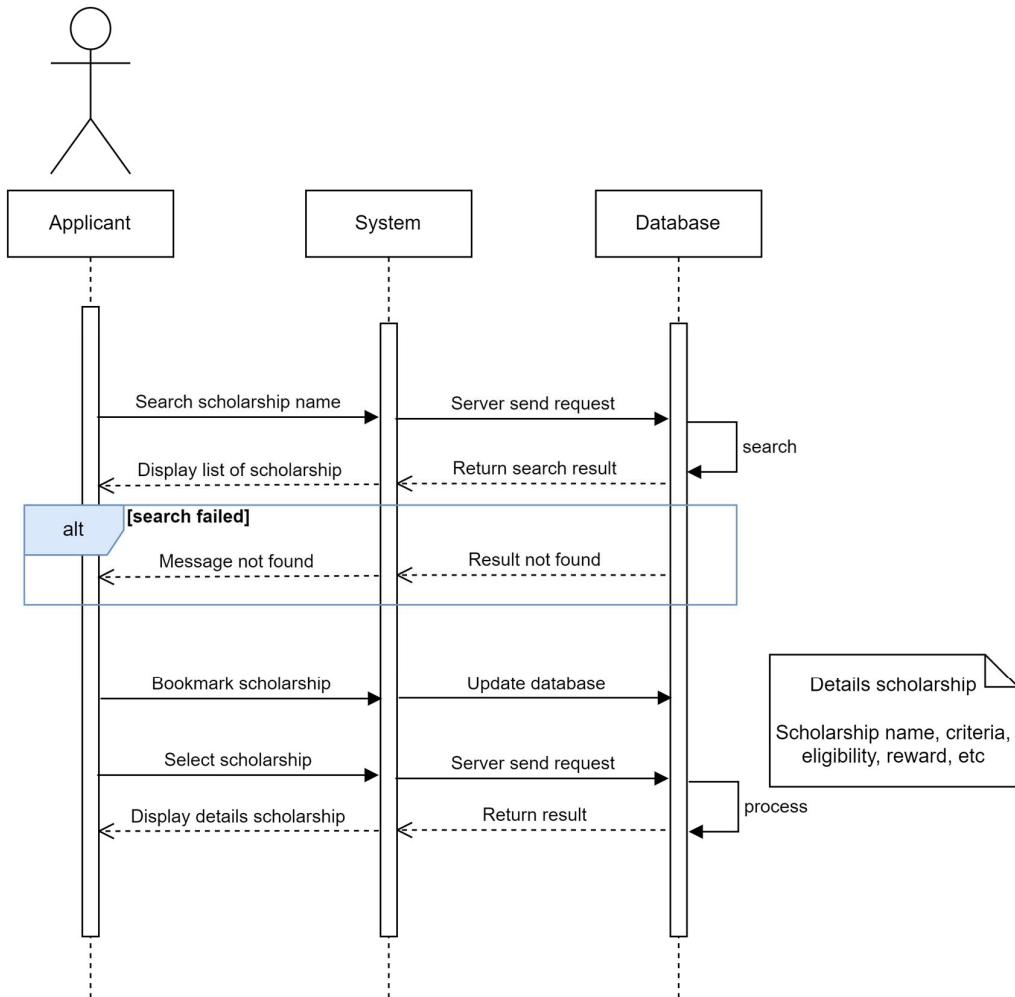


Figure 21: Sequence diagram for the applicant to view the list and details of the scholarship

