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SPASALON: SMART CLIENT ENGAGEMENT WEB APP

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Abstract

This report introduces the development of the *SpaSalon: Smart Client Engagement Web App.* It is a web- based system that was made to help spas better manage customer feedback and loyalty. A lot of small spas, like Pelangi Hair Beauty Spa Muslimah in Batu Muda, Selangor, still use old-fashioned methods like stamp cards, handwritten customer records, and WhatsApp broadcasts to share promotions. These old ways of doing things often cause problems like lost data, mistakes made by people, low engagement, and not enough information about how customers act. The system that is being proposed is a modern one that has two main user interfaces which are one for customers and one for spa staff. Customers can easily sign up, see how many loyalty points they have, get deals, and give feedback. On the other hand, a central dashboard lets staff manage client profiles, keep an eye on feedback, keep loyalty records up to date, and learn useful things. The system was made using the Agile method, which lets improvements be made over time based on feedback from stakeholders in real time. Questionnaires and interviews were used to gather information, which was then analysed to figure out what the system needed to do and not do. To see how the system worked and what it did, supporting diagrams like the use case model, flowchart, and BPMN diagram were used. The *SpaSalon: Smart Client Engagement Web App* wants to improve operational efficiency, cut down on manual work, and make customers happier by digitising processes for engaging with customers. In the end, this project gives spa businesses a smart, safe, and easy-to-use solution that fits their changing needs in the digital age.

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Acknowledgements

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Throughout this journey, I not only learned how to develop a system but also gained important values like discipline, teamwork, and problem-solving. It was a meaningful and memorable experience that has prepared me better for the future. Lastly, I would like to thank all my lecturers from semester three until now. Their dedication and kindness have contributed so much to my academic journey. May Allah SWT bless everyone who helped and supported me during this project.

1 INTRODUCTION

1.1 Introduction

This project, titled “SpaSalon: Smart Client Engagement Web App”, involves the development of a web-based system to help a spa business located in Batu Muda, Selangor improve its customer loyalty and feedback management. The system will be developed as a web application, which can be accessed online through a browser without the need for installation on a specific device. A web application, or web app, is a type of software that runs on a web server and can be accessed using the internet through platforms such as Google Chrome, Safari, or Microsoft Edge (Kinza, 2023). Web apps are widely used in today’s businesses because they are flexible, cost-efficient, and can be accessed on multiple devices including smartphones and laptops.

This system was developed to help the spa modernize its operations, particularly in managing its customer loyalty program and collecting customer feedback. Currently, the spa relies on manual methods to handle these processes. For example, after completing a service, staff members use a physical stamp to mark the customer’s reward card. Customer details such as names and phone numbers are recorded manually in notebooks or on paper. Promotional messages are sent to customers through WhatsApp broadcasts, which are time-consuming and lack an organized structure. These traditional methods often result in missing records, human errors, and difficulties in analyzing customer satisfaction and loyalty trends. By implementing this system, repetitive manual tasks can be reduced, human errors can be minimized, and the overall customer experience can be improved. Centralized management also allows staff to easily access and organize customer data, leading to more efficient operations. Ultimately, this project aims to simplify daily business activities and support the spa’s long-term growth.

Many businesses have already switched to digital reward schemes to build stronger ties with their customers. Loyalty programs are ways to thank customers for coming back or buying from you again. For example, a reward program can help you keep customers longer, get them to buy from you again, learn more about how they behave, build better ties with them, and stand out from competitors. Businesses can tailor benefits to each customer, see what they're doing in real time, and get them more involved with the brand with digital tools. Emotional loyalty is also supported by these programs, which recognise actions other than sales, like social media involvement or recommendations. This makes customers feel more linked to the brand. Digital reward programs, on the other hand, give more exact data, cut down on routine work, and let target discounts. This not only gets people to come back, but it also helps companies change what they offer based on how real customers act. A digital reward system gives small businesses like spas the edge they need to build long-lasting relationships with their customers. It can also be expanded, so

companies can make their reward programs bigger over time without having to do a lot of work to the system. Overall, digital reward programs are an important way to keep customers happy, grow the business, and stay relevant in a market that is always changing (Molliere, 2025).

There are two main users in this system, which are customers and spa staff. Customers will use the frontend of the website, where they can register, log in, get loyalty points, submit feedback, and check available promotions and make service bookings directly through the spa's website. This gives them better control over their experience. On the other hand, staff will use the backend to manage bookings, adjust customer points, update promotions and rewards, and view customer feedback. The system also allows staff to generate and verify QR codes, making point tracking more accurate. Customers will receive direct updates about offers through the platform instead of manual messages. All sensitive data will be stored securely and only accessible by authorized staff. The login system ensures privacy and proper access control. Overall, the system helps improve both customer satisfaction and business operations.

As part of the project research, a brief review was conducted to compare how businesses implement loyalty and feedback systems through their websites. One example is the Bloom Spa website, which features a clean and well-structured design that includes service listings and an online booking option. However, it lacks integrated loyalty or feedback features, which limits opportunities for continued customer engagement. In contrast, the Urban Retreat Loyalty Club website offers a complete digital loyalty system where users can sign up, earn points, and redeem rewards online, focusing more on customer retention through digital interaction. This comparison highlights that while certain businesses have adopted modern loyalty technologies, many smaller or local spas still rely on basic websites or traditional methods. This gap suggests a strong need for a more interactive, all-in-one platform that combines booking, feedback, and point tracking features to improve customer experience and support business growth in the spa industry.

Overall, the development of the *SpaSalon: Smart Client Engagement Web App* represents an important step toward digital transformation for a traditional spa business. This system enhances customer experience by offering a more personalised and convenient way to interact with the spa's services, while also reducing the need for manual work. Over time, it can improve service efficiency and strengthen customer loyalty. Additionally, the system helps organise and centralise customer information, making it easier for staff to manage records and monitor activities. Communication between customers and staff also becomes faster and more seamless through the platform's built-in features. This transformation not only modernises daily operations but also supports business growth in a more structured and efficient manner.

1.2 Project Background

Pelangi Hair Beauty Spa Muslimah, a spa and hair salon located in Batu Muda, Selangor, is currently managing customer details, loyalty points, and promotions manually. Customer information such as names, contact numbers, and service records is recorded on paper, while loyalty tracking is done using physical reward stamps. To promote offers or services, the spa relies on WhatsApp messages, which makes it difficult for customers to stay updated about ongoing promotions or available rewards. In addition, customers must contact the spa directly or visit in person to check or redeem their rewards. This manual approach not only slows down operations but also increases the risk of misplaced records and inefficient communication.

These traditional methods negatively affect both customer engagement and staff productivity. Physical stamp cards can easily be lost, damaged, or duplicated, which causes inconvenience for both staff and customers. Promotions shared through WhatsApp are also difficult to monitor, as they cannot be tracked, personalised, or automated (Cflowapps, 2024). According to MioSalon (2024), manually recording customer information increases the risk of human error and consumes valuable time that could be used to improve customer service and business growth. These inefficiencies make it challenging for the spa to understand customer preferences, reward loyalty in real time, and expand its services effectively.

The development of the *SpaSalon: Smart Client Engagement Web App* is proposed to overcome these challenges. The system consists of two main components which are a frontend for customers and a backend for staff. Through the frontend, customers can make service bookings directly through the spa's website, register, view their loyalty points, provide feedback, redeem rewards, and access personalised promotions. Meanwhile, the backend allows staff to manage customer's records, adjust points by using QR codes, update promotions, and review customer feedback through a centralised dashboard. By automating loyalty tracking and centralising communication, the system reduces manual work and improves accuracy. According to Cflowapps (2024), implementing a digital solution like this not only enhances productivity but also enables the spa to deliver a more interactive and data-driven customer experience, which is essential in modern business environments. Overall, this digital transformation supports better service delivery and contributes to sustainable business growth.

1.3 Problem Statement

The problem statement section identifies the main challenges that have led to inefficiencies in the spa's daily operations, particularly in managing customer loyalty, bookings, and feedback. These issues affect both customer satisfaction and business performance. Therefore, the development of the *SpaSalon: Smart Client Engagement Web App* is proposed to address the following problems:

1.3.1 Manual Loyalty Tracking

Customers currently get real stamp cards with loyalty benefits after every service. It is easy to lose, damage, or forget cards with this method, but it can also be hard to remember them. The result is not just that clients are annoyed, but also that the company is unable to function effectively. Customers are unable to access their point balance or follow their progress towards a reward unless they manually update their card. It is not possible for customers to do any of these things. This lack of visibility and convenience leads to a reduction in client engagement, which in turn may result in a reduced participation rate in loyalty programs. This is particularly true when compared to digital alternatives that provide real-time information (Musa, 2023).

1.3.2 Delayed Access to Point Balances

Currently, staff are only aware of a client's loyalty points once the service has been finished and the client has presented the real card. This delay reduces the company's ability to recommend appropriate redemptions or special offers before or during the service selection process. This means that clients lose out on possible advantages they might have had earlier, and staff are unable to offer timely or smart promotional suggestions. This decreases the loyalty program's usefulness as a tool for consumer engagement (Mandy, 2021).

1.3.3 Ineffective Promotion Channel

Clients are informed about promotions via the use of *WhatsApp* messages and captions added to *Facebook* posts. Due to the fact that not every client would be able to see the messages, this manual technique is not only inconsistent but also unreliable. Furthermore, there is no way to monitor exactly who has received or replied to the offer. In addition, these messages are often generic and cannot be personalised depending on the preferences or actions of the client. As a result of the absence of a centralised platform for the management and automation of promotions, the company has difficulty delivering timely and targeted offers (MioSalon, 2023).

1.4 Project Objectives

The project objectives section presents the specific goals that the *SpaSalon: Smart Client Engagement Web App* aims to achieve. These objectives serve as a guideline for the system's development and ensure that it effectively addresses the identified problems:

1.4.1 To develop a new digital loyalty tracking feature

Make a digital reward program that lets customers get points after their hotel or salon visit by entering a unique service code or scanning a QR code. Allows customers to collect, view, and manage their loyalty points in real time. This makes sure that points are only given out after the service has been finished and checked. This keeps things accurate while getting rid of the need for stamp cards. Users can see their progress at any time, and the method makes it less likely that they will forget or lose prizes. Tracking with a scannable or digital code improves security and the user experience. It also fits with current trends in reward technology that encourage self-service and automation (Kumar et al., 2021).

1.4.2 To develop a database loyalty points feature in the system

Develop an organised database that provides staff with the ability to access information about loyalty points in an effective manner. A customer's point balance may be seen by staff members either before or during a visit and the database guarantees that points are tracked accurately. Additionally, this enables the staff to provide real-time redemptions and personalise service suggestions, all of which contribute to increased customer satisfaction. Better marketing techniques and customer relationship management are both supported by a loyalty database that has been correctly constructed (Yue et al., 2020).

1.4.3 To develop a personalized promotion

A smart promotional function will be included into the app to replace the traditional and manual ways of advertising. Businesses are able to automate campaigns, target individual users based on their preferences or behaviour, and track the effectiveness of campaigns thanks to the promotion module. By delivering timely and relevant offers, digital promotions boost client engagement while simultaneously lowering the number of employees and expense required for marketing. Numerous studies have shown that personalised promotions dramatically increase the chance of customers making a purchase and their level of reaction to the deal (Nguyen & Simkin, 2022).

1.5 Scope and Target User

In this section, the product scope and project scope are outlined, with particular attention given to their objectives and deliverables. This section also identifies the primary target users involved in the system's operation. Clearly defining these scopes helps guide the development process more effectively and ensures that the system meets the actual needs of its users:

1.5.1 Project Scope

This project focuses on developing a web-based client engagement system for a spa business operating in Batu Muda, Selangor. The purpose of this system is to replace the existing manual method of tracking loyalty points and collecting feedback, which is currently done through stamp cards and *WhatsApp*. By digitalizing these processes, the system aims to minimize human errors, streamline daily operations, and provide customers with a more convenient and satisfying experience. Among the main features of the system are digital point tracking, online feedback submission, service booking through the spa's website, and automatic promotion displays. The website will be developed specifically to allow customers to easily book spa services online, view available promotions, and manage their loyalty rewards in one platform. Through this digital setup, customers information will be more organized, and reward progress can be updated more accurately.

The system is designed to two main types of users, which are customers and staff. Customers will have access to the frontend, where they can register, log in, get loyalty points, make bookings, provide service feedback, and check the latest promotions. On the other hand, staff will use a secure backend dashboard that allows them to manage client records, monitor feedback, adjust loyalty points, and update promotional content when necessary. This structure ensures proper access control, where customers can only view and manage their own accounts, while staff handle administrative and operational tasks. Additionally, the system supports centralized data storage, enabling easier record management and better tracking of customer engagement. Overall, the project aims to help the spa adopt a digital approach, reduce paperwork, and strengthen customer loyalty through an organized, efficient, and user-friendly platform.

1.5.2 Product Scope

The *SpaSalon: Smart Client Engagement Web App* is developed to assist a spa business in Batu Muda, Selangor, in managing its customer loyalty, booking, and feedback processes more efficiently. This system includes a secure login feature where both clients and staff can sign in using their respective usernames and passwords. Each user role is assigned specific access levels to ensure that customers and staff can only perform tasks according to their responsibilities. Customers will interact with the frontend interface, where they can view loyalty points, submit feedback, make service bookings directly through the spa's website, and check active promotions. After completing a booking or a service, customers can scan a QR code provided by the admin to collect loyalty points. This process ensures that point tracking is accurate, automated, and transparent for both parties.

The website will be developed with a clean and user-friendly layout, suitable for users of all experience levels. By replacing the manual system of stamp cards and WhatsApp announcements with a centralized digital platform, the system is expected to minimize human errors, improve data accuracy, and deliver a smoother overall experience. Loyalty statuses will be updated instantly, while customers can conveniently book services to enhance their engagement with the spa's offerings. For staff, the backend dashboard allows efficient management of client information, feedback monitoring, QR code generation, and promotional updates. This structure provides real-time insights into customer interactions, enabling staff to improve service quality and design more targeted promotional strategies. Additionally, all client records and transaction data will be securely stored in the system, supporting better organization, data protection, and long-term business planning.

1.5.3 Target User

The *SpaSalon: Smart Client Engagement Web App* is designed to support three main types of users, each with different roles and access levels in the system:

1. Customers

   Customers are the main users who access the system through the spa's website using a computer or mobile browser. They can create personal accounts, book spa services online, view collected loyalty points, redeem available rewards, check current promotions, and provide service feedback or ratings. After completing a booking or service, customers will scan a QR code provided by the staff to collect loyalty points. To earn points, customers are also required to submit their feedback and rating, ensuring that the spa can continuously improve its service quality. The platform is designed to provide a convenient self-service experience, allowing customers to manage their bookings, track loyalty progress, and claim rewards or promotions

directly through the website. Since customers are the primary users of the frontend, their needs are prioritized during the design, planning, and testing stages to ensure the interface remains user-friendly, visually clear, and responsive across different devices.

2. Spa Pelangi Staff (Owner and Employees)

   Spa staff, which include both the owner and employees, are granted full access to the backend system. Their main responsibilities involve managing customer bookings, updating customer records, adjusting loyalty points after each service, and generating QR codes for customers to claim their points. Staff are also responsible for updating promotions and rewards, as well as reviewing customer feedback when necessary. In addition, the backend system allows staff to create an interactive dashboard that provides a clear overview of customer activity, loyalty performance, and feedback trends. This feature helps staff monitor engagement levels and make informed decisions to improve service quality and promotional strategies. With full control over the backend, staff can perform daily operations more efficiently and ensure that the spa continues to provide a seamless and high quality customer experience.

1.6 Overview of This Report

Chapter 1: Introduction

The first chapter provides an overview of the *SpaSalon: Smart Client Engagement Web App* project, including its background, objectives, and overall purpose. It outlines the problems that led to the development of the system, the goals it aims to achieve, and the justification for its implementation. This chapter also identifies the intended users of the system and defines key terms relevant to the project. Overall, it serves as the foundation for understanding the direction and scope of the project, with each subsequent section expanding on the details introduced here.

Chapter 2: Literature Review

Chapter 2 focuses on reviewing existing studies and related works that are relevant to the project. It explores topics such as digital reward systems, customer engagement, and data security. Comparisons between similar systems and applications are made to identify current industry practices, as well as their strengths and weaknesses. These findings highlight potential areas for improvement and support the need for a modern, user-focused solution. Relevant studies and case analyses are also discussed to provide a deeper understanding of system functionality and trends, forming the basis for the proposed system's design and development approach.

Chapter 3: Methodology

Chapter 3 explains the methodology used in developing the *SpaSalon: Smart Client Engagement Web App*, which follows the Agile approach. This section describes how the Agile method was applied

throughout the project, including the key stages of planning, designing, coding, testing, deployment, and feedback collection. The rationale for choosing Agile is discussed based on its flexibility, adaptability, and iterative nature, which allow continuous improvement during development. Each phase of the process is clearly outlined, along with the roles involved, tools used, and timelines set. This ensures that the entire development process remains structured, efficient, and easy to manage.

Chapter 4: Requirements

Chapter 4 outlines the main requirements for developing the system. It begins with the techniques used to gather information, such as interviews and surveys, which help identify important insights from users and stakeholders. The collected data are then categorized into two types of requirements which are functional and non-functional. In addition, this chapter lists the software tools, technologies, and applications required to build the system effectively. Each requirement is described in detail to provide a clear direction for development. This ensures that the system is designed and implemented based on well-defined goals and user needs.

Chapter 5: Analysis

Chapter 5 explains the analysis activities conducted before developing the *SpaSalon: Smart Client Engagement Web App*, focusing on understanding user needs and existing operational issues. Requirement gathering was carried out through an interview session with the spa owner and a questionnaire distributed to 50 respondents to identify customer expectations. The chapter also presents several analysis models including the use case diagram, admin and customer flowcharts, and the BPMN diagram to illustrate the system's logical behaviour. These tools help visualize the processes, actors, and interactions involved in the system. Overall, this analysis ensures that the system design is built based on accurate, validated, and user-driven requirements.

Chapter 6: Design

Chapter 6 describes the overall design of the *SpaSalon: Smart Client Engagement Web App*, beginning with the interface design and wireframes created before development to map user navigation and screen layout. This chapter also includes the database design, presented through the data dictionary and ERD diagram, ensuring structured and efficient data storage. Additional diagrams such as the DFD and overall system flow diagram are used to illustrate how information moves throughout the system. Each design component is developed to align closely with the requirements identified in the previous chapter. This ensures that the system's blueprint is complete, organized, and ready for implementation.

Chapter 7: Implementation

Chapter 7 discusses the implementation stage where the system was developed based on the approved design. It explains the hardware used, the software tools, and the coding languages applied throughout development, along with the web hosting selected for deployment. This chapter also describes how each module was coded and integrated into a fully functional system. Screenshots of completed system

interfaces are included to demonstrate the final output of each feature. Overall, this chapter documents how the system transitioned from design concepts to a working web application.

Chapter 8: Testing

Chapter 8 outlines the testing processes carried out to evaluate the system's performance, reliability, and usability. Several testing types were conducted, including unit testing, integration testing, system testing, and acceptance testing to verify that each module works correctly together. An interview-based evaluation was performed with the spa owner to analyse the system after full development. Additionally, a feedback questionnaire was distributed to 50 Pelangi customers to gather user satisfaction data. The results help confirm that the system meets its intended requirements and performs effectively in real usage.

Chapter 9: Project Management

Chapter 9 presents the project management activities used to plan, monitor, and control the development of the *SpaSalon: Smart Client Engagement Web App*. Key tools such as the Work Breakdown Structure (WBS) and Gantt Chart are included to outline the project schedule and task allocation. This chapter also highlights the risk management process, where potential risks were identified and mitigation strategies were implemented. The use of structured planning ensured that the project remained on track and aligned with the timeline. Overall, project management played an essential role in ensuring smooth and organized system development.

Chapter 10: Conclusion

Chapter 10 concludes the project by summarizing how the *SpaSalon: Smart Client Engagement Web App* successfully achieved the objectives set at the beginning of the study. It reflects on the strengths of the system and the improvements introduced to the spa's customer engagement process. The chapter also discusses constraints and limitations faced during development, such as time, resources, or technical boundaries. In addition, several recommendations for future work are proposed, including system enhancements and new features that can improve scalability. Overall, the chapter finalizes the project by highlighting its contributions and potential for further advancement.

2 LITERATURE REVIEW

2.1 Introduction

The development of the *SpaSalon: Smart Client Engagement Web App* requires an in-depth literature review to understand the latest trends and technological demands in the spa and salon industry. This chapter begins by addressing the challenges of managing loyalty programs manually, particularly for small businesses that still rely on traditional methods. By examining existing systems and spa websites, valuable insights can be gained to improve feature design, functionality, and user experience. A comparison between *Walking on Sunshine*, *Urban Retreat Loyalty Club*, and *Bloom Spa* provides a clearer understanding of current industry practices, identifying effective strategies as well as areas that require improvement. Evaluating these systems based on criteria such as functionality, usability, navigation, security, and platform compatibility helps determine their overall strengths and weaknesses. This literature review plays a crucial role in supporting informed decision-making during the system development process. It not only consolidates existing knowledge but also highlights gaps that need further exploration. Ultimately, this ensures that the proposed system aligns with evolving technological advancements and current industry standards (Hulland & Houston, 2024).

2.2 Investigation

A clearer understanding of the main objective of this project requires reviewing several studies that explore the issues related to manual loyalty programs and their impact on customer engagement. The findings from these studies highlight the common limitations of traditional methods, such as inefficient tracking, risk of data loss, and limited personalisation. When businesses continue to rely on these outdated approaches, it becomes challenging to build strong and lasting relationships with customers, especially in a highly competitive market. This section focuses on three key areas that are crucial for developing a more efficient and modern solution for service-based industries such as digital loyalty programs, customer engagement strategies, and data protection policies.

2.2.1 Digital Loyalty Programs in Service – Based Businesses

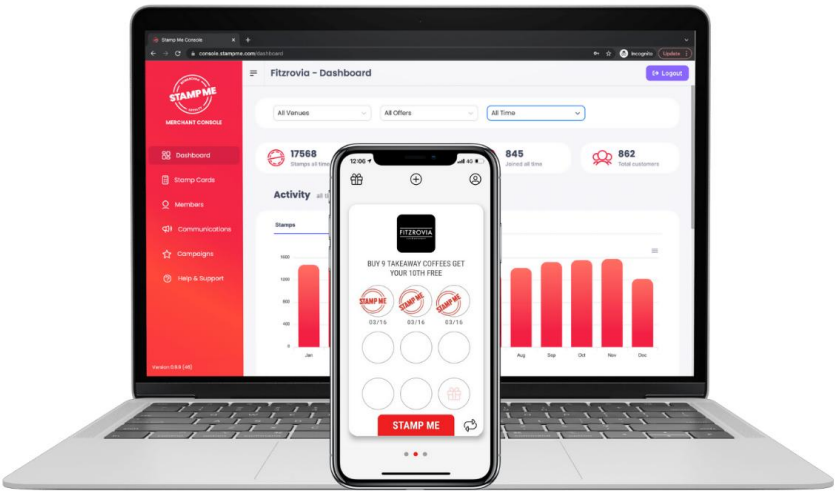

Figure 2.1 Loyalty Program Business (Brad Davis, 2020)

Digital loyalty programs are digital tools that businesses use to thank and keep customers. They can be found on websites or mobile apps. By giving customers rewards like points, discounts, coupons, or special deals, these programs are meant to get people to buy from you again and keep buying from you over time. Digital loyalty programs come in many forms, such as point based systems where users earn rewards for the things they buy, tier-based systems where users move up in the membership levels, and referral programs where users get rewards for getting new customers (Growave, 2024). Customer loyalty programs are especially helpful for service-based companies like hairdressers and spas because they help keep customers by recognising regular trips and building trust between the business and its customers (Jana Dimovska, 2025). Digital reward schemes are safer, easier to keep track of, and can be tailored to each customer based on what they do. These systems also make it easy for customers to get their awards, which makes it less likely that they will lose them or forget about them. Loyalty programs are becoming more important as more businesses use digital tools to improve brand connections and boost total happiness.

People and companies can both gain from digital reward schemes. When a brand thanks its customers for their continued support, they feel appreciated and are more likely to stay loyal to that brand. Additionally, business owners and employees gain a deeper understanding of their customers, which helps them make smart choices and adapt services or deals based on how users behave (Mollie, 2025). Starbucks and Sephora, two well-known global brands have successfully adopted digital reward programs that let customers earn points, receive birthday gifts, and take advantage of special deals. All of this is handled through an easy-to-use mobile app. These programs not only make customers feel valued, but they also get them to connect with the brand more often. People usually earn loyalty points by doing things like shopping or checking in. These points are then kept in a safe server system and can be cashed on the same platform for different deals (Halona, 2020). Overall, digital reward programs are very important for

keeping customers interested, making things easier for them, and helping businesses grow in a service-based, competitive market.

2.2.2 Comparison of Loyalty Systems: Physical vs Digital

Figure 2.2 Card-Based vs. Digital Loyalty Programs (Brad Davis, 2021)

There are two main types of loyalty systems which are real and digital. For years, small businesses and spas have used stamp or punch cards and other physical loyalty systems to thank customers who keep coming back. However, these systems often get lost, torn, copied, or even used wrongly by customers, which makes it hard to keep track of and check them (Shopuddy, 2022). As an option, digital reward programs work through mobile apps or the web and are more up to date and safe. Through safe systems and system-generated awards, they let businesses keep track of points automatically, cut down on staff work, and get rid of scam risks. Digital platforms give staff better access to customer data and behaviour, which can be used to adjust promos and improve engagement. Both systems have the same main goal, which is to get people to come back. Some businesses especially small or traditional spas, still use real cards because they are easy to set up and do not cost much at first. But because customer data and personalization are becoming more important, companies need digital reward systems to grow and stay competitive in a digital first, privacy conscious age (Jai Rawat, 2024).

2.2.3 Importance of Customer Engagement in the Spa Industry

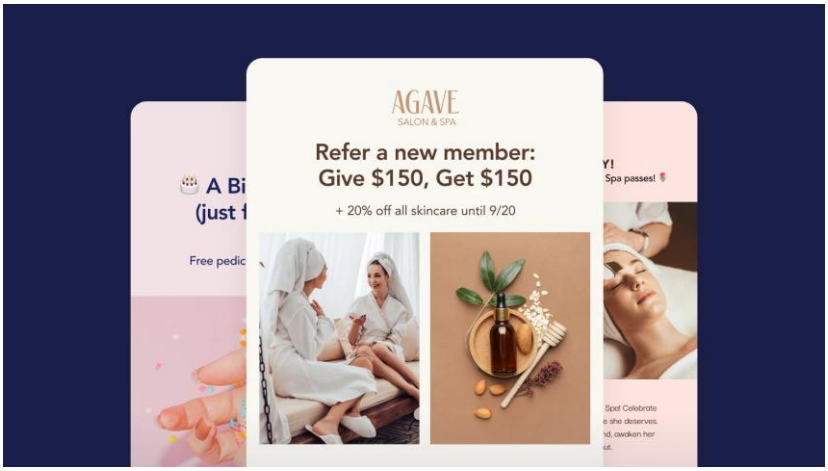

Figure 2.3 Customer Engagement (Emily Holzer, 2023)

Customer involvement is when a customer and a business meet and interact in a way that makes the customer feel loyal, trusted, and happy. Engagement in spas means more than just providing a service it also means making sure that clients feel welcome and like they are valued and respected. To do this, service quality must be constant, communication must be friendly, and care must be tailored to each customer's wants and tastes (Splice, 2025). Customers who are interested in a business are more likely to come back often, spend more when they do, and build a long-term relationship with it. People who own spas and know how important involvement is know that happy customers are the ones who help the business grow the most. It also helps the spa's image as a safe place that puts its clients' health and pleasure first. Both companies and customers benefit which are customers have a better experience, and businesses make steady money. Customers who feel linked to the spa are more likely to look into more treatment choices when they are involved on a regular basis. Clients feel heard and understood with this relationship-based method, which builds a loyal customer base. To keep people coming back, many spas use a mix of friendly service and reward schemes. Involvement in spas also means getting back in touch with customers, asking for feedback, and making changes to services based on what they say. This way, involvement isn't just a marketing plan it is part of how the business works every day (Splice, 2025).

Another important thing for long-term business success is keeping customers interested. This is especially true in-service industries like spas that are very competitive. According to Splice (2025), engaged customers are usually the happiest because they come back more often, write good reviews, and tell their friends and family about the spa. These customers become brand ambassadors and spread the word about your business for free because they liked the experience they had. The features like prizes, feedback forms, loyalty points, and personalised deals are some of the best ways to keep this relationship going (Gideon, 2023). Giving people prize points after each visit is one way to get them to come back and make loyalty a habit. Also, discounts that are tailored to each customer's habits make them feel valued and increase the likelihood that they will book again. Collecting feedback is also a big part of involvement because it shows customers that the company cares about their thoughts and wants to make things better.

From a business point of view, these interaction tools help collect information and data that can be used to make operations and marketing plans better. When a spa knows its customers better, it can serve them better, which makes them happier and more likely to stick with the spa. As the health business becomes more digital, involvement tactics need to use both technology and real-life interactions. If want to build long-term trust, digital connection is no longer a nice to have, it is a must have. So, connection is not just a nice to have anymore but it is a must for spas that want to grow in a way that lasts (Gideon, 2023).

2.2.4Data Privacy and Security in Web Applications

Figure 2.4 Customer Engagement (StealthLabs, 2020)

Data privacy is the protection of personal information that people exchange with digital systems, such names, emails, phone numbers, or data connected to services. Forms, bookings, and feedback systems are common ways for web apps, particularly those used by service-based companies like spas to gather this information. The companies need to be careful with this data so that it does not to be used for the wrong reasons or violate people's privacy. The Personal Data Protection Department (PDP) of Malaysia says that any company that collects personal data must keep it private, safe, and only let certain people see it (PDP, 2023). Malaysia needs enterprises to have tougher rules for managing personal data since harsher rules will go into force by June 2025 (ASEAN Briefing, 2025A). This means being open about how data is gathered and handled and making sure that people know what their privacy rights are. Not following these rules may lead to big problems including penalties, losing data, and hurting the image of your organisation. People nowadays are increasingly conscious of their online privacy and want companies to do more to protect their personal information.

Technical steps and good management are both needed to make sure that web services are safe. Developers and system managers are very important when it comes to keeping data safe because they create secure system architecture, manage access control, and make sure that data is stored protected (Salma, 2025). Secure login methods, like passwords or OTP, must be used for systems and only

authorised users must be able to get in. Also, both while being stored and while being sent, customer data should be secured to keep it from being viewed by people who are not supposed to (Safna, 2025Dever). It is important for companies to follow global data protection rules and keep their systems up to date. Users are more likely to trust the system, interact with it, and give honest feedback if their information is well protected. This is good for both the customer and the business. A safe and private web app not only follows the law, but it also gives you an edge over your competitors when it comes to keeping customers. Investing in strong security features is no longer a choice for businesses like spas that need to use personal information to make plans and keep customers interested. It is now a must for safe digital interaction (Lizz, 2024).

2.3 Related Works

Before starting to build a system, it is important to look at features that will work well to make sure the project meets real wants and standards. The main purpose of this study is to gather useful data that can help make a web application that does similar things. The pros and cons of each system can be better understood by looking at how they compare in terms of their features, functions, and goals. This part of the report will be discussing about three current spa service systems that can be used online:

2.3.1 Walking on Sunshine Website

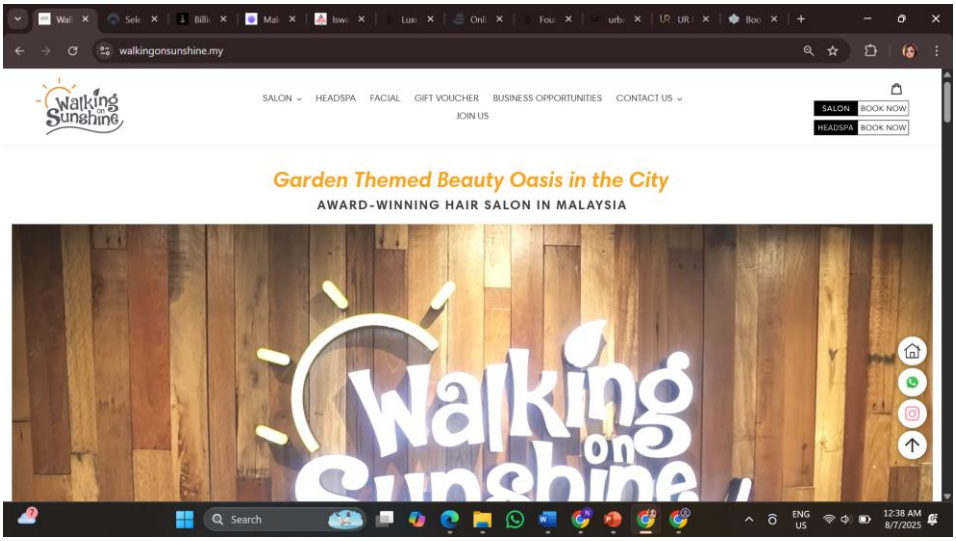

Figure 2.5 Home Page (Walking on Sunshine, 2025)

Walking on Sunshine is a web-based business platform that allows users to make online bookings. Upon accessing the website, the design appears clean and straightforward, making it easy for visitors to understand its purpose. The homepage in the Figure 2.5 clearly presents itself as a salon booking site, with a prominent “Book Now” button located at the top right corner. This feature simplifies the process for users to schedule their appointments quickly. The platform supports bookings for both Salon and Head Spa services, offering a convenient experience for potential clients.

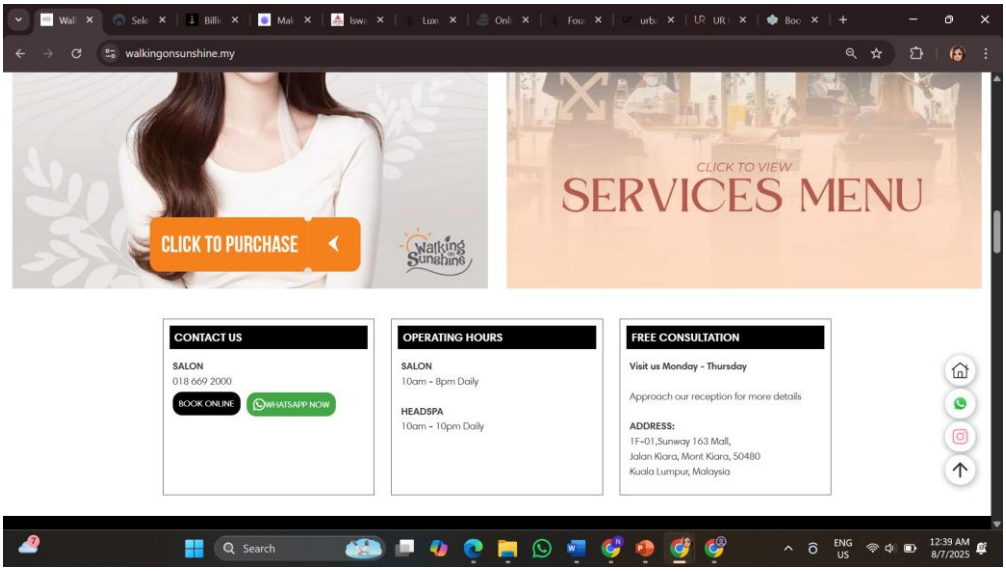

Figure 2.6 Home Page (Walking on Sunshine, 2025)

As the page is scrolled down, Figure 2.6 show that the website displays useful business details such as operating hours, contact information, and consultation descriptions. However, the overall design and layout appear somewhat crowded. This may cause confusion, especially for first-time users who are unfamiliar with the site, as the content is not well-spaced or organized clearly.

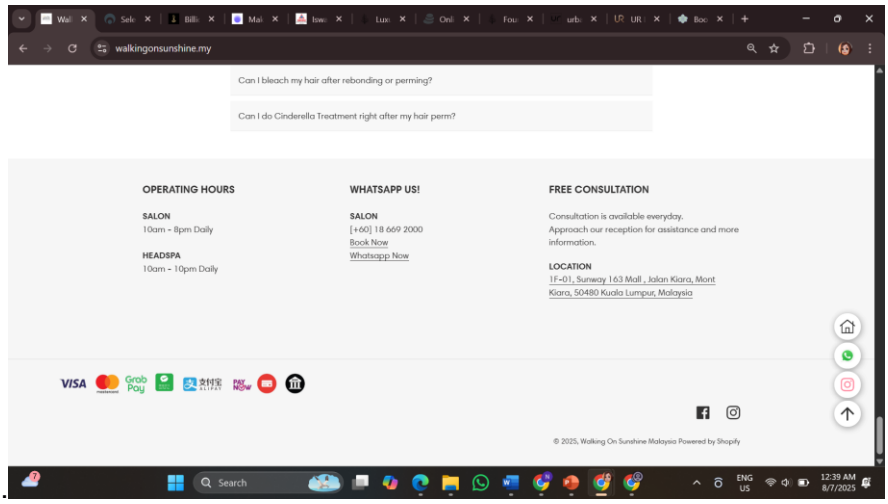

Figure 2.7 Footer Website (Walking on Sunshine, 2025)

The footer section in Figure 2.7 of the website is well-completed, displaying important information such as available payment methods at the bottom. Social media links like Facebook and Instagram are also included, which is essential for business growth and online presence. Additionally, the colour scheme used on the website is appropriate and aligns well with the relaxing and elegant theme typically associated with spa and salon services.

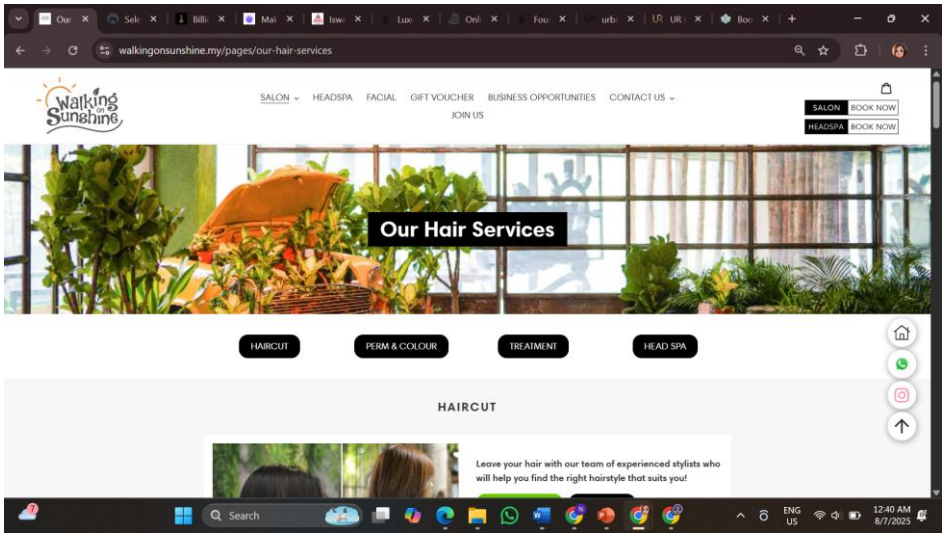

Figure 2.8 Hair Service Page (Walking on Sunshine, 2025)

When the “Book Now” button under the Head Spa section is clicked in Figure 2.8, the website redirects to a page that lists all available hair services. This page provides detailed information about each service, including descriptions and pricing. It gives users a clear overview of what is offered before they proceed with booking an appointment.

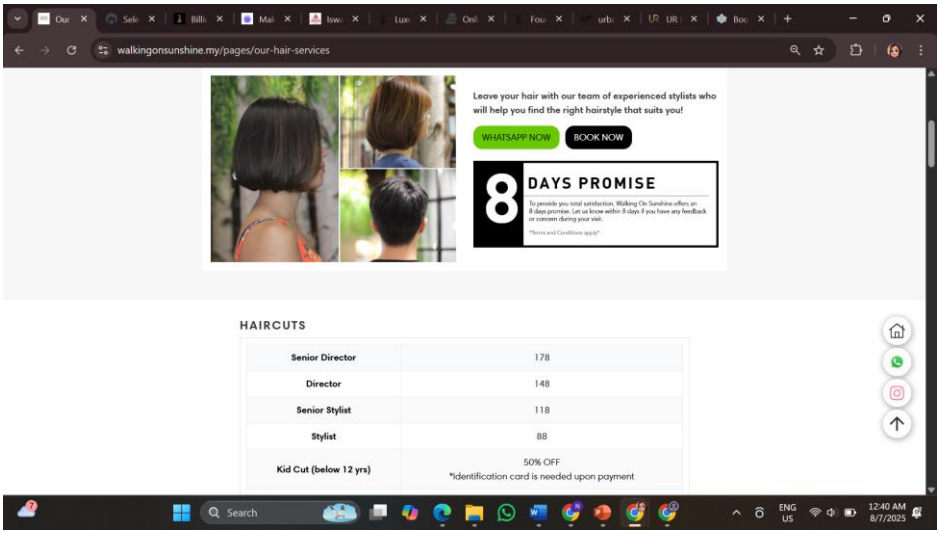

Figure 2.9 Hair Service Page (Walking on Sunshine, 2025)

Figure 2.9 show that if the user continues scrolling, the website provides a clickable link that opens WhatsApp for direct communication. However, for booking purposes, selecting the “Book Now” button redirects users to a dedicated appointment page. This feature allows users to select their preferred date and time instantly, without the need to wait for a manual response from the spa through WhatsApp, making the process faster and more convenient.

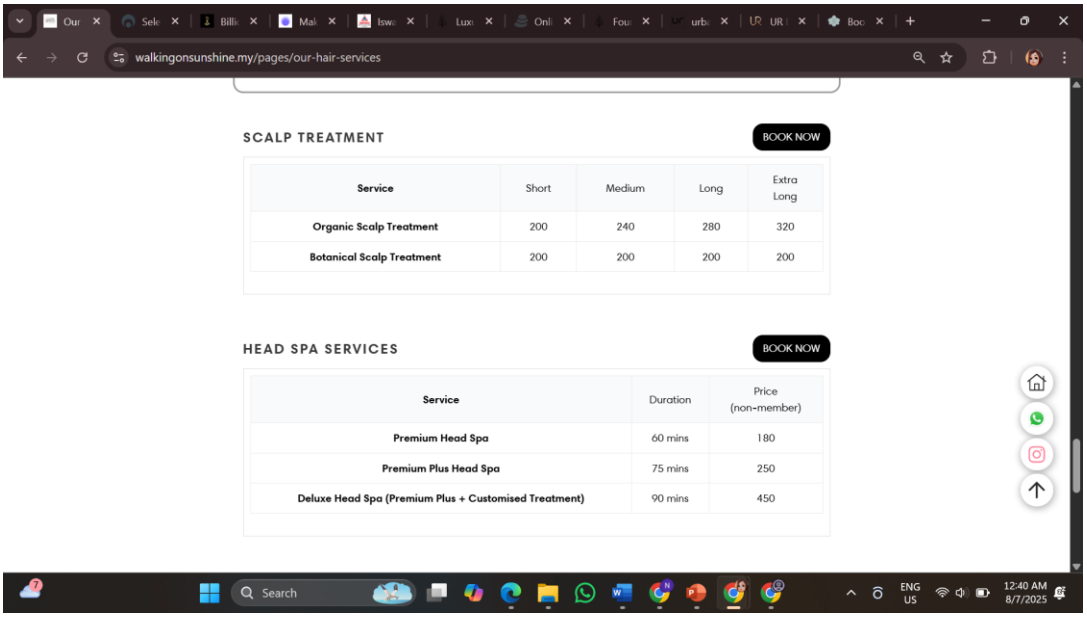

Figure 2.10 Hair Service Page (Walking on Sunshine, 2025)

On Figure 2.10, similar to the Head Spa section, other services on the website also include a “Book Now” button, allowing users to easily click and schedule their appointments without any hassle.

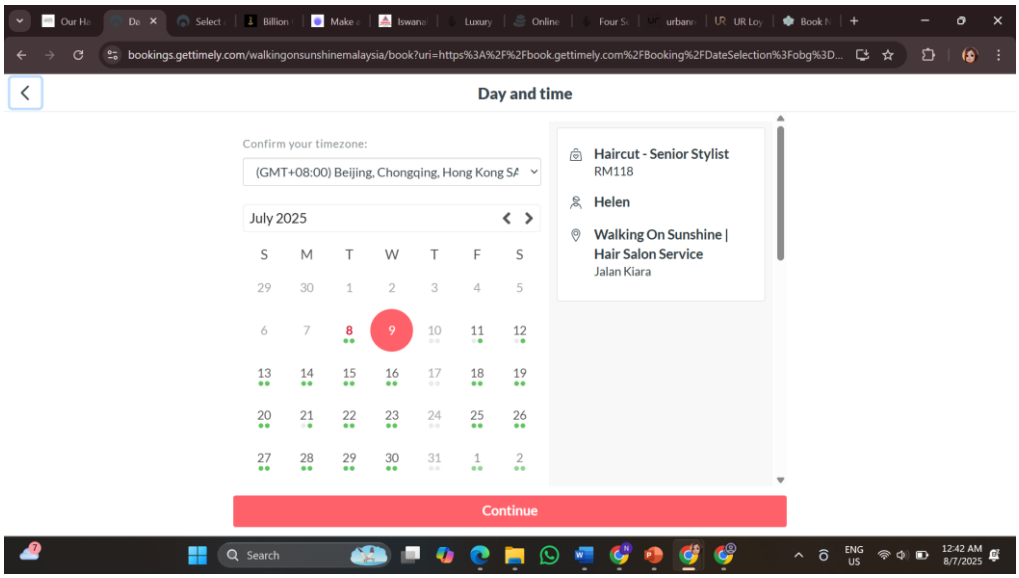

Figure 2.11 Booking Page (Walking on Sunshine, 2025)

Figure 2.11 show that after clicking the “Book Now” button, the user is directed to an appointment booking page. The first step requires the user to select the branch of Walking on Sunshine they wish to visit. Next, they need to choose the type of service they want. Following that, users can select the staff member they prefer, such as a senior stylist, along with their name. The system then allows users to pick an available date and time for the appointment. Once these steps are completed, clicking "Continue" brings the user to a final page with detailed information about the selected booking.

2.3.2 Urban Retreat Loyalty Club Website

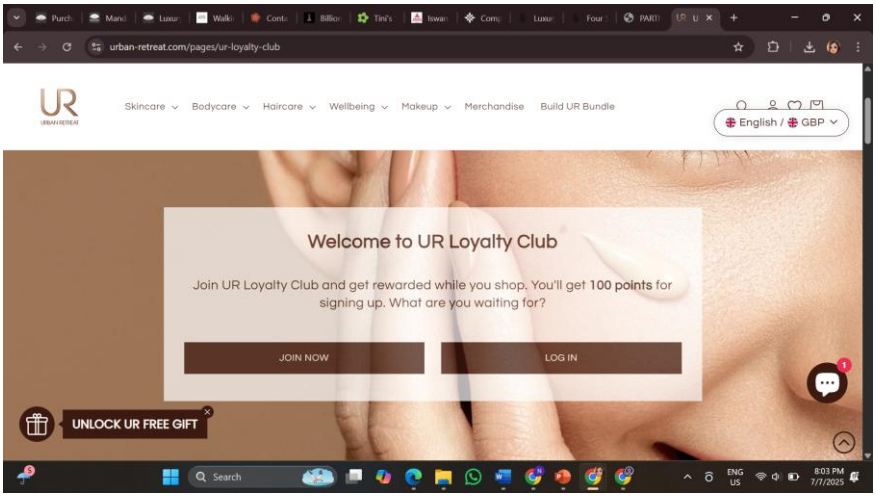

Figure 2.12 Home Page (UR Loyalty, 2025)

Urban Retreat Loyalty Club is a web-based application designed specifically for managing a digital loyalty program. Based on Figure 2.12, when first accessing the website, the layout appears visually appealing and user-friendly. The theme colors used throughout the site effectively reflect the purpose of promoting a modern and professional loyalty system. To join the loyalty program, users can navigate to the dedicated Loyalty Club page, which displays a welcoming introduction. Upon signing up, users automatically receive 100 points, marking the beginning of their membership and participation in the loyalty system.

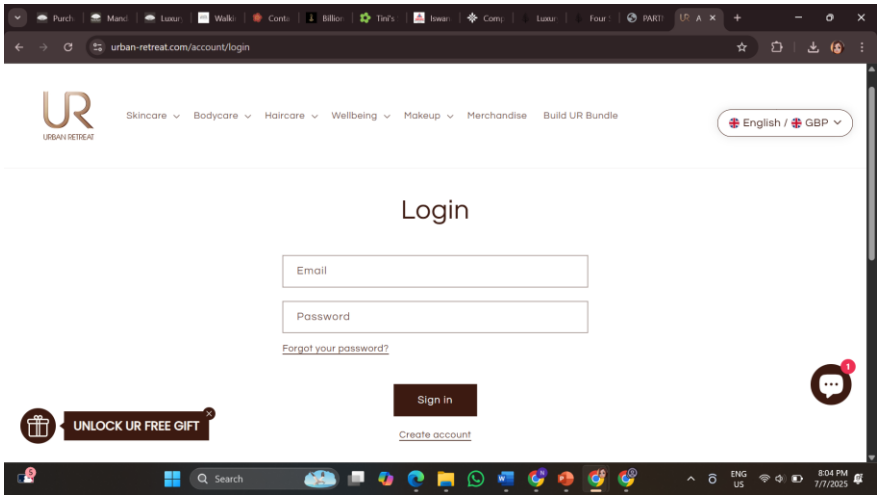

Figure 2.13 Login Page (UR Loyalty, 2025)

Figure 2.13 shown when the user clicks the “Login” button, they are directed to the login page where they can enter their email and password if they already have an account. The website also provides a “Forgot Password” option, allowing users to reset their credentials through their registered email. Additionally, for new users who haven’t signed up yet, there is a “Create Account” button that guides them through the registration process.

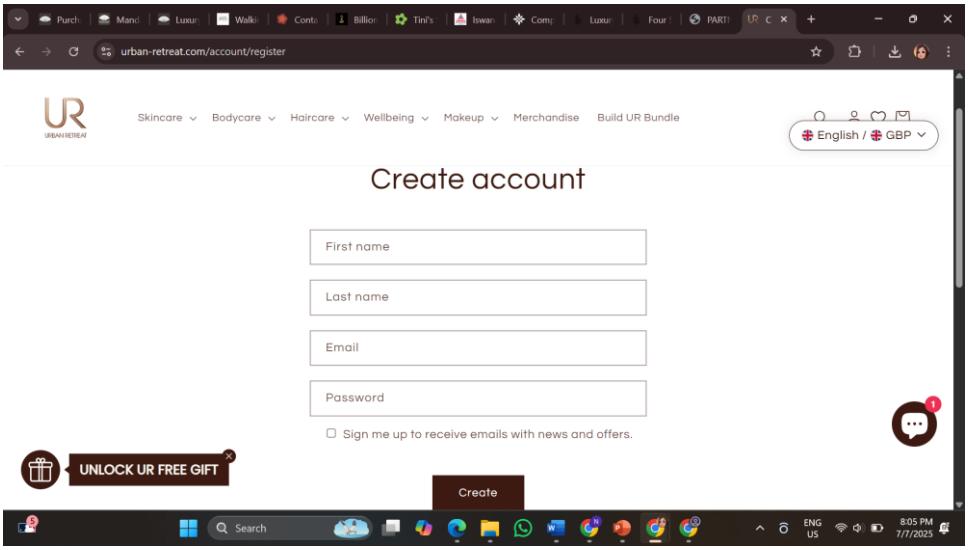

Figure 2.14 Sign Up Page (UR Loyalty, 2025)

The registration page shown in Figure 2.14 for new users requires them to fill in their first name, last name, email address, and create a password. There is also an optional checkbox that allows users to subscribe to emails containing news and promotional offers. If selected, users will receive updates and promotions directly to their email, helping them stay informed. This feature is commonly used in businesses to boost customer engagement and encourage repeat interactions.

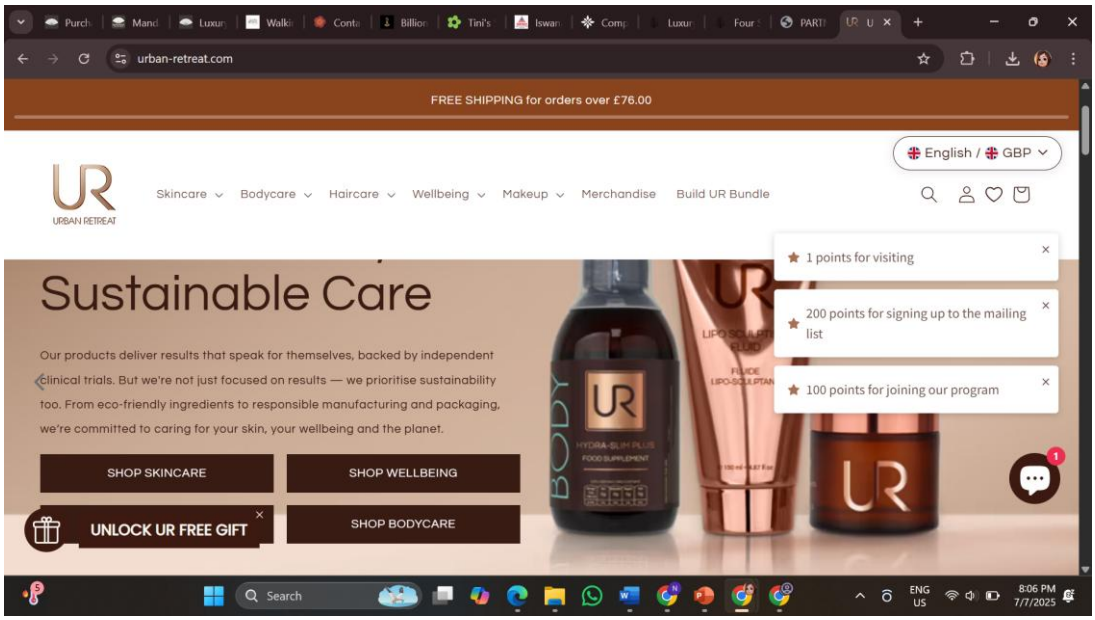

Figure 2.15 Home Page (UR Loyalty, 2025)

Figure 2.15 shown once users successfully log in to their account, they are redirected to the main page of the Urban Retreat Loyalty Club website. A notification automatically appears in the right corner of the screen, informing them about the points they have earned. This notification is triggered because the user has successfully registered and logged in, which grants them reward points as part of the loyalty program.

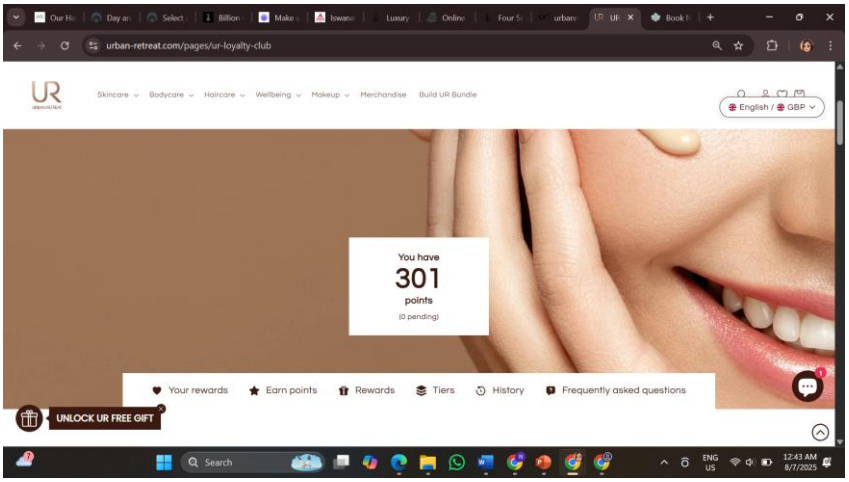

Figure 2.16 Points Page (UR Loyalty, 2025)

Based on Figure 2.16, users access the UR Loyalty Club page, their current loyalty points are displayed clearly, allowing them to track their points in real time. This page also includes sections for rewards, details on how points are earned, tier levels, and a history of previously earned points. These features give users a complete overview of their loyalty status and benefits. Overall, the website presents an engaging and well-organized loyalty program, making it a valuable reference for the system to be developed later.

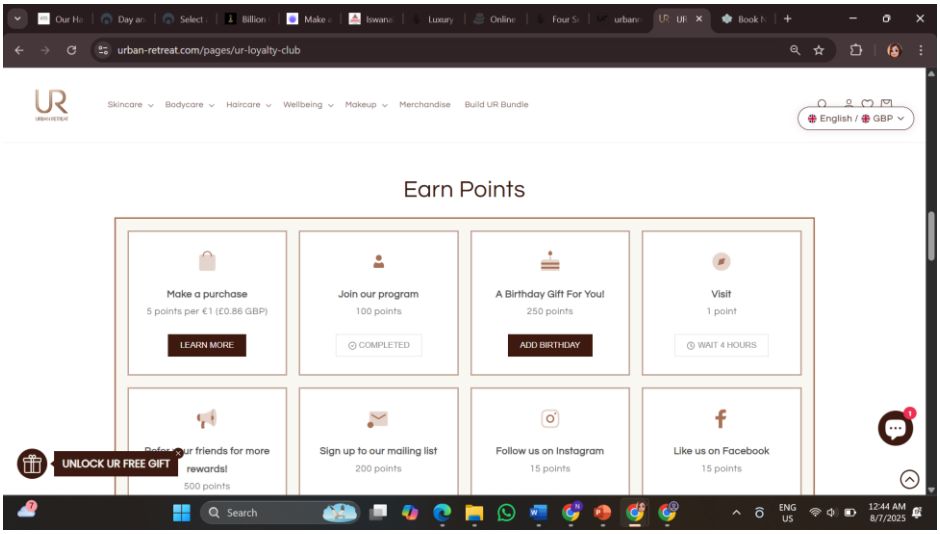

Figure 2.17 Points Page (UR Loyalty, 2025)

By continuing to scroll down the same page shown in Figure 2.17, users can view detailed information about how points can be earned. These clear guidelines make it easier for users to understand and track their point accumulation. For instance, one of the ways to earn points is by entering a birthdate then users will automatically receive 250 points as a birthday reward from the UR Loyalty Club. This type of feature adds value to the user experience and encourages continued engagement with the loyalty program.

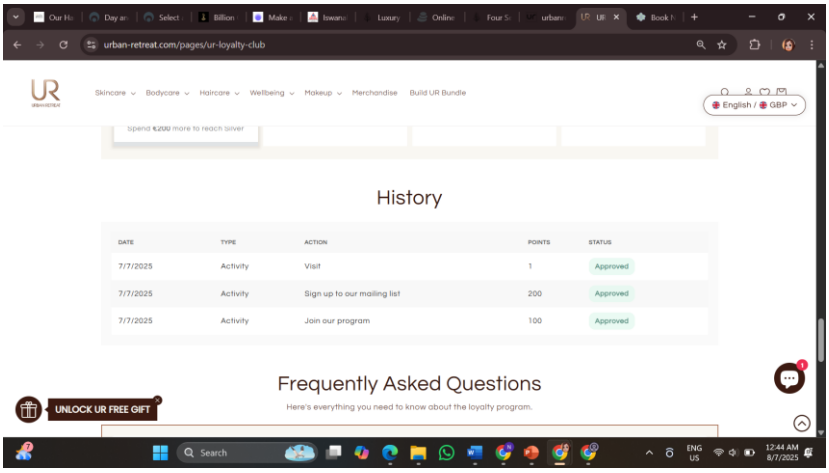

Figure 2.18 Points Page (UR Loyalty, 2025)

Based on Figure 2.18, users scroll further down the page, they can view their complete point-earning history. Information such as the date, activity type, action taken, and the number of points earned is clearly displayed in one section. This organized layout makes it very convenient for users to keep track of how and when they earned their points, enhancing transparency and user experience.

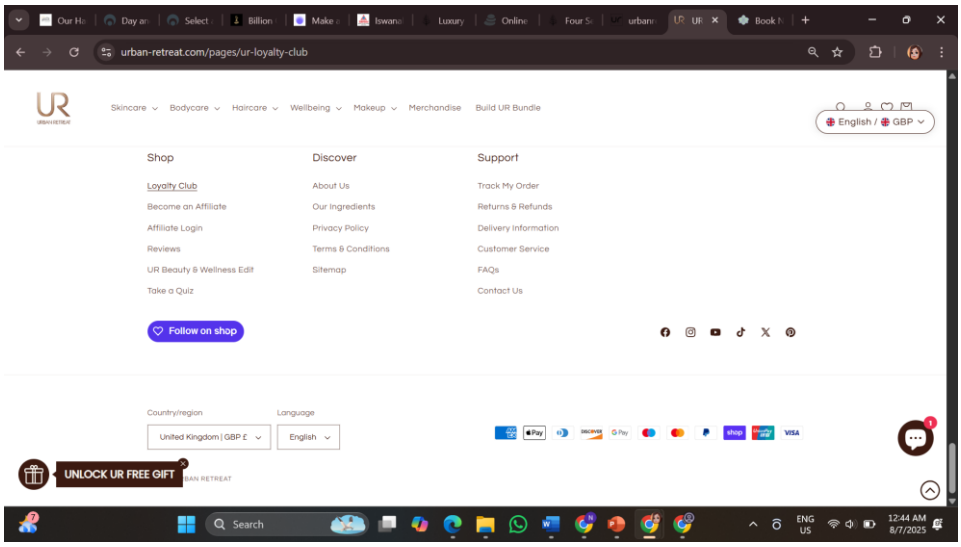

Figure 2.19 Footer Website (UR Loyalty, 2025)

The footer section in Figure 2.19 of the UR Loyalty Club website includes all essential details in one place, which is important for any web-based platform. It provides useful information such as payment methods, making it easier for users to understand their options. Additionally, the “Loyalty Club” button is highlighted to draw attention, encouraging users to join the program and enjoy its benefits. This layout helps improve navigation and supports user engagement.

2.3.3 Bloom Spa Website

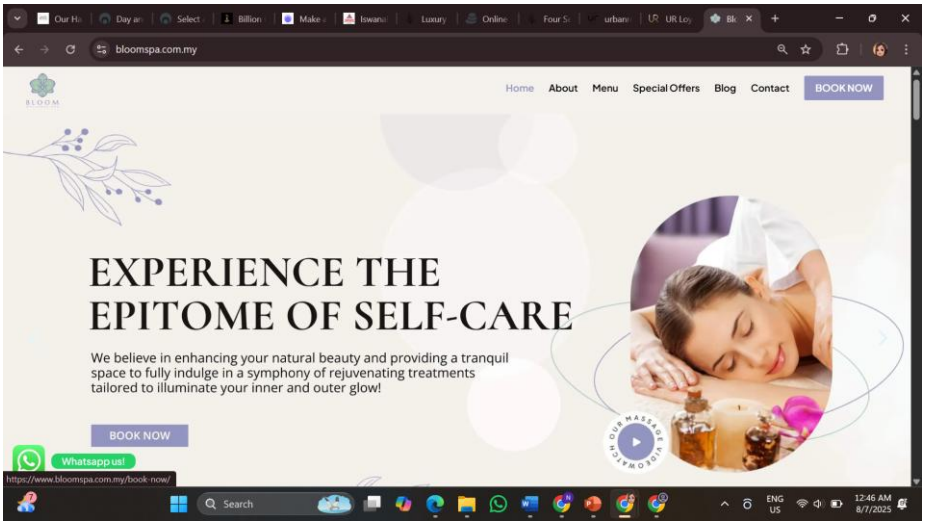

Figure 2.20 Home Page (Bloom Spa, 2025)

Bloom Spa's website functions as a standard online platform for customers to book their appointments. The website in Figure 2.20 uses a calm and soothing colour theme, which aligns well with the relaxing atmosphere typically associated with spa services. For first-time visitors, navigation is simple, with a clearly visible “Book Now” button available both on the homepage and at the top right corner, making it easy for users to schedule their appointments.

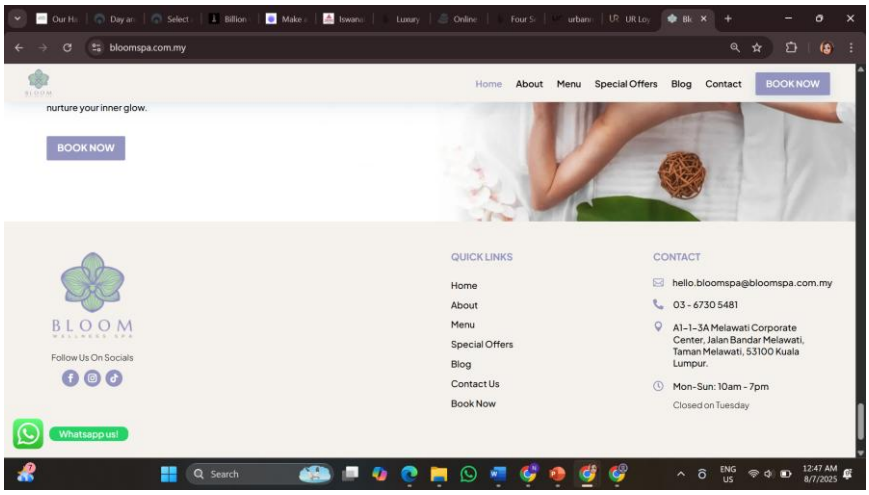

Figure 2.21 Footer Website (Bloom Spa, 2025)

The footer in Figure 2.21 of the Bloom Spa website is neatly organized, making it easy for users to navigate and find what they need. It includes all the essential contact details related to Bloom Spa, ensuring users can reach out easily. Additionally, links to their social media platforms are also provided, helping users stay connected and updated with the latest promotions or services.

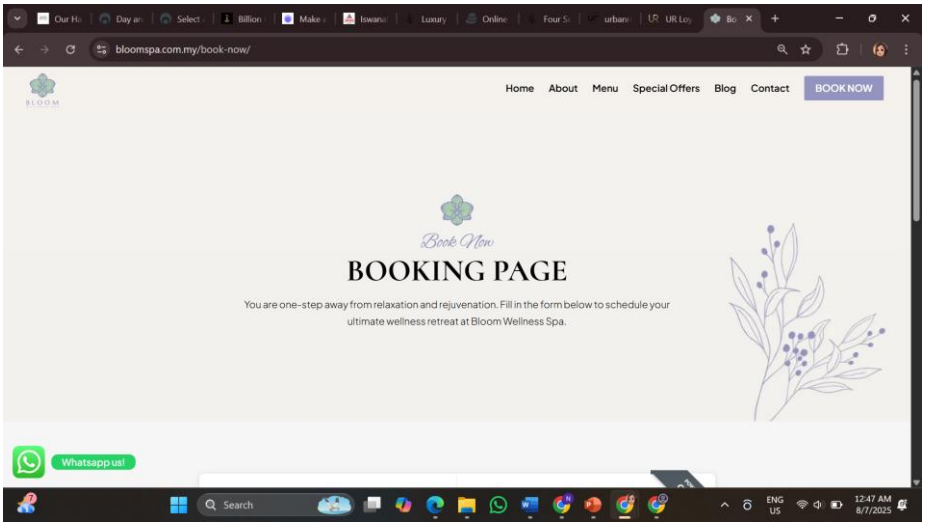

Figure 2.22 Booking Page (Bloom Spa, 2025)

Figure 2.22 shown when the user clicks the “Book Now” button, they are redirected to the booking page. This page is clearly labelled, helping users confirm that they are in the correct section to schedule their appointment.

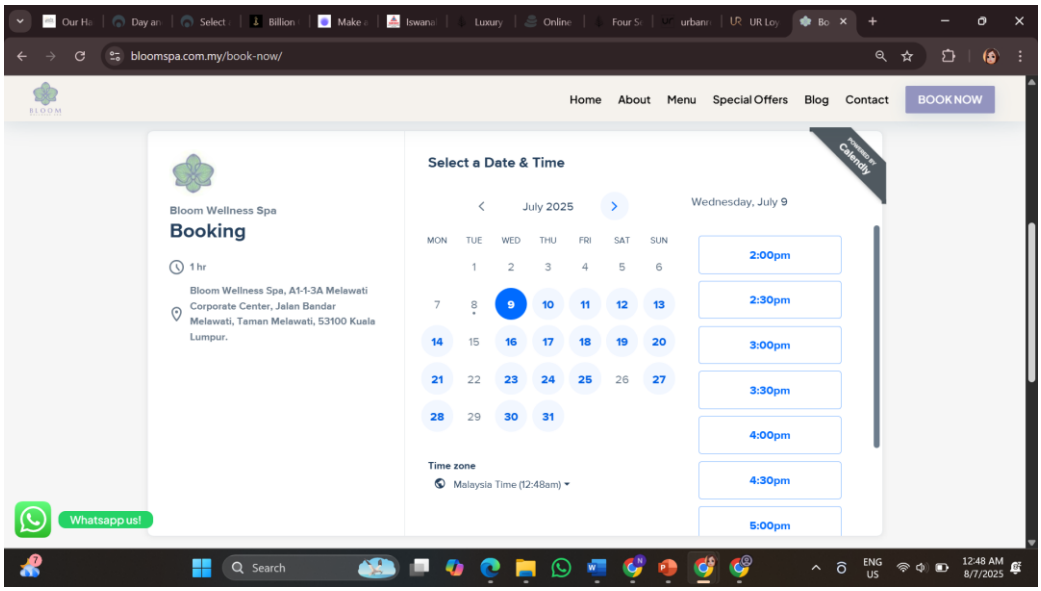

Figure 2.23 Booking Page (Bloom Spa, 2025)

Figure 2.23 show that users need to scroll down the booking page to find the calendar section. Through this page, they are required to make an appointment by selecting an available date and time. This feature helps ensure a smooth and organized booking process.

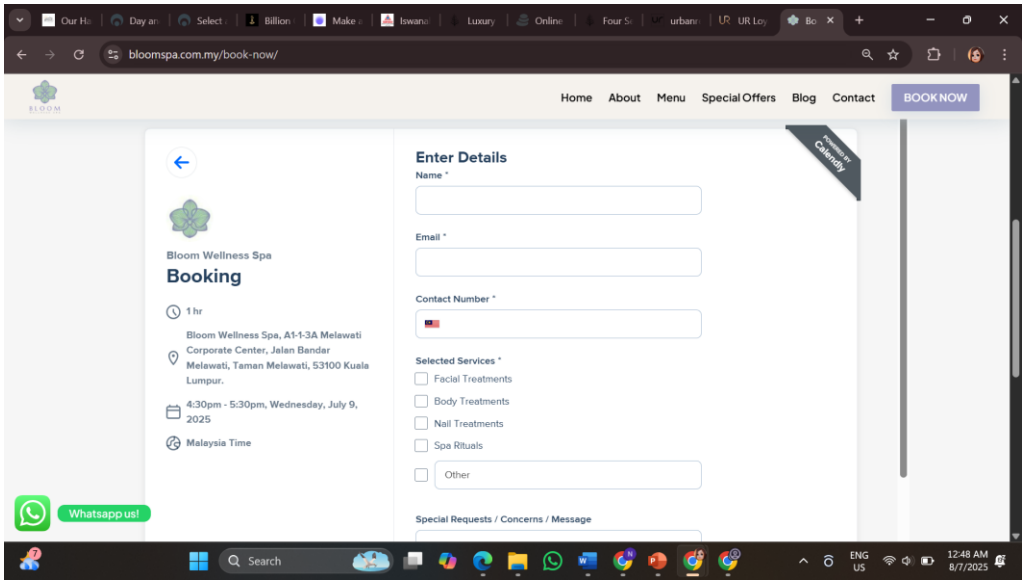

Figure 2.24 Booking Page (Bloom Spa, 2025)

Based on Figure 2.24, after selecting the desired date and time, users are required to fill in their personal details, including name, email, and contact number. Additionally, they must choose from the list of available services offered by Bloom Spa. The overall booking process on the website is straightforward and user-friendly, making it easy for customers to complete their appointment without confusion.

2.4 Comparison

Comparing things in different ways has helped find ways to make the project better. The purpose of these comparisons is to evaluate several characteristics, including functionality, usability, navigation, security, and platform, based on past case studies. The results of this research make it much simpler to comprehend which program offers the components that are both the most user-friendly and the most helpful. The results may then be used as helpful references or sources of inspiration in the process of creating and improving the existing system.

Table 2.1 Comparison of Existing Project

Criteria / Project	Walking on Sunshine Website	Urban Retreat Loyalty Club Website	Bloom Spa Website
Features	Booking button Service info No loyalty program	Loyalty club with points & rewards Sign-up bonuses	Booking & service menu Promotions No loyalty program
Usability	Simple layout Easy to use	Clear loyalty steps User-friendly	Clean design Slightly navigation
Navigation	Direct booking link	Loyalty page easy to find	Clear categories
Security element	No login	Login system	Privacy policy available
Platform	Not fully responsive	Mobile responsive	Mobile responsive

2.5 Discussion

As part of the development process for the *SpaSalon: Smart Client Engagement Web App*, it is important to examine existing websites that operate within the same or related industry. This investigation helps to identify the strengths, weaknesses, and features currently implemented by real businesses, particularly those offering spa services or loyalty programs. To conduct this analysis, a comparison was made between *Walking on Sunshine*, *Urban Retreat Loyalty Club*, and *Bloom Spa* based on five key criteria which are features, usability, navigation, security aspects, and platform. These criteria were selected because they represent the overall quality, user experience, and safety of a website also all of which are essential for both customers and spa staff. The features criterion focuses on the range of services provided by the website, such as online booking, loyalty programs, or promotional offers. Usability refers to how easily users can interact with and operate the website. Navigation evaluates how effectively menus and links guide users to the information they need. The security aspect examines how well the website protects user data, including the presence of login systems or privacy features. Lastly, the platform criterion helps to understand the underlying technology used and whether the website is responsive across both mobile and desktop devices.

The first website, *Walking on Sunshine*, is a simple and straightforward platform that mainly focuses on displaying services and allowing users to make reservations. A prominently placed “Book Now” button makes it convenient for customers to begin the booking process. However, the website lacks a customer loyalty program and other engagement features such as customer reviews or promotional offers. In terms of usability, the layout is clean and uncluttered, providing a basic but smooth user experience. Despite this, the website offers limited opportunities for user interaction or personalisation. The navigation structure is minimal, consisting mainly of a simple menu and a few pages. This helps prevent confusion but may also restrict users from exploring more options. Regarding the security aspect, although the website appears to use HTTPS, there is no clear statement on how customer data is protected, and no login system is provided. This makes the security feature less transparent. From the platform perspective, the website seems to be built using static HTML and is not fully optimised for mobile devices, which may cause accessibility issues for some users. Overall, the website places greater emphasis on simplicity and ease of use rather than on interactive features or user engagement capabilities.

The *Urban Retreat Loyalty Club* website stands out for its well-structured and thoughtfully designed loyalty program. It offers several attractive features, including sign-up incentives, the ability to earn points on purchases, and options to redeem rewards. Additionally, the inclusion of an affiliate program benefits both the company and potential customers, enhancing overall engagement and brand loyalty. In terms of usability, the website demonstrates a high level of user-friendliness, featuring a modern layout and simple steps for joining and using the rewards system. Information is clearly presented in a customer-oriented manner, making it easy for new users to understand and participate. The navigation is straightforward,

with a clear menu bar that directs users to the login page and loyalty-related sections efficiently. From a platform perspective, the website is likely powered by *Shopify*, which enables smooth integration of loyalty functionalities and ensures full responsiveness across mobile devices. Although the website does not provide detailed information about its security measures, the presence of a login system and a dedicated loyalty member area suggest a higher level of data protection compared to simpler platforms. Overall, this website serves as an excellent example of how to design an effective and engaging loyalty-based system, offering both functionality and a satisfying user experience.

Lastly, the *Bloom Spa* website presents a modern and visually appealing design with a strong emphasis on promoting its services and special offers. Customers can easily browse the spa menu, explore promotional packages, and make online bookings. However, similar to Walking on Sunshine, the website does not include a loyalty program or client login features. In terms of usability, the website performs well, featuring high-quality visuals and professional branding that create a sense of trust and engagement. The navigation is well-organised, with a clear menu directing users to main sections such as Home, Services, Promotions, and Contact. Although the site structure is slightly deeper than the others which is requiring users to click through more pages so it remains simple and intuitive to use. From a security standpoint, the presence of a contact form with captcha verification and a privacy policy enhances user confidence and data protection. The platform appears to be built on a custom content management system (CMS) and functions effectively across various devices, ensuring a responsive experience. While the website lacks advanced features such as loyalty integration or customer analytics, it successfully delivers a professional and accessible online presence that effectively highlights the spa's services and promotions.

2.6 Conclusion

This chapter has presented a comprehensive analysis of the current practices, challenges, and digital trends related to customer engagement and loyalty systems, particularly within the spa and salon industry. It provided an overview of various existing systems and highlighted key aspects of digital loyalty programs, customer interaction strategies, data privacy, and platform comparisons. The findings from this analysis revealed the main strengths and limitations of current solutions, offering a clearer understanding of the improvements needed to develop a more user-friendly, secure, and efficient system. By examining real-world examples and identifying common issues in manual approaches, this chapter established a strong foundation for the design and development of an enhanced loyalty and engagement platform. The insights gathered will serve as a guiding reference in the upcoming chapters, where they will be applied directly to support the development and implementation of the proposed SpaSalon: Smart Client Engagement Web App.

3 METHODOLOGY

3.1 Introduction

When developing a software system, it is important to follow a specific methodology that can help manage the entire process from start to finish. A development methodology acts as a guide for how the project should be planned, carried out, and completed. One of the most commonly used approaches today is the Agile methodology, which is well-known for being flexible, focused on teamwork, and centered around user needs. Instead of completing everything at once, Agile promotes working in smaller cycles and encourages regular discussions with users or clients to gather feedback and make improvements along the way (Laoyan, 2025). For final year project titled *SpaSalon: Smart Client Engagement Web App*, I have chosen to use the Agile methodology. This is because the system I'm building is designed to support spa businesses, and it requires frequent input from users to make sure it works well in real-life situations. By following Agile, I can stay connected with my project stakeholders, apply their feedback effectively, and keep improving the system throughout the development. This method also gives me more control over how the project progresses and ensures that the final product meets both technical and practical goals of a real spa environment.

3.2 Agile Methodology

Figure 3.1 Agile Methodology Diagram (Salsabila, 2020)

Agile methodology was chosen for this project because it offers a flexible and collaborative approach that fits well with the nature of developing the *SpaSalon: Smart Client Engagement Web App*. The system requires constant updates based on user input, especially from spa staff and management, and Agile supports this by encouraging frequent feedback and adaptation. Unlike traditional models, Agile allows for changes to be made even during development, making it ideal for projects with evolving requirements (Laoyan, 2025). Agile supports this by breaking the project into several simple phases like meeting and planning, design, coding and testing, release, and feedback. Each phase helps ensure that features are delivered quickly, users like spa staff can give their opinions early, and the system can be adjusted based on their needs. These phases are repeated in cycles to ensure that the final product is both functional and user-friendly.

3.3 Phases in Agile Methodology

In this project, the Agile methodology is carried out through five main phases. These phases are Meet and Plan, where project goals and requirements are discussed. Next design, where the system layout and interface are planned. Also code and test, where the features are developed and tested. Moreover, is release where a functional version of the system is deployed and last is feedback, where responses from users are collected to improve the system. These phases are repeated in cycles to ensure continuous improvement and alignment with user needs.

3.3.1 Meet and Plan

The Meet and Plan phase is the first and one of the most important stages in the Agile development cycle. It sets the direction of the project by focusing on collaboration between the developer and stakeholders to define goals, clarify expectations, and identify user needs. For the *SpaSalon: Smart Client Engagement Web App*, this phase involved communicating with the spa's staff and management to understand their daily operations and pain points such as lack of a digital loyalty system or inefficient feedback collection. Through this initial planning, the core features of the system were outlined, including client loyalty tracking and feedback submission tools. Agile planning focuses on setting clear objectives

while staying adaptable, which ensures that the project starts with a solid understanding and remains open to changes along the way (Laoyan, 2025).

3.3.2 Design

The Design phase in Agile focuses on planning how the system will look and function before development begins. In this stage, the layout of the user interface, system flow, and core functionalities are designed based on the requirements gathered during the planning phase. For the *SpaSalon: Smart Client Engagement Web App*, the design process involved creating wireframes and user flow diagrams to visualize how spa staff and customers would interact with the system. Key modules such as the loyalty program interface and admin dashboard were carefully planned to ensure usability and smooth navigation. Agile design aims to be flexible, allowing room for changes and improvements as the project evolves. By focusing on a simple and user-friendly design, this phase helps ensure that the system meets both functional goals and user expectations (Laoyan, 2025).

3.3.3 Code and Test

The Code and Test phase is where the actual development of the system takes place. In this stage, the planned features are translated into working code and tested continuously to ensure functionality and stability. For the *SpaSalon: Smart Client Engagement Web App*, this included developing key modules such as customer account, loyalty point tracking, advertised promotion and the admin dashboard. Each feature was developed in small parts and tested as soon as it was completed. This helped in identifying bugs or design issues early, reducing the risk of major problems later in the project. Agile encourages frequent testing and iteration during development, which improves the overall quality of the system. Through this process, improvements were made based on testing results and early feedback, making the system more reliable and user-focused as it progressed (Laoyan, 2025).

3.3.4 Release

The Release phase is when a functional version of the system is deployed and made available for real users to try. In Agile, releases happen in smaller, manageable stages so that feedback can be collected earlier and improvements can be made in the next cycle. For the *SpaSalon: Smart Client Engagement Web App*, the first release included core features such as customer registration, loyalty tracking, and a simple feedback submission form. This version was shared with the spa staff for initial use, allowing them to test the system in a real environment. Agile releases focus on delivering value quickly rather than waiting for a perfect final product. By releasing a basic but usable version early, the development process remains efficient and more responsive to actual business needs. This approach helped ensure that the system was practical, functional, and ready for enhancement based on actual user experience (Laoyan, 2025).

3.3.5 Feedback

The Feedback phase is an essential part of the Agile process, where responses from real users are collected and used to improve the system. After the initial release of the *SpaSalon: Smart Client Engagement Web App*, feedback was gathered from spa staff and stakeholders regarding the

functionality, user interface, and overall usability of the system. This included suggestions to improve the loyalty point tracking, the design of the promotion, and the clarity of the admin dashboard. In Agile, feedback is not only encouraged but expected, as it helps guide the next iteration of development (Laoyan, 2025). By listening to the actual users, the system can evolve to better meet their needs and fix any issues early. This phase ensures that the final product is practical, user- friendly, and aligned with what the business truly needs to operate smoothly.

3.4 Conclusion

In conclusion, the Agile methodology provides a flexible and structured approach that is highly suitable for the development of the *SpaSalon: Smart Client Engagement Web App*. Through its five main phases which are meet and plan, design, code and test, release, and feedback so the project is managed in smaller, manageable cycles that allow for continuous improvement. This method not only supports active collaboration between the developer and stakeholders but also ensures that changes can be made throughout the development process without disrupting the overall progress. By following Agile, the system is built based on real feedback and practical needs from the spa environment, which increases the chances of delivering a high-quality, user-friendly product. The iterative nature of Agile helps reduce risk, improve communication, and ensure that the final system truly adds value to the business.

4 REQUIREMENTS

4.1 Introduction

In Chapter 4, the focus is on finding and describing all the system needs that will be used to build the *SpaSalon: Smart Client Engagement Web App*. In the first part of this step, data gathering tools like interviews and surveys are used to get useful feedback from partners and possible users. To make sure the system works well and meets real world needs, it is important to understand these needs. After the data is gathered, it is analysed and put into two main groups of requirements which are functional and non – functional. Functional requirements say what the system should be able to do, like keeping track of reward points or letting people give feedback. Non – functional requirements, on the other hand, are more about things like performance, security, and ease of use. This part also talks about the system requirements, which include both the hardware and software that the program needs to run properly. According to Sommerville (2020), it is important to have clear and accurate requirements specs to lower the risks of development and avoid changes or mistakes in the future. This chapter sets the stage for making a reliable, efficient, and easy to use the system by organising and recording all of these parts.

4.2 Data Gathering Techniques

Data collection is a central step in system development as it focuses on obtaining precise and pertinent information regarding the current system, which assists developers in comprehending user necessities and business operations. It guarantees that the finished product will serve its intended purpose and genuinely make a difference. Data collection as the use of precise techniques to amass information for analysis and strategy formulation. One of the approaches that a researcher can use to collect primary data is through interviews and questionnaires. An interview targets a specific person to obtain detailed information through direct interaction, whereas a questionnaire seeks general information from a broad audience through written queries. Both techniques assist in identifying the needs and expectations of the users in a better way (Roselin Manawis, 2023). Below are the two techniques used to collect data for the *SpaSalon: Smart Client Engagement Web App* project:

4.2.1 Interview

The interview took place via *Google Meet* on the 28th of June 2025, with Puan Nor Hapizah binti Abidin, the owner of *Pelangi Hair Beauty Spa Muslimah* in Kampung Batu Muda. The purpose of the interview was to gain a deeper understanding of how the spa is currently functioning, and to provide a list

of important features needed in the new system. The interview meant we could collate data on how the business is currently operating for things like, booking appointments, records on customers, loyalty programs, and promotions. This process also helped to identify the weaknesses of the existing manual system and gave us more insight to develop the proposed features of the system. All information given was critical to develop the system, which would correspond to the realities of the business.

4.2.1 Questionnaire

A questionnaire was made using *Google Forms* and sent out to random people who have been to spas or salons. The form had 16 questions in total, beginning with a demographic question to get a sense of the respondents' backgrounds. The project was split into two main parts to collect more specific feedback. Section A is to understand what people do and how they feel about the loyalty programs provided by spas or salons. Section B looked into how they like to collect rewards, keep track of loyalty points, and get special offers or promotions. The answers from this questionnaire gave helpful insights for creating a system that meets user expectations and needs.