4.2 Apply for a scholarship

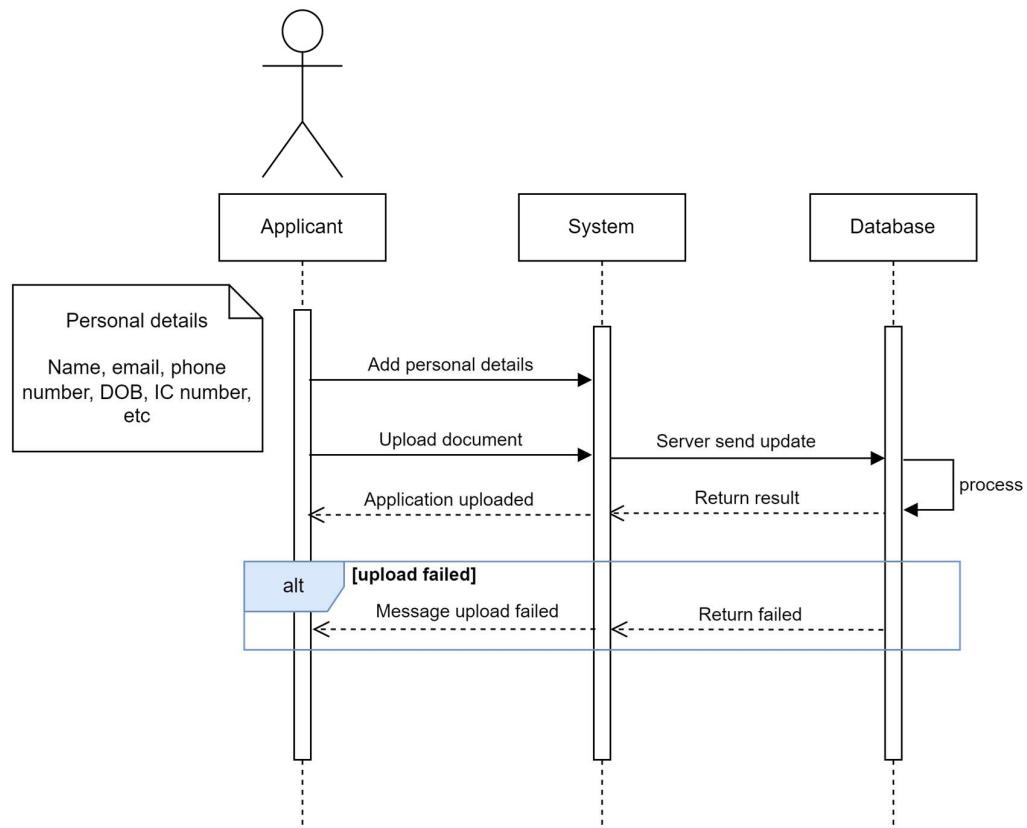


Figure 22: Sequence diagram for the applicant to apply for a scholarship

4.3 View scholarship history

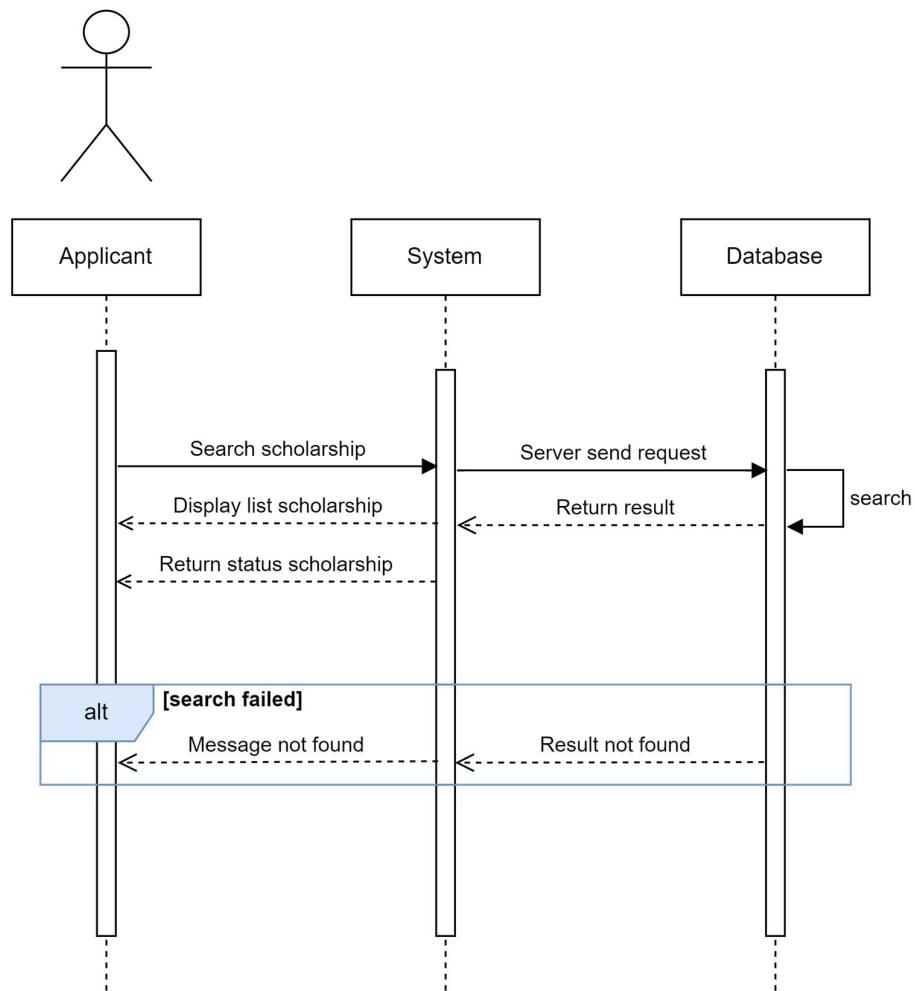


Figure 23: Sequence diagram for the applicant to view scholarship history

4.4 Search and view interview meeting

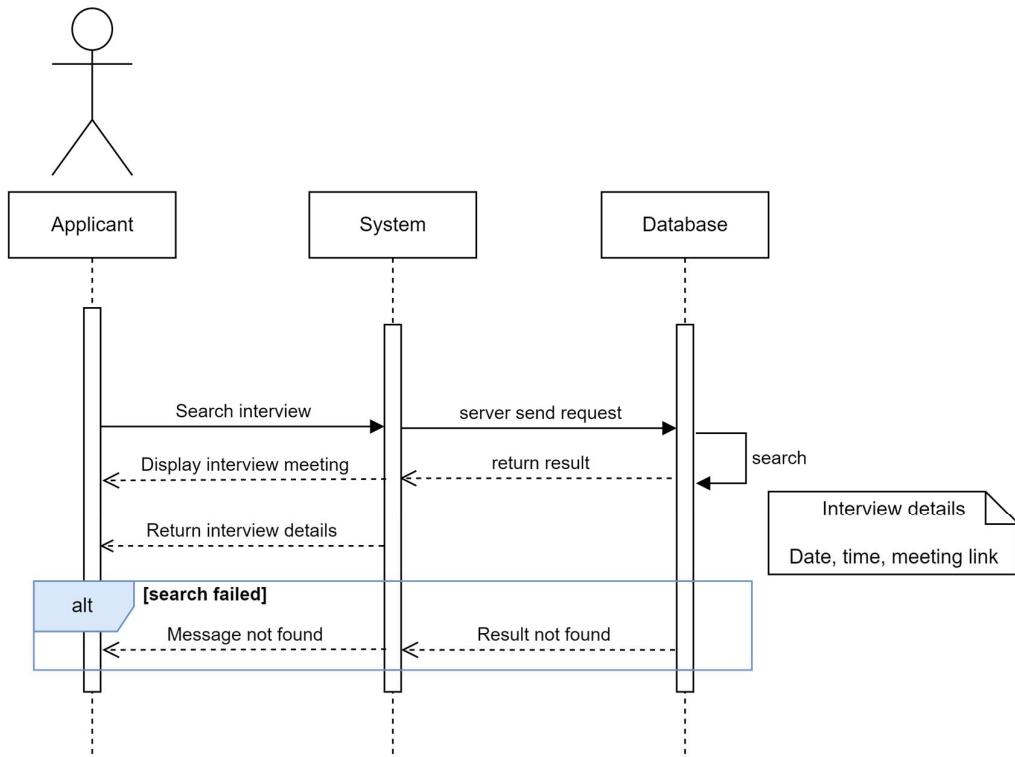


Figure 24: Sequence diagram for the applicant to search and view interview meeting

4.3. Detailed description of the proposed system

Based on figure 2, SMS consists of five modules, they are User management module, Applicant module, Scholarship provider module, Administrator module, Notification module, and Document Management module. Table 29 shows the details and the functionalities of each module and sub-module of the system.

Module	Sub-module	Functionalitites
User management module	User profile module	Allow user to manage or update their information in the system.
	User registration module	Allow the user to register themselves as a scholarship provider and applicant.

	User authentication module	Allow user to log into the system by authenticating their login credentials.
Administrator module	User verification module	The system administrator can select and verify a user who has been registered as a scholarship provider.
	Content management module	The administrator is allowed to disable the content of the website if the website is under maintenance.
Scholarship provider module	Selection module	Streamlines and automates various processes, such as application review and selection of the applicant.
	Account management module	Handles user roles and permissions, allowing scholarship providers to control access and manage the system effectively.
	Interview listing module	Display a list of interview schedule by the scholarship provider
Applicant Module	Scholarship listing module	Displays a list of available scholarships, including eligibility criteria, deadlines, and award amounts.

	Scholarship application module	Allows students to create and submit scholarship applications. It typically includes features for collecting personal information, academic records, essays, and other required documents.
	Scholarship history module	Display all the recent scholarship applications, history and a favourable scholarship.
Notification module		Enables the applicant alert with incoming updates from the scholarship provider through WhatsApp.
Document management module		Stores and organises all the necessary documents associated with the scholarship application.

Table 30: Table of module and sub-module of SMS

Based on the architecture diagram of SMS in figure 1, SMS consists of three users that interact with the system. They are the administrator, scholarship provider and applicant. Then, SMS provided each of the users with different interfaces with different modules and functions to allow each user automates the system efficiently.

In this architecture diagram, web server plays a crucial role as it serves as the central component responding to the users or client request. It processes requests from the user's web browser, retrieves the requested resources from the database and sends them back to the clients. The web server acts as an intermediary between the user device and the server of the Scholarship management system, facilitating the delivery of content

and ensuring smooth interaction between the client and the server-side components of the SMS.

For instance, the applicant will send their data of scholarship information into the system. Then the data will be transmitted to the web server for processing over a network. The communication that occurs between the applicant device and the web server is through HTTPS protocols. Next the web server may perform various operations such as validation or authenticating the data to process the applicant data. Finally, once the data is processed, the web server will interact with the database to store the information.

SMS used a MySQL database to store all the information and data of the clients. MySQL database was chosen in this project as it can handle a large amount of data, suitable for high- traffics website because of its high performance, efficient data retrieval and high- throughput. Moreover, MySQL is an open-source database and easier to implement in the project. Thus, it can be a cost and time effective option compared to some proprietary database management system.

Finally, WhatsApp API is used as a tool of communication to send notifications and updates from the user. This is because WhatsApp is an application that is mostly used as a primary tool for communication between people. Once the scholarship provider had finished reviewing and updating the status of the scholarship of the applicant. The data will be transmitted to the webserver and then the webserver will process the data and send an automatic message to the applicant phone number.

4.4. Technology deployed and hardware

Hardware/ Technology	Specification
Lenovo Ideapad Flex 5	<ul style="list-style-type: none"> • Processor: AMD Ryzen 7 5700U with radeon graphics • RAM: 16 GB
Operating System (OS)	<ul style="list-style-type: none"> • Windows • Apache Linux

Integrated Development Environment (IDE)	Visual Studio Codes
Version Control System (VCS)	Github
Programming languages	<ul style="list-style-type: none">• PHP• Javascript• AJAX• HTML• CSS
Database	MySQL

Table 31: List of technology and hardware use in the project

5 CONCLUSION & FUTURE WORK

In conclusion, the scholarship management system (SMS) is a pivotal tool in revolutionizing the administration of scholarship programs, offering enhanced efficiency, transparency, and inclusivity. Through automation and data-driven insights, the SMS streamlines processes reduces administrative burdens and promotes equal access to educational opportunities. Implementing such systems has significantly improved scholarship management and educational ecosystems.

Future work in scholarship management systems could focus on continuous refinement and expansion. This may involve integrating advanced technologies such as artificial intelligence and machine learning to automate decision-making processes further and personalize scholarship recommendations based on individual student profiles. Additionally, enhancing cybersecurity measures within the SMS is crucial to safeguard sensitive student information and maintain the integrity of the scholarship allocation process.

In conclusion, while scholarship management systems have significantly improved scholarship administration, ongoing developments and collaborations are necessary for the continued evolution of these systems. The future holds promising opportunities for innovation, efficiency, and increased accessibility, ultimately contributing to the broader mission of making education more equitable and accessible for all.

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APPENDICES

A. Existing system interface

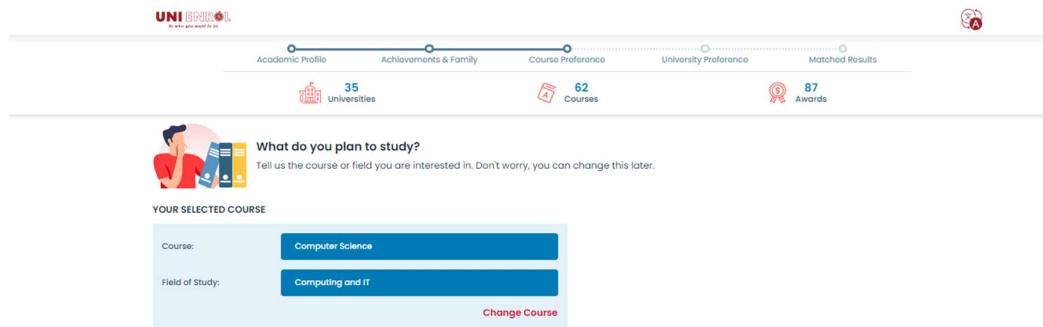


Figure A.1: Uni Enroll pathway match

- In general good health and condition
- Neither parents are in the JPA blacklist and are not subjected to any legal actions by JPA
- Not a recipient of any other financial sponsorship for studies
- First-time SPM candidates, who have just undertaken the most recent SPM examination
- Below 19 year-old in the year of the SPM examination
- Scored at least **A+** in **9 subjects** i.e. including Bahasa Melayu, Bahasa Inggeris, Matematik, Sejarah, Matematik Tambahan, Fizik, Kimia and Pendidikan Islam / Pendidikan Al-Quran Dan As-Sunnah / Pendidikan Syariah Islamiah / Pendidikan Moral.
- Scored at least **A-** for any remaining subjects.