4.3 Functional Requirement

Functional requirements refer to the essential features and actions that a system must perform to fulfil its intended purpose. These requirements define how the system should operate under specific conditions and describe the expected responses when users interact with it. Examples include functions such as user login, data submission, and information display, all of which are crucial for ensuring the system operates effectively. In essence, functional requirements outline what the system must deliver to users in terms of operations and services. Clearly defining these requirements is vital, as it helps developers understand the necessary components to be built and ensures that the system performs reliably and as intended during real-world use (GeeksforGeeks, 2025).

Table 4.1 Functional Requirement for Client or Customer

Function	Expected Result
Sign Up	Client will be able to sign up by creating an account with their personal details in order to access the system.
Log In	Client will be able to log in using their registered email and password to access the system.
Collect Loyalty Points	Client will be able to collect loyalty points automatically after each service, which will be recorded in the system.
View Points History	Client will be able to view their points history to track past visits and rewards earned.
Receive Targeted Promotions	Client will be able to receive targeted promotions that are personalized based on their service history or engagement.

Submit Feedback	Client will be able to submit feedback after receiving a service to help the spa improve its offerings.

Table 4.2 Functional Requirement for Staff

Function	Expected Result
Log In	Staff will be able to log in to the backend system using their registered credentials to access the admin dashboard.
Manage Customer Account	Staff will be able to manage customer accounts by viewing, editing, or updating customer information.
Loyalty Points Management	Staff will be able to handle loyalty points management by adding or adjusting points after each customer visit.
Create and Update Promotions	Staff will be able to create and update promotions to offer targeted deals or rewards to specific customers.
View Customer Feedback	Staff will be able to view customer feedback submitted through the system to monitor service quality and customer satisfaction.
Access Analytic	Staff will be able to access analytics such as loyalty program performance and client engagement through dashboards.

4.4 Non-Function Requirement

Non-functional requirements define how a system should perform rather than what specific tasks it should accomplish. While functional requirements focus on system features and operations, non-functional requirements address the quality attributes of the system, such as performance, usability, manageability, and security. These aspects ensure that the system operates efficiently, remains user-friendly, and maintains stability during use. There are essential for providing a smooth and consistent user experience, ensuring that the system performs effectively under various conditions (GeeksforGeeks, 2025). In this project, these requirements play a vital role in supporting the development of a responsive, secure, and accessible web application that meets the needs of both staff and clients.

Table 4.3 Non – Functional Requirement for SpaSalon: Smart Client Engagement Web App

Non – Functional	Result
Performance	The system should provide fast response time when updating loyalty points and submitting forms to ensure a smooth user experience.
Usability	The system should be mobile-responsive, allowing users to access and navigate it easily on smartphones.
Privacy	The system should ensure customer data is kept confidential, protecting personal information from exposure.

Security	The system should securely store data and prevent unauthorized access to maintain a high level of security.
Manageability	The system should offer a manageable admin dashboard, allowing staff to easily monitor users, loyalty points, and customer feedback.

4.5 System Requirement

System requirements specify the hardware and software components necessary for a system to operate effectively. These requirements are crucial to ensure that the application runs smoothly, remains stable, and is fully compatible with the user's environment. Without well-defined system requirements, the software may encounter performance issues such as crashes, slow operation, or incompatibility errors (Requirements.com, 2024). By clearly outlining the required hardware and software specifications, developers can minimise technical issues during installation, testing, and deployment. This also ensures that users have the appropriate setup to experience the system as intended. Therefore, system requirements must be carefully planned during the early stages of development to guarantee the success, stability, and reliability of the project.

4.5.1 Hardware Requirement

Hardware refers to the physical parts of a computer that are needed to make a system function. Unlike software, which contains instructions for the system to follow, hardware is the actual equipment that carries out those instructions. Both hardware and software must work together in order for a computer system to perform tasks properly and deliver useful results. For the development of this project, the hardware used is a personal laptop. The laptop must be capable of running a local server and database smoothly during the development and testing phase. Since the system is web-based, no additional hardware is required for the end users other than a device with internet access.

Table 4.4 About personal laptop

Device name	LAPTOP-IPIGHIPL
Processor	11th Gen Intel(R) Core(TM) i5-1135G7 @ 2.40GHz 2.42 GHz
Installed	RAM8.00 GB (7.77 GB usable)
Device ID	A1BCB513-DF46-41DA-9DEC-6CE6A0015CBB
Product ID	00327-36306-52476-AAOEM
System Type	"64-bit operating system, x64-based processor "

4.5.2 Software Requirement

Software requirements refer to the particular tools, programming languages, and technologies necessary for effectively building and operating a system. The requirements outline what the system needs to accomplish and make sure that the development process adheres to the right framework. Software requirements are crucial as they offer a clear direction for developers, minimise misunderstandings, and simplify the management of the system's development throughout the entire process. They help make sure that the final product meets the goals we set and works well for users (Taylor, 2023). Here are the software tools used to create my system, which includes the programming languages and platforms that help with both front-end and back-end development:

1. Server Hosting

Figure 4.1 XAMPP Logo (Wikipedia, 2025)

XAMPP is free software used to run and test web applications locally without needing an online server. It includes Apache, MySQL, PHP, and Perl, making it easy to build and manage dynamic systems. In this project, XAMPP was used to develop and test the *SpaSalon: Smart Client Engagement Web App* by connecting the database and server files efficiently. It also helped reduce costs and allowed testing in a safe local environment (ITU Online, 2024).

2. Programming Language
    - HyperText Markup Language (HTML)

Figure 4.2 HTML Logo (Wikipedia, 2025)

The usual language for making the structure and style of web pages is HTML, which stands for "HyperText Markup Language." It lets authors use things like titles, paragraphs, forms, and links to organise information. Without HTML, a website's information won't show up right in a browser. Every online page is built on top of it, and it works with other languages to finish the design (DongYu, 2025).

- Cascading Style Sheets (CSS)

Figure 4.3 CSS Logo (Ralf Van, 2024)

Making web pages that are made with HTML look nicer is done with CSS (Cascading Style Sheets). Some of the things it controls are a website's colours, fonts, spacing, layout, and how responsive it is. CSS make a web app look better and be easier to use. It makes the system interface look and feel better when paired with HTML (DongYu, 2025).

- JavaScript

Figure 4.4 JavaScript Logo (Wikipedia, 2025)

JavaScript is a computer language that lets websites be interactive and change over time. It lets people do things like show pop-up messages, click buttons, and make sure forms are correct. JavaScript works right in the browser, which makes web pages more dynamic and interesting. It's a big part of making the front-end user experience better (DongYu, 2025).

- PHP – Laravel

Figure 4.5 PHP Laravel Logo (Hung Luu, 2021)

PHP is a scripting language that runs on the computer and is used to make the back end of web apps. It handles data, keeps track of sessions, and talks to systems so that dynamic websites can work. Laravel is a PHP framework that helps writers make web apps faster by making the code cleaner and easier to find. Laravel also has useful tools like routing, authentication, and security that make it easier to run and grow a system (Jyoti Prasad, 2024).

3. Database

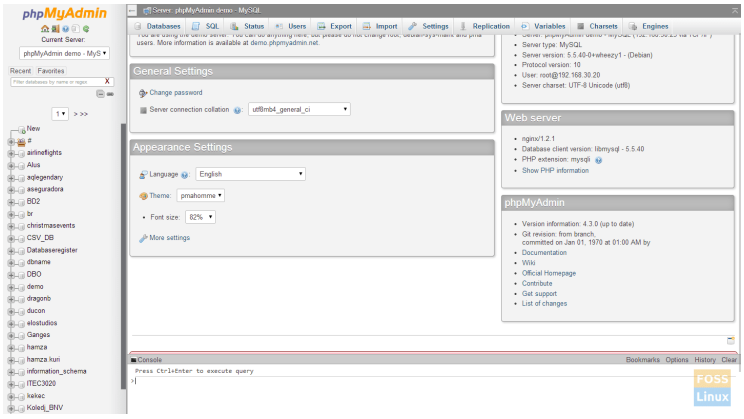

Figure 4.6 phpMyAdmin Interface (Kaps, 2020)

MySQL is an open-source relational database management system that stores data in organised tables and organise and control them. It's often used with PHP to handle changing content like user accounts, reward points, and service records, and it works well with web apps. If handle the MySQL databases visually than by typing SQL commands, phpMyAdmin is a web-based tool that can help. It lets can browse tables, run searches, import and export data, and handle accounts, all of which make database management easier (TutorialsPoint, 2024).

4. Tools

- Draw.io

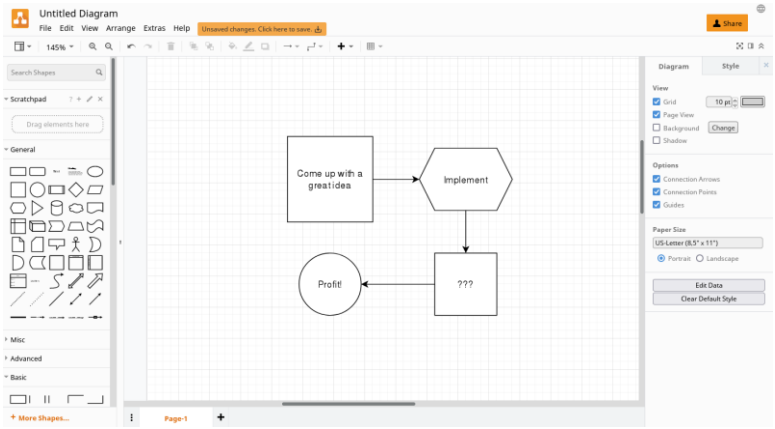

Figure 4.7 Draw.io Interface (Seth Kenlon, 2021)

Drawing online is easy with Draw.io, which is sometimes called diagrams.net. It's free and lets you make flowcharts, use case diagrams, and system architecture diagrams. It lets you make professional sketches with a simple drag and drop interface and a lot of symbols and themes. It was used to plan the flow and layout of the system in a clear and organised way for this project. This helps the creator and the people who have a stake in the system understand it better (FOTC, 2023).

- Visual Studio Code

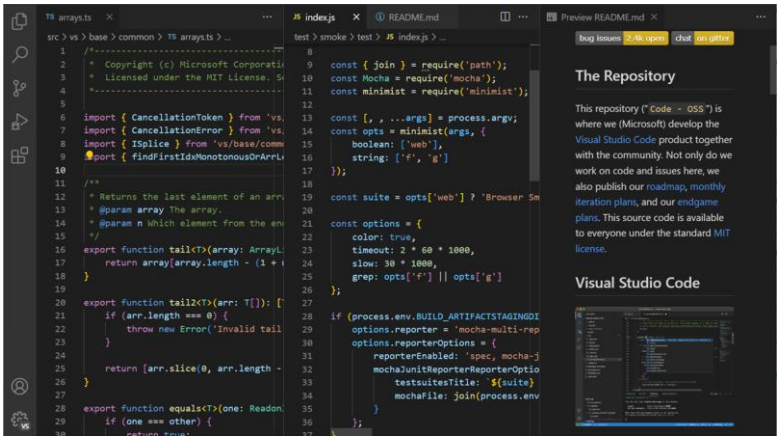

Figure 4.8 VS Code Interface (Microsoft, 2021)

Microsoft made VS Code, a small but strong code editor that works with many computer languages, such as HTML, CSS, JavaScript, and PHP. It has useful features like grammar colouring, code hints, analysis tools, and add-ons that make writing code easier and faster. The interface can also be changed to fit your needs, and both newbies and experts use it to build websites. That project used VS Code to write and arrange the source code in a neat and easy-to-use way (Visual Studio Code, 2024).

- Google Analytics

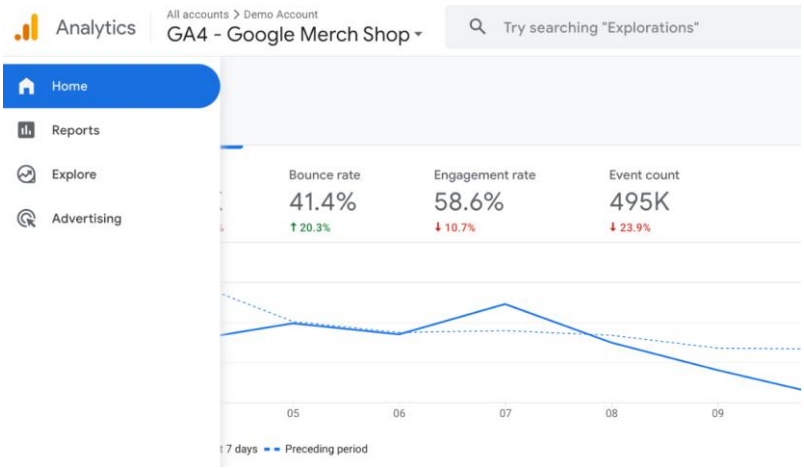

Figure 4.9 Google Analytics Interface (Iron Brands, 2025)

Google tracking is a web tracking service that helps websites keep track of and study how people use their content. It tells you things like how many people visited the site, how long they stayed, and which pages they connected with the most. Based on actual user behaviour, this data is crucial for system improvement. Google Analytics may be utilised with this system to track customer use trends and assist the spa owner in making wise choices (Chai, 2021).

- GitHub

Figure 4.10 GitHub Logo (Ishara, 2023)

GitHub is a site where people work together to make software and keep track of different versions. It lets writers work together as a team, store code online, and keep track of changes. Through folders, GitHub also makes it easy to keep backups and handle project files. GitHub helped with this project by keeping all of the system files in one place and organising them. It also let us track changes and new versions (Maria, 2023lo).

4.6 Conclusion

In conclusion, this chapter has talked about the most important things that need to happen in order for the *SpaSalon: Smart Client Engagement Web App* to be developed successfully. A lot of useful data was gathered from interviews and surveys about what users and other important people want from the system. The results were put into two groups which are functional requirements, that describe the main functions of the system, and non-functional requirements, that describe quality factors such as safety, speed, and ease of use. The system's hardware and program needs were also spelt out to make sure it can be set up and used correctly. This chapter sets a strong and organised base for the next phase's design and development of the system by clearly outlining all of its requirements.

5 ANALYSIS

5.1 Introduction

Collecting and analysing important data to make sure the system design meets real user and business needs is the first step in the *SpaSalon: Smart Client Engagement Web App* analysis phase. This step is very important for turning basic thoughts into a clear and useful system design. An organised questionnaire and an in-depth discussion were the two main ways that detailed information was gathered. The poll was mostly about finding out what users wanted and expected, while the conversation with the spa owner illustrated how the business is currently run and what needs to be changed. According to Future Processing (2023), gathering data is an important part of system design because it brings to light useful details that help with making choices and creating good solutions. After the data was collected, visual modelling tools were used to look at the layout of the system and how users interact with it. The Use Case Diagram, Flowchart, and BPMN Diagram are some of these. According to Lucidchart (2024), graphic models make complicated processes easier to understand and talk about. According to Wikipedia (2024), diagrams also help users and individuals stay on the same page during the development process. This part makes a strong base for the system's design and execution by integrating data analysis with clear visual models.

5.2 Data Gathering Analysis

Getting correct and useful data early on in the development process is important to make sure the suggested system meets the wants of its users and the objectives of the business. This study mainly looks at how information was gathered to find out what problems are happening now, what users want, and what features would work best with the system. Collecting accurate data enables smart design choices and lowers the chance of system failure. It also gives a better picture of how the current human processes work and what users really want to see changed. The input was ensured to be properly and beneficial by considering both qualitative and quantitative methods. The following are the two methods used to gather requirements for the *SpaSalon: Smart Client Engagement Web App* system:

5.2.1 Interview Analysis

Figure 5.1 Interview Session via Google Meet

An interview session was held with Puan Nor Hapizah binti Abidin, who is the owner of *Pelangi Hair Beauty Spa Muslimah* at Kampung Batu Muda, on 28 June 2025. The main purpose of the interview was to understand the spa's current business process and to find out what important features should be included in the system. To gather accurate information based on real needs, a total of six (6) interview questions were asked during the session. Below are the feedback analysis based on the responses given by the spa owner to each interview question:

Table 5.1 Question 1

QUESTION 1	How do your customers currently book appointments (walk-in, WhatsApp, phone, online, etc.)?
ANSWER	Most customers usually make their bookings through WhatsApp or phone calls.
ANALYSIS	The spa mostly uses WhatsApp and phone calls for bookings, which shows the current method is still basic and can be improved.

Table 5.2 Question 2

QUESTION 2	How do you normally manage daily appointments? Is there any system, notebook, or staff handling it manually?
ANSWER	I have a link is used as a booking to help manage daily appointments.
ANALYSIS	Although the owner uses a form link for booking, the process is still quite manual and not fully systematic.

Table 5.3 Question 3

QUESTION 3	Do you currently have a loyalty program for your customers? If yes, how is it managed (e.g., stamp card, manual record)?
ANSWER	Yes, there is an existing loyalty program using a stamp card. Customers receive a stamp card after more than three visits.
ANALYSIS	The loyalty program exists but it's done manually using a stamp card, so it could be more efficient if made digital.

Table 5.4 Question 4

QUESTION 4	What type of promotions do you usually offer to your customers (e.g., discounts, free treatments, referral bonuses)?
ANSWER	For promotions, customers are entitled to discounts or free treatments once they have completed 20 stamps on their card.
ANALYSIS	The promotions are linked to the stamp card, so a digital system could help make the rewards easier to manage and track.

Table 5.5 Question 5

QUESTION 5	Are you open to using a website-based system (instead of only WhatsApp/manual methods) to manage the loyalty?
ANSWER	No problem, I open to using a website-based system to manage loyalty programs.
ANALYSIS	The owner is open to using a website-based system, which means the proposed system has a good chance of being accepted.

Table 5.6 Question 6

QUESTION 6	Can you provide a list of services your spa currently offers, along with a brief description for each service?
ANSWER	Later I will list and give to you all of the services offered at the spa.
ANALYSIS	The owner is willing to provide the spa service details, which will help to complete the content for the web app.

5.2.2 Questionnaire Analysis

A questionnaire was created using *Google Forms* and shared with random individuals who have experience visiting spas or salons. The aim was to collect opinions and preferences related to loyalty programs and how they are usually used by customers. A total of 16 questions were included, beginning with demographic information, followed by two main sections. Section A focused on loyalty program behaviour and experience, while Section B covered preferences on loyalty points, tracking methods, and how users like to receive promotions. The feedback from this survey helped in identifying what features are most important to users and how the system should be designed. Below are the questionnaire analysis results based on the responses received:

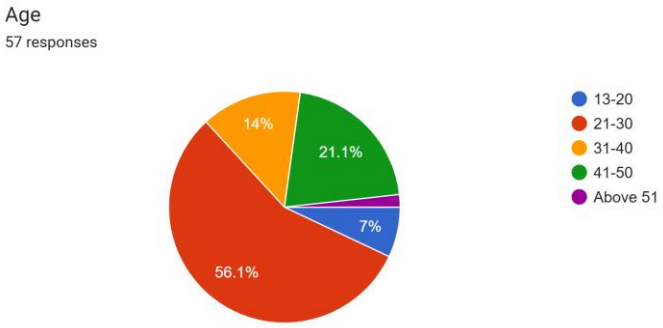

Figure 5.2 Demographic Question

The first question in the survey is about the age of the user. Based on the chart above, the majority of the respondents are from the age 21 to 30 with the percentage is 56.1% while the respondents are from the age 41 to 50 with the percentage of user is 21.1%. Then, the percentage of user in respondent's age 31 to 40 is 14% while the percentage of user in respondent's age 13 to 20 is 7%. Lastly, the rest of respondents are from the age above 51.

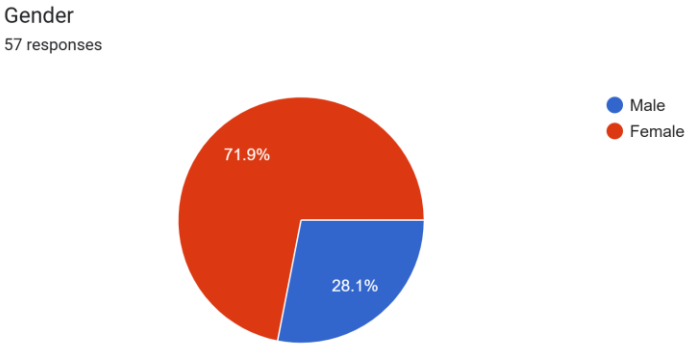

Figure 5.3 Demographic Question

The second question in the survey is about gender of the respondents. Based on the chart above, the most gender that answering all the questions is more to female user than male user. The percentage of female user is 71.9% while male user is 28.1% from 57 respondents.

Section A: Loyalty Program Behaviour & Experience

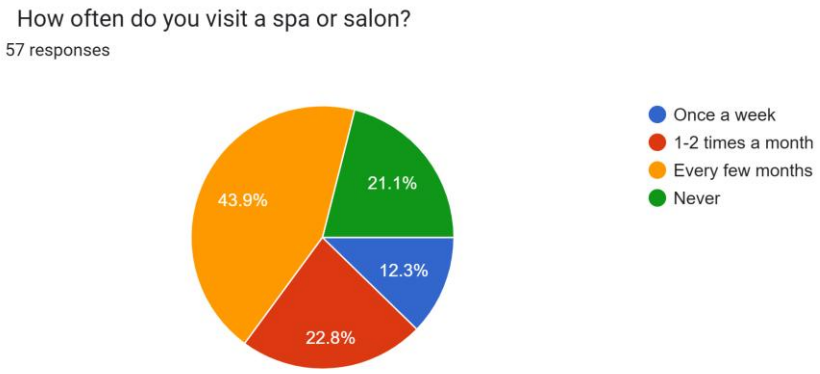

Figure 5.4 Question 1

This is the first question for section A, it about how often that they visit a spa or salon. There are 43.9% respondents who are visit spa or salon in every a few months while 22.8% respondents who visit like one to two months. Then, there are 21.1% respondents that are never going to the spa or salon while 12.3% who visit once a week to the spa and salon.

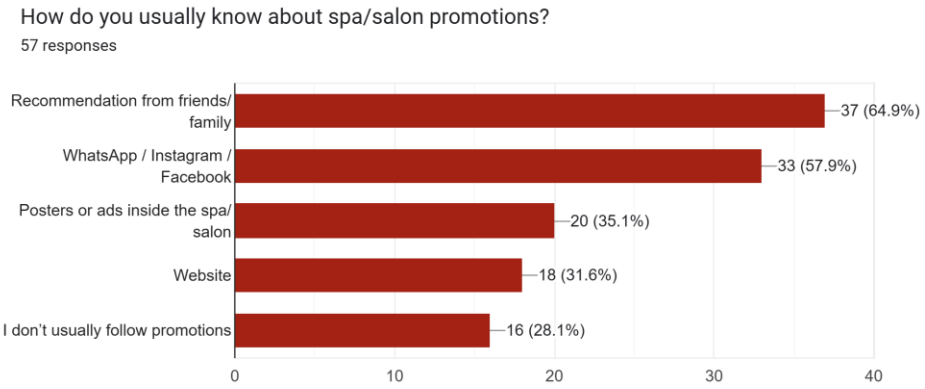

Figure 5.5 Question 2

The second question is about how they know about the spa or salon promotions. Recommendation from family or friends and also through from platform like WhatsApp, Instagram and also Facebook are the most they know about the promotion's spa or salon. For the posters or ads inside about the spa or salon are just 35.1% respondents choose that while from the website just 31.6% respondents. Then, the rest who are usually didn't follow the promotions of the any spa or salon.

Figure 5.6 Question 3

The third question is about how they usually track their loyalty rewards from a spa or salon. From the survey, 36 respondents are usually using physical stamp card while 28 respondents are usually using website. Then, 24 respondents are using manual notes in their phone also didn't track it for loyalty rewards. The rest of respondents are using their self-memory to track the loyalty rewards.

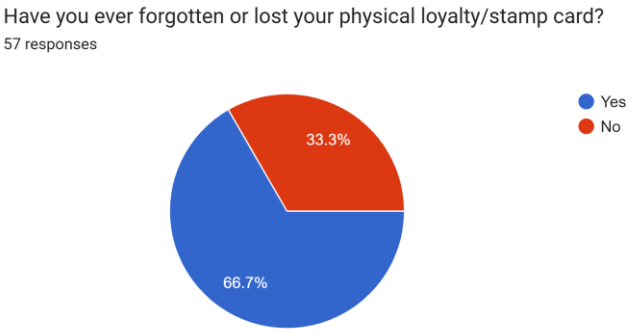

Figure 5.7 Question 4

The fourth question is about forgotten or lost their physical stamp card so in 66.7% respondents are the most answered yes, they usually forgot or lost their own physical stamp. Then, in 33.3% respondents answered no for this question.

Figure 5.8 Question 5

Next question is about are they usually use loyalty points or rewards when visiting a spa or salon. From the survey, 57.9% answered they sometimes usually use the loyalty points or rewards while 28.1% answered are they always use it. The rest 14% respondents answered never use loyalty points or rewards when visiting a spa or salon.

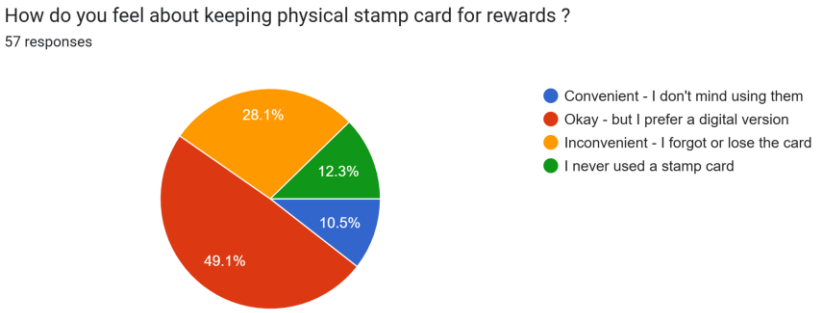

Figure 5.9 Question 6

The sixth question is about how they feel about just keeping a physical stamp card for rewards. In 49.1 respondents answer they acceptable but they prefer for a digital version while 28.1% answered they feel inconvenient because they always forgot or lose the card. 10.5% respondents answered responded convenient and they didn't mind to use it. For the rest respondents who are never used a stamp card.

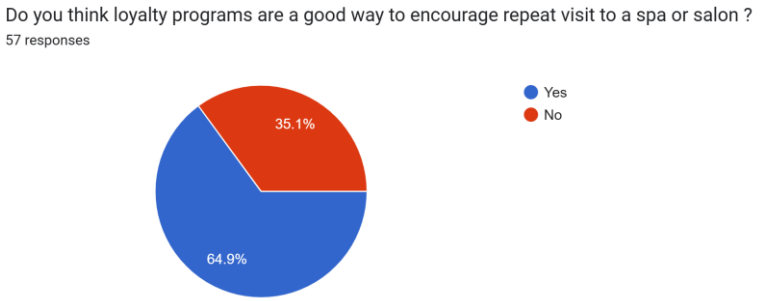

Figure 5.10 Question 7

Then, the question above is about the loyalty program are a good way to encourage repeat visit to a spa or salon. Most of respondents in 64.9% answered yes then no in 35.1%.

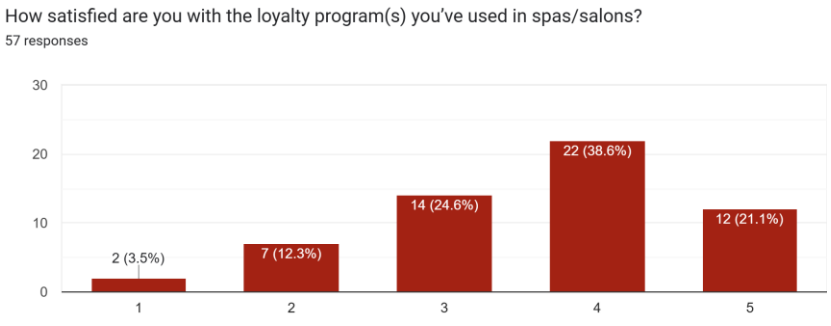

Figure 5.11 Question 8

Last question in section A is about how they satisfied with the loyalty program used in spa or salon. Total number of they satisfied with the loyalty program are 34 respondents while total number of they not satisfied are 9 respondents. For the average are in 14 respondents answered it.

Section B: Loyalty Points & Targeted Promotion Preferences

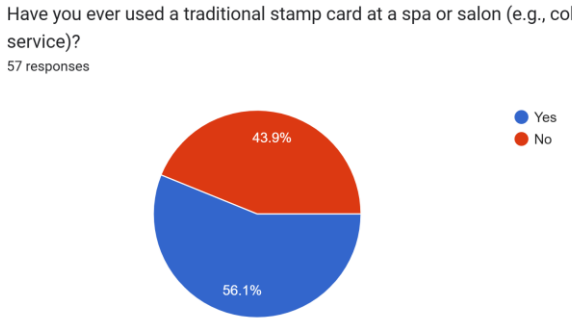

Figure 5.12 Question 9

The first question for section B is about they haven't used a traditional stamp card at a spa or salon like they must collect 10 stamps to get 1 free service. From the survey, 56.1% respondents answered yes for this question while the rest respondents are answered they didn't have used traditional stamp card at a spa or salon.

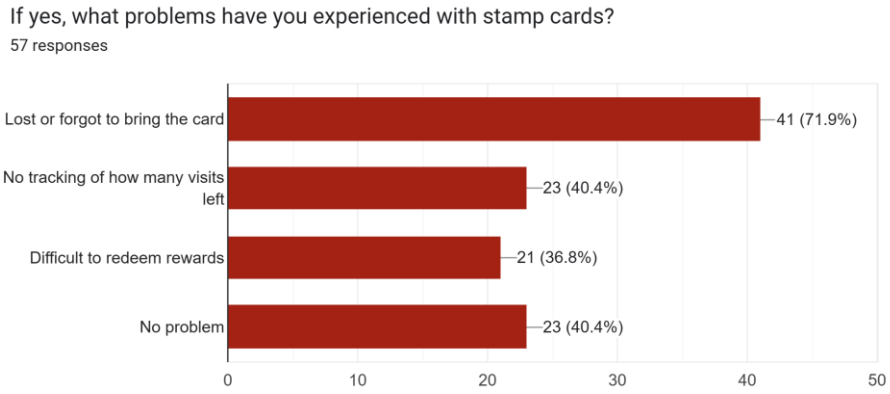

Figure 5.13 Question 10

Second question is about if they answered yes so what the problems have, they experienced with stamp cards. 71.9% respondents who are lost or forgot to bring the card to the spa or salon while 40.4% who are no track of how many visited left and also, they no problem with the stamp card. In 36.8% respondents had experienced like difficulties to redeem rewards.

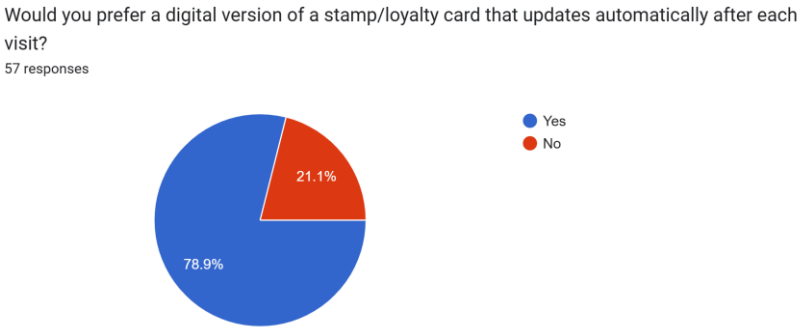

Figure 5.14 Question 11

Third question is about they prefer or not have in digital way for a stamp or loyalty card that updates automatically after each visited. The most of them answered yes in 78.9% respondents then no in 21.1% respondents.

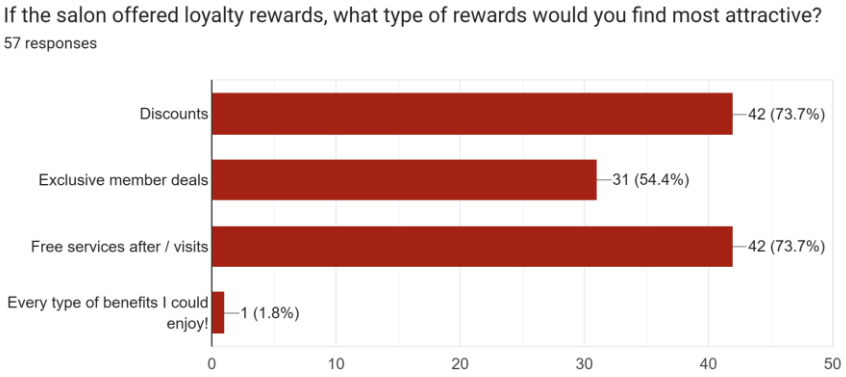

Figure 5.15 Question 12

Next, the question above is about if the salon or spa offered loyalty rewards so in what of types reward that they would find most attractive. From the survey, in 73.7% they want discounts and free service after visited. 54.4% wants exclusive member deals while 1% that she or he accepted every type of benefits.

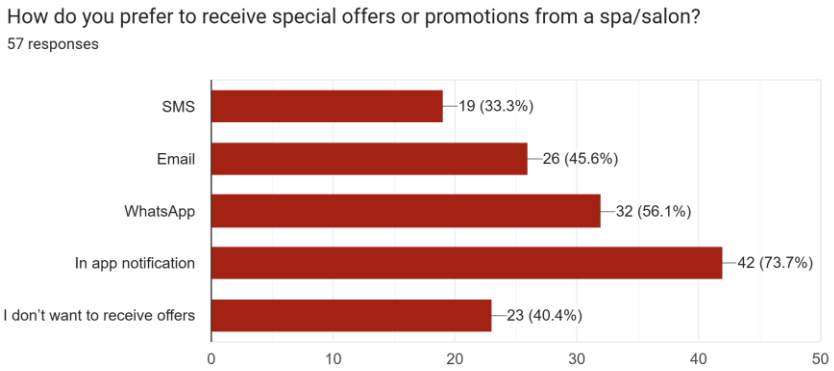

Figure 5.16 Question 13

Fifth question is about are in what way they prefer to receive special offers or promotions from a spa or salon. Most of them 73.7% want in app notification also followed 56.1% through WhatsApp. Then, SMS and Email are responded 33.3% and 45.6%. Last who are didn't want to any receive offers in 40.4%.

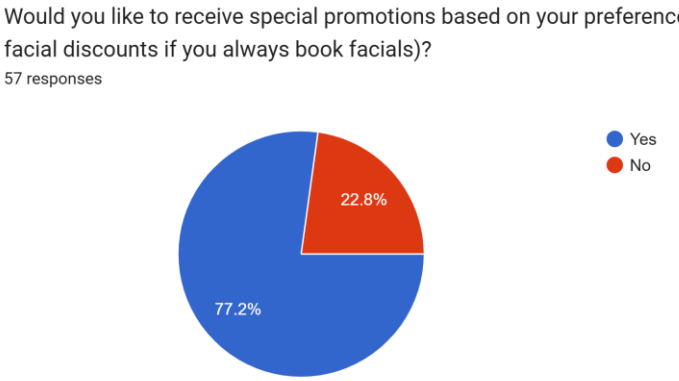

Figure 5.17 Question 14

Last question in section B is about they like or not to receive a special promotion based on past bookings like facial discount if they always book the facials. In 77.2% had responded yes while in 22.8% responded no for this question.

5.3 Use Case Model

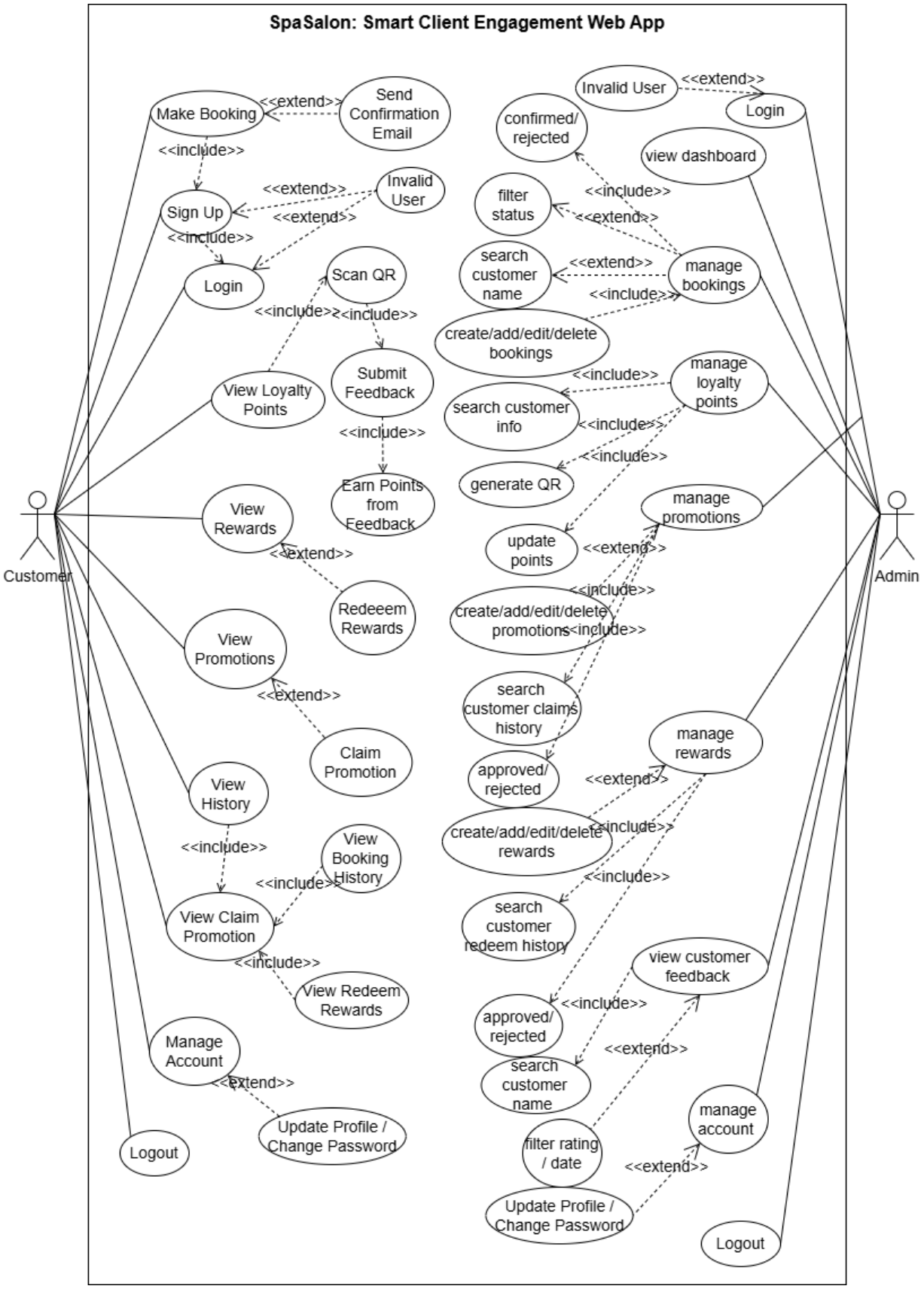

Figure 5.18 Use Case Diagram

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Figure 5.18 shown a use case diagram is a Unified Modeling Language (UML) tool that represents a system's functional requirements by illustrating the interactions between external actors and the services provided by the system (Visual Paradigm, 2024). For the *SpaSalon: Smart Client Engagement Web App*, the diagram identifies two primary actors which are customer and admin also the maps their interactions with major system functions. Customer related use cases include make booking, sign up, login, scan QR, submit feedback, earn points, view loyalty points, view rewards, redeem rewards, view promotions, claim promotion, view history, manage account, and logout. These use cases are structured with include and extend relationships, showing functional dependencies, such as login being required before claiming promotions or viewing reward history. On the admin side, the use case diagram presents key operational functions including manage bookings, manage loyalty points, generate QR, manage promotions, manage rewards, view customer feedback, search customer information, and update admin account. Each use case outlines how the admin maintains, validates, and updates customer transactions and promotional mechanisms. The diagram also incorporates additional supporting functions such as filtering customer claims, reviewing redemption records, updating points, and handling approvals or rejections. Collectively, the use case diagram clarifies the complete behavioural scope of the system, defining what the system must provide from both user and administrative perspectives, and forming the foundation for subsequent design and development phases (Nulab, 2021).

5.4 Flowchart

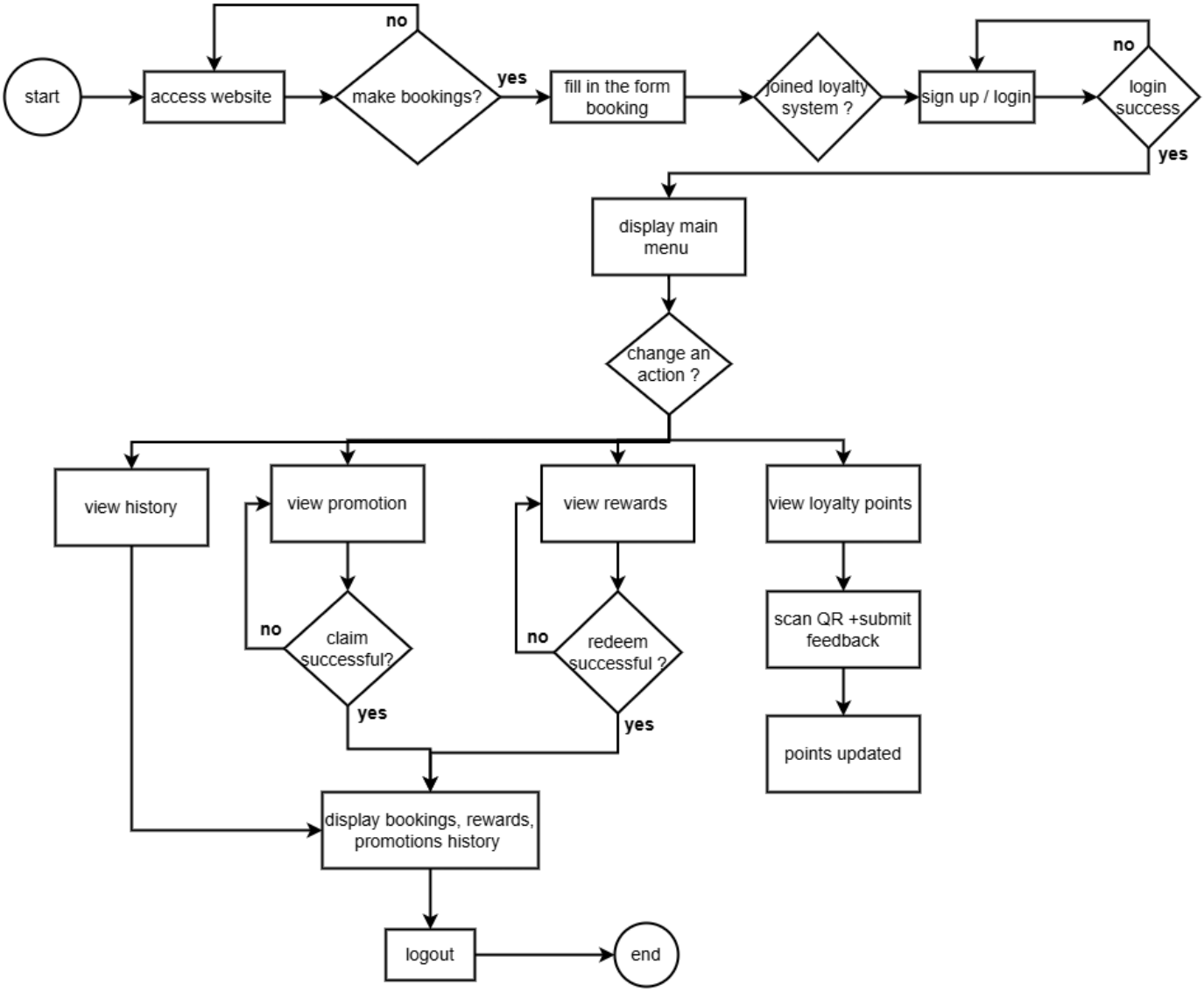


Figure 5.19 Flowchart for Customer

Figure 5.19 shown the customer workflow of the *SpaSalon: Smart Client Engagement Web App* is focused on enhancing user experience and streamlining interaction with the platform. When a customer accesses the web app, the system first determines their intent, directing them to the booking form if a reservation is required. The workflow checks whether the user is part of the loyalty program, prompting a “Sign Up” or “Login” if they are not yet authenticated. Once logged in, the customer dashboard serves as the main navigation center, allowing users to view booking history, explore promotional offers, claim rewards, and check loyalty points. The system integrates a QR code scanning feature that facilitates instant feedback submission and updates to loyalty points. Upon completing their activities, customers can review their updated history and securely log out, ensuring all session data is protected. By visualizing this workflow through flowcharts, developers and stakeholders gain a clear understanding of customer interactions and system responses, which helps in error detection and efficient process planning (Rushiti et al., 2025; Atlassian, 2024).