Highlights

- This scholarship is in our list of top 10 full malaysian scholarships to study overseas.
- JPA sponsorship i.e. all the study expenses, is actually provided in the form of a study loan (*pinjaman boleh ubah*) that student would have to repay upon graduation. The loan may be converted to a full/partial scholarship, depending on the recipient's employer upon graduation:
 - 0% loan repayment (full scholarship) if recipient is employed under civil service (*Perkhidmatan Awam*)

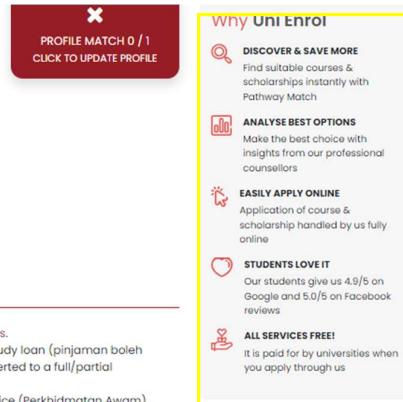


Figure A.2: Uni Enroll provides the advantages of Uni Enroll in the yellow highlighted box

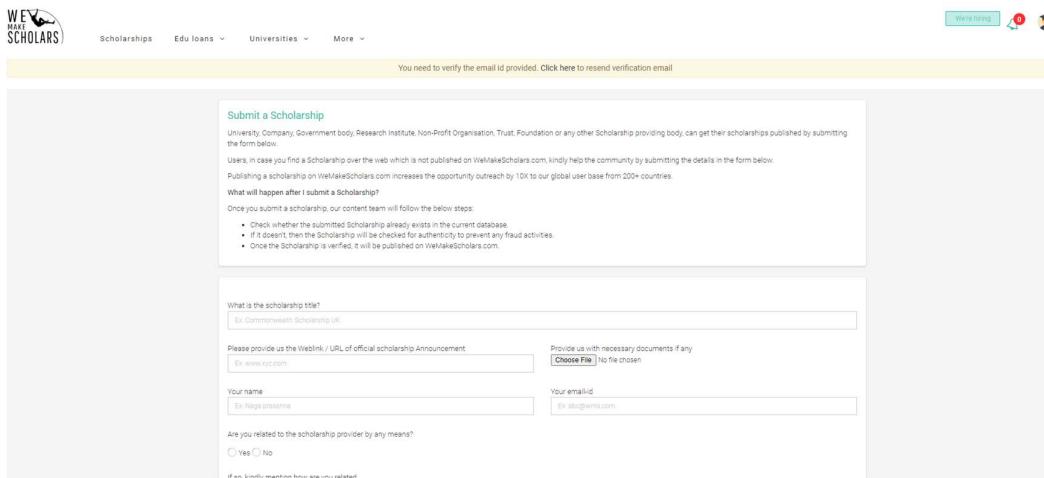


Figure A.3: We Make Scholar allow user to publish a scholarship online

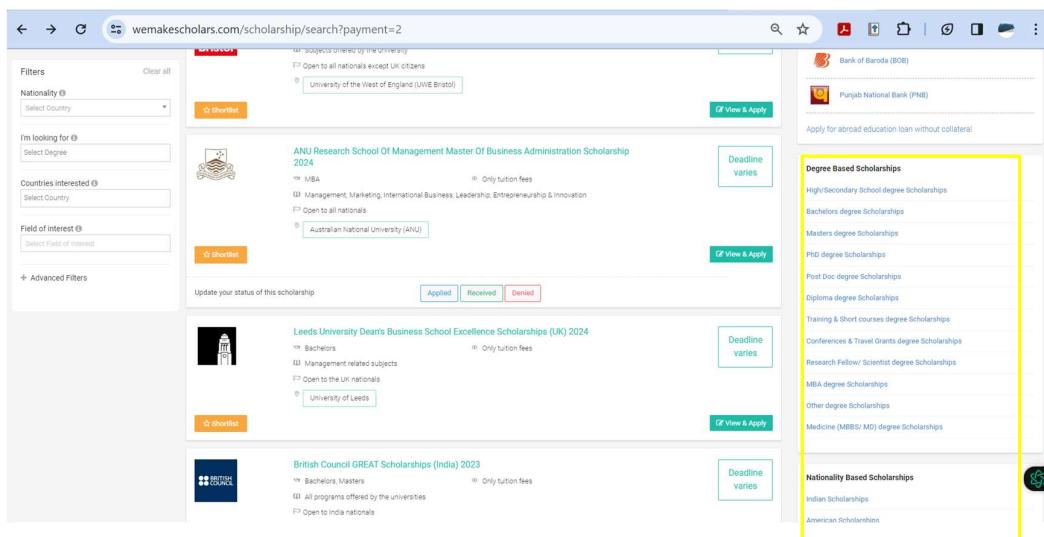


Figure A.4: We Make Scholar provide a variety of scholarship categories

B. SMS design interface.

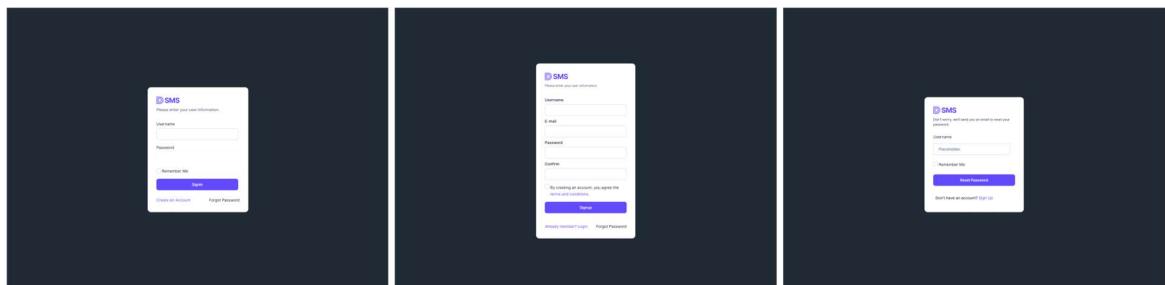


Figure B.1: User login, register and forgot password interface

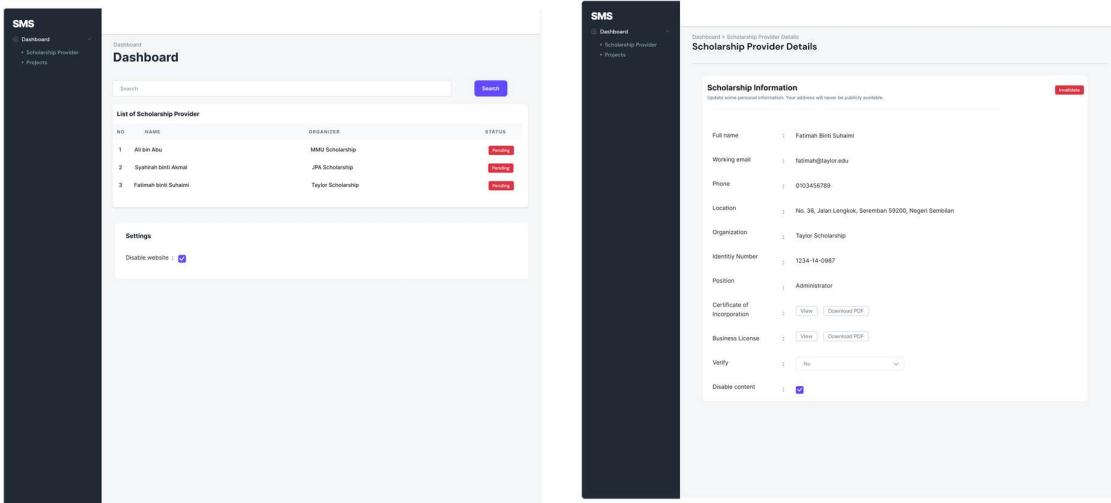