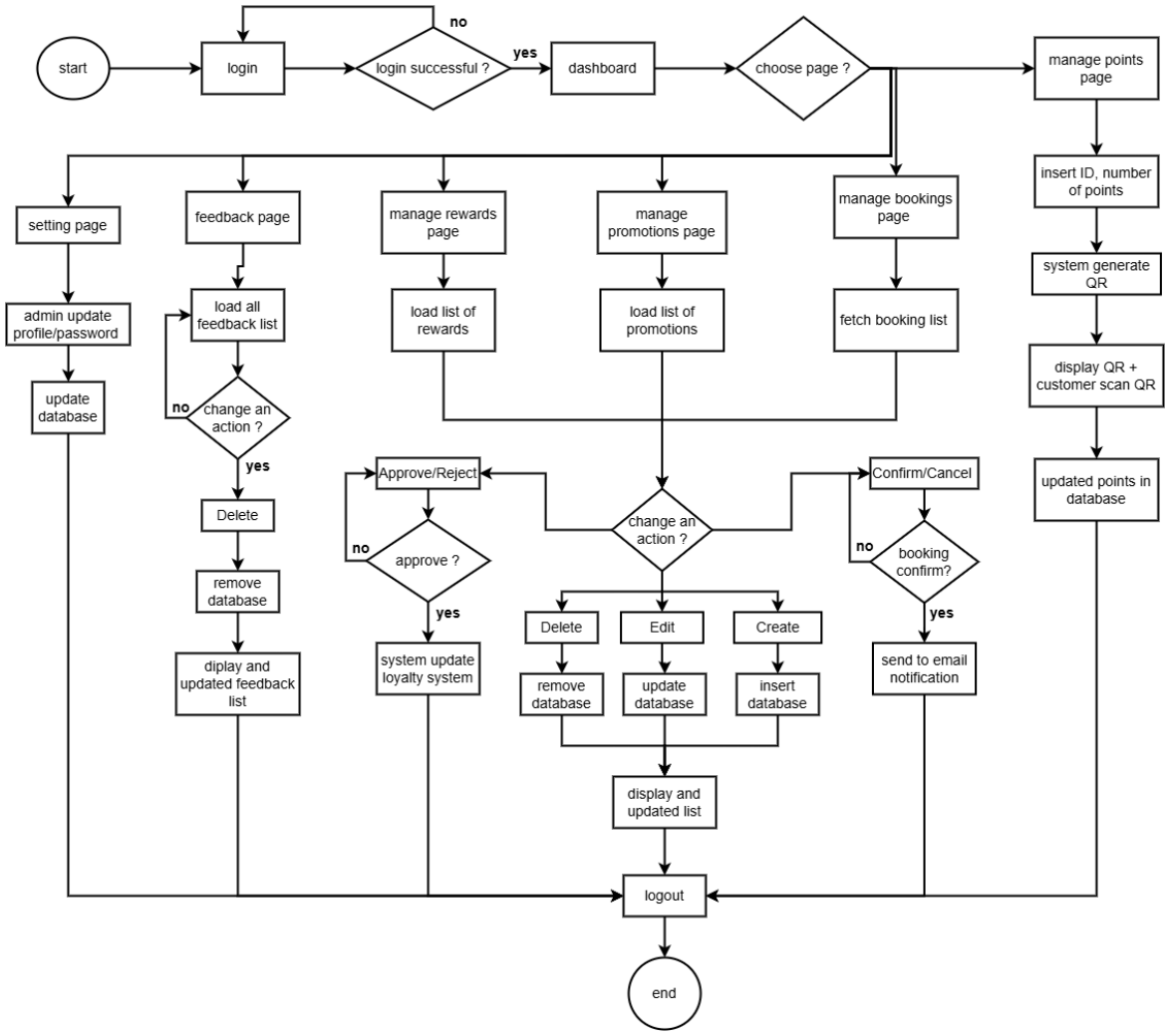


Figure 5.20 Flowchart for Owner Spa or Staff

Figure 5.20 shown the administrative workflow of the *SpaSalon: Smart Client Engagement Web App* is designed to provide comprehensive control over all backend operations while ensuring security and efficiency. The process begins with a secure login verification to authenticate the administrator, granting access to the main dashboard. From this central hub, the admin can navigate five primary modules: Settings, Feedback, Rewards, Promotions, and Bookings. In Settings and Feedback, the administrator can update profile information or remove outdated feedback records from the system. The Rewards and Promotions modules allow the admin to perform full CRUD (Create, Read, Update, Delete) operations, enabling updates to the loyalty system in real-time and the approval of customer requests. In the Booking module, reservation lists can be reviewed, confirmed, or canceled, triggering automated email notifications to customers. The Points management function supports manual customer ID insertion to generate QR codes for loyalty validation. All administrative actions ultimately converge at the logout function, ensuring that any changes are securely stored and session data is safely terminated. This structured flow facilitates precise system management while minimizing operational errors and maintaining system integrity (Rushiti et al., 2025; GeeksforGeeks, 2025).

5.5 BPMN (Business Process Modelling Notation)

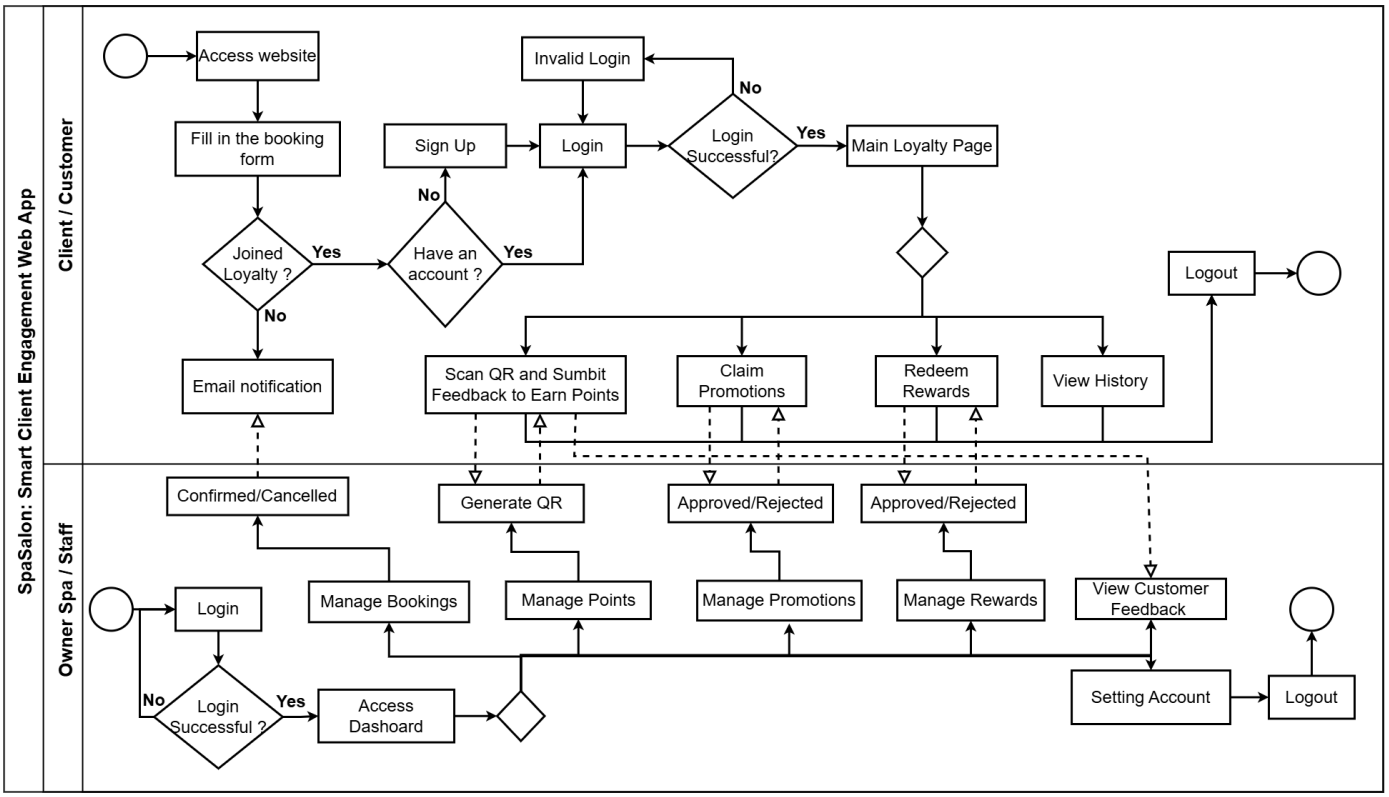


Figure 5.21 BPMN Diagram

Figure 5.21 shown a Business Process Model and Notation (BPMN) is a standardized graphical language designed to model business processes clearly and consistently so that both technical developers and business stakeholders can interpret the workflow in the same manner (IBM, 2024). In the context of the *SpaSalon: Smart Client Engagement Web App*, the BPMN diagram illustrates the complete end to end interaction between two key participants which are customer and admin. The customer flow begins with accessing the website, completing the booking form, and passing through decision gateways that determine whether the user is already part of the loyalty program or requires sign-up and login. The diagram also models the login validation process, which branches into successful or invalid login outcomes before directing the user to the main loyalty page. From this point, several core activities which are the scanning QR codes, submitting feedback to earn points, claiming promotions, redeeming rewards, and viewing history are represented as sequential tasks. Correspondingly, the admin swim lane captures backend activities such as confirming bookings, generating QR codes, updating points, and managing bookings, promotions, claims, rewards, and customer feedback. Message flows between swim lanes demonstrate system to user communication, approvals, and synchronous actions required for loyalty functions. Gateways, events, and subprocesses that the approval or rejection of claims highlight decision logic and operational controls, ensuring the BPMN captures the full operational scope of spa client engagement ecosystem (TechTarget, 2023).

5.6 Conclusion

As a result, the research part was very important in getting the *SpaSalon: Smart Client Engagement Web App* ongoing. It was possible to learn a lot about both business goals and user tastes through conversations and surveys. This data was carefully looked at and turned into visual models, such as the Use Case Diagram, Flowchart, and BPMN Diagram, to help show how the system is structured and how it works. These tools helped make complicated ideas easier to understand and made sure that coders and users could talk to each other clearly. Overall, the ideas and models created in this phase will be very helpful when designing and building a web application that is both useful and easy to use in the next steps.

6 DESIGN

6.1 Introduction

The *SpaSalon: Smart Client Engagement Web App*'s design phase is important because it offers a clear blueprint to system development. At this point, the requirements are converted into wireframes, models, and diagrams that direct the development process. As mentioned by Anjalee (2025), the design phase is the system's structure and interface to ensure smooth implementation. In this phase, the system design focuses on both customer and staff features in a clear way. For customers can make a booking, join the loyalty program, and give feedback, while for staff it involves managing customers, checking bookings details, and using the dashboard. The chapter also shows the interface design with wireframes, the database design with data dictionary, Entity Relationship Diagram (ERD), and Data Flow Diagram (DFD). All of these parts give a base for the system and make sure can run smoothly. Frontend and backend design, this phase makes the project more complete and ready to move to implementation.

6.2 Interface Design

Planning the design and interactive components of the system, such as the layout, buttons, and menus, is important to create an effective interface design for the *SpaSalon: Smart Client Engagement Web App.* The objective is to make sure the system functions are works also clear and easy for users to understand (Dix et al., 2024). This design work important to the project because a well-designed interface directly affects the user experience. In the end, good interface design is to boosting user engagement and ensuring the system is adopted successfully, which is a main objective of the system. The wireframe designs shown below the two main user roles in the system, customer and admin, highlighting the layout and navigation flow for each interface. Both spa and customers benefit from accessible design, which helps users complete the task quickly and with mistakes, increasing their overall satisfaction with the system (Shneiderman et al., 2024).

6.2.1 Wireframe of Customer Part

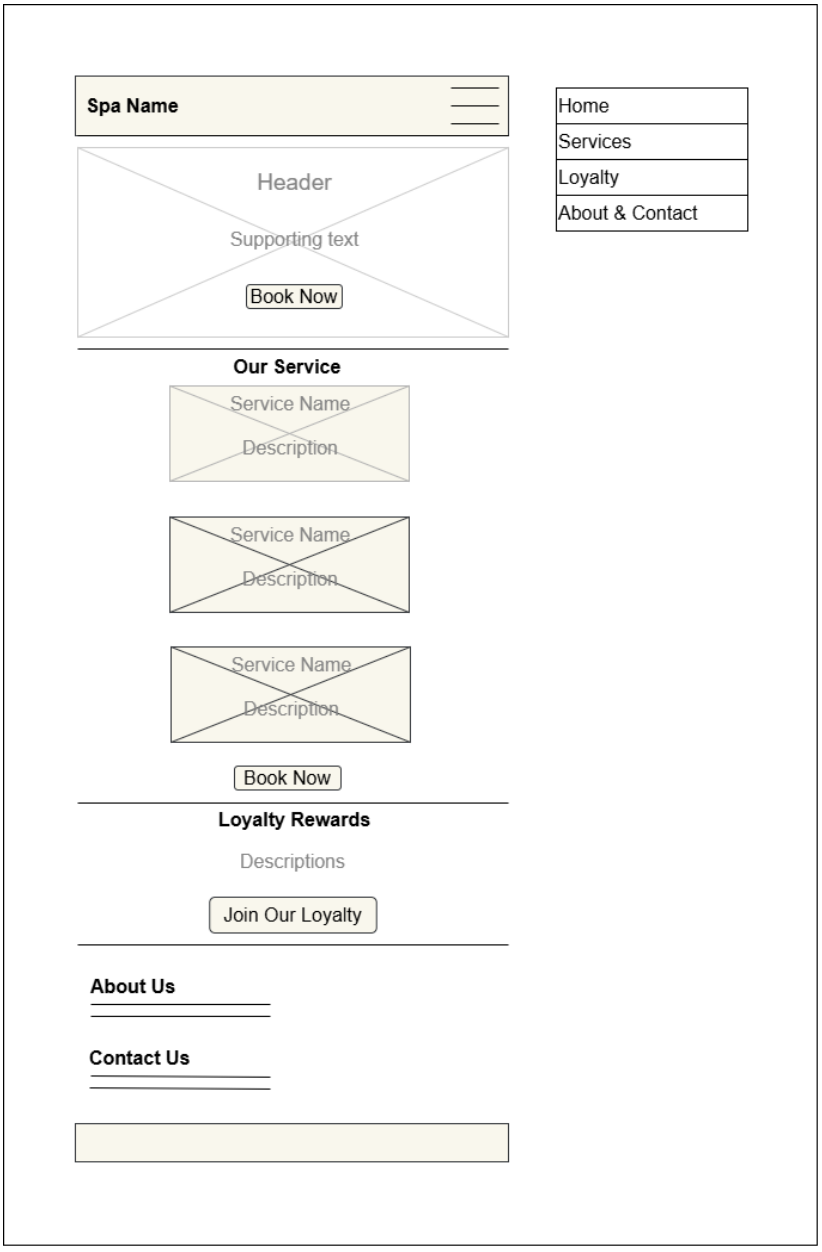


Figure 6.1 Main Website Page

The figure 6.1 above shows the main website interface for *SpaSalon: Smart Client Engagement Web App.* The website layout is designed vertical as the project is developed as a web application, allow Spa Pelangi customers to access the system through their mobile browsers. This approach help that the system is mobile responsive and user – friendly on different devices. The colour theme of the interface Spa Pelangi's calming and relaxing brand scope with use soft tones such as nude, brown, and white. Also, one or two font styles are used throughout the website to maintain consistency and improve text readability.

The website consists of a single page layout that is divided into several sections. A hamburger menu will be implemented to help customers navigate easily between sections. The website includes key

information about Spa Pelangi such as company details, available services, contact number, and location. The Loyalty System button is placed in the loyalty section, as it the main feature of the system for Spa Pelangi. The customer also can make a booking for available services in that website.

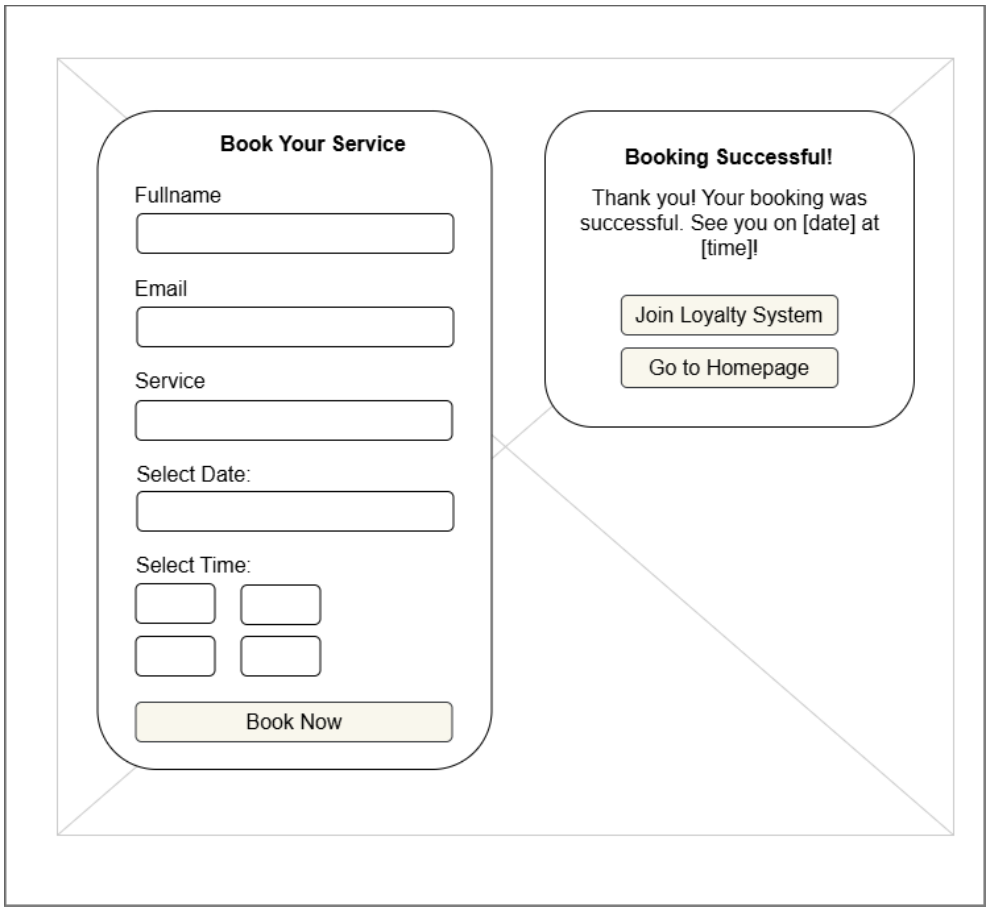


Figure 6.2 Booking Form Page

The figure 6.2 on the left shows the booking form page, which is designed for Spa Pelangi customers who want to make a booking for the available services. Customers are required to fill in details such as full name, email address, selected service, preferred date, and available time. The booking form design in a full page layout for ease of use. Once the customer clicks the “Book Now” button, a Booking Successful page, as shown on the right will appear on a separate page. This shows that there will be two pages developed for the booking process. Additionally, customers will be given the option to join the Spa Pelangi Loyalty Program based on their preference. A button will be provided to redirect them to the loyalty registration page if they want to join it. Each page will maintain a consistent design theme, where the form background includes images or videos related to spa elements to enhance the relaxing scope of the system.

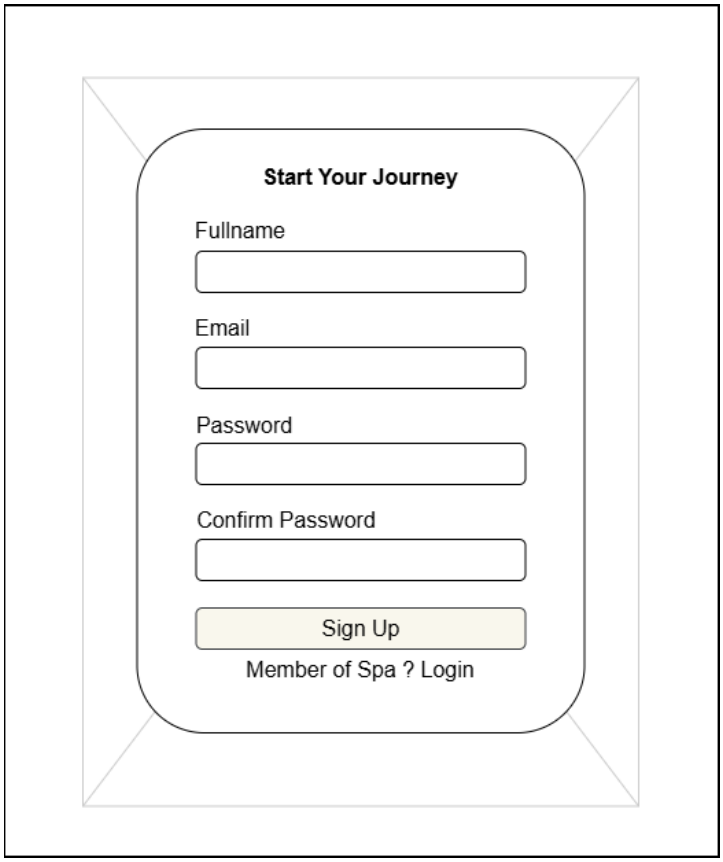


Figure 6.3 Sign Up Loyalty System Page

Figure 6.3 shows the Sign-Up page, it design for customers to use in the Spa Pelangi Loyalty Program following their service. The sign-up form requests fill in the details which are full name, email address, and a password. This is to make sure that the registration details are correct. For those already registered, a "Log In" button is conveniently located below the sign-up option for access to the loyalty program. The page design reflects the previously set layout and style. It uses a consistent visual language, using images or video related to the spa as the background of the form. This make a unified and calming aesthetic throughout the system.

Figure 6.4 Login Loyalty System Page

The Spa Pelangi Loyalty Program Log-In page is shown in figure 6.4 above. Customers must enter their password and email address from the sign-up process on the log-in form. To maintain a consistent and organized user interface across the system, the design of the registration and login pages was retained. There is a "Sign Up" button for new customer who want to register for the Spa Pelangi Loyalty Program.

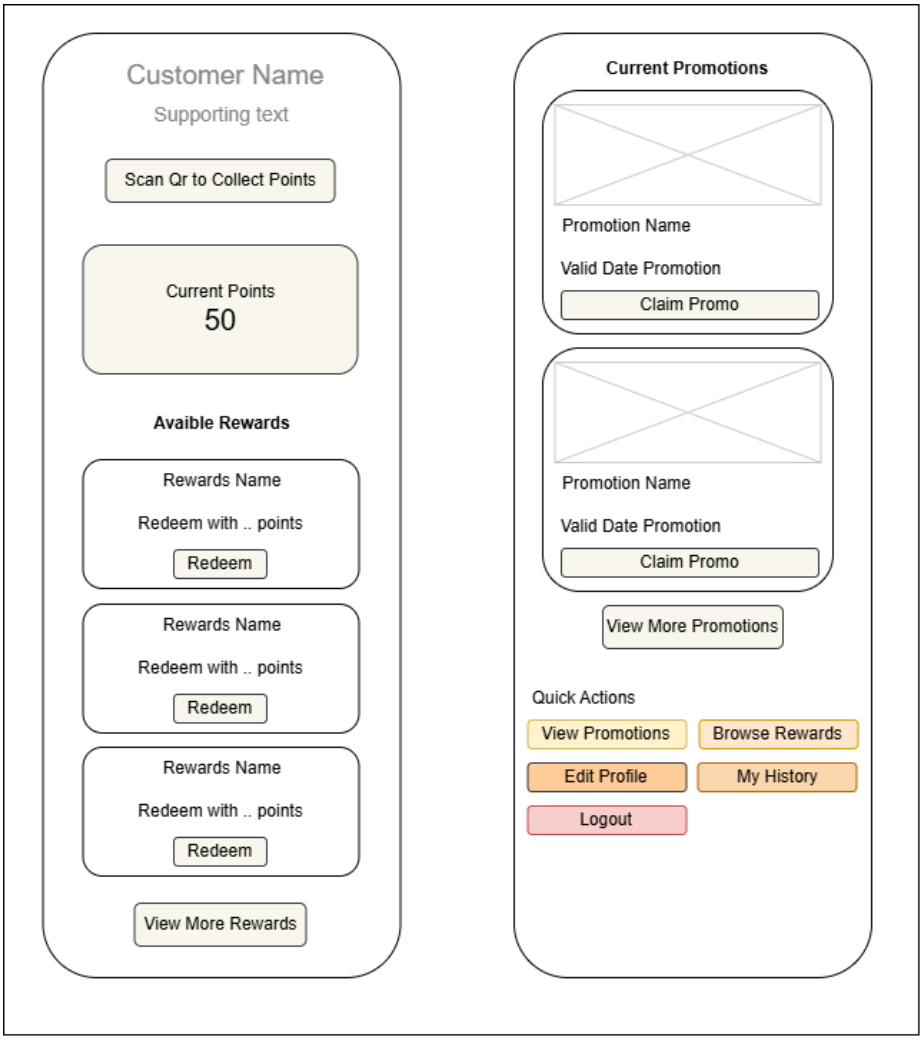


Figure 6.5 Main Loyalty System Page

Above is the homepage design of the Spa Pelangi Loyalty System. The layout is designed as a single vertical page, where customer can scroll down from the left side to the right side. To help customers double check if they are logged into the correct account, the customer's name is shown at the top of the page. Since the main objective of this project is to develop a loyalty system, this page has a QR button to allow users to start earn their points. To allow customers to keep track of the number of points they have, the loyalty points balance will be displayed on the home page. Supporting texts will also be included on the homepage to improve user engagement and encourage the customer to collect more loyalty points.

Ongoing promotions sections and available rewards sections, very common in loyalty systems, are also included in the Spa Pelangi system to enrich user experience and increase customer engagement. The page bottom contains several navigation buttons, such as View Promotions, Browse Rewards, Edit Profile, History, and Log Out. By clicking on the History button, customers can view their most recent booking, promotion, and reward history. Above all, the whole layout of this main page uses nude, brown, and white hues, which reflect Spa Pelangi's serene and sophisticated character.

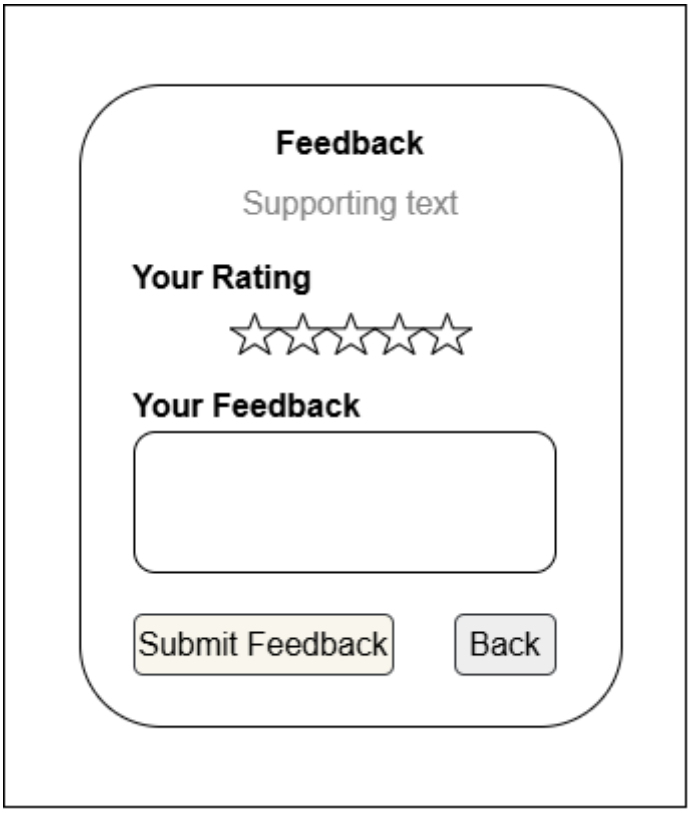


Figure 6.6 Feedback Loyalty System Page

The Spa Pelangi Loyalty System's Feedback Page is shown in figure 6.6 above. Customers must scan the admin's QR code and provide feedback on this page after scanning the QR code to get their loyalty points. Customers can rate their experience after receiving a service using a star rating, and they can also write their comments or feedback in a text box. The feedback page's design is kept straight and neat, with a colour scheme of white, brown, and nude. Supporting text is also included to improve the page's aesthetic appeal and make the design more appealing.

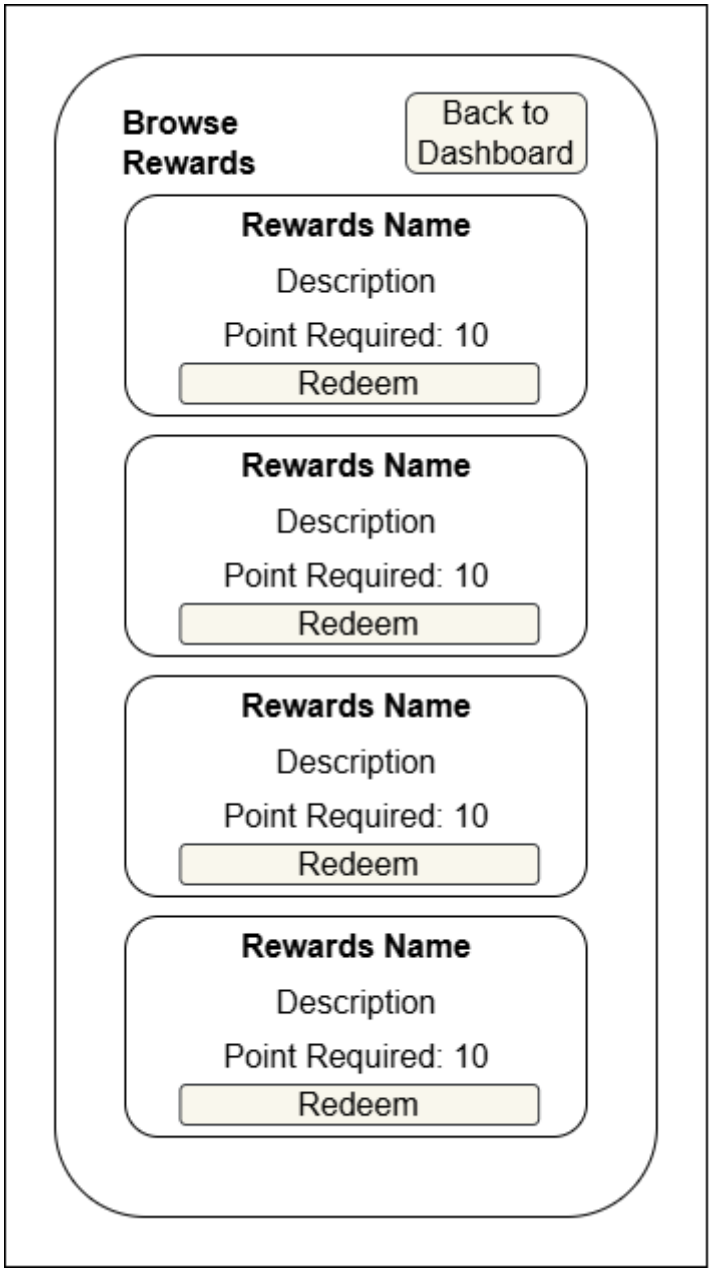


Figure 6.7 Rewards Loyalty System Page

The Spa Pelangi Loyalty System's Rewards Page design is displayed in figure 6.7 above. The page's colour scheme is consistent with the overall layout of the spa system. Customers can scroll down to view all of the available rewards because the layout is presented in a single column format. To make it easier for customers to understand what each reward offers, each one has a brief description. Since rewards are intended to be redeemed, the necessary loyalty points for each reward are prominently displayed to inform customers of the number of points required for redemption. Customers can quickly return to the main loyalty system page by using the "Back to Dashboard" button, and each reward has a "Redeem" button to make the redemption process easy and convenient for users.

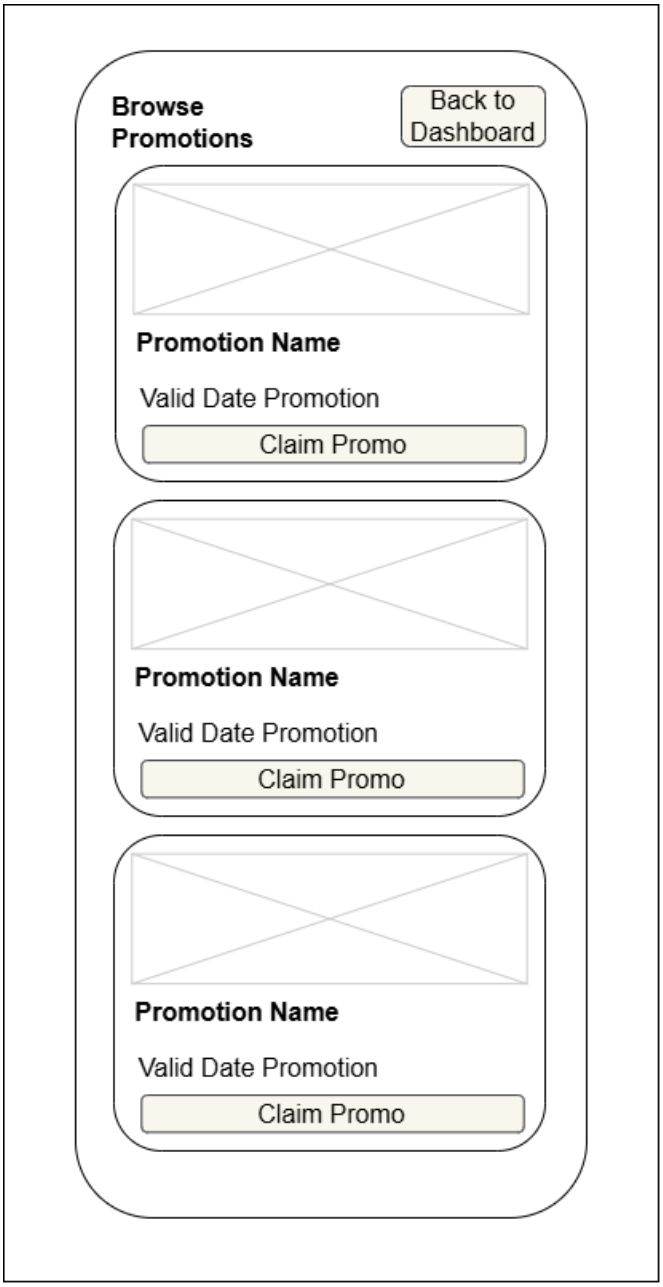


Figure 6.8 Promotions Loyalty System Page

The Spa Pelangi Loyalty System's Promotion Page design is shown in figure 6.8 above. With a single column format that shows a list of all available promotions, the colour scheme, design, and layout are all in line with the Rewards Page. In order to notify customers of the promotion period, each promotion includes a pertinent image that corresponds with the promotion title and the validity date. Customers can simply return to the main loyalty system page by using the "Back to Dashboard" button, which operates similarly to the Rewards Page. Customers can also easily claim any available promotions by clicking the "Claim Promo" button.

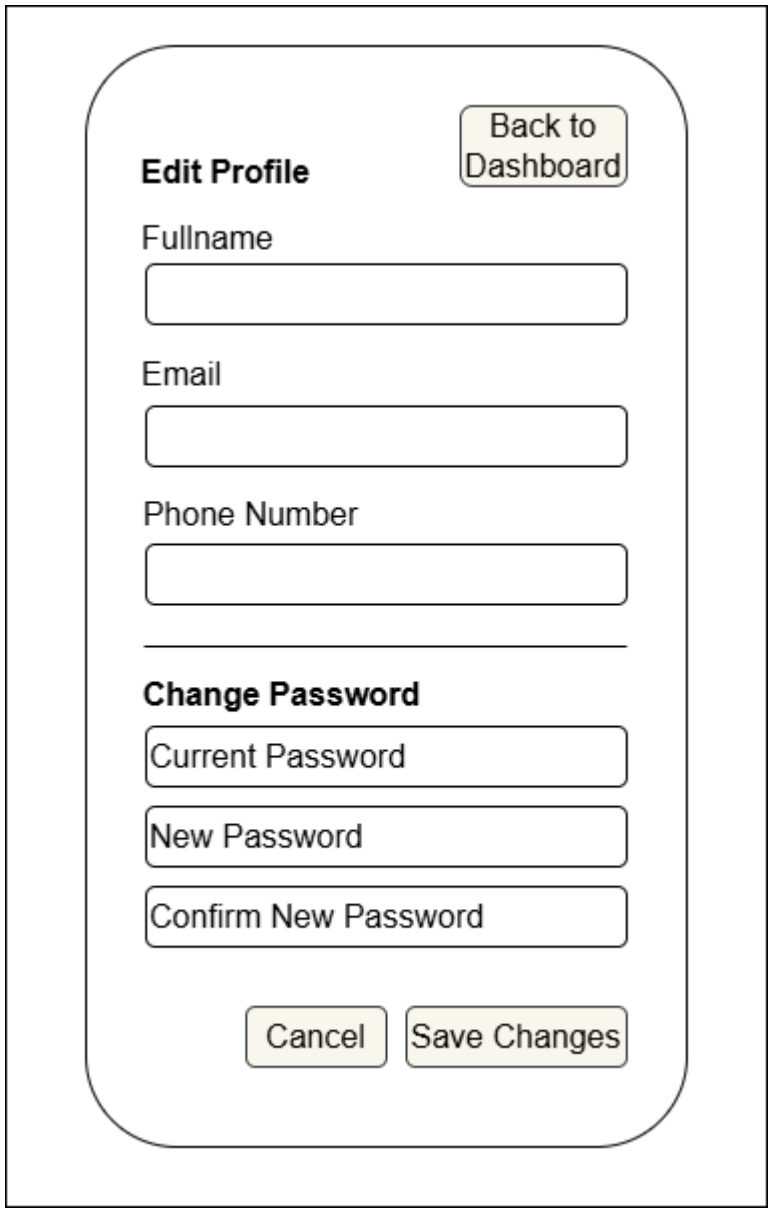


Figure 6.9 Edit Profile Loyalty System Page

Figure 6.9 shows the Edit Profile Page for Spa Pelangi's Loyalty System. This page is where customers can manage their personal details. The design make simple and ease of use also featuring key functionalities. Customers can modify their phone numbers and make a new password for the following logins to the loyalty system. A "Save Changes" button will create, enable customers to securely save and updated information within the system.

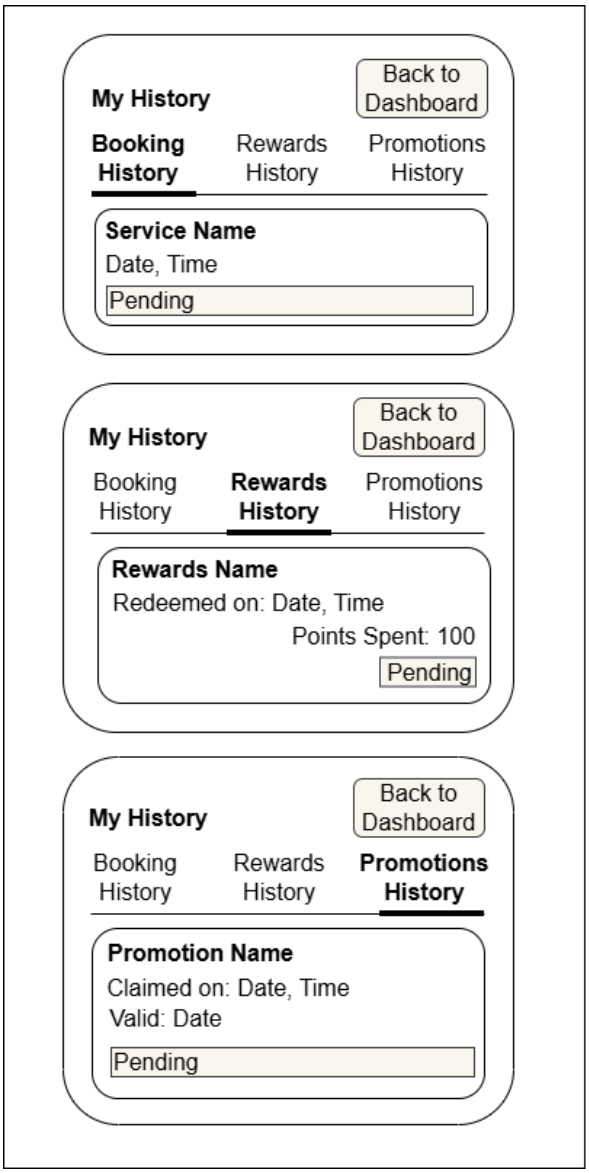


Figure 6.10 History Loyalty System Page

The Spa Pelangi Loyalty System's History Page style and design shown that figure 6.10 above. Customers can see the dates and times of their bookings, the rewards they redeem, and the promotions they have claimed on this one page view. Customers can also see each history status on this page, including whether it has been authorized by the admin or still pending. Every history entry has the details required to guarantee accurate information. Additionally, there is a "Back to Dashboard" button that works similarly to the Rewards and Promotions pages, making it simple for users to get back to the homepage system.

6.2.2 Wireframe of Admin Part

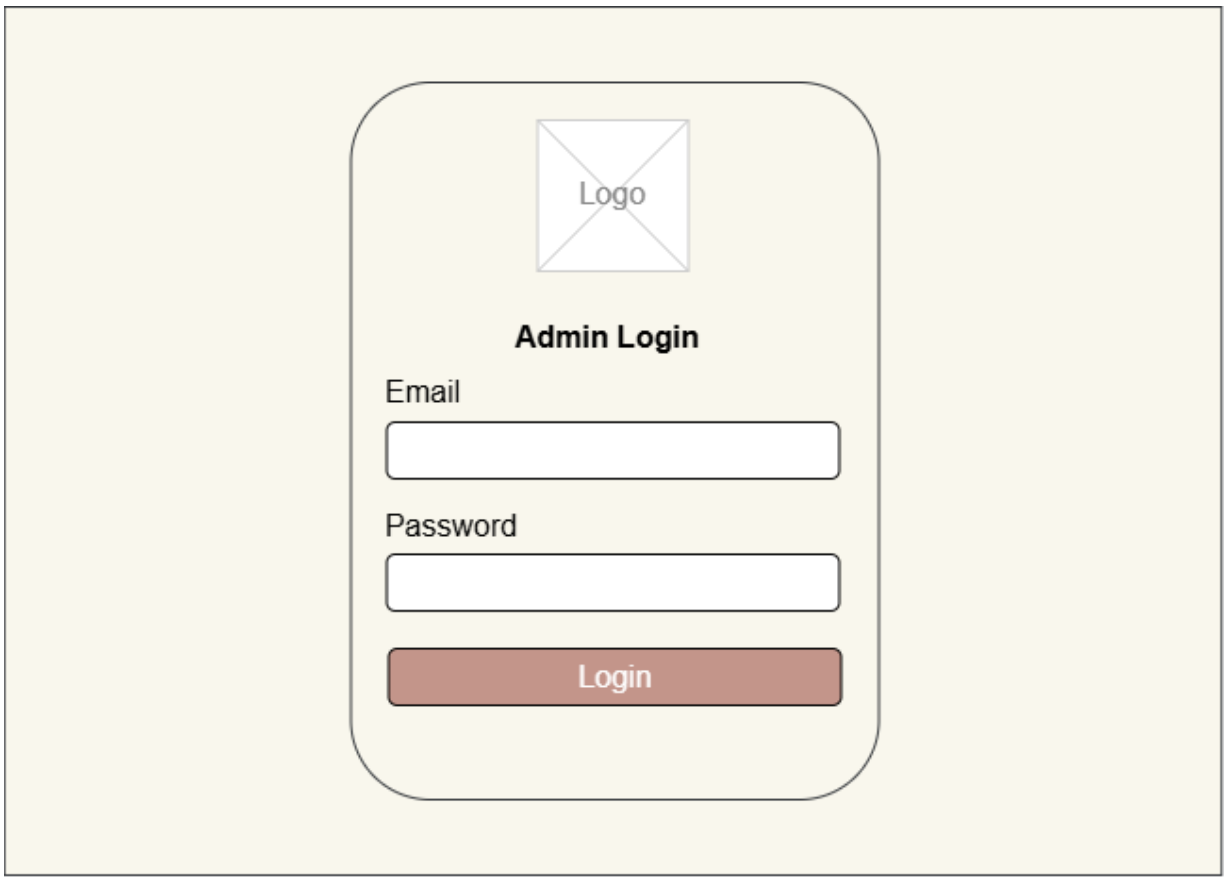


Figure 6.11 Login Page

The figure 6.11 above is the Admin Login Page for the staff of Spa Pelangi. This section is purpose for administrative access, allowing only authorized to log into the backend system. The system database directly configures the login credentials, which include the email address and password. The logo of Spa Pelangi is placed above the “Admin Login” title, effectively indicating that this backend system is associated with Spa Pelangi. The colour theme for this page is in harmony with the overall system design which are the nude, brown, and white tones that align with the spa’s serene and branding.

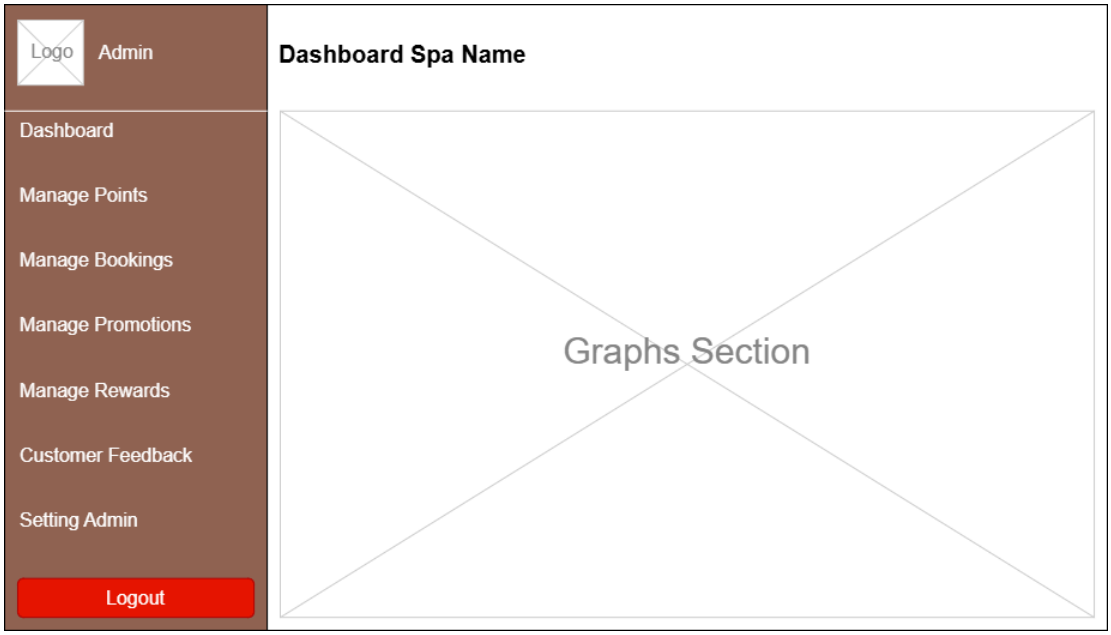


Figure 6.12 Dashboard Page

The Spa Pelangi Loyalty System's admin dashboard page design is seen in figure 6.12 above. Dashboard, Manage Points, Manage Bookings, Manage Promotions, Manage Rewards, Customer Feedback, and Admin Settings are among the choices in the navigation menu on the left side of the screen. To preserve brand integrity, the Spa Pelangi logo is also uniformly presented on every page in the admin area. A summary of the loyalty system's success is provided via a number of graphs and data visualizations on the dashboard page. To improve clarity and engagement for admin users, these graphs are made to be interactive and displayed in appropriate colours.

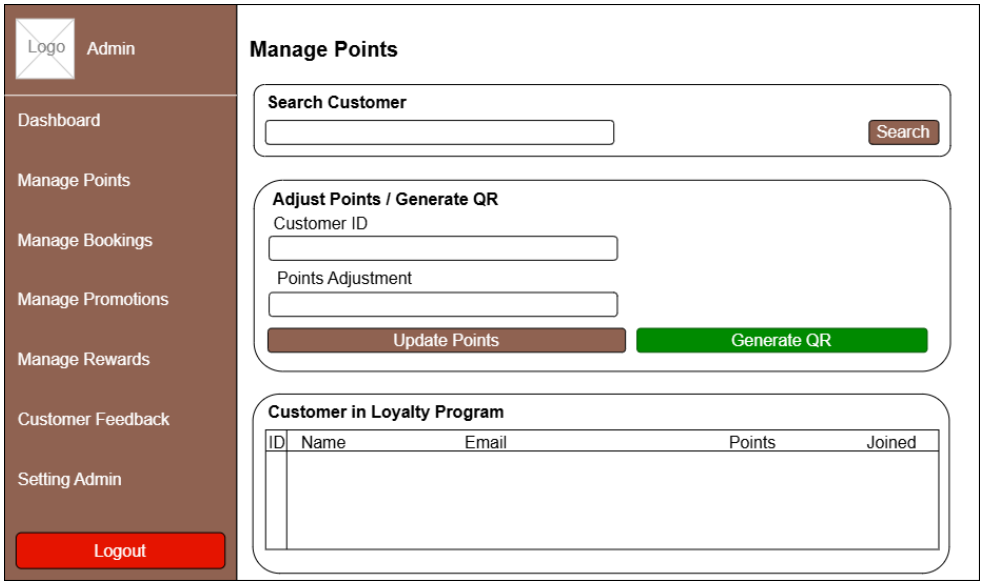


Figure 6.13 Manage Points Page

The admin section's Manage Points Page design is seen in picture 6.13 above. The administrator may search for customer names, modify customer loyalty points, create QR codes for clients to scan after

using Spa Pelangi's services, and see the list of clients who have signed up for the loyalty program on this site, which is separated into many parts. The layout's efficiency and simplicity guarantee admin users will find it easy to utilize. To preserve a polished and unified visual appearance, the color scheme stays in line with the overall system design.

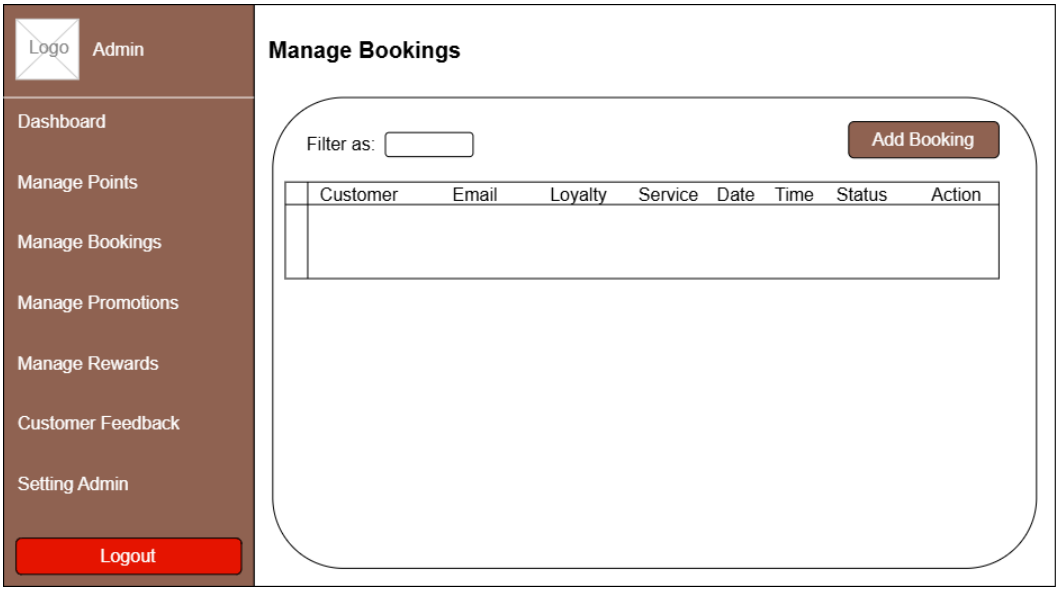


Figure 6.14 Manage Bookings Page

The admin section's Manage Bookings Page design is seen in figure 6.14 above. A list of clients who have booked reservations via the internet is shown on this page. For simpler data administration, admin users may add new reservations and filter records according to pertinent criteria. Additionally, the site enables administrators to determine whether or not a consumer has signed up for the loyalty program. To facilitate effective booking administration, a number of useful buttons are added in the Action column, including Confirm, Delete, Edit, View, and other associated choices.

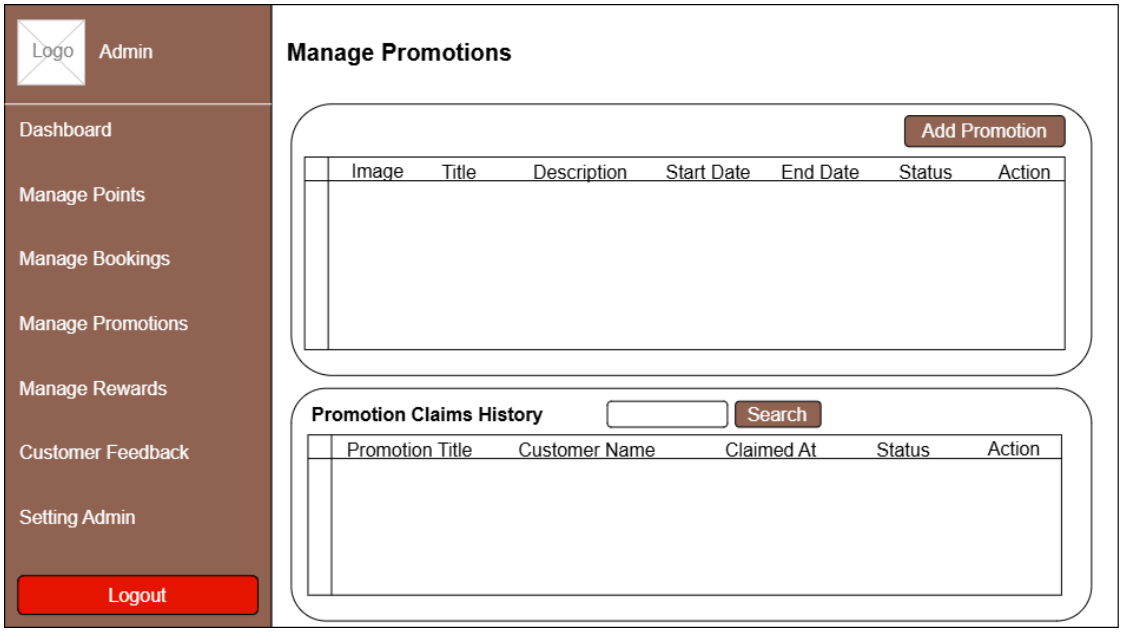


Figure 6.15 Manage Promotions Page

The layout of the Manage Promotions Page for the admin area can be viewed in figure 6.15 above. This page is divided into two parts which are the list of available promotions is displayed on the top portion, while the list of customers claiming those specials is displayed on the bottom portion. On the top portion, the admin users can add new promotions, edit promotion dates, delete promotions, and perform other relevant actions. On the bottom portion, administrators can search client names, view the customers that have claimed certain promotions, and allow or deny each claim request. This structure ensures that all activities concerning promotions are well-planned and easy for the administrator to manage.

Figure 6.16 Manage Rewards Page

The admin section's Manage Rewards Page design, which is modelled after the Manage Promotions Page, is seen in figure 6.16 above. Additionally, this page is separated into two sections which are the list of awards is shown in the top portion, and the list of customers who have redeemed those incentives is shown in the bottom half. Admin users may add new prizes and specify the number of loyalty points that consumers must accrue in order to redeem them in the top area. Admins may search for customer names, see when customers have redeemed their incentives, and accept or reject each redemption request in the bottom portion. Reward administration is made obvious, effective, and simple for admin users to operate thanks to its well-organized structure.

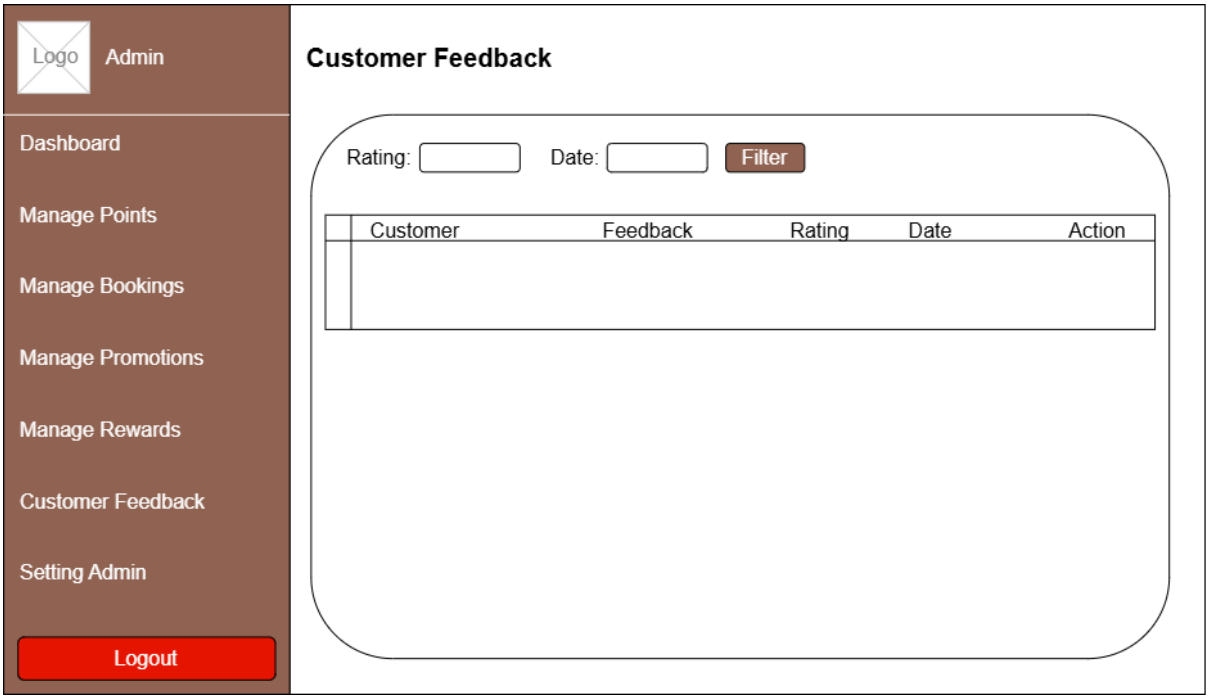


Figure 6.17 Customer Feedback Page

The admin section's Customer Feedback Page design is displayed in figure 6.17 above. A list of customers who have left reviews for Spa Pelangi is shown on this page. Both rating and date filter options are incorporated to enhance usability, making it simple for administrators to sift and examine comments according to predetermined standards. Administrators may examine each customer's rating and feedback data inside the table. Admins may eliminate any superfluous or unrelated feedback items from the system by using the Delete button in the Action column.

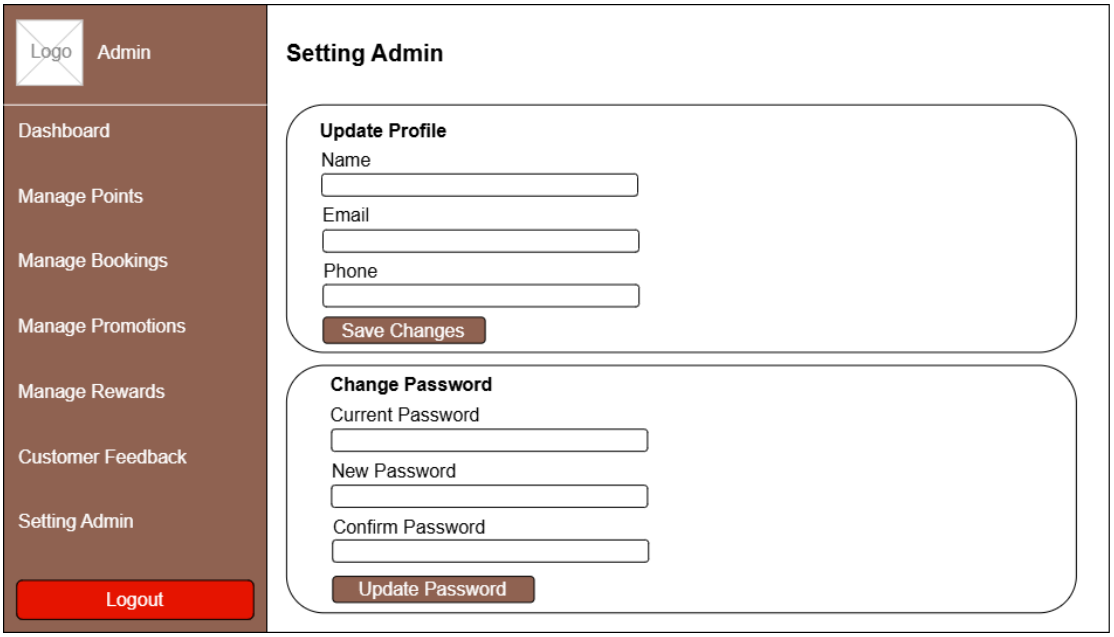


Figure 6.18 Setting Page

The admin section's Settings Page design is seen in figure 6.18 above. With the help of this easy-to-use website, administrators may update their phone number and password for the admin system. The

simple layout guarantees use and adheres to the Spa Pelangi Loyalty System's overarching design concept.

6.3 Database Design

Since it provides the basic framework for data management and storage, the database design for the *SpaSalon: Smart Client Engagement Web App* is the most important component of the system's backend. This is the guide for handling all the data, including feedback, loyalty points, and customer profiles (Coronel & Morris, 2023). For the system to function well and for the data to continually be accurate and dependable, a strong design is necessary. Additionally, a well-designed database offers the foundation required to effectively support every function of the program (Elmasri & Navathe, 2024). In order to demonstrate the database's architecture and information flow, this part will go into depth about the data dictionary, entity-relationship diagram (ERD), and data flow diagram (DFD).

6.3.1 Data Dictionary

Table 6.1 Data Dictionary of "admins" Table

Table Name	Data Name	Data Type	Description	Example
admins	admin_id	Int (11)	Unique ID for each admin (Primary Key)	1
	name	Varchar (100)	Admin’s full name	Admin
	email	Varchar (100)	Admin’s email address used for login	admin@spaloyalty.com
	password	Varchar (255)	Hashed password for authentication	$2y$10$GIB….
	phone	Varchar (20)	Admin contact number (optional)	0123456789
	created_at	Timestamp	Date and time the admin account was created	2025-08-25 16:30:26

Details regarding the system administrator with the authority to oversee the backend operations of the SpaSalon: Smart Client Engagement Web App are kept in Table 6.1, which is located above the administrator’s table. As the main key, each admin is uniquely recognized by their admin_id. The administrator's complete name and login email are entered in the name and email boxes, and an encrypted password is stored in the password field to protect the account. The created_at column logs the date and time the account was created, while the phone field stores the admin's phone number for internal correspondence. This table guarantees that the data and activities of the system may only be safely accessed and managed by authorized administrators.

Table 6.2 Data Dictionary of "bookings" Table

Table Name	Data Name	Data Type	Description	Example
bookings	booking_id	Int (11)	Unique ID for each booking (Primary Key)	1
	customer_id	Int (11)	ID of customer who made the booking (Foreign Key)	15
	service_name	Varchar (100)	Name of the service booked	Relaxing Massage
	email	Varchar (100)	Customer's email for booking confirmation	umairah.sabrina@gmail.com
	date	Datetime	Date and time of the booking	2025-08-22 15:31:44
	time	Time	Time slot of the booking	16:00:00
	status	Varchar (50)	Current booking status (Pending/Completed/Cancelled)	Pending
	points_collected	Tinyint (1)	Indicator if loyalty points have been collected (0>Yes, 0=No)	28
	created_at	Timestamp	Date and time booking record was created	2025-08-16 17:45:24

Table 6.2 above the bookings table is designed to store information about customer service reservations made through the system. Each booking is identified by a unique booking_id as the primary key. The customer_id field links the booking to a specific customer, while service_name records the name of the service that has been booked. The email field stores the customer's email address for communication purposes such as booking confirmation. The date and time fields determine when the booking is scheduled, and the status field shows the current status of the booking, such as Pending, Completed, or Cancelled. The points_collected field shows whether loyalty points have been awarded for the booking, where a value of 0 means no points collected it because customer not joined loyalty, and 1 or more it means points have been collected because customer joined loyalty. The created_at field automatically record when the booking record was created. This table helps manage and track customers bookings efficiently in the system.

Table 6.3 Data Dictionary of "claimed_promotions" Table

Table Name	Data Name	Data Type	Description	Example
claimed_promotions	id	Int (11)	Unique ID for each claimed promotion (Primary Key)	1
	customer_id	Int (11)	ID of the customer who claimed the promotion (Foreign Key)	3
	promotion_id	Int (11)	ID of the promotion being claimed (Foreign Key)	5
	claimed_at	Timestamp	Date and time	2025-08-24

			when promotion was claimed	07:33:41
	status	Enum (‘Pending’, ‘Approved’, ‘Rejected’)	Status of the claimed promotion	Approved

Table 6.3 above the claimed_promotions table stores records of promotions that have been claimed by customers. Each record is identified by a unique id that as the primary key. The customer_id and promotion_id fields create a link between the customer and the promotion being claimed. The claimed_at field records the date and time when the promotion was claimed, while the status field indicates the approval stage, which are Pending, Approved, or Rejected. This table helps the system monitor the usage and effectiveness of promotional campaigns by keeping a detailed record of customer claims and their processing status.

Table 6.4 Data Dictionary of "customers" Table

Table Name	Data Name	Data Type	Description	Example
customers	customer_id	Int (11)	Unique ID for each customer (Primary Key)	1
	name	Varchar (100)	Customer full name	Husna Liyana
	email	Varchar (100)	Customer’s email address used for login	husna.liyana@gmail.com
	password	Varchar (255)	Hashed password for authentication	$2b$12$mzn…
	phone	Varchar (20)	Customer phone number (optional)	0123456789
	profile_pic	Varchar (255)	File path or URL to customer’s profile picture	NULL
	points	Int (11)	Total loyalty points accumulated by the customer	50
	joined_loyalty	Tinyint (1)	Indicates whether customer joined loyalty program (1=Yes, 0=No)	1
	created_at	Timestamp	Date and time the customer account was created	2025-08-04 12:32:36

All of the system's registered customer data is kept in Table 6.4, which is located above the customer’s table. Customer_id is a unique identifier for every customer. Personal information and login credentials are stored in the name, email, and password boxes also passwords are encrypted for protection. The customer's phone number is stored in the phone field, while the file path or URL of their

profile picture is stored in the profile_pic field. While joined_loyalty shows if the consumer has joined the loyalty program, the points column keeps track of the total loyalty points the customer has earned. The time and date of registration are recorded in the created_at column. This table acts as the main database for the system's management of client identities, login credentials, and loyalty involvement.

Table 6.5 Data Dictionary of "feedback" Table

Table Name	Data Name	Data Type	Description	Example
feedback	feedback_id	Int (11)	Unique ID for each feedback (Primary Key)	1
	customer_id	Int (11)	ID of customer who submitted feedback (Foreign Key)	1
	rating	Int (11)	Rating given by customer (1–5 scale)	5
	comment	Text	Additional comments from customer	Best spa ever, service tiptop!
	date	Timestamp	Date and time the feedback was submitted	2025-08-05 20:42:23

Customer input on their experiences with the services is included in Table 6.5 above the feedback table. Feedback_id is used to identify each entry. The customer's rating, which ranges from 1 to 5, is stored in the rating field, while the customer_id field related the feedback with a specific customer. Written comments or ideas are recorded in the comment section, and the date of submission is noted. This table help service excellence and offers insightful information on customers happiness.

Table 6.6 Data Dictionary of "promotions" Table

Table Name	Data Name	Data Type	Description	Example
promotions	promotion_id	Int (11)	Unique ID for each promotion (Primary Key)	1
	title	Varchar (150)	Title of the promotion	Mid-Year Glow Promo
	description	Text	Description or details of the promotion	10% off for Facial Treatment during August
	image	Varchar (255)	File path or URL of promotion image	mid_aug.jpg
	start_date	Date	Start date of the promotion	2025-08-01
	end_date	Date	End date of the promotion	2025-08-31
	created_at	Timestamp	Date and time the promotion was	2025-08-01 02:00:00

			created	

Details of all the company's promotional are kept in Table 6.6, which is located above the promotions table. Promotion_id serves as a unique identifier for every promotion. While the image maintains the associated image URL, the title and description sections provide information about the promotion. The promotion term is determined by the start and end dates and the date of promotion was created is recorded by the created_at. This table help that customers have access to the most recent offers by effectively managing both previous and ongoing promotions.

Table 6.7 Data Dictionary of "redemptions" Table

Table Name	Data Name	Data Type	Description	Example
redemptions	redemption_id	Int (11)	Unique ID for each redemption (Primary Key)	1
	customer_id	Int (11)	ID of customer who redeemed the reward (Foreign Key)	2
	reward_id	Int (11)	ID of reward being redeemed (Foreign Key)	4
	date	Timestamp	Date and time of redemption request	2025-08-14 15:18:53
	status	Varchar (50)	Redemption status (Pending/Approved/Rejected)	Pending

Table 6.7 above the redemptions table keeps records of rewards redeemed by customers through the loyalty program. Each redemption is uniquely identified by redemption_id. The customer_id and reward_id fields link to the customer and reward respectively. The date field records when the redemption happened and status indicates whether it is Pending, Approved, or Rejected. This table help transparency and organization in tracking customer reward redemptions.

Table 6.8 Data Dictionary of "rewards" Table

Table Name	Data Name	Data Type	Description	Example
rewards	reward_id	Int (11)	Unique ID for each reward (Primary Key)	1
	title	Varchar (150)	Title or name of the reward	RM10 Discount Voucher
	description	Text	Description or terms of the reward	Get RM10 off on your next booking.
	points_required	Int (11)	Number of points required to redeem the reward	100
	created_at	Timestamp	Date and time the reward was added	2025-08-01 02:00:00

Table 6.7 above the rewards table stores all available rewards that customers can redeem using their loyalty points. Each reward is identified by a unique reward_id. The title and description fields are the reward details, while points_required is how many points are needed to redeem it. The created_at field records when the reward was added to the system. This table help the loyalty program by provide a structured information on available redemption options.

Table 6.9 Data Dictionary of "transactions" Table

Table Name	Data Name	Data Type	Description	Example
transactions	transaction_id	Int (11)	Unique ID for each points transaction (Primary Key)	13
	customer_id	Int (11)	ID of customer involved in the transaction (Foreign Key)	1
	points	Int (11)	Number of points adjustments	-5, 10
	transaction_type	Varchar (20)	Type of transaction (Add/ Deduct)	add, deduct
	description	Varchar (255)	Note about the adjustment	Admin adjustment
	created_at	Timestamp	Date and time transaction was recorded	2025-08-02 07:06:19
	seen_by_admin	Tinyint (1)	Indicator admin has viewed the transaction (1=Yes)	1

Table 6.9 above the transactions table is used to record all administrative actions related to the adjustment of customer loyalty points. Each transaction is identified by a unique transaction_id. The customer_id field links the transaction to a specific customer, while the points field indicates the number of points added or deducted by the admin. The transaction_type field specifies the action taken which add or deduct, the adjustment made to the customer's points balance. The description field provides a brief note about the adjustment, which is consistently labeled as "Admin Adjustment" for clarity. The created_at field records the exact date and time the transaction, while seen_by_admin remains set to 1, means that all transactions are created and reviewed by admin. This table help accurate tracking and documentation of all point adjustments made manually by admin.

6.3.2 Data Flow Diagram (DFD)

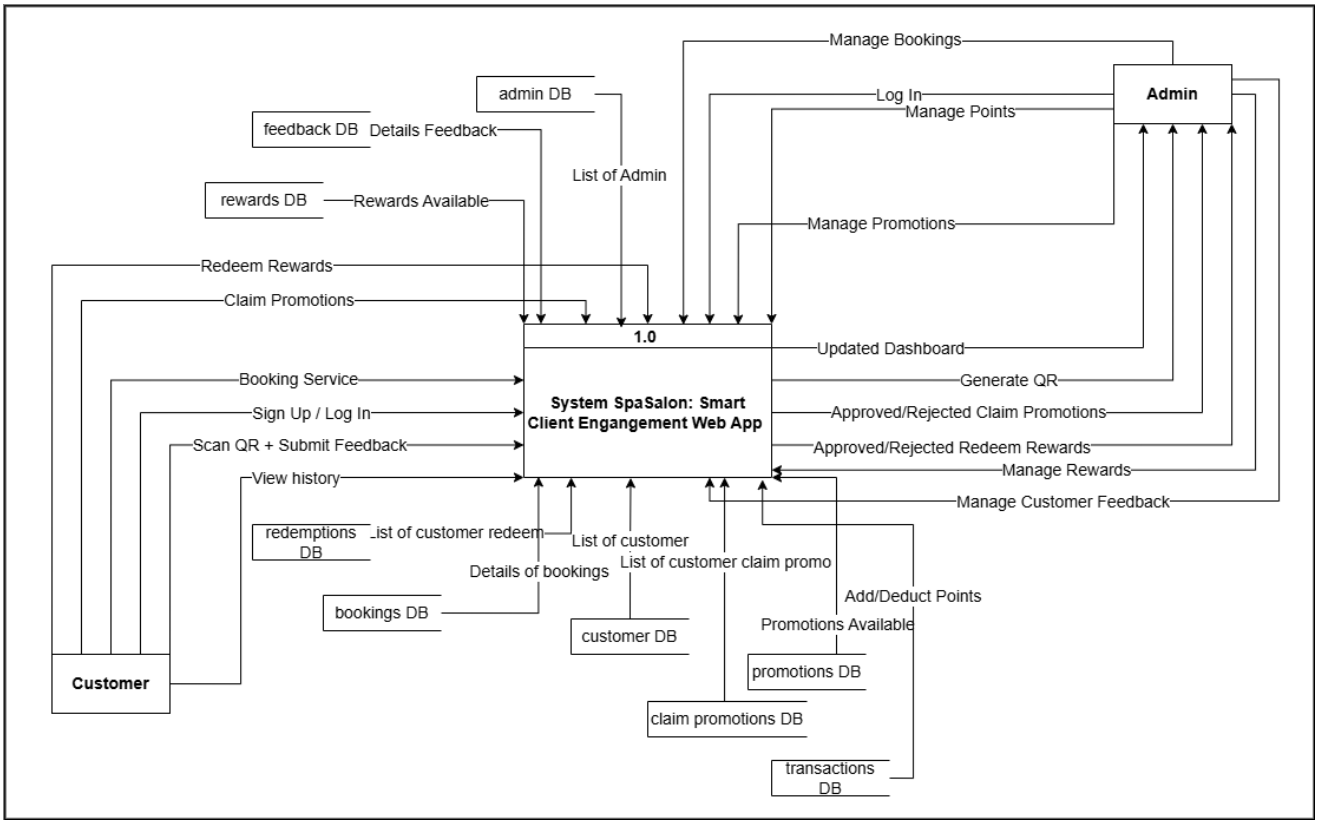


Figure 6.19 Data Flow Diagram

In Figure 6.19, the Context Level Data Flow Diagram (Level 0 DFD) developed for the *SpaSalon: Smart Client Engagement Web Application* focus on representing the overall system interactions with external entities. At this level, the entire system is considered as a single process, while the internal logic is ignored. Customer inputs include their bookings, promotions, rewards, and feedback, and the system processes and validates the inputs along with any necessary updates. Administrators participate with the system through management functions, including promotion updates, reward coupon approval, and loyalty verification QR code. Although the Level 0 diagram does not cover the internal workings of the system, overall, the main data sources for the specified system remain which are bookings, rewards, and transactions, and therefore all inputs and outputs. At this level, creating a DFD is very important because it shows where the system boundaries and allows developers to focus to the movement of data rather than the internal mechanisms of individual functions. According to recent systems analysis literature, early development of a context diagram helps verify the completeness of data flows and prevents issues such as missing processes or untracked data (Valacich & George, 2021; Al-Fedaghi, 2021).

6.3.3 Entity Relational Diagram (ERD)

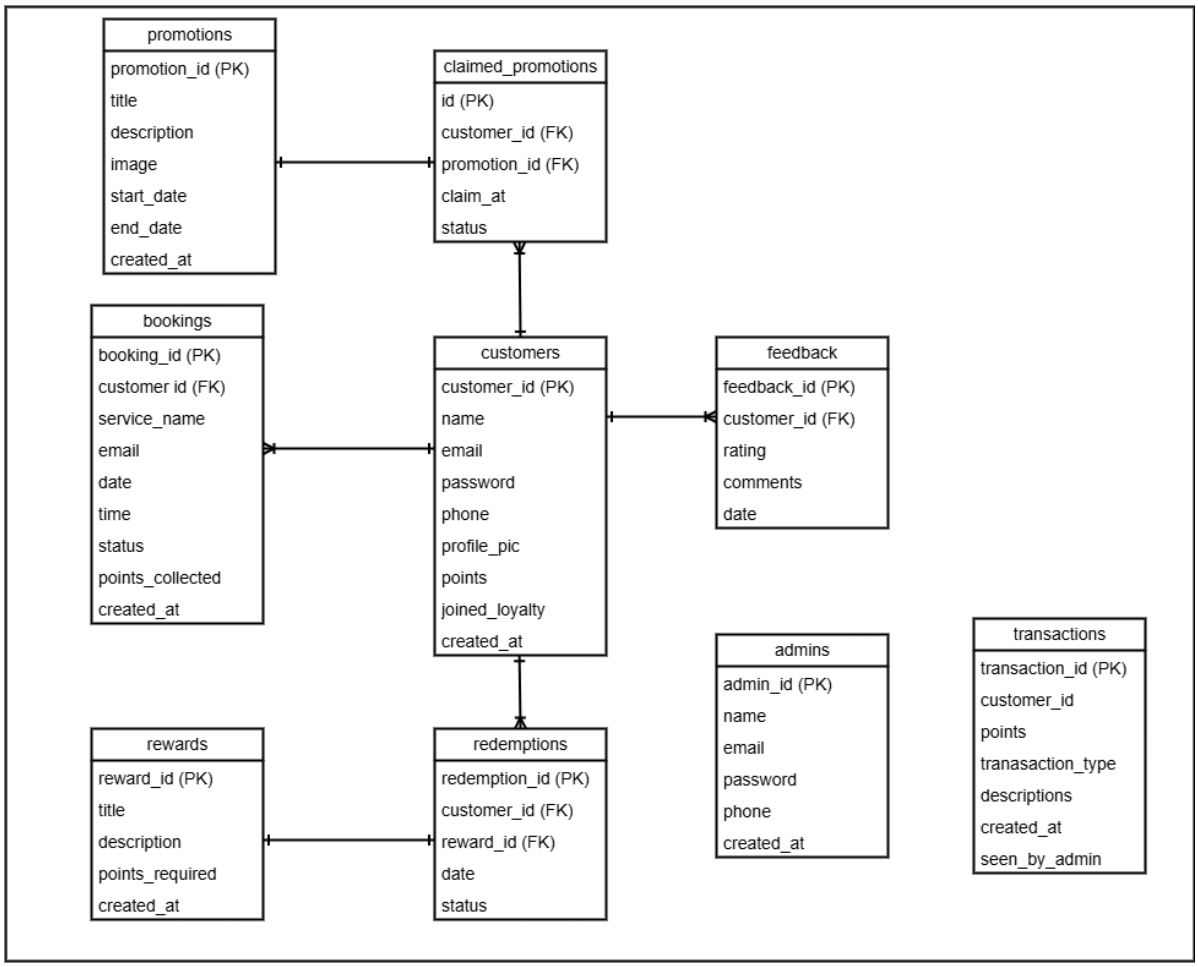


Figure 6.20 ERD Diagram

Figure 6.20 shown that Entity Relationship Diagram (ERD) for the *SpaSalon: Smart Client Engagement Web App* shows how all the main entities in the system are connected and how data flows between them. In this design, the customers table acts as the main point of reference because it stores user details and loyalty information. From this table, several one-to-many relationships exist, where a single customer can make multiple bookings, submit multiple feedback entries, claim various promotions, and redeem different rewards. The promotions and rewards tables also support the loyalty features, as each promotion can be claimed by many customers and each reward can be redeemed many times, and these interactions are recorded through their respective linking tables. On the other hand, the admins and transactions tables are not connected to other tables; the admins table is used only for system management, while the transactions table stands alone because there are no foreign keys linking it to any specific entity. The creation of the ERD is a crucial stage since it helps to clearly define the database's structure, prevents needless duplication, and guarantees that the overall design is well-organized prior to construction starting. According to recent database design references, having a clear visual model of the relationships helps improve data organization, system performance, and scalability (Coronel & Morris, 2023; Silberschatz et al., 2024).

6.4 Flow of the System

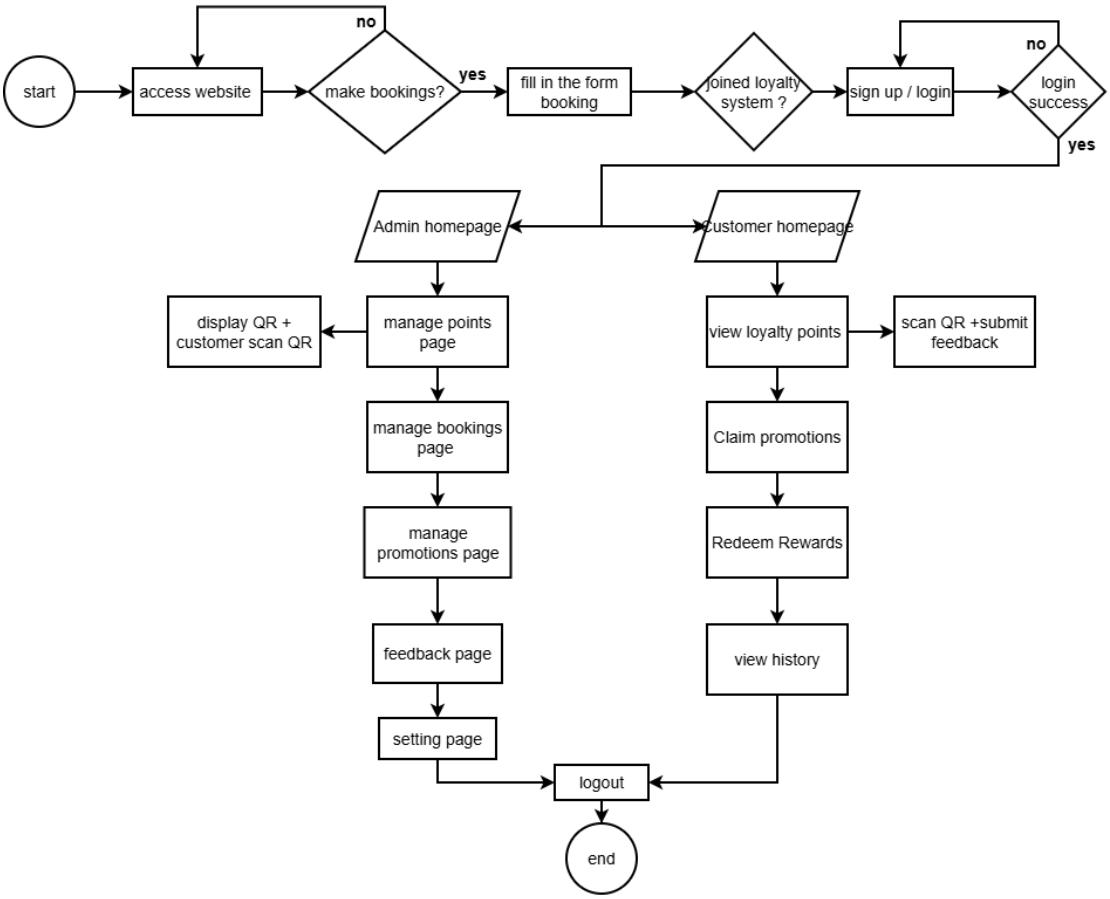


Figure 6.21 Workflow Diagram

Figure 6.21 shown that the operational workflow of the SpaSalon: Smart Client Engagement Web App begins when a user accesses the system and indicates a booking intent, which triggers a mandatory authentication step through the loyalty module to verify the user's identity. After the user enters their credentials, the first drag and drop interface in the system assigns the user roles and redirects them. There are three types of roles. Admins can create QR codes tied to reward points, can see and manage orders, and can see and manage feedback. Customers can see their loyalty points, feedback QR codes to receive discounts, and see their rewards. This feedback shows them in real-time all of their activities in the system. At the end of all activities in the system, each user can log out securely to ensure that the application deletes active session data. These system flow diagrams are easy to understand and in system design serve to keep the developer in line with the sequence of actions that the system is supposed to perform. Visual modelling shows the sequence of actions in the design layer and identifies flaws in the system before the design undergoes software construction. This happens during the early modelling stages of the system and comes as a result of pattern recognition that the designer employs during system construction (Ozkaya, 2023). Also, the sequence diagrams serve as a modelling tool for developers and system end users during the entire design process, which should ensure that the developed system meets the end users' needs (Bourque & Fairley, 2024).