Figure B.2: Admin interface to verify and manage content

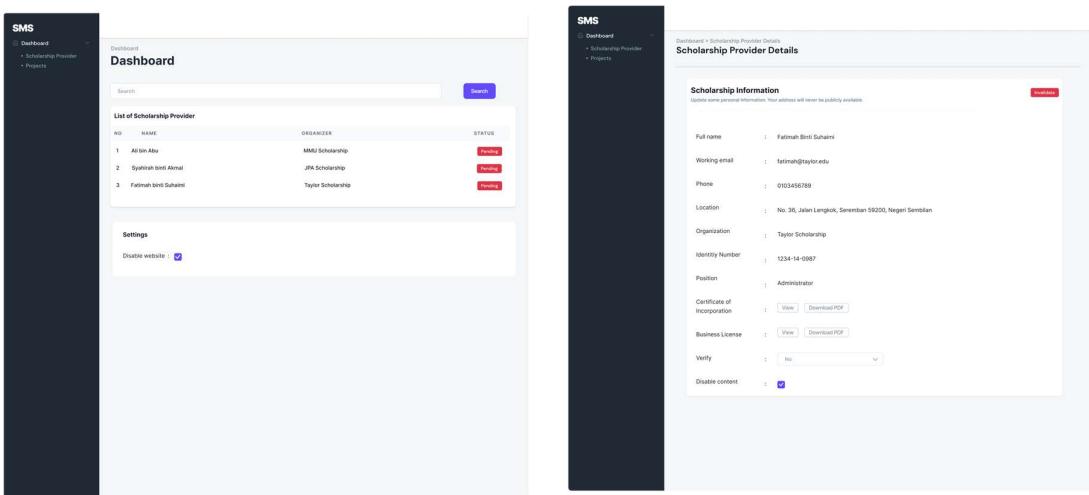


Figure B.3: Scholarship provider interface to manage profile

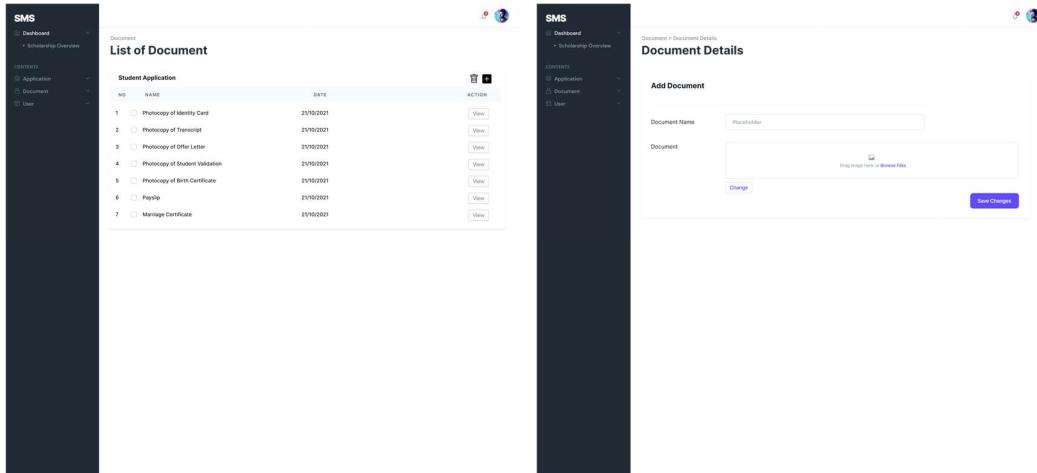


Figure B.4: Scholarship provider interface to manage document

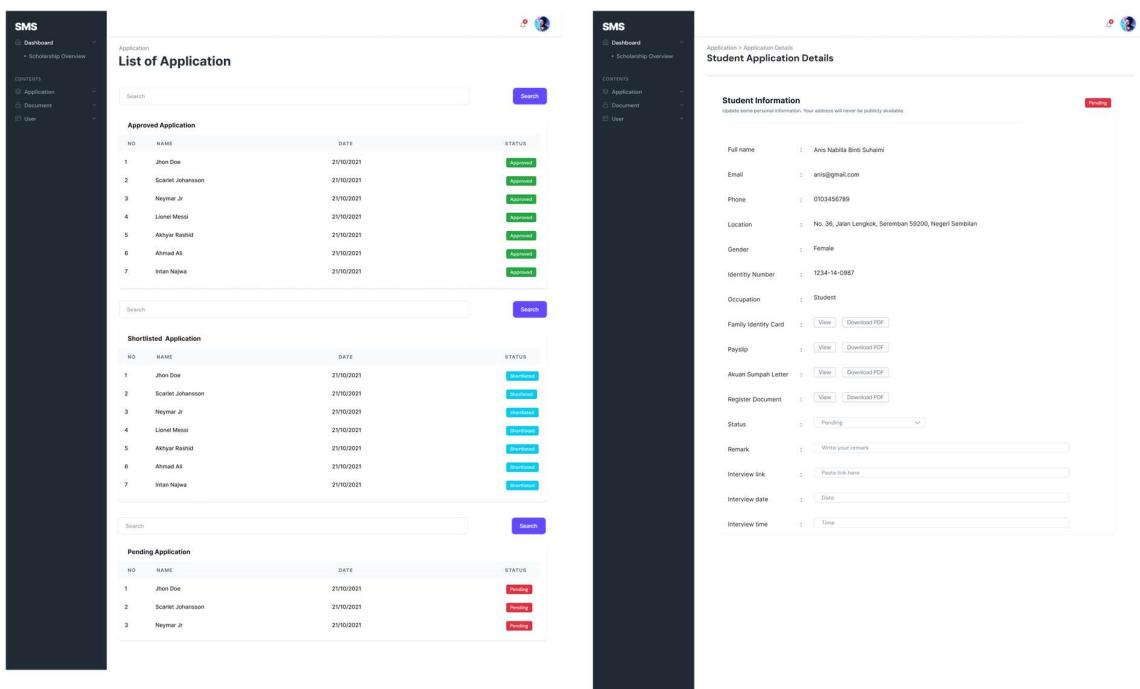


Figure B.5: Scholarship provider interface to select and review scholarship application

List of User

ID	NAME	DATE	ACTION
1	Ali bin Ali	21/02/2021	Admin 1
2	Amran Bin Ali	21/02/2021	Admin 2