6.5 Conclusion

In short, the design phase of the *SpaSalon: Smart Client Engagement Web App* successfully translated the system requirements into accurate and comprehensive models, diagrams and wireframes that served as a development roadmap. Both user and staff capabilities were efficiently organized by the design, ensuring that aspects such as booking, loyalty program participation, feedback submission, customer administration, booking confirmation and dashboard usage were organized logically and intuitively. The system architecture and procedures were well defined as a result of the integration of interface design, database design with data dictionary, Entity Relationship Diagram (ERD) and Data Flow Diagram (DFD), which provided a solid foundation for a smooth implementation. The design phase improved the project's completeness and coherence, reduced the possibility of implementation issues and ensured that the system was ready for the development stage by considering both front-end and back-end components. Overall, the design process created a solid structure that supported the project's goals and prepared the SpaSalon web application for a successful launch.

7 IMPLEMENTATION

7.1 Introduction

This chapter explains the implementation of the *SpaSalon: Smart Client Engagement Web App* using the previously developed design. It explains how staff tasks such as customer management, booking monitoring and dashboard usage were developed, as well as user features such as booking, loyalty registration and feedback. In addition to outlining the main interface and key features of the system, this chapter also describes the platforms, tools and technologies used throughout development. To help the design function as intended, implementation involves establishing a technological environment and using appropriate tools (Qin et al., 2023). This chapter shows how a system is effectively designed and prepared for testing by providing these specifications.

7.2 Execution Platform

The hardware and software environment where a program run is called an execution environment (OpenTEAM, 2023). There is an operating system, runtime libraries, and system hardware needed to run the program. Windows 11 is the development and execution platform for this project. Windows 11 is a modern, stable, and highly supported operating system and therefore is used for system development, testing, and execution. Since Windows is the system that most people use, it is also the one that most developers pick because it is a system that works with new IDEs, development libraries, and runtime libraries. Windows 11 also provides good system services with optimal performance and a good number of system security patches which ensures a smooth and safe development environment. This project is taking advantage of the efficiency of the Windows 11 platform ecosystem.

7.2.1 Windows 11

Table 7.1 About personal Laptop

Device name	LAPTOP-IPIGHIPL
Processor	11th Gen Intel(R) Core(TM) i5-1135G7 @ 2.40GHz 2.42 GHz
Installed	RAM8.00 GB (7.77 GB usable)
Device ID	A1BCB513-DF46-41DA-9DEC-6CE6A0015CBB
Product ID	00327-36306-52476-AAOEM
System Type	"64-bit operating system, x64-based processor "

The laptop used to construct the *SpaSalon: Smart Client Engagement Web App* has the following specs, LAPTOP-IPIGHIPL is a device that is powered by an Intel Core i5-1135G7 11th generation CPU running at 2.40GHz. Due to the kind of laptop with 8.00 GB of RAM, the development tools work without problems. The device is compatible with contemporary development frameworks since it runs on a 64-bit operating system with an x64-based CPU architecture. For the purpose of creating, testing, and operating the project's system components, these hardware specs provide adequate performance.

7.3 Implementation Tools

According to Somerville (2021), implementation tools comprise applications and utilities that help developers create, test, and manage software systems. These tools comprise programming environments, code editors, and debugging tools that make the development process steadfast. Development tools also provide user support to control missing files, ensuring high and content quality code. In the case of SpaSalon: Smart Client Engagement Web App, suitable deployment tools were chosen to balance the efficient system development. Employing implementation tools benefits the development of software systems across the spectrum of structure, maintenance, and efficiency.

7.3.1 Software

Figure 7.1 XAMPP Logo (Wikipedia, 2025)

XAMPP is a local server and integrates Apache, MySQL/MariaDB, PHP, and phpMyAdmin for web application development and it is a favourite for many beginners because of its simple setup and low configuration. An easy server is provided that can be managed easily. Through the development process, XAMPP was the main application that allowed the team to execute the system and perform operations on the database. Testing and development of the application in an orderly manner is made easier by its reliability.

Figure 7.2 VS Code Logo (Microsoft, 2021)

Visual Studio Code (VS Code) is a powerful yet lightweight code editor that is able to perform writing, functionalities, and organizing all source codes for a system. Smooth and efficient development is made possible through multiple functionalities of the code editor such as; debugging in real-time documentations, the availability of the editor debugging in real time, and the ability to highlight syntaxes. VS Code even made the adjustments and refinements to the code. the editor made it possible to develop system functionality. Furthermore, the editor is even able to make the developer experience more seamless through the accessible platform and even the functionalities themselves.

Figure 7.3 HTML Logo (Wikipedia, 2025)

Each webpage in the system has its layout and content structured using HTML. It serves as the basic building block for the layout of text, input fields, buttons, and other components of the interface. This markup language enables each page to present information in a clear and uniform manner. HTML complements the overall system user interface design.

Figure 7.4 PHP Logo (Wikipedia, 2025)

Initially, the PHP programming language was the server-side programming language intended to manage all the logic, processing of data and, and data base interaction from the system. That programming language eases the interaction of the interface from the front end and the actions from the back end. A framework was not used, specifically Laravel, because of the longer setup time and longer time to learn Laravel. Using PHP was a better choice to be able to quickly develop the system.

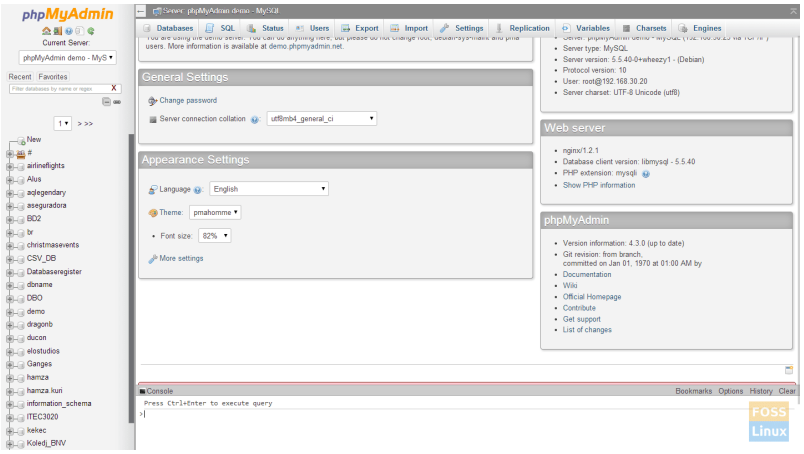


Figure 7.5 phpMyAdmin Interface (Kaps, 2020)

Over the course of system development, the systems development team utilized phpMyAdmin to manage the system's MySQL database. Being a graphical user interface, phpMyAdmin made it convenient to create tables, edit table records, and run SQL commands. This database management system eliminates the need to work directly with the command line to manage the system's MySQL database in a more streamlined fashion, so it is a more efficient option to achieve bottom line objectives. Data utilized within the system is efficiently managed with the help of phpMyAdmin.

Figure 7.6 MySQL Logo (Wikipedia, 2025)

MySQL served as the main database management system that collected and stored user information, loyalty points, user feedback, promotions, and transaction history. Such databases are ideal for performance organization and supporting a system that is structured. MySQL performs information retrieval for system tasks in a secure and efficient manner. MySQL and PHP serve as good combinations as far as the system architecture is concerned.

Figure 7.7 JavaScript Logo (Wikipedia, 2025)

JavaScript was used to improve the interactivity and responsiveness of the user interface. It enables dynamic functions necessary for the user interface such as form validation, updates in the system in real time, and other user interface components that may require continuous updating. This programming language provides seamless use of the system even when switching among various pages of the system. It forms the core of the application’s front end interactivity.

Figure 7.8 Chart.js Logo (Wikipedia, 2025)

Data visualisation on the admin dashboard for system data was done using interactive graphs created with Chart.js library. Charts of varying types that are easily integrated with JavaScript can be built using the library. Google Analytics was not utilized as it does track real time visitors on the website, however, it does not allow the pulling of records in a database for interactive graphs. Chart.js allows for the instant visualization of MySQL backend data.

Figure 7.9 ngrok Logo (Wikipedia, 2025)

Ngrok is a very useful tool which is helpful in the creation of a public temporary link during the advancement of the local XAMPP environment that can be utilized to provide external access to the local XAMPP. It establishes a safe tunnel which makes it possible to observe the local XAMPP environment without the need of testing it on a public hosting site. Ngrok can be best utilized for remote system testing access, development demonstrations, and user testing. The tool creates instant links making it possible to easily access and view the system.

7.4 System Interface

7.4.1 Customer View

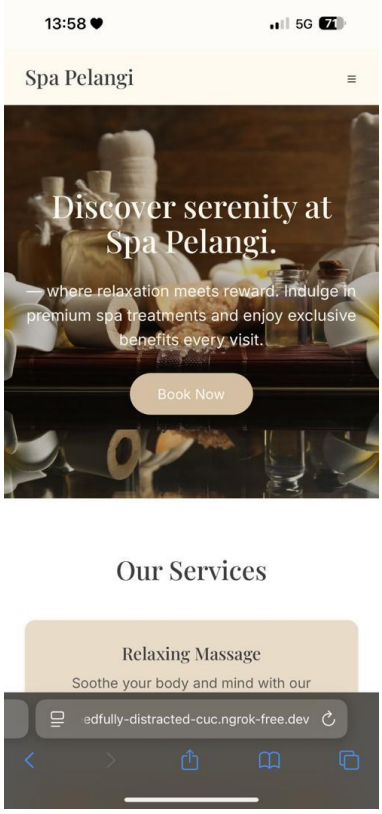


Figure 7.10 Spa Pelangi Website

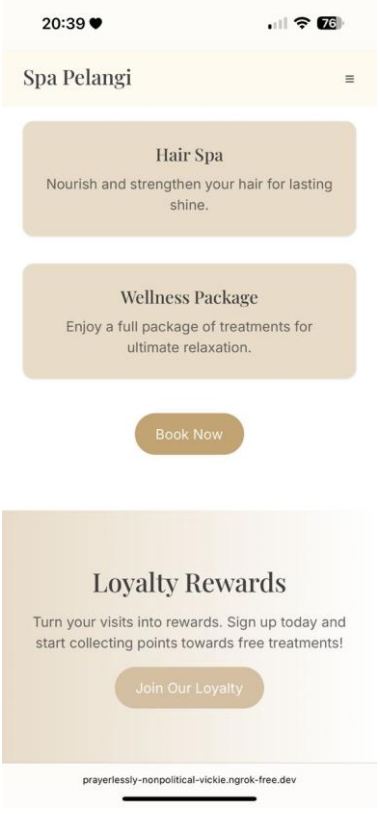


Figure 7.11 Spa Pelangi Website

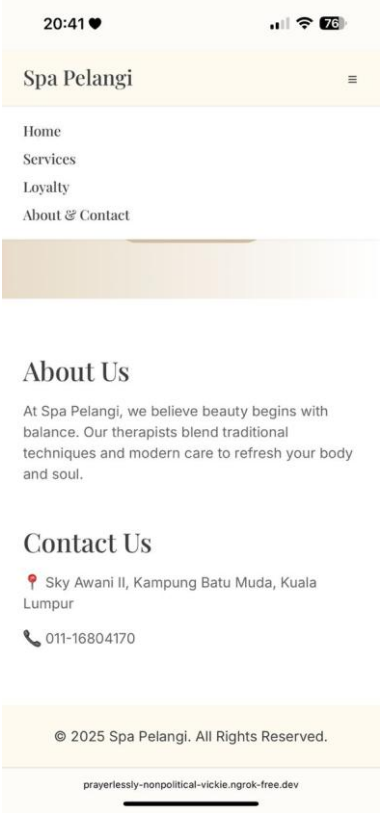


Figure 7.12 Spa Pelangi Website

Figures 7.10, 7.11, and 7.12 indicate that the spa Pelangi website system interface was designed to be mobile responsive so that the customers will be able to access the site easily and conveniently. Also, the figure demonstrates that the site interface is designed into different segments in order to be able to provide clarity and effective functioning navigation. Of the site's segments, some users may want to jump to any section in order to provide effective site utilization. Moreover, the services that spa Pelangi render are displayed in their own segment in order to bring clear information for customers about varying services. Plus, the site interface has a segment that helps users to register for the loyalty program, an about us page, and a segment that has the spa's contact address in order to make communication easier. The site interface also has a uniform colour theme that is designed from the spa's colours which is white, nude, and brown.

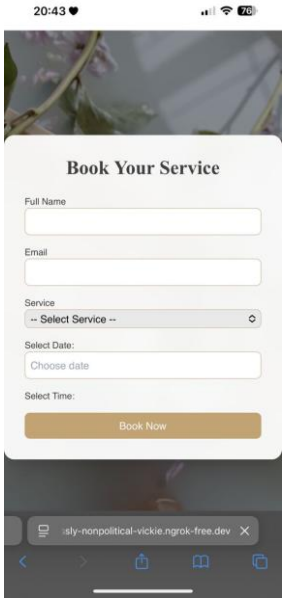


Figure 7.13 Booking Form Page

In figure 7.13, all information entered by customers using the booking form and the data necessary for the purchase document. In the form, customers must enter date and time information and fill in the form as required. In the formed background, there is a short looping video with a theme appropriate to the spa and consists of soft relaxing colours. The background of the booking form is kept to the colour and high quality for the entire website, and the form is arranged to walk the customers through the booking steps in a friendly and loving manner.

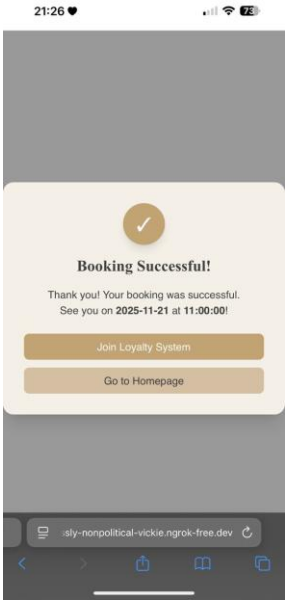


Figure 7.14 "Booking Successful" Message

Upon successful booking, the confirmation page displays a “Booking Successful” message alongside the booking details, including the selected service, date, and time slot. Figure 7.14 shows that two buttons are provided for customers to either join the loyalty program or return to the main

Spa Pelangi website if they do not wish to participate. The page maintains the same consistent color theme, ensuring a seamless user experience throughout the process.

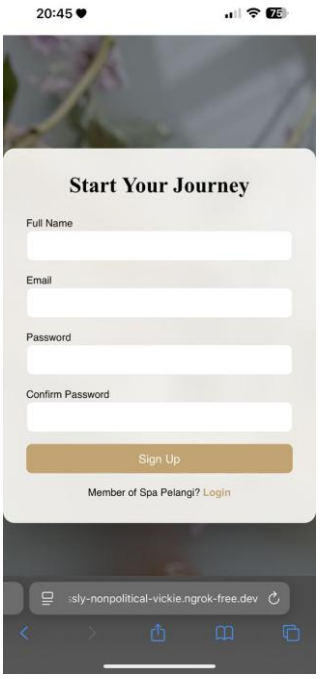


Figure 7.15 Sign-Up Loyalty System Page

The sign-up page for the loyalty program collects essential customer details and allows the creation of a secure password to access the loyalty system. Figure 7.15 shows that the design and color scheme follow the same style as the booking form page, providing visual continuity and an intuitive interface for customers.

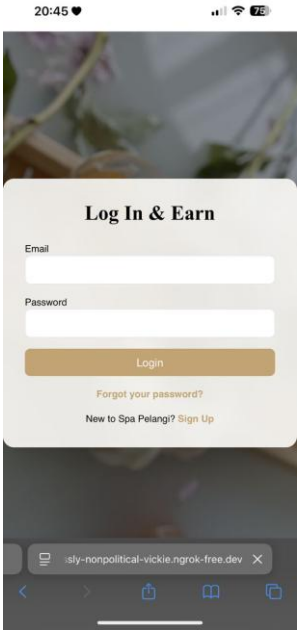


Figure 7.16 Login Loyalty System Page

From the login section, users can enter their email and assigned passwords for secure access to the loyalty system. Figure 7.16 shows an alternative “Forgot Password” option provided, which allows customers to reset their password by entering their email address and receiving a new password via email. The design is the same as previous ones in order to keep the same look and feel.

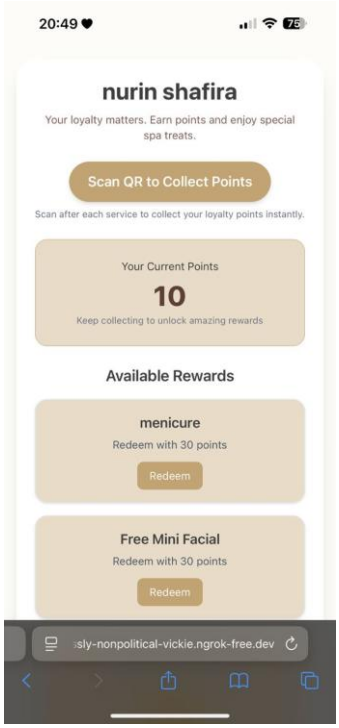


Figure 7.17 Main Loyalty System Page

The entire system is arranged vertically so it enables users to scroll easily downwards in succession. To verify the account in the customer’s name at the moment and verify customer system access, the customer’s name is show at the top, as displayed in Figure 7.17. A scan button QR is provided in case customers want to earn loyalty points. There are three rewards and two promotions available, and users can see more by click the more button. There are navigation buttons at the bottom of the screen so users can take action more quickly. The screen is designed in a nude, brown, and white colour combination to help the visually cohesive.

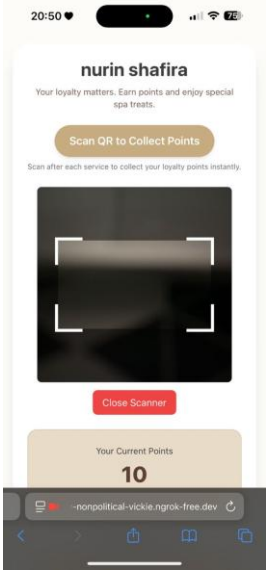


Figure 7.18 QR Scan Camera

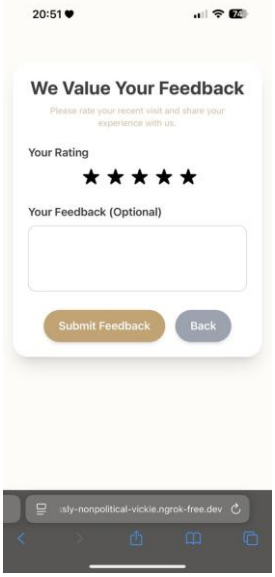


Figure 7.19 Feedback Loyalty System Page

The feedback page is displayed after the QR code scan is completed. Figure 7.18 and 7.19 shows that customers can rate services using a five-star system and provide textual feedback via a chat box. A submit button allows the feedback to be sent to the system, after which loyalty points are awarded. The design ensures usability and clarity while reinforcing the system's interactive features.

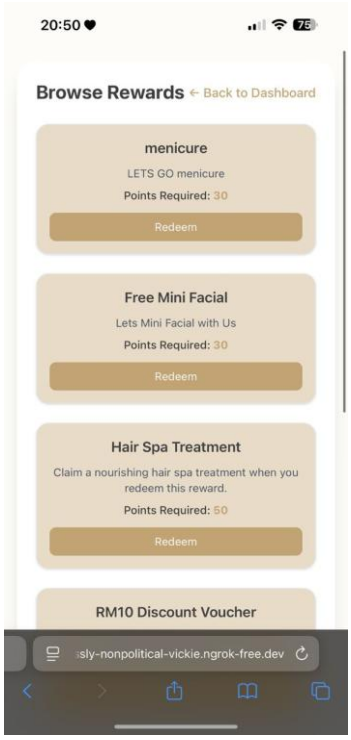


Figure 7.20 List of Rewards Loyalty System Page

The list of rewards includes the name of each reward, the description of the reward, and the details of the number of points needed to redeem each reward. In Figure 7.20 it is shown that to the right of each reward there is a redeem button so customers can easily and quickly redeem the rewards that they have. Also, they can hit the Back to Dashboard button to go to the main dashboard of the

loyalty program. The page has the same colour scheme as the other pages and maintains a consistent visual appearance for the entire system.

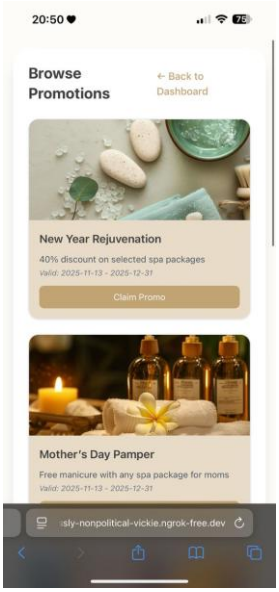


Figure 7.21 List of Promotions Loyalty System Page

Images, titles, descriptions, and date ranges covering all active promotions can be found on the promotions page. In Figure 7.21, the promotions can be obtained using the claim button. The user can also return to the main page of the loyalty system, which is the Dashboard, using the Back to Dashboard button. The design and format are the same as those of the rewards page to keep the system visually aligned.

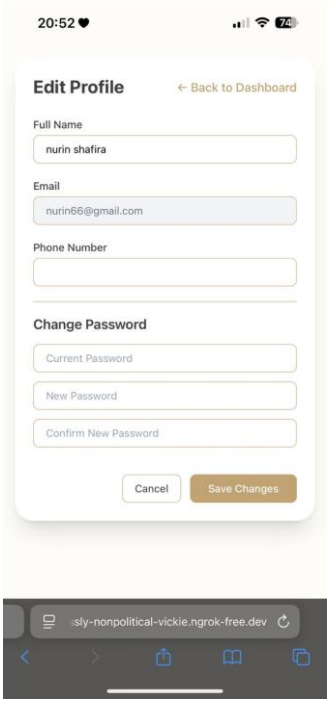


Figure 7.22 Setting Account Loyalty System Page

Users have the capability to alter their phone numbers and establish new passwords on the Edit Profile page. As depicted in Figure 7.22, the page is intentionally designed to achieve the utmost simplicity and comfort of use, with the opportunity to enter passwords being the only exception, as this is important to assure the proper updating of the database. The design further adheres to the overall system style.

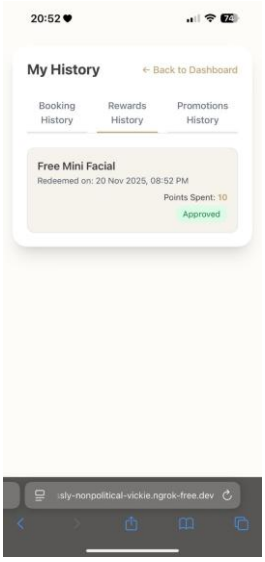


Figure 7.23 History Loyalty System Page

The history page shows the past activities of consumers, including reservations, reward redemptions, and claim promotions, as activities of past consumers are documented. Figure 7.23 shows the vertical three-bar structure for easy navigation. All history is categorized under bookings, rewards, and promotions. Adopting the three colour tones of nude, white, and brown set for the design gives the customers a unified and uncluttered system.

7.4.2 Admin View

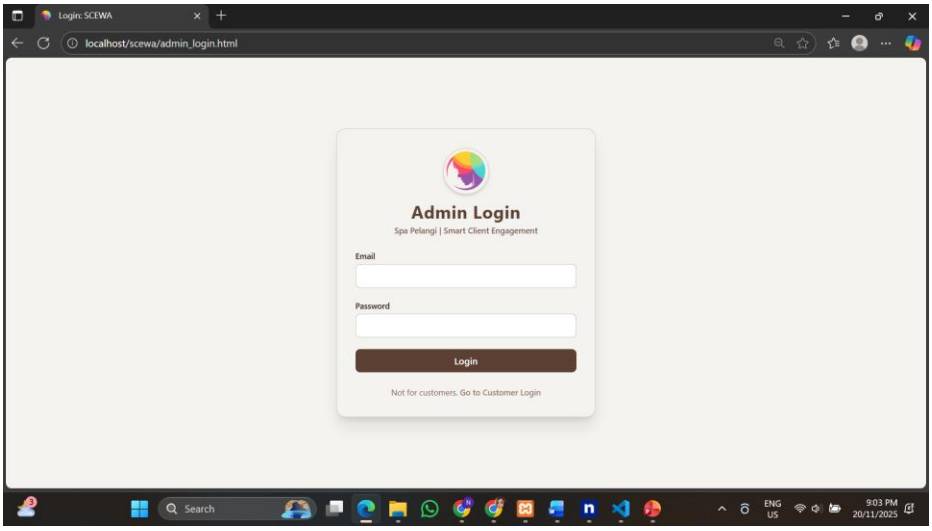


Figure 7.24 Admin Login Page

For Spa Pelangi, only website admins can manage the business of the spa, and customers can only view the website through their laptops, as shown in Figure 7.42. As shown, the business of the spa and the activities of all customers are recorded databases which the admin manages. Access to the admin portal requires an email and password combination, and the admin pages are styled as the spa, which features a colour palette of brown, white, and nude.

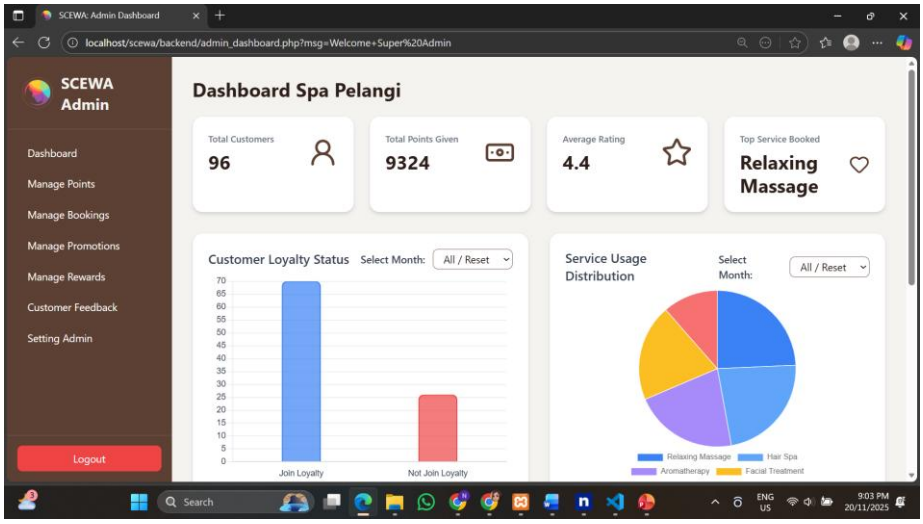


Figure 7.25 Admin Dashboard Page

With reference to the screenshot in Figure 7.25, it can be seen that on the left of the screen, there is a navigation menu that allows the administrator to move between different tabs. The first main tab is the dashboard, in which there are four cards, three of which are graph representations and one is a tabular representation. The four cards represent the total number of customers, the total number of customer points, the average rating of services given, and the top services. The three graphs show customer loyalty status, service usage distribution, and activities via a QR scan, and bookings made. Each graph has a dropdown menu to choose data by the month of August, September, and October, and will update the graphs. The table shows the five most recent customers who booked services and also has a search function to view customers who booked services in the past.

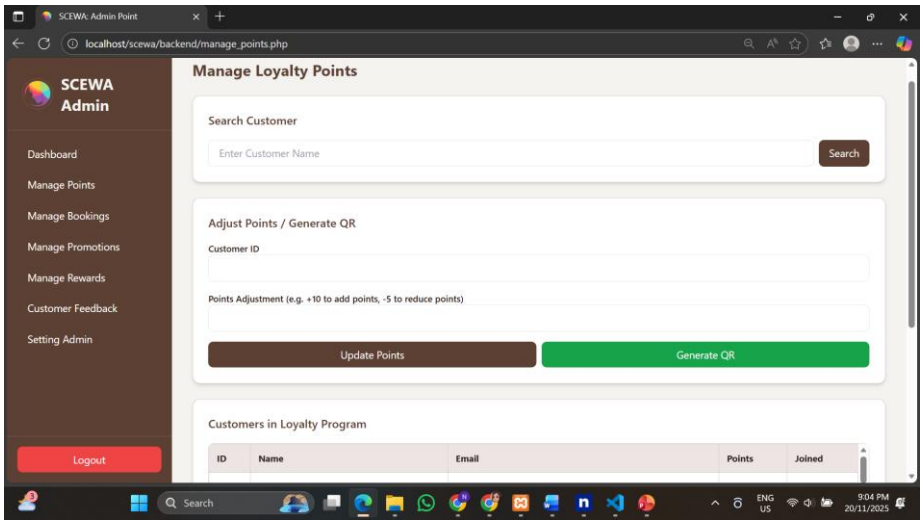


Figure 7.26 Admin Manage Points Page

Admin users have complete control over loyalty points as shown on the manage points page. There are three main sections on this page as shown in Figure 7.26. The first section allows search for customers' ID, names and points. The second section allows for points to be adjusted and includes buttons to create QR codes for customer scanning as well as to add or subtract points. The last section displays all customers in the loyalty program. The page design keeps in line with the brand and uses beige and white colour tones.

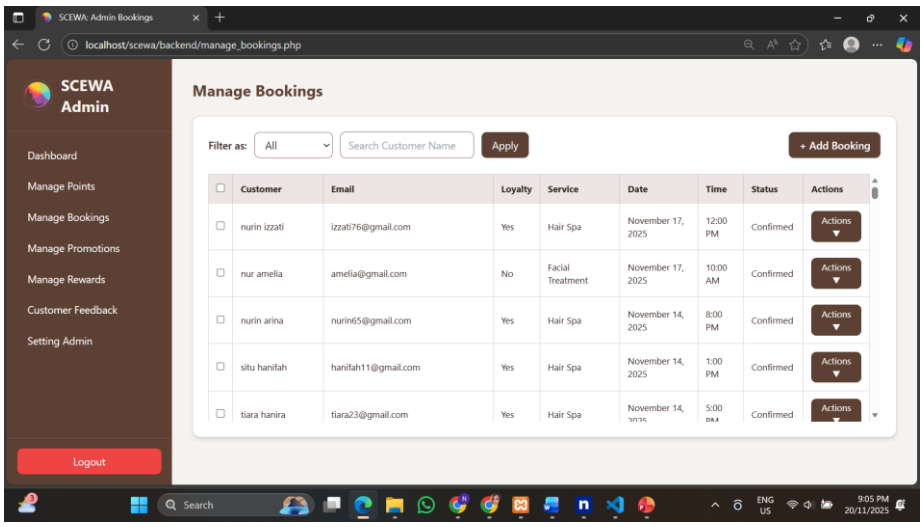


Figure 7.27 Admin Manage Bookings Page

The Manage Bookings page displays all clients who have made a reservation. In Figure 7.27 it can be seen that administrators have the ability to confirm or deny a reservation using the actions drop down. Moreover, the administrator has the ability to add, modify, change, or remove a customer reservation. There is a search filter by name to quickly access the detailed information of a customer reservation. The page is designed using the nude, white, and brown colour palette.

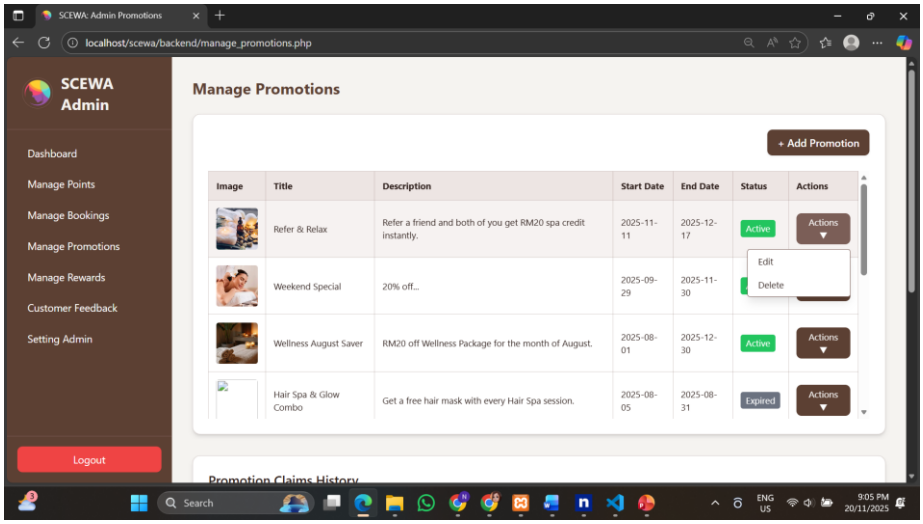


Figure 7.28 Admin Manage Promotions Page

The manager promotions page permits the admin to supervise all ongoing promotional activity. As shown in Figure 7.28, the page is split into two parts: the promotion listing section at the top and the promotion-abused customers listing at the bottom. The admin can create, update, and remove promotions, and for each promotion can assign start and end dates. In the customer listing section, the admin can approve or deny promotional abuse for specific customers using the search functionality. The organization of this page flows and designed to match the other admin pages.

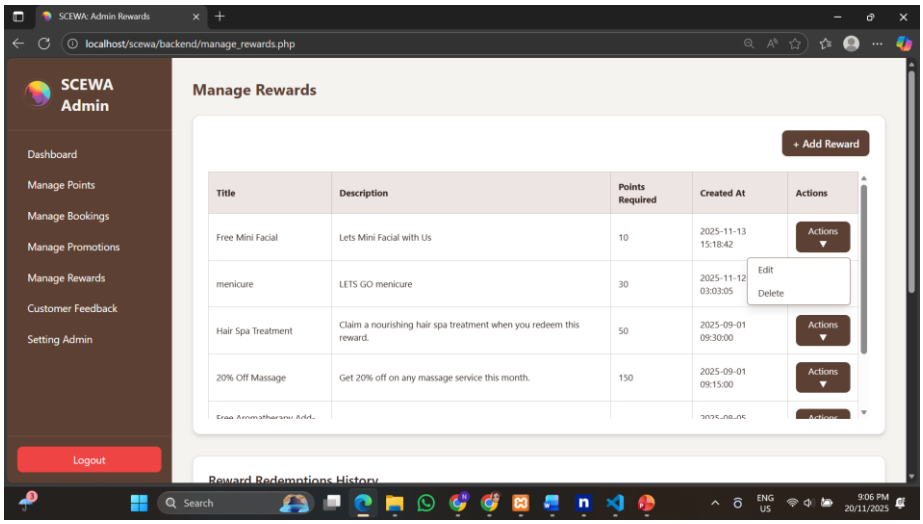


Figure 7.29 Admin Manage Rewards Page

The manage rewards page functions similarly to the promotions page. Figure 7.29 shows that the top section lists available rewards, including points required for redemption, and allows the admin to add, edit, update points, or delete rewards. The bottom section lists customers who have redeemed rewards, with search and approval/rejection functions for admin control. The design maintains consistency with the promotions page.

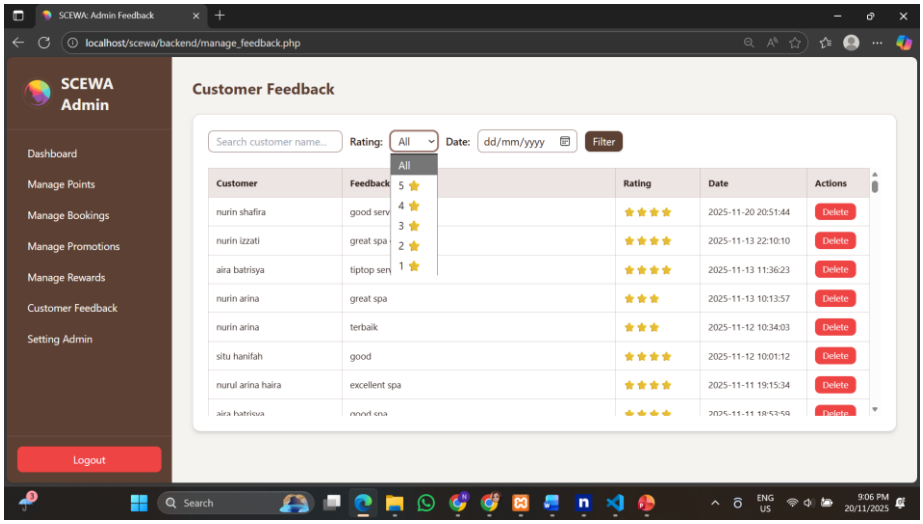


Figure 7.30 Admin Customer Feedback Page

In the design feedback section of the admin interface, we can see all the feedback we have received from the customers. In Figure 7.30, the administrative personnel have the ability to see the feedback, the rating, also see filtered feedback by date, search for feedback by customer name, and delete entries of feedback when necessary. The design follows the same logic as the rest of the admin interface.

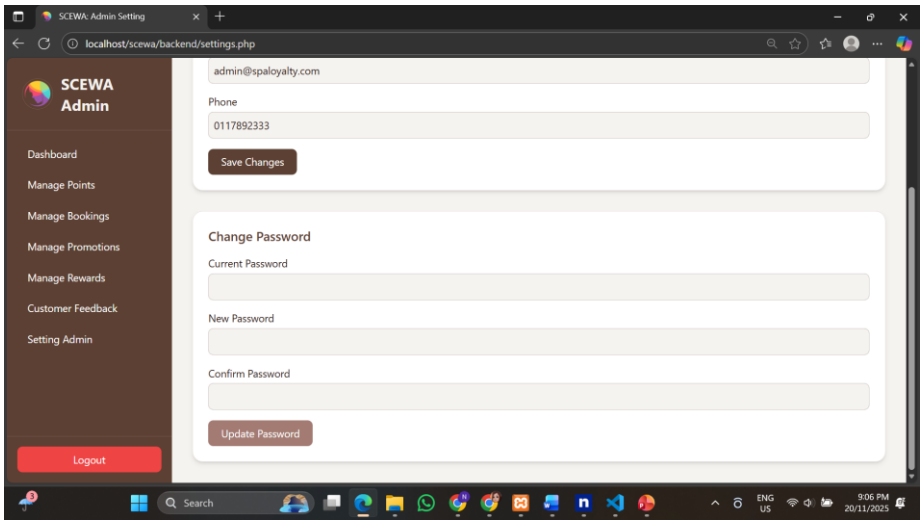


Figure 7.31 Admin Setting Page

As presented in Figure 7.31, the settings page gives the administrator the opportunity to modify personal information like phone numbers or passwords. This part of the system is straightforward and accessible. Furthermore, the colour pattern is in alignment with the spa themes of white, brown, and nude, which ties the visual elements of the system together.

7.5 Conclusion

To summarize, considering the implementation phase of the *SpaSalon: Smart Client Engagement Web App*, it was possible to finalize the design to the working web app of the system. From the chosen software and programming language, the execution platform was able to create the frontend and the backend, while the system operated and was smooth to run on the test hardware. The enhancement of the key functions was done via the deployment of the implementation tool to perfection, and these functions include: booking management, inte grating the loyalty program, collection of feedback, and carrying out operational functions on the admin dashboard. The design of the system functionalities was done and implemented to be simple so that they could be used and understood with ease by customers and the staff. Major sections of the code show that core functions were implemented, proving the system was able to meet some of the required functions that were determined at the design phase. Looking at the above, it can be said that the implementation phase has provided a dependable and working system that is ready to be tested, assessed, and eventually used for planned activities.

8 TESTING

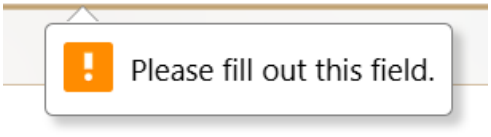
8.1 Introduction

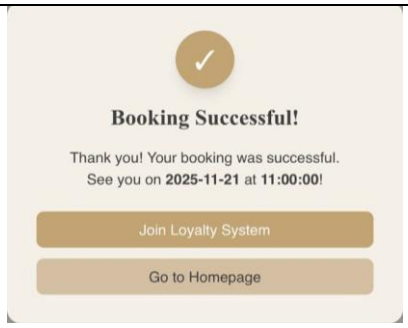
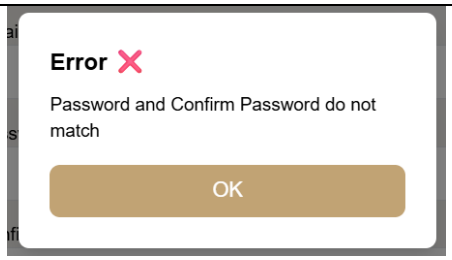
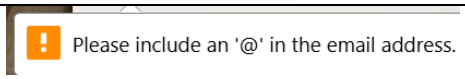
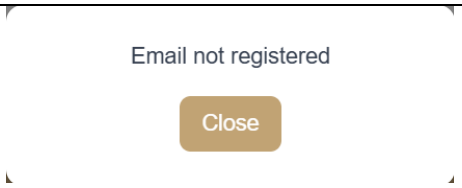
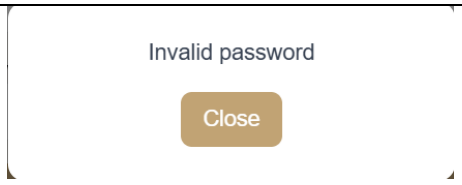
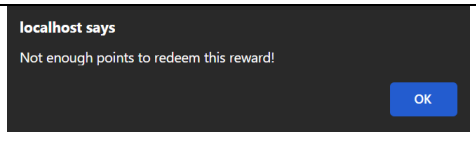
This chapter explains the evaluation completed for the *SpaSalon: Smart Client Engagement Web App*, and validates that the system works per design. Evaluating the system is essential as it assists in determining the gaps in the customer and staff features, and ensures that the system works in the overall expectation. This chapter captures the following; unit testing, integration testing, system testing, and user acceptance testing (UAT). Testing is the most critical step in any software project as it is the only step that guarantees there is no problem which would be a hindrance for the system to be usable (Samuel Gbli, 2024). These tests guarantee the system is usable and reliable for public use. Evaluating the system also ensures the users and the developers that the system is fully functional. Also, it demonstrates the system's ability to manage real users and their tasks efficiently. Finally, it helps confirm the system is usable and serves the purpose for which it was designed.

8.2 Unit Testing

For the Smart Client Engagement Web App, this segment focused on the unit testing for the application components on the login, booking, loyalty points, promotions, and feedback sections, checking each to see if they really worked (Dziak, 2023). With this strategy, the defects were found early and the the cost of development and expenses for correcting ones found later were significantly lowered (TestRail, 2025). With the separation of each component, the developers were able to verify the to see if there was correct functionality, and consistency across the components. Unit tests also served to forecasting the behaviour that was to be expected across each functional module. Overall, unit testing significantly improved the functionality and adaptability of the system (Dziak, 2023; TestRail, 2025).