User Details

Add user

Username: Placeholder

Password: Placeholder

Role: Select Option

Save Changes

Figure B.6: Scholarship provider interface to manage user role

Profile Overview

About Me

STUDIES

Interview Session

Account Details

General Settings

Avatar: Placeholder

Cover photo: Placeholder

Basic Information

Fulname: Placeholder

Email: Placeholder

Bio: Placeholder

Studies: Placeholder

Phone: Placeholder

Date Of Birth: Placeholder

Location: Placeholder

Save Changes

Figure B.7: Applicant interface to view and manage profile

List of Document

Student Application

ID	NAME	DATE	ACTION
1	Photocopy of Identity Card	21/02/2021	View
2	Photocopy of Transcript	21/02/2021	View
3	Photocopy of Offer Letter	21/02/2021	View
4	Photocopy of Student Validation	21/02/2021	View
5	Photocopy of Birth Certificate	21/02/2021	View
6	Pasip	21/02/2021	View
7	Maneger Certificate	21/02/2021	View

Document Details

Add Document

Document Name: Placeholder

Document: Placeholder

Change

Save Changes

Figure B.8: Applicant interface to manage document

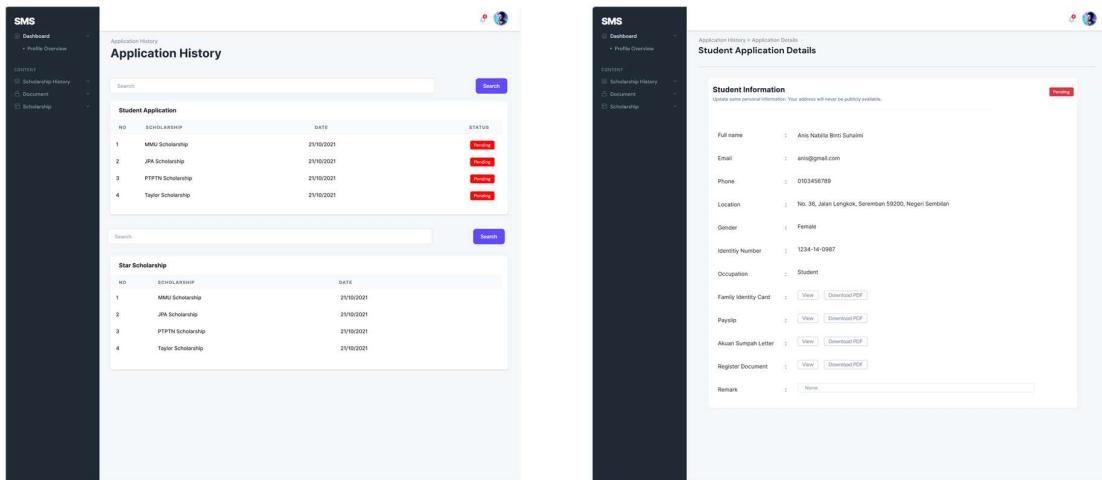


Figure B.9: Applicant interface to view application history

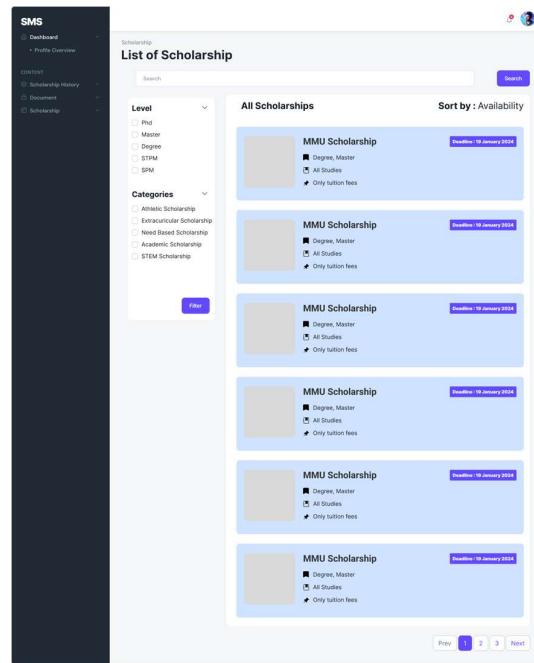


Figure B.10: Applicant interface to select scholarship

SMS

Scholarship Overview

About Us

Collaboration

CRITERIA

HIGHLIGHTS

AWARDS

Relevant Information

Student Application Details

Student Information

Update some personal information. Your address will never be publicly available.

Full name: Placeholder

Email: Placeholder

Phone: Placeholder

Location: Placeholder

Gender: Placeholder

Identity Number: Placeholder

Occupation: Placeholder

Identity Card: Select Document

Paylip: Select Document

Aman Sampan Letter: Select Document

Register Document: Select Document

Figure B.11: Applicant interface to apply for a scholarship