Table 8.1 Unit Testing Loyalty System

No	Module	Description	Input	Output	Error Handling	Status
1	Booking	Validates that all required fields in the booking form are completed before submission.	Booking form submitted with one or more empty fields		Displays an error message prompting the user to fill all required fields	Pass

		Allows users to submit a booking with valid details and records the information in the database.	Complete booking form with valid customer details		-	Pass
2	Sign Up (Loyalty)	Checks that the password and confirmation password match during registration.	Password and confirmation password fields with mismatched values		Displays an error message indicating passwords do not match	Pass
		Verifies that the email format is valid during login attempts.	Email input does not comply with the required format		Displays an error message specifying invalid email format	Pass
		Notifies the user when the entered email is not found in the system.	Email input that does not exist in the database		Displays an error message indicating the email is not registered	Pass
		Prevents login if the password entered does not match the registered account.	Email exists but password is incorrect		Displays an error message indicating incorrect password	Pass
		Grants access to the dashboard and awards 10 loyalty points upon successful login.	Correct email and password	Redirect to dashboard + 10 points	-	Pass
3	Redeem Rewards	Blocks reward redemption when the	Customer attempts to redeem a reward with		Displays an error message stating	Pass

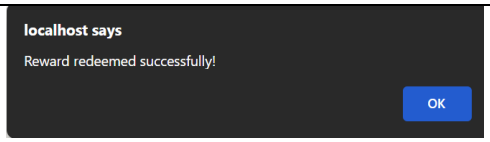
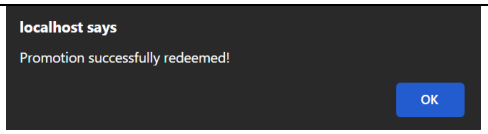
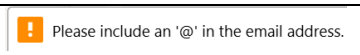
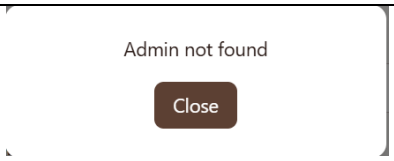
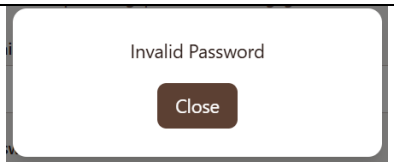
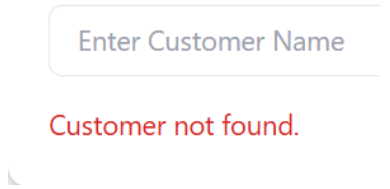
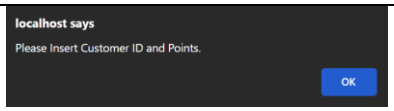
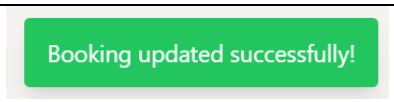
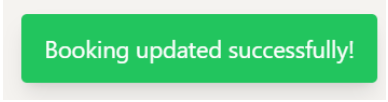
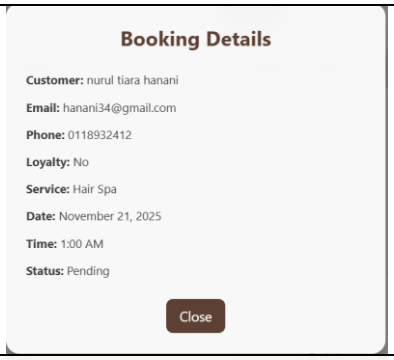
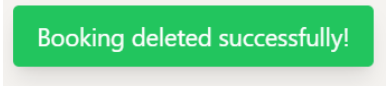
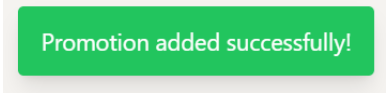
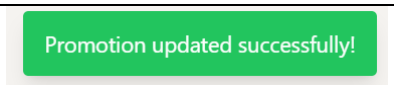
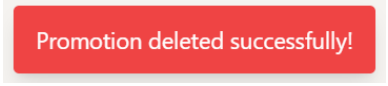
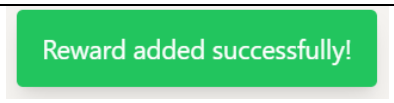
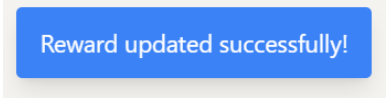
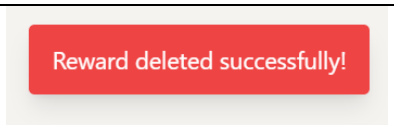
		user does not have sufficient points.	points less than required		insufficient points	
		Enables users to redeem rewards if they have sufficient points and updates their points balance accordingly.	Customer attempts to redeem reward with enough points		-	Pass
4	Claim Promotion	Allows users to claim an active promotion and displays a success notification.	Customer attempts to claim a valid promotion		-	Pass

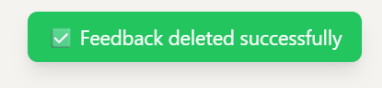
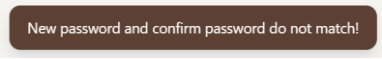
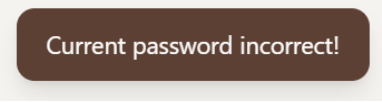
Table 8.2 Unit Testing Administration System

No	Module	Description	Input	Output	Error Handling	Status
1	Admin Login	Validates the email format entered by the admin during login.	Email input with invalid format		Displays an error message specifying invalid email format	Pass
		Notifies the admin if the entered email is not registered in the system.	Email input not found in database		Displays an error message indicating the email is not registered	Pass
		Prevents login if the password does not match the registered account.	Correct email but incorrect password		Displays an error message indicating incorrect password	Pass
		Allows successful login and	Correct email and password	Redirect to Dashboard	-	Pass

		redirects the admin to the dashboard page.				
2	Manage Points	Enables the admin to search for a customer and view their details including ID, name, email, and current points.	Customer name exists in database	Customer details displayed (ID, Name, Email, Points)	-	Pass
		Notifies the admin if a searched customer does not exist in the database.	Customer name not found in database		Displays an error message “Customer not found”	Pass
		Prevents QR code generation if customer ID or points are missing.	Attempt to generate QR code without customer ID or points		Displays an error message indicating missing data	Pass
3	Manage Bookings	Filters bookings based on Pending, Confirmed, or Cancelled status and displays customer names accordingly.	Select booking filter (Pending / Confirmed / Cancelled)	List of customer names displayed according to filter	-	Pass
		Allows the admin to search for a customer and view their booking details.	Enter customer name in search	Customer booking details displayed	-	Pass
		Allows the admin to add a new booking for a customer and confirms addition with a notification.	Input valid customer booking details		-	Pass

		Allows the admin to edit existing booking details and confirms update with a notification.	Modify customer booking details		-	Pass
		Displays detailed information for a selected customer booking.	Select customer booking		-	Pass
		Allows the admin to delete a booking and confirms deletion with a notification.	Select customer booking		-	Pass
4	Manage Promotions	Allows the admin to add a new promotion and confirms addition with a notification.	Input valid promotion details		-	Pass
		Allows the admin to edit an existing promotion and confirms update with a notification.	Modify promotion details		-	Pass
		Allows the admin to delete a promotion and confirms deletion with a notification.	Select promotion to delete		-	Pass
		Allows the admin to search for a customer in the promotions	Enter customer name	List of customers displayed	-	Pass

		page and display relevant results.				
		Allows the admin to approve or reject promotions and updates the promotion history accordingly.	Select promotion and choose approve/reject		-	Pass
5	Manage Rewards	Allows the admin to add a new reward and confirms addition with a notification.	Input valid reward details		-	Pass
		Allows the admin to edit an existing reward and confirms update with a notification.	Modify reward details		-	Pass
		Allows the admin to delete a reward and confirms deletion with a notification.	Select reward to delete		-	Pass
		Allows the admin to search for a customer in the rewards page and display relevant results.	Enter customer name	List of customers displayed	-	Pass
		Allows the admin to approve or reject rewards and updates the reward history accordingly.	Select reward and choose approve/reject		-	Pass
6	Customer Feedback	Filters customer	Select rating	Filtered feedback list displayed	-	Pass

		feedback by rating and displays filtered results.				
		Filters customer feedback by date and displays filtered results.	Select date	Filtered feedback list displayed	-	Pass
		Searches for customer feedback and displays relevant entries.	Enter customer name	Feedback of customer displayed	-	Pass
		Deletes a customer feedback entry and confirms deletion with a notification.	Select feedback entry		-	Pass
7	Settings	Verifies that the new password and confirmation match when updating account settings.	New password ≠ Confirm password		Displays an error message indicating passwords do not match	Pass
		Verifies the current password before allowing account changes.	Incorrect current password		Displays an error message indicating incorrect current password	Pass

8.3 Integration Testing

The integration testing for *SpaSalon: Smart Client Engagement Web App* was done to ensure that the various modules, such as booking, promotion, and customer feedback, interacted well. Testing issues that normally arise because of data exchange, interface mismatches, or workflow dependencies between components were identified (Dziak, 2023). The overall functionality, data consistency, and process accuracy were checked by testing the integrated modules of the system. The integration testing performed helped to identify communication errors early on and ensured that the system operated in a reliable manner prior to the system testing and User Acceptance Testing process (TestRail, 2025).

Table 8.3 Integration Testing Modules Involved

No	Modules Involved	Description	Scenario	Expected Output	Status
1	Booking + Email Notification	Verifies that customers who make bookings without joining the loyalty program receive an email confirmation successfully.	Customer submits a booking without registering an account	Email notification delivered and booking stored in database	Pass
2	Booking + Sign Up + Login + Loyalty Dashboard	Ensures that customers who make a booking, then register and log in, can access their loyalty dashboard seamlessly.	Customer books → signs up → logs in	Customer redirected to Loyalty Dashboard with correct data	Pass
3	Login + QR Points Update	Ensures that new loyalty members who log in receive 10 points automatically.	Newly registered customer logs in	10 points added	Pass
4	QR Scan + Rating + Feedback + Loyalty Update	Validates that after scanning a QR code, submitting rating/feedback updates loyalty points and saves data in the database.	Customer scans QR → submits rating & feedback	Points awarded, feedback recorded, updated info reflected in database	Pass
5	Redeem Rewards + Points Deduction + History Update	Ensures that redeeming a reward deducts points and updates the reward history table.	Customer selects a reward to redeem	Points deducted and redemption record added to history	Pass
6	Claim Promotion + History Update	Confirms that claiming a promotion updates the promotion history in the loyalty system.	Customer claims an active promotion	Promotion claimed and history table updated accordingly	Pass
7	Admin Login + Dashboard Data Loading	Ensures that successful admin login loads all dashboard data accurately.	Admin logs in with valid credentials	Admin redirected to dashboard, charts and statistics loaded	Pass
8	Search Customer +	Validates that	Admin	Updated points saved	Pass

	Adjust Points + Generate QR + Update DB	searching for a customer, adjusting points, and generating a QR code updates the database and displays notification.	searches customer name/ID → adjusts points → generates QR	and QR generated	
9	Search Customer + Manual Point Adjustment + Update DB	Ensures that manual point adjustments (add/deduct) update the database and trigger a success notification.	Admin searches customer → updates points	Updated points stored in database	Pass
10	Add Promotions + Set Period + Active Promotion Reflected in Loyalty System	Ensures that newly added promotions with valid start/end dates appear for customers during the active period.	Admin adds promotion with active date range	Active promotion displayed in customer loyalty system	Pass
11	Add Rewards + Set Required Points + Rewards Reflected in Loyalty System	Ensures that newly added rewards with required points appear correctly in the loyalty system.	Admin adds new reward with sets points required	Reward listed in loyalty system with correct points requirement	Pass

8.4 System Testing

The purpose of the System Testing for *SpaSalon: Smart Client Engagement Web App* was to evaluate the system in its entirety. This meant examining all incorporated systems functioning together as intended and configured for the requirements of the system, as outlined in Dziak (2023), to include the integration of the various modules of the system: log in, bookings, loyalty points, promotions, and feedback management. Systems testing recognized that the application preserves system performance and the integrity of the data processed by the application, and functions correctly in the application as a whole. Systems Testing also confirmed that the systems involved in the application met the intended functional requirements, as well as system and web application non-functional requirements for usability, security, and reliability. All identifiable gaps in testing were closed to permit the application to accurately simulate real-world conditions for deployment. Systems testing was able to provide confidence that the system was able to provide a reliable and efficient platform for client engagement, as noted in TestRail (2025).

Table 8.4 System Testing Loyalty System

No	Test Category	Description	Scenario	Expected Output	Status
1	Website Access	Verifies that customers can successfully access the Spa	Customer opens the website homepage in a browser	Website loads completely with correct layout and navigation	Pass

		Pelangi website			
2	Service Booking (Non-Loyalty)	Ensures booking functions correctly for non-loyalty users	Customer selects a service → fills booking form → submits	Booking is stored and confirmation email is automatically sent	Pass
3	Loyalty Registration	Validates customer onboarding into loyalty system	Customer fills in registration form and submits	Customer account successfully created in database	Pass
4	Loyalty Login	Ensures customer can log in using valid credentials	Customer enters correct email and password	Redirected to loyalty dashboard	Pass
5	Auto Points Award (10 Points)	Confirms new members receive welcome points	Customer completes loyalty registration	Dashboard shows with 10 welcome points automatically	Pass
6	QR Scan & Feedback Submission	Ensures QR feedback and point rewards flow operate smoothly	Customer scans QR → provides feedback → submits	Feedback stored and loyalty points updated in database	Pass
7	Reward Redemption	Verifies redemption workflow and point deduction	Customer selects reward and redeems	Required points deducted and redemption history updated	Pass
8	Promotion Claim	Ensures valid promotions can be claimed	Customer selects promotion → claims	Promotion claim saved and displayed in history	Pass
9	View History	Confirms history pages display accurate data	Customer opens the History section	Booking, redemption, and promotion claim histories appear correctly	Pass
10	Profile Settings	Ensures customers can update their profile	Customer edits personal information → saves	Profile updated successfully in database	Pass
11	Logout	Confirms logout feature works properly	Customer clicks Logout button	Session ends and customer redirected to login	Pass

Table 8.5 System Testing Admin System

No	Test Category	Description	Scenario	Expected Output	Status
1	Admin Login	Verifies secure access to admin system	Admin enters valid email and password	Admin successfully logged in and redirected to dashboard	Pass
2	Dashboard Data Load	Ensures dashboard displays accurate business metrics	Admin opens dashboard page	All statistics, charts, and summary data load correctly	Pass
3	Manage Bookings – CRUD & Status Updates	Validates booking management operations	Admin adds, edits, views, deletes bookings and updates to confirmed/cancelled	Booking records updated accordingly and toast notifications displayed	Pass
4	Manage Points – QR Generation	Ensures points adjustment and QR generation function correctly	Admin searches customer → adjusts points → generates QR code	Points updated in database and QR generated successfully	Pass
5	Manage Promotions – CRUD & Approval	Verifies administration of promotions	Admin adds, edits, deletes promotions and approves/rejects customer claims	Promotion list updates instantly; approval status reflected in loyalty system	Pass
6	Manage Rewards – CRUD & Approval	Validates reward management operations	Admin adds, edits, deletes rewards; approves/rejects reward claims	Reward records updated and approval reflected in customer history	Pass
7	Manage Customer Feedback	Ensures feedback filtering and deletion operate smoothly	Admin filters by rating/date or searches name; deletes feedback	Correct feedback displayed and deleted feedback removed with toast notification	Pass
8	Admin Settings	Validates ability to update admin account settings	Admin updates password or profile settings	Input validated and settings updated successfully	Pass
9	Admin Logout	Confirms secure exit from system	Admin clicks “Logout”	Admin session ends and returned to login page	Pass

8.5 Acceptance Testing

User Acceptance Testing (UAT) for *SpaSalon: Smart Client Engagement Web App* had the spa personnel check the fully integrated system for the first time to evaluate its real-world usability and functionality (Dziak, 2023). Employees were asked to carry out everyday responsibilities like booking management, point redemption, promotion claims, and feedback provision to confirm the system's functionality meets the needs of the operation. UAT confirmed the system's design and functionality were within the reasonable range of user expectations and system efficiency. This stage's feedback was used to finalize the system and adjustments. This testing showed that system was ready to be installed and could be used to carry out daily activities (TestRail, 2025).

8.5.1 Alpha Testing

Figure 8.1 Testing with Owner of Spa Pelangi

Alpha Testing is preliminary user acceptance testing within a controlled environment with the customer and/or stakeholders, to discover issues prior to a public release (Sommerville, 2021). For the *SpaSalon: Smart Client Engagement Web Application*, occurred on 2 November 2025 with Mrs. Nor Hapizah binti Abidin, the owner. She was shown the fully developed system, then she and the testing administrators participated in a structured interview for feedback in order to measure the system’s usability, functionality, and business requirements. Areas of inquiry were on system features, namely, management of bookings, loyalty programs, usage of QR codes, promotional features, rewards system, feedback mechanisms. This model of testing provided the owner with the opportunity to observe the system in action and to raise any questions. This Alpha Testing exercise was the first to confirm, with minor usability adjustments, that the system was ready for the client to use in business operations, so that system Beta Testing could commence (Then, 2022).

Table 8.6 Section A – Main Website (Customer View)

QUESTION 1	Is the website convenient and easy for users to navigate?
ANSWER	Yes
ANALYSIS	Website layout, menu, and navigation flow are user-friendly. Users can easily find pages like booking, promotions, and loyalty without confusion.

Table 8.7 Section B – Loyalty & Feedback Features (Customer View) Question 1

QUESTION 2	Is the loyalty interface easy to use and well-organized?
ANSWER	Yes
ANALYSIS	Loyalty points, rewards, and customer info are clearly displayed. Interface allows users to track points efficiently.

Table 8.8 Section B – Loyalty & Feedback Features (Customer) Question 2

QUESTION 3	Does the QR scan feature and the feedback form work smoothly for collecting points?
ANSWER	Yes
ANALYSIS	QR scanning and feedback submission function without errors, ensuring points are collected reliably and feedback is recorded correctly.

Table 8.9 Section B – Loyalty & Feedback Features (Customer) Question 3

QUESTION 4	Is the process of redeeming rewards or claiming promotions efficient and easy to understand?
ANSWER	Yes
ANALYSIS	Users can redeem points or claim promotions with minimal steps, and instructions are clear, reducing user errors or confusion.

Table 8.10 Section C – Dashboard & Charts (Admin/Staff View) Question 1

QUESTION 5	Are the charts and data in the dashboard clear and easy to understand?
ANSWER	Yes
ANALYSIS	Dashboard provides visual insights (charts, tables) that are intuitive for admins, supporting quick analysis and decision-making.

Table 8.11 Section C – Dashboard & Charts (Admin/Staff View) Question 2

QUESTION 6	Is generating or managing QR codes straightforward for staff use?
ANSWER	Yes
ANALYSIS	Admin can generate and manage QR codes efficiently, reducing workload and potential errors during operations.

Table 8.12 Section C – Dashboard & Charts (Admin/Staff View) Question 3

QUESTION 7	Is it easy to manage customers' details, rewards, and promotions?
ANSWER	Yes
ANALYSIS	Admin can perform CRUD operations for customers, rewards, and promotions without difficulty, ensuring smooth backend management.

Table 8.13 Section D – Overall System Evaluation Question 1

QUESTION 8	Did you face any errors or confusing parts while using the system?
ANSWER	No
ANALYSIS	System is stable and intuitive; users and admin did not encounter technical errors during testing.

Table 8.14 Section D – Overall System Evaluation Question 2

QUESTION 9	What improvements or additional features would you recommend?
ANSWER	Include initial deposit for booking
ANALYSIS	Client suggests adding an option for customers to pay a deposit during booking. This can enhance booking commitment and reduce no-shows.

Table 8.15 Section D – Overall System Evaluation Question 3

QUESTION 10	I confirm that I have tested the system and that it meets the agreed functional and business requirements.
ANSWER	Yes
ANALYSIS	Client confirms system meets all functional and business requirements, indicating readiness for deployment with minor improvement noted.

8.5.2 Beta Testing

Beta Testing involves checking for acceptance of the actual users outside the development team to validate the system for usability and functionality (Then 2022). At this point, we had 57 of our selected customers at Spa Pelangi who were peripheral customers who used the web app as a primary user through their computers and mobile phones. These customers were used to configure the system for their essential validation of the system before a full roll out. We asked users during the Beta Testing period to perform the primary functions of the system which included service bookings, loyalty program access, reward QR code scans, promotion claiming, and feedback submission via a *Google Form*. This Beta Testing ensured validation of systematic data collection for the primary functions (Then 2022). This gap in system user experience and functionality the Beta Testing captures will inform the system developers in closing to be a final product.

Questionnaire Analysis (Post-Development)

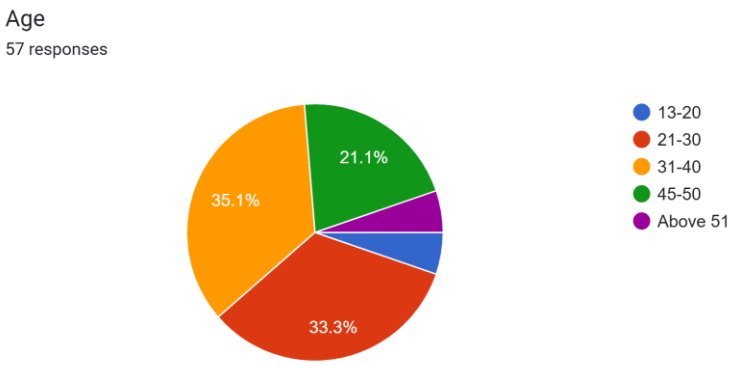


Figure 8.2 Demographic Question

As shown in Figure 8.2 in the pie chart above, the age group 31 to 40 had the highest number of respondents at 20. The second largest group consisted of 21 to 30 years old, 19 respondents, followed by the 45 to 50 age group with 12 respondents. The remaining respondents were in the age ranges 13 to 20 and 51 and above. Customers age 20 and above are frequent visitors to Spa Pelangi, possibly to receive massage services or hair salon treatments.

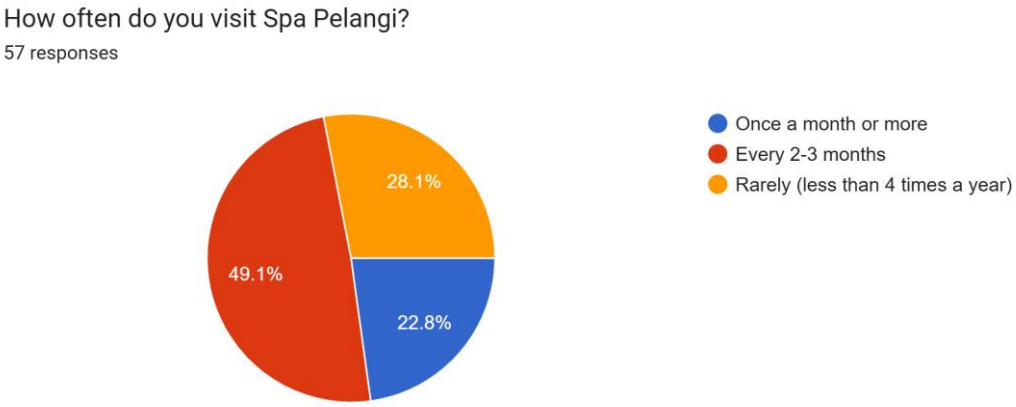


Figure 8.3 Demographic Question

The pie chart in figure 8.3 shows the response frequencies of the visitors of the spa. 28 respondents indicated the spa was visited every two to three months, 16 respondents indicated the spa was visited every four months, then the other respondents visited the spa once a month or more.

Section A: Website and Booking Experience

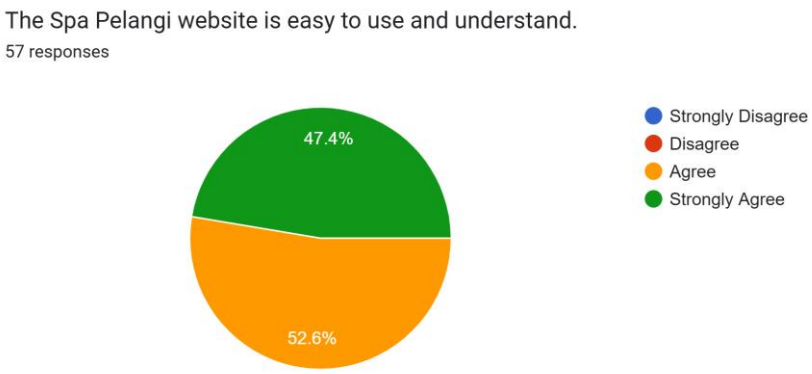


Figure 8.4 Question 1

Figure 8.4 pie chart above illustrates whether respondents understood the Spa Pelangi website. Twenty-seven respondents strongly agreed that they fully understood the website, while the remaining respondents agreed that they were aware of the website's purpose.

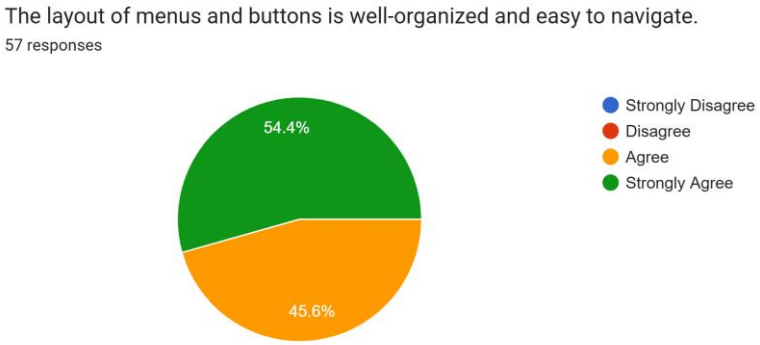


Figure 8.5 Question 2

Figure 8.5 pie chart above shows the opinions regarding the website's layout and menus. Thirty-one respondents strongly agreed that the layout was well-organized and the navigation menu was easy to use, while the remaining respondents agreed.

Figure 8.6 Question 3

Figure 8.6 pie chart above reflects respondents' ability to complete the booking form. All 57 respondents indicated that the form was easy to understand and complete.

Figure 8.7 Question 4

Figure 8.7 pie chart above shows responses regarding whether respondents received an email after making a booking. All respondents confirmed that they received email confirmations.

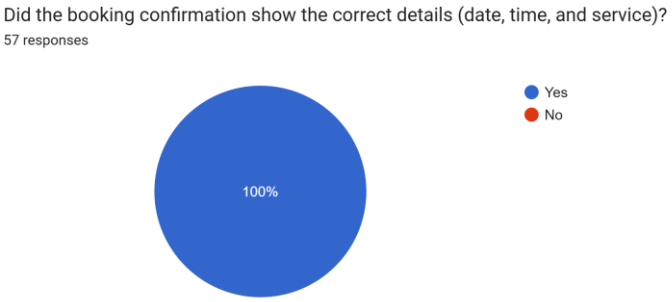


Figure 8.8 Question 5

Figure 8.8 pie chart above illustrates whether the booking details, including date, time, and service, were correct. All 57 respondents confirmed that the booking details were accurate.

Section B: Loyalty and Feedback System

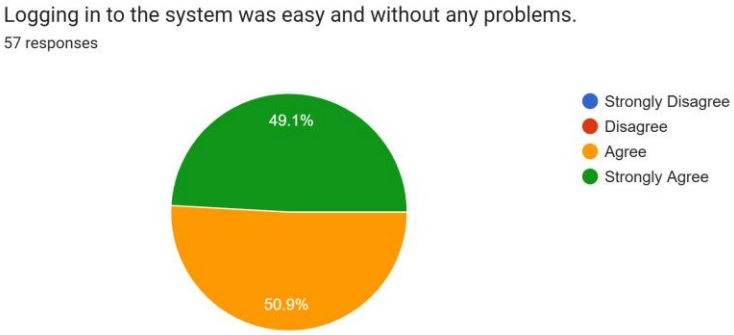


Figure 8.9 Question 6

Figure 8.9 pie chart above presents respondents' views on accessing the loyalty system login. Twenty-nine respondents agreed, while the remainder strongly agreed that logging in was easy and free from errors. This indicates that the loyalty system can be accessed smoothly by customers.

Figure 8.10 Question 7

Figure 8.10 pie chart above shows responses regarding the QR code scanning feature. Thirty-four respondents strongly agreed, and the remainder agreed, that scanning the QR code to earn points worked smoothly.

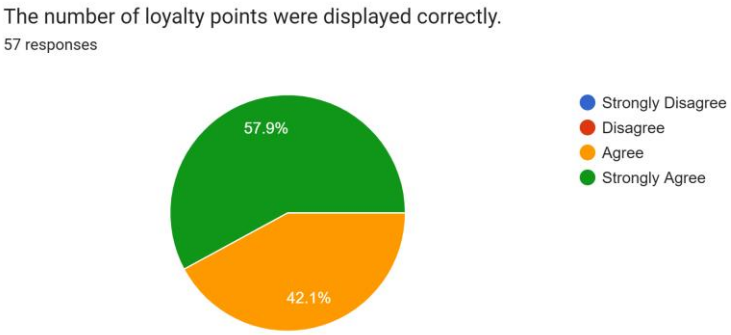


Figure 8.11 Question 8

Figure 8.11 pie chart above illustrates whether the number of loyalty points earned was correct. Thirty-three respondents strongly agreed, and the remaining respondents agreed, indicating that the points were accurately recorded in the loyalty system.

Figure 8.12 Question 9

Figure 8.12 pie chart above shows respondents ability to redeem rewards. All respondents confirmed that they were able to redeem rewards successfully.

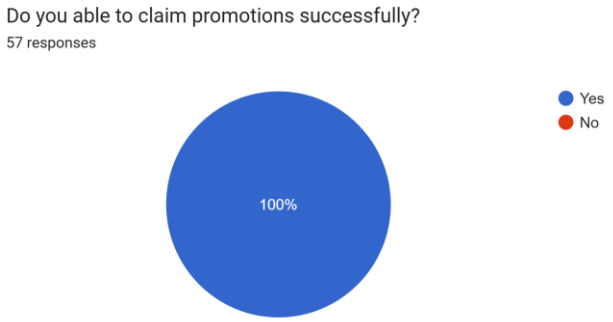


Figure 8.13 Question 10

Figure 8.13 pie chart above illustrates whether respondents were able to claim promotions. All respondents answered yes, confirming that the system allows customers to claim promotions successfully.

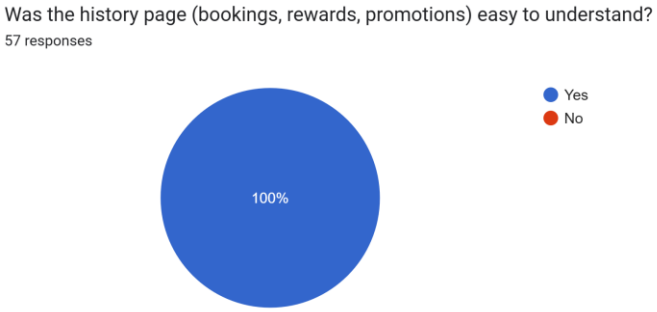


Figure 8.14 Question 11

Figure 8.14 pie chart above shows whether respondents understood the history page, which contains booking history, redeemed rewards, and claimed promotions. All respondents indicated that they understood the contents of the history page.

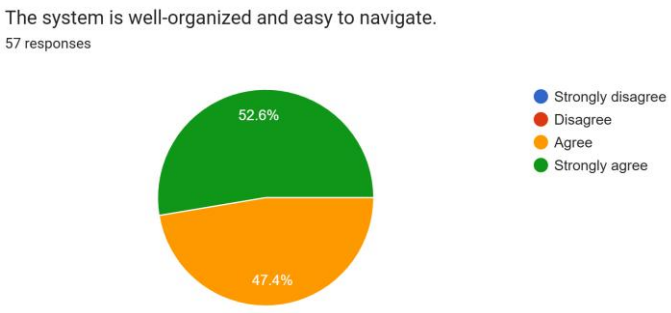


Figure 8.15 Question 12

Figure 8.15 pie chart above reflects respondents' opinions on the overall organization and navigation of the system. Thirty respondents strongly agreed that the system was well-organized and easy to navigate.

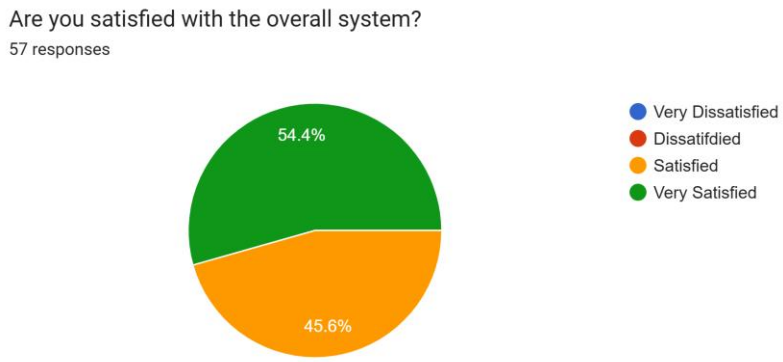


Figure 8.16 Question 13

Figure 8.16 pie chart above shows respondents' satisfaction with the loyalty system. Thirty-one respondents indicated that they were very satisfied with the system.

8.6 Conclusion

Testing for the *SpaSalon: Smart Client Engagement Web App* confirming between the client and the testers the application works as described and serves its intended purpose. In the unit testing of the program, each module operated under its self defined functionality and while doing so, unit integration testing of the program, data granularity of customer data and admin modules showed data harmony bridge while confirming modules of the application do not lock up or cross interfere while doing their intended tasks. Data harmony of the modules demonstrated granularity of purpose fulfilment of all modules within the application and showed system functions data set. The system scan and digitized reward functionality showed user efficient evidentiary completion and fulfilment of system elements. The system gave completion to tasks entered by the user and the system fulfilled a purpose within a given task as entered by the user. With the completion of the system integration testing, the reservation system module was suggested to be have a purpose within user system skimming of the basic task completion and functionality within the module as system operated. The comprehensive testing process has demonstrated that the Spa Pelangi System is operational, dependable and ready for deployment, and have met the requirements of the project and the needs of the operation.

9 PROJECT MANAGEMENT

9.1 Introduction

This chapter outlines what Project Management is like for the SpaSalon: Smart Client Engagement Web App, how project processes were organized, scheduled, and divided into tasks that made it possible for every component of the system such as front end, back end, security, and storage to be executed in an orderly fashion. This chapter also focuses on risk management where possible problems were predicted and mitigation plans were made. The Project Management Institute (2024) defines project management as the integration of knowledge, skills, tools, and techniques to achieve the project objectives regarding scope, time, and quality. As mentioned by Khatun (2021), project management is one of the factors that provide the opportunity for software development projects to be flexible to challenges and stay on track. This chapter is an illustration of how the practices of project management contributed to the efficiency of the development process of the system.

9.2 Project Schedule

Period activities of organizing all scheduled project activities including assigning tasks, their starting and ending dates, as well as relevant resources, so that the development processes can go in an orderly fashion and on time (GeeksforGeeks, 2020). It also arranges for each project stage to be organized in such a way that the mitigation of delays in the alignment of work with the timelines is achieved (PMTrainingschool, 2023). Software projects can be developed in an orderly fashion because of the development processes clarity, accountability, and control, and for that reason, a well-defined schedule is very important. Concerning the *SpaSalon: Smart Client Engagement Web App*, such a schedule is also necessary to be able to develop modules in an orderly fashion such as the booking, loyalty, and dashboard management, so that all the modules are completed on time with the semester deadline.

WBS and Gantt charts are helpful in most software development projects because they improve planning and tracking. WBS divides the scope of the project into smaller and more manageable scopes, which makes it easier to delegate task, and oversee progress (Rakesh, 2025). Gantt charts, on the other hand, provide a visual timeline of the project showing the duration, dependencies, and milestones of all task, thus helping the entire team to understand the overall flow of the project (Nandini, 2025). The application of both WBS and Gantt charts in the software project to predict development activities.

9.2.1 Work Breakdown Structure

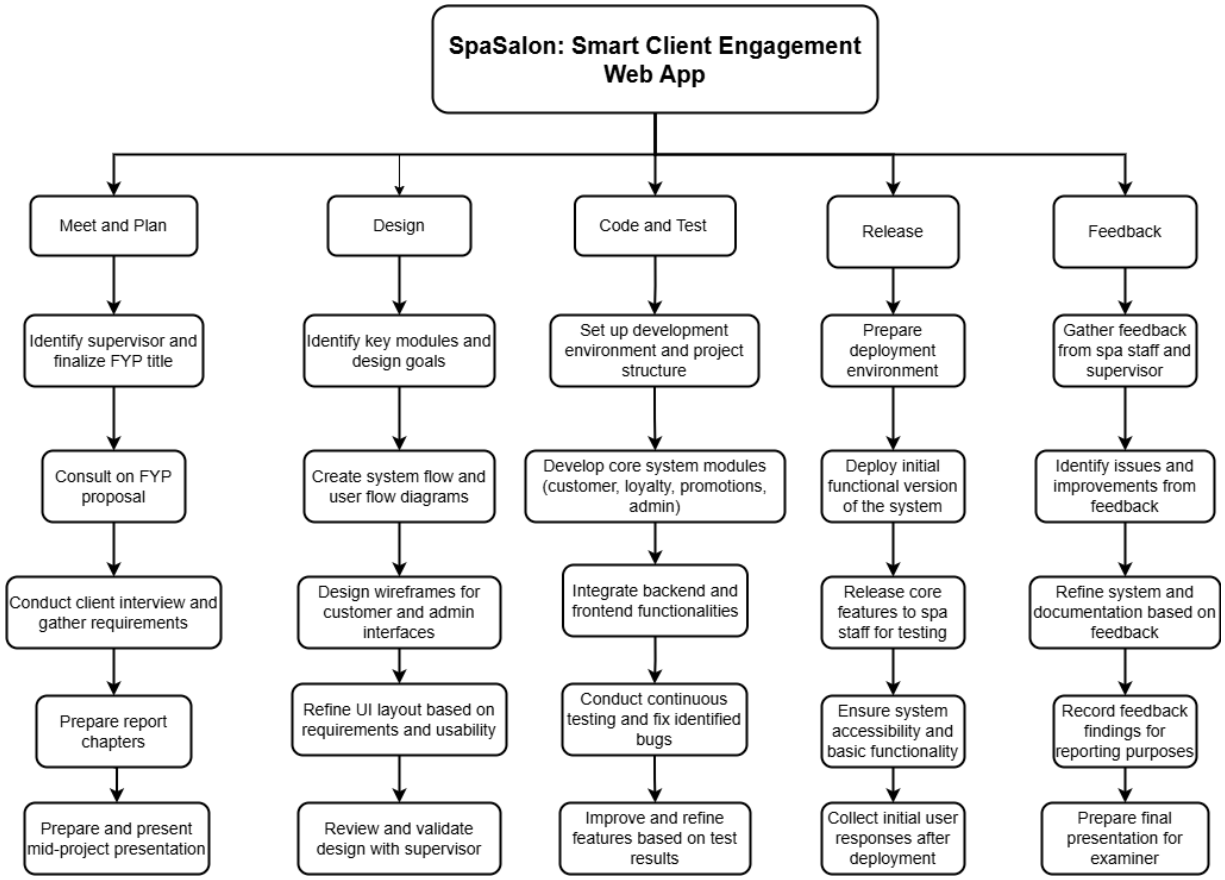


Figure 9.1 Work Breakdown Structure

Having a Work Breakdown Structure WBS allows you to structure your project by giving you the ability to compartmentalize the project into small manageable pieces to help streamline the development processes (Harrison & Andrews, 2020). For the project, the WBS was categorized as per the Agile methodology which provides iterative work, changing scope, and continuous improvement during the development (Rahman & Idris, 2021). Meet and Plan was the first phase and it was spent talking to the supervisor to guide the project, meeting the Spa Pelangi client, and collecting the necessary requirements for the SpaSalon: Smart Client Engagement Web App. Design was the painting of the complete picture, producing system flow diagrams, user flows, and wireframes that demonstrated the functionalities the customers and spa staff would be able to use in the loyalty program and admin dashboard. In Code and Test, the system was developed in iterations, and different features customer registration, loyalty points, and promotion management were tested to verify that the system was stable and accurate (Lee & Kumar, 2022). Then in the Release phase, a minimal viable product of the system was launched for spa staff to use in a live setting. Ultimately, the comments and recommendations from the spa personnel and the supervisors were consolidated, and the system was improved for the purposes of completing the final presentation. In conclusion, the WBS, here, was able to provide a structured framework for the development process while adhering to Agile principles and methodologies.

9.2.2 Gantt Chart

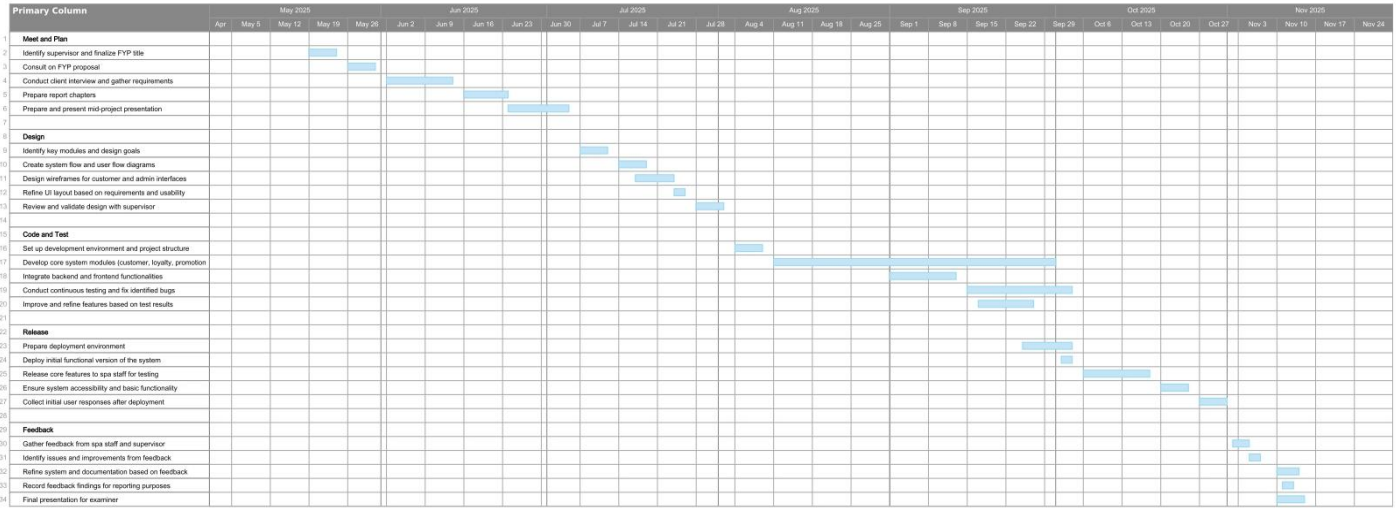


Figure 9.2 Gantt Chart of SpaSalon: Smart Client Engagement Web App

A Gantt Chart is a project management tool that is used to visually represent the progress of a project divided into tasks and sub-tasks. Specifically, Gantt Charts become useful when project managers and project management teams need to allocate and keep track of resourcPres schedilim, and track time to progress at any point in the project (Kerzner). For the project, ‘SpaSalon: Smart Client Engagement Web App’, a Gantt Chart was used to estimate the time and organize the structure of the project into the following phases: planning and client interviews, design, coding, deployment, testing, and feedback collection. Having the Gantt Chart helped the project to work heavily planning the time each of the tasks in the project were going to take and helped set tasks and deadlines to keep the project schedule on track. It helped the project manager set deliverables to be completed on time and maintain communication between the project team and stakeholders. Ultimately, Gantt Charts identify and map out the project constraints (Kerzner). The Gantt Chart from this project illustrates activities in five main phases: Meet and plan, design, code and test, release, and feedback.

Every task has been divided into distinct activities that include their individual start and finish timelines as well as the foreseen time they will take to complete to achieve an overview of the time allocated to the project. This method simplifies the communication of project progress to the project team and the client and allows them to ident focus on relevant info and manage the time if needed enhancing the overall efficiency of the project (Mir & Pinnington, 2020). Dividing the project into smaller and manageable sub-projects ensures that it has no missing critical activities and that the dependencies are structured in the right way. The matrix below provides an overview of the total time of each task as a concise reference for the appropriate planning and evaluation. In Gantt Charts, the overall project is broken down into many organized sections. It positively impacts the overall orderliness of the entire system development and is very easy to manage as new tasks are traced along the timeline ensuring the *SpaSalon: Smart Client Engagement Web App* is delivered and top quality is maintained in terms of control and responsibility in the project.

Table 9.1 Duration Activities

Name	Start	Finish	Duration
Meet and Plan			
Identify supervisor and finalize FYP title	05/19/25	05/23/25	5d
Consult on FYP proposal	05/26/25	05/30/25	5d
Conduct client interview and gather requirements	06/02/25	06/13/25	10d
Prepare report chapters	06/16/25	06/23/25	6d
Prepare and present mid-project presentation	06/24/25	07/04/25	9d
Design			
Identify key modules and design goals	07/07/25	07/11/25	5d
Create system flow and user flow diagrams	07/14/25	07/18/25	5d
Design wireframes for customer and admin interfaces	07/17/25	07/23/25	5d
Refine UI layout based on requirements and usability	07/24/25	07/25/25	2d
Review and validate design with supervisor	07/28/25	08/01/25	5d
Code and Test			
Set up development environment and project structure	08/04/25	08/08/25	5d
Develop core system modules (customer, loyalty, promotions, admin)	08/11/25	09/30/25	37d
Integrate backend and frontend functionalities	09/01/25	09/12/25	10d
Conduct continuous testing and fix identified bugs	09/15/25	10/03/25	15d
Improve and refine features based on test results	09/17/25	09/26/25	8d
Release			
Prepare deployment environment	09/25/25	10/03/25	7d
Deploy initial functional version of the system	10/02/25	10/03/25	2d
Release core features to spa staff for testing	10/06/25	10/17/25	10d
Ensure system accessibility and basic functionality	10/20/25	10/24/25	5d
Collect initial user responses after deployment	10/27/25	10/31/25	5d
Feedback			
Gather feedback from spa staff and supervisor	11/02/25	11/04/25	3d
Identify issues and improvements from feedback	11/05/25	11/06/25	2d
Refine system and documentation based on feedback	11/10/25	11/13/25	4d
Record feedback findings for reporting purposes	11/11/25	11/12/25	2d
Final presentation for examiner	11/10/25	11/14/25	5d

9.3 Risk Management

Risk management is about identifying, analyzing, and addressing risks associated with a project (Jabatan Digital Negara (JDN) 2024). In the case of an ICT system like a loyalty and feedback platform, risks must be addressed so that technical issues, data issues, value system downtimes, and so forth do not get in the way of project goals. The JDN notes the need for effective management of ICT projects that include ongoing supervision, management, and risk management (JDN 2024). The project team is able to foresee and counter issues, which is the aim of these strategies, like software bugs, downtime on servers or the data hosting, loss of data, and new features such as the QR function.

Table 9.2 Structured of Risk Management

Risk	Analysis	Mitigation
Bug in the system	Certain functions may not work as expected	Test each function before deployment, use unit & integration testing, maintain backup data
Server / hosting down	Website may not be accessible for both admin and customers	Ensure stable hosting, monitor server, have backup plan in case of downtime
Data loss / data corruption	One of the database files may be lost	Perform regular database backups to prevent data loss
New QR function	QR feature is a new addition, requiring in-depth research and proper implementation	Conduct preliminary research, perform thorough testing, gather feedback from early users before deployment

To conclude, the existence of a structured risk management plan guarantees the success of this endeavour, and the reliability of the four main risks, system bugs, server downtime, data loss, and new QR feature implementation, have been identified, and they pinpoint critical aspects of the potential degradation of a system's functionality and system user experience. Testing, server monitoring, database backups, and QR feature user feedback research are ways to reduce the risks mentioned. Such approaches best illustrate the practices of ICT project governance as suggested by Jabatan Digital Negara (JDN, 2024a) and the significance of risk management when providing a system that is managed safely and securely.

9.4 Conclusion

To sum up, the successful execution of the projects that pertains to the *SpaSalon, Smart Client Engagement Web App* wholly depends on good project management. Using the WBS and Gantt charts the team was able to achieve deadline management and task accomplishment. Anticipating and mitigating risks such as system bugs, server downtimes, data loss, and new QR functionalities were handled with management's risk control. They also improved the loyalty feedback system. System data monitoring and system performance verification were conducted after the system was operational. Members of the team communicated effectively, and issues were escalated and resolved quickly. The application of systematic management techniques was the basis on which the project improved. It was the control of schedules, the control of risks, and the control of flow that allowed the project to progress without hiccups. It was these combined efforts that allowed the project to result in a system that was operational and secure and that users could interact with in an efficient manner.

10 CONCLUSION

10.1 Introduction

This chapter is meant to wrap up the completed project *SpaSalon: Smart Client Engagement Web Application*. In this chapter, the focus is on consolidating the project's accomplishments, areas that were particularly difficult, and key takeaways. The chapter also identifies the challenges that were experienced with this project and discusses the recommendations that can be taken in the future. In offering this information, the chapter demonstrates the extent to which the goals for this system were achieved and the steps taken to further improve the system. In addition, this chapter summarizes the overall experience gained primarily from using the technical skills acquired, in developing the project. The chapter also demonstrates how the system was implemented successfully due to thorough planning, designing, and testing. Finally, the chapter focuses on the developed system and how it can be enhanced further to provide additional value to the clients.

10.2 Achievement

This part of the report summaries the goals of the project and asesses how each one has been accomplished during the construction of the *SpaSalon: Smart Client Engagement Web App*. The project had the intention of creating a new digital loyalty tracking feature, a promotion mechanism that is driven by a customer database, and a personalized promotion component for customers. All three goals were accomplished with the construction of an operational module that automated and streamlined multiple functions of the spa’s customer engagement processes. The digital loyalty tracking feature gives customers the ability to easily view and accumulate loyalty points, while the database system ensures that data is managed and loyalty points are tracked consistently. Furthermore, the promotion module has been personalized to provide promoted rewards to customers targeting their satisfaction with the spa to increase repeat visits. In general, the results of the project prove that the goals of the project were accomplished and that the project provided enhancements that were needed by Spa Pelangi.

10.2.1 To develop a new digital loyalty tracking feature

This goal was achieved by creating a complete digital loyalty module. Customers can easily register and log in, and the system will automatically track their loyalty points. Adding points for services completed have now become easier for customer to scan QR codes. The digital system also enables customers to provide feedback offering a more participative interactive experience. The reliability and performance of the loyalty system is demonstrated through instant point calculations. The calculations are saved in a database and are displayed in real-time on the customer dashboard as well as on the loyalty history page. This development improves upon the old manual processes by providing greater transparency and efficiency and allowing a more interactive experience.

10.2.2 To develop a database loyalty points feature in the system

This goal is achieved through the design of a structured database, which serves all critical operational data related to the spa. This database serves a variety of purposes, including storing loyalty point transactions, maintaining customer reservations, maintaining feedback submissions and maintaining promotional activities and rewards, ensuring systematic data capture and easy data retrieval. Staff can use an interactive admin dashboard to manage customer points, manage feedback and modify active promotions, all facilitated by real-time data retrieval directly from the database. This represented a improvement over the spa's previous manual approach, which lacked organization and consistency in recording customer information and tracking loyalty. As a result, the database component significantly improved the accuracy, efficiency, and management of data in the system.

10.2.3 To develop a personalized promotion

This goal has been accomplished through the addition of the Promotion Module to SpaSalon: Smart Client Engagement Web App. All current promotions are consolidated and the administrator can create and modify promotions as well as monitor them from one location. Customers can see promotions available and rewards can be redeemed through the system. The customer experience is significantly enhanced and the entire processing system is more streamlined. Previously, promotions were individually distributed on multiple online social media platforms on an ad hoc basis. Tracking was time consuming and promotion management was inefficient. The new system provides and records promotions, rewards, customized engagement, and personalization that improve the enhanced marketing of the spas.

Proof??

10.3 Constraint and Limitation

In developing the SpaSalon: Smart Client Engagement Web App, several constraints and limitations were encountered that influenced both the design and implementation process. Challenges range from lack of resources, technical problems, time constraints, and unexpected system issues, impact project timelines and require careful planning to solve problem. Identifying and reflecting upon such limitations allows for a clearer view of the scope of the project and points toward areas that need improvement.

One of the key limitations was the restricted availability of materials concerning digital loyalty systems. Research indicated that material regarding the implementation of digital loyalty schemes is limited, even on the internet. This is probably because most small-scale businesses still depend on stamp cards in monitoring the loyalty of their customers. Moreover, much cost and technical expertise are needed to develop a digital loyalty system, and this may be difficult to achieve at a small scale. These limitations affected the choices in design and the scope of the project; hence, the system was to be developed efficiently with the provided tools and knowledge.

Another one of the different limitations was the implementation of the scanning of QR codes feature as it was one of the more advanced features in the system. Awarding customers points precisely was going to take some time to plan and required a lot of set research before implementing into the system as it was going to turn out to be one of the harder features to build into the system. At the later stages of the system development, we had a problem with the corruption of some of the database files in phpMyAdmin which resulted in the need to build the affected databases from the ground up. On top of these we had some minor issues with the technical aspects of XAMPP and it took some time to properly troubleshoot the problem. These events proved to us the necessity of keeping backups and being careful with the local server environment, which affected the timeline of the project in a minor way.

Last challenge included the constraint of time. Considerable time study and time testing were required for the incorporation of complex features such the performance of real time monitoring of loyalty points and QR code scanning. Time was even more restricted by the need to balance the development proceedings with other academic obligations. Additionally, the effort required to fix bugs and ensure the system worked flawlessly was extensive, and this also extended the time required to complete the project.

10.4 Future Work and Recommendation

This section describes possible future enhancements and makes some suggestions for continuing improvement of the Smart Client Engagement Web App for SpaSalon. The new features can improve the functionality of the system for user convenience and system efficiency. Upgrading the system will improve the ability to meet user demands and will enhance the management of spa services system for a more expansive and developed management system to be used for a longer term.

10.4.1 Editable Booking Feature

Having access to modify bookings in real-time is something we believe will add positive value to customer experience. We see that customers want to change date, time, or service booked in real time for more flexibility. Allowing customers to modify their bookings will lessen administrative workload on spa staff while doing more for customer experience.

10.4.2 Auto Deduction for Promotions

To improve the system to automatically deduct the discount amount from the total service cost owed by the customer when the customer redeems, it is recommending the system be designed this way. Moreover, the system enhancement can be done to offer customer the option redeem discount by entering a promotion code. In this way, the customer is able to apply promotion more flexibly. The customer is able to apply promotion more flexibly. The designed system automated billing to prevent errors incurred by manual calculations. The system is more improved to service customer better.

10.4.3 Deposit Payment for Bookings

Based on client feedback during User Acceptance Testing (UAT), it is recommended that customers be required to make a deposit payment through the system when confirming a booking. This feature would secure appointments, reduce no-shows, and provide the spa with better financial planning. Integrating an online payment gateway for deposits would further improve convenience and strengthen the reliability of the booking process.

10.5 Conclusion

The development of the Spa Salon is the digital loyalty offers management system integration, tracking system, a loyalty point, customer booking system, & custom promotion system has met all the initial requirements. Numerous challenges also expected during the life of the project with the limited technological resources in the integration of complex features like QR code scanning, system corruption, and our tight deadlines. These issues, however, were overcome thanks to extensive analytical planning and ongoing research with all efforts serving to advance the project. The project has had system enhancement challenges that provided the participants with an opportunity to acquire a series of new skills in system development and management, interactive dashboards, and the integration of features. The experience also reinforced and reiterated the importance of backups & testing with timelines to show how critical iterative code management processes can be. Developing the functionalities of an editable booking, auto-promotional rate deduction, redeemable promo, payment deposit promotion & system convenience directly correlate to the increased efficiency of system user engagement. The project met its objectives, offering a valuable platform for its participants. It can then be used for advanced analysis and potentially developed commercially.

Appendix A – Requirements Specification Document

1. Project Source Code (GitHub Link)

   https://github.com/syzna22/FYP2_NURSYAZANA.git

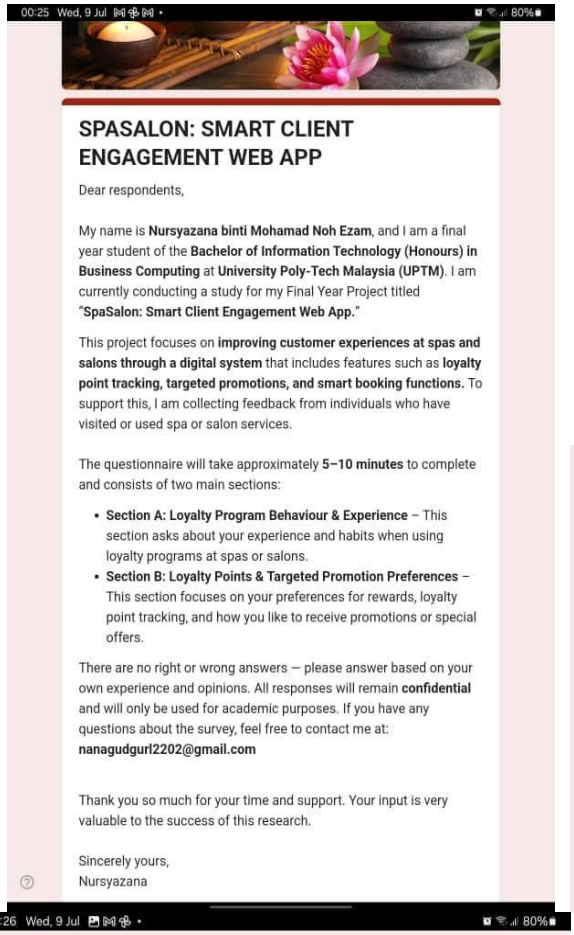
2. Interview with Client Video (Youtube Link)

   https://youtu.be/FpBi0ZgDBQw

3. Demonstration Video (Youtube Link)

   https://youtu.be/cyPZ2g2dJWA

4. Questionnaire: Pre-Development (Google Form)



SPASALON: SMART CLIENT ENGAGEMENT WEB APP

Dear respondents,

My name is **Nursyazana binti Mohamad Noh Ezam**, and I am a final year student of the **Bachelor of Information Technology (Honours) in Business Computing** at **University Poly-Tech Malaysia (UPTM)**. I am currently conducting a study for my Final Year Project titled "**SpaSalon: Smart Client Engagement Web App.**"

This project focuses on **improving customer experiences at spas and salons through a digital system** that includes features such as **loyalty point tracking, targeted promotions, and smart booking functions.** To support this, I am collecting feedback from individuals who have visited or used spa or salon services.

The questionnaire will take approximately **5–10 minutes** to complete and consists of two main sections:

- **Section A: Loyalty Program Behaviour & Experience** – This section asks about your experience and habits when using loyalty programs at spas or salons.
- **Section B: Loyalty Points & Targeted Promotion Preferences** – This section focuses on your preferences for rewards, loyalty point tracking, and how you like to receive promotions or special offers.

There are no right or wrong answers — please answer based on your own experience and opinions. All responses will remain **confidential** and will only be used for academic purposes. If you have any questions about the survey, feel free to contact me at: **nanagudgurl2202@gmail.com**

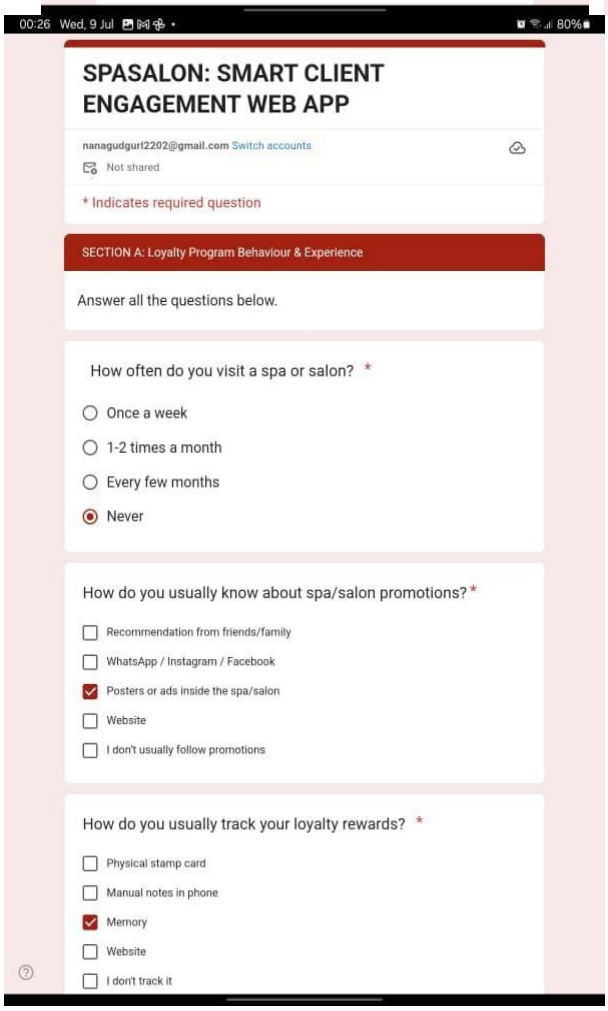
Thank you so much for your time and support. Your input is very valuable to the success of this research.

Sincerely yours,
Nursyazana

Age *
- 13-20
- 21-30
- 31-40
- 41-50
- Above 51

Gender *
- Male
- Female

Next Clear form



SPASALON: SMART CLIENT ENGAGEMENT WEB APP

nanagudgurl2202@gmail.com Switch accounts
Not shared

* Indicates required question

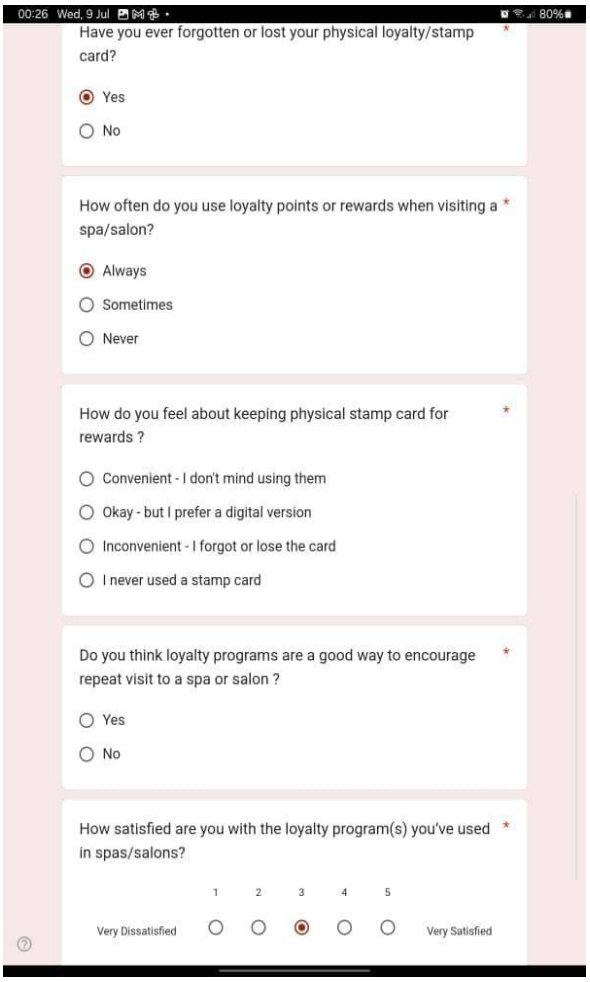
SECTION A: Loyalty Program Behaviour & Experience

Answer all the questions below.

How often do you visit a spa or salon? *
- Once a week
- 1-2 times a month
- Every few months
- Never

How do you usually know about spa/salon promotions? *
- [ ] Recommendation from friends/family
- [ ] WhatsApp / Instagram / Facebook
- [x] Posters or ads inside the spa/salon
- [ ] Website
- [ ] I don't usually follow promotions

How do you usually track your loyalty rewards? *
- [ ] Physical stamp card
- [ ] Manual notes in phone
- [x] Memory
- [ ] Website
- [ ] I don't track it



Have you ever forgotten or lost your physical loyalty/stamp card? *
- Yes
- No

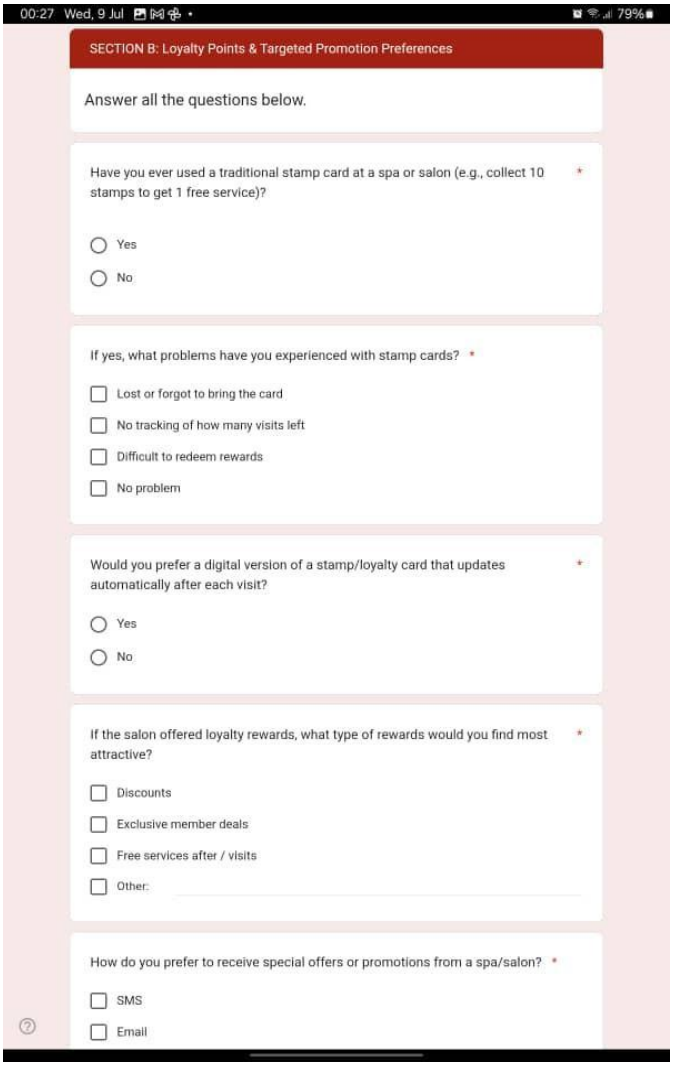
How often do you use loyalty points or rewards when visiting a spa/salon? *
- Always
- Sometimes
- Never

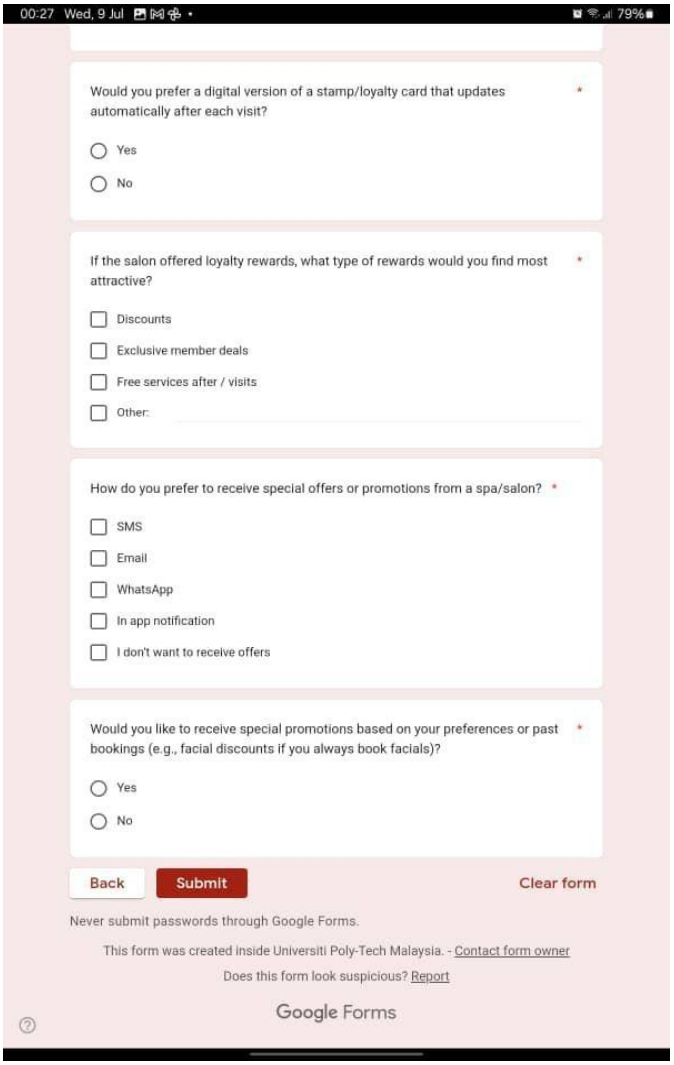
How do you feel about keeping physical stamp card for rewards ? *
- Convenient - I don't mind using them
- Okay - but I prefer a digital version
- Inconvenient - I forgot or lose the card
- I never used a stamp card

Do you think loyalty programs are a good way to encourage repeat visit to a spa or salon ? *
- Yes
- No

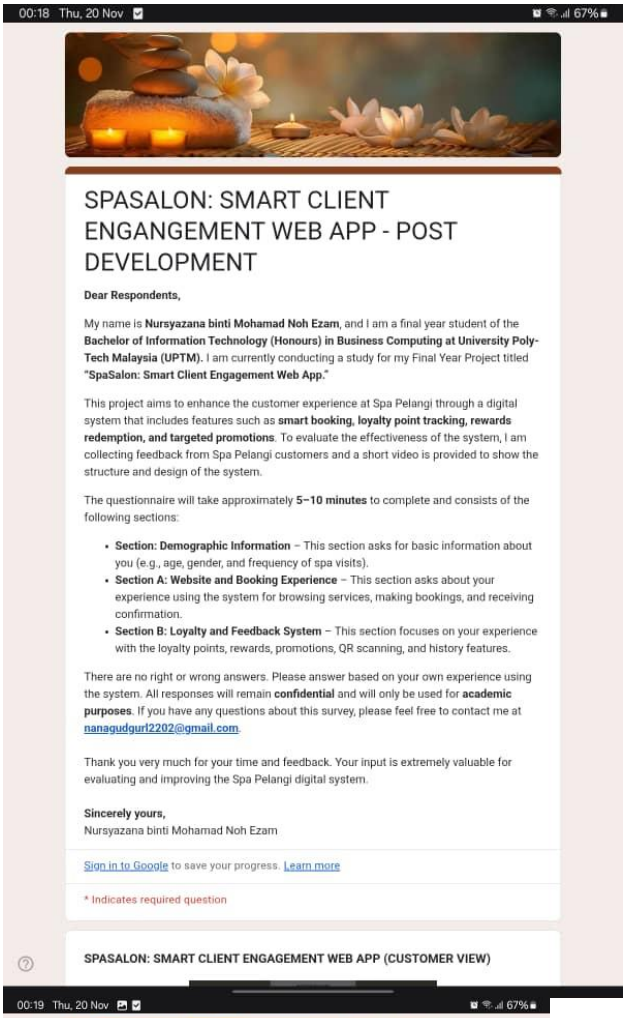
How satisfied are you with the loyalty program(s) you've used in spas/salons? *

	1	2	3	4	5	
Very Dissatisfied	○	○	◉	○	○	Very Satisfied


00:27 Wed, 9 Jul 79%
SECTION B: Loyalty Points & Targeted Promotion Preferences
Answer all the questions below.
Have you ever used a traditional stamp card at a spa or salon (e.g., collect 10 stamps to get 1 free service)? *
Yes
No
If yes, what problems have you experienced with stamp cards? *
Lost or forgot to bring the card
No tracking of how many visits left
Difficult to redeem rewards
No problem
Would you prefer a digital version of a stamp/loyalty card that updates automatically after each visit? *
Yes
No
If the salon offered loyalty rewards, what type of rewards would you find most attractive? *
Discounts
Exclusive member deals
Free services after / visits
Other:
How do you prefer to receive special offers or promotions from a spa/salon? *
SMS
Email


00:27 Wed, 9 Jul 79%
Would you prefer a digital version of a stamp/loyalty card that updates automatically after each visit? *
Yes
No
If the salon offered loyalty rewards, what type of rewards would you find most attractive? *
Discounts
Exclusive member deals
Free services after / visits
Other:
How do you prefer to receive special offers or promotions from a spa/salon? *
SMS
Email
WhatsApp
In app notification
I don't want to receive offers
Would you like to receive special promotions based on your preferences or past bookings (e.g., facial discounts if you always book facials)? *
Yes
No
Back
Submit
Clear form
Never submit passwords through Google Forms.
This form was created inside Universiti Poly-Tech Malaysia. - Contact form owner
Does this form look suspicious? Report
Google Forms

5. Questionnaire: Post-Development (Google Form)



SPASALON: SMART CLIENT ENGANGEMENT WEB APP - POST DEVELOPMENT

Dear Respondents,

My name is **Nursyazana binti Mohamad Noh Ezam**, and I am a final year student of the **Bachelor of Information Technology (Honours) in Business Computing at University Poly-Tech Malaysia (UPTM).** I am currently conducting a study for my Final Year Project titled **"SpaSalon: Smart Client Engagement Web App."**

This project aims to enhance the customer experience at Spa Pelangi through a digital system that includes features such as **smart booking, loyalty point tracking, rewards redemption, and targeted promotions**. To evaluate the effectiveness of the system, I am collecting feedback from Spa Pelangi customers and a short video is provided to show the structure and design of the system.

The questionnaire will take approximately **5–10 minutes** to complete and consists of the following sections:

- **Section: Demographic Information** – This section asks for basic information about you (e.g., age, gender, and frequency of spa visits).
- **Section A: Website and Booking Experience** – This section asks about your experience using the system for browsing services, making bookings, and receiving confirmation.
- **Section B: Loyalty and Feedback System** – This section focuses on your experience with the loyalty points, rewards, promotions, QR scanning, and history features.

There are no right or wrong answers. Please answer based on your own experience using the system. All responses will remain **confidential** and will only be used for **academic purposes**. If you have any questions about this survey, please feel free to contact me at nanagudgurl2202@gmail.com.

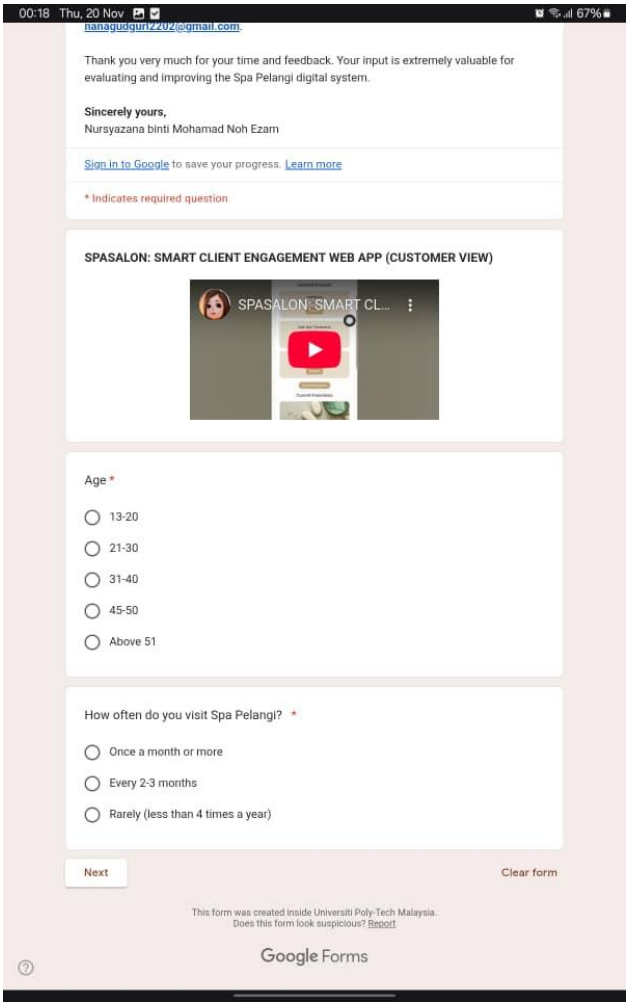
Thank you very much for your time and feedback. Your input is extremely valuable for evaluating and improving the Spa Pelangi digital system.

Sincerely yours,
Nursyazana binti Mohamad Noh Ezam

Sign in to Google to save your progress. Learn more

* Indicates required question

SPASALON: SMART CLIENT ENGAGEMENT WEB APP (CUSTOMER VIEW)



Thank you very much for your time and feedback. Your input is extremely valuable for evaluating and improving the Spa Pelangi digital system.

Sincerely yours,
Nursyazana binti Mohamad Noh Ezam

Sign in to Google to save your progress. Learn more

* Indicates required question

SPASALON: SMART CLIENT ENGAGEMENT WEB APP (CUSTOMER VIEW)

SPASALON: SMART CL...

Age *

- 13-20
- 21-30
- 31-40
- 45-50
- Above 51

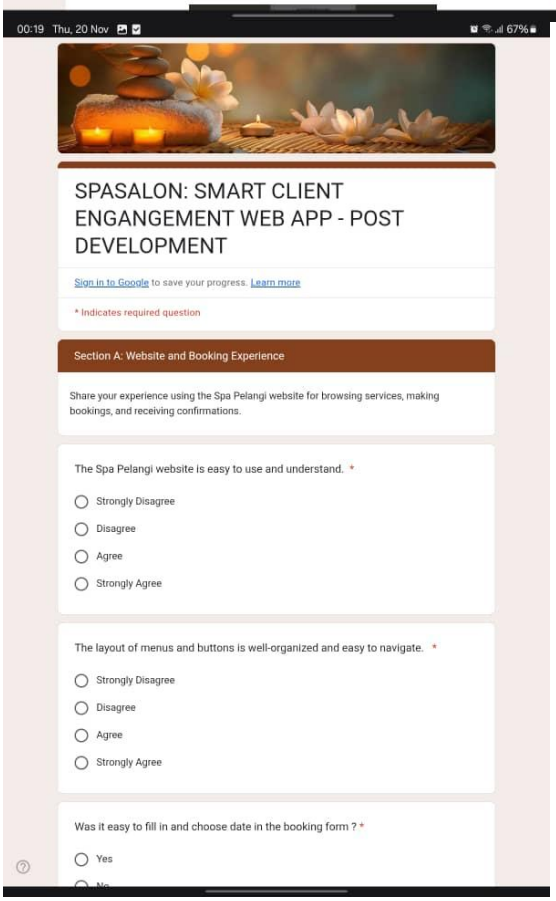
How often do you visit Spa Pelangi? *

- Once a month or more
- Every 2-3 months
- Rarely (less than 4 times a year)

Next Clear form

This form was created inside Universiti Poly-Tech Malaysia.
Does this form look suspicious? Report

Google Forms



SPASALON: SMART CLIENT ENGANGEMENT WEB APP - POST DEVELOPMENT

Sign in to Google to save your progress. Learn more

* Indicates required question

Section A: Website and Booking Experience

Share your experience using the Spa Pelangi website for browsing services, making bookings, and receiving confirmations.

The Spa Pelangi website is easy to use and understand. *

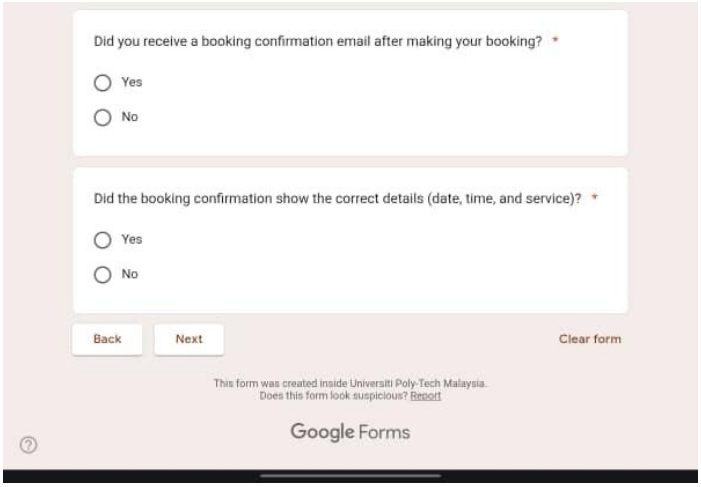
- Strongly Disagree
- Disagree
- Agree
- Strongly Agree

The layout of menus and buttons is well-organized and easy to navigate. *

- Strongly Disagree
- Disagree
- Agree
- Strongly Agree

Was it easy to fill in and choose date in the booking form ? *

- Yes
- No



Did you receive a booking confirmation email after making your booking? *

- Yes
- No

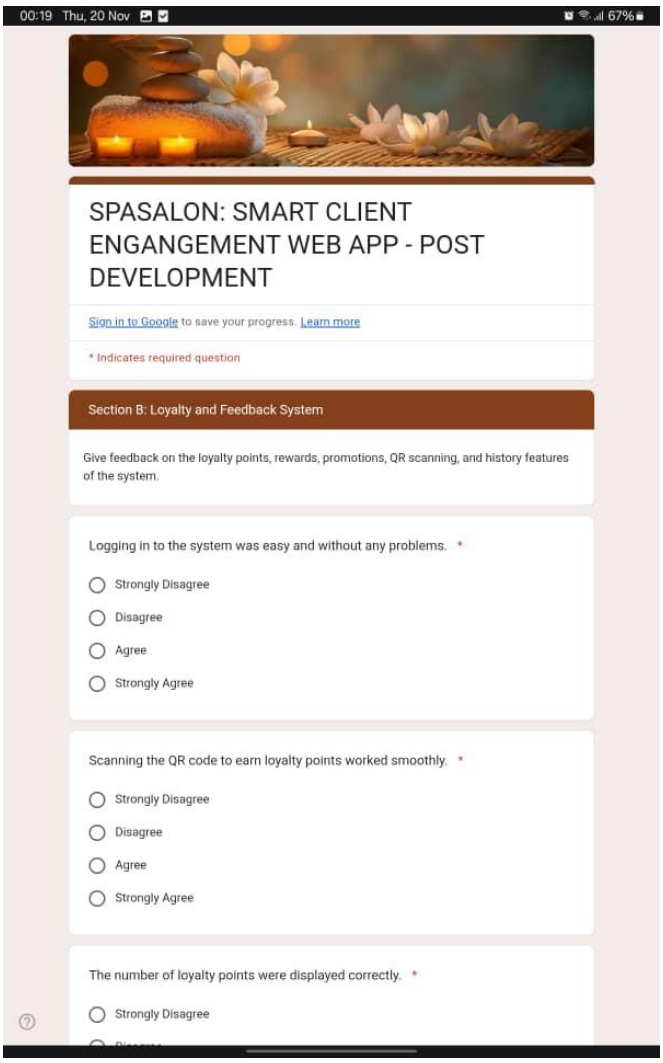
Did the booking confirmation show the correct details (date, time, and service)? *

- Yes
- No

Back Next Clear form

This form was created inside Universiti Poly-Tech Malaysia.
Does this form look suspicious? Report

Google Forms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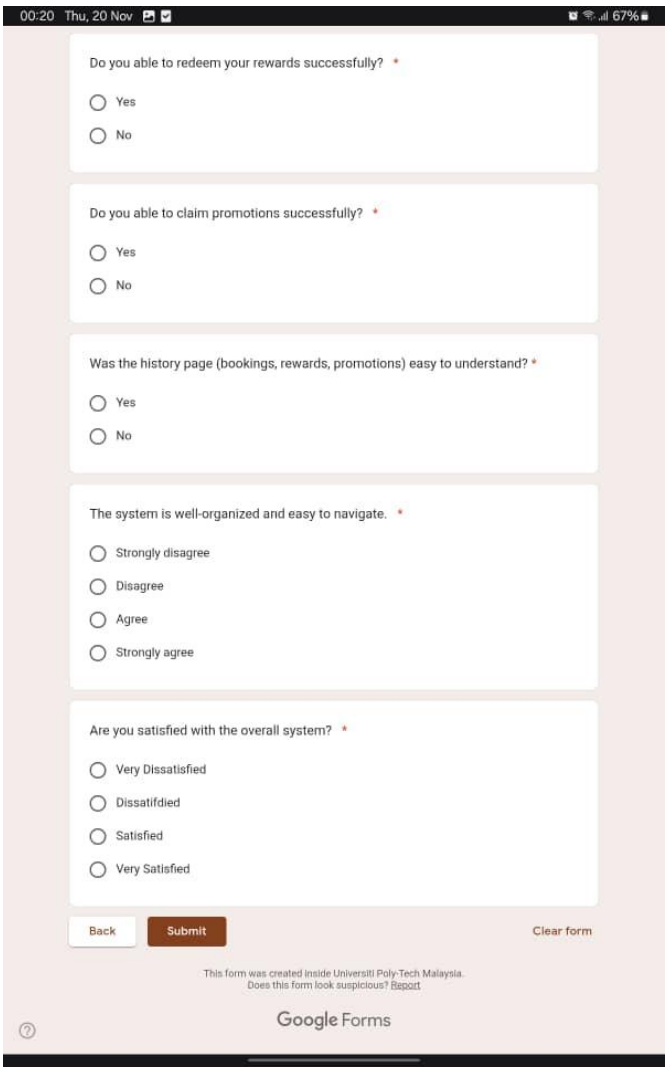
67%
SPASALON: SMART CLIENT ENGANGEMENT WEB APP - POST DEVELOPMENT
Sign in to Google to save your progress. Learn more
* Indicates required question
Section B: Loyalty and Feedback System
Give feedback on the loyalty points, rewards, promotions, QR scanning, and history features of the system.
Logging in to the system was easy and without any problems. *
Strongly Disagree
Disagree
Agree
Strongly Agree
Scanning the QR code to earn loyalty points worked smoothly. *
Strongly Disagree
Disagree
Agree
Strongly Agree
The number of loyalty points were displayed correctly. *
Strongly Disagree


00:20 Thu, 20 Nov
67%
Do you able to redeem your rewards successfully? *
Yes
No
Do you able to claim promotions successfully? *
Yes
No
Was the history page (bookings, rewards, promotions) easy to understand? *
Yes
No
The system is well-organized and easy to navigate. *
Strongly disagree
Disagree
Agree
Strongly agree
Are you satisfied with the overall system? *
Very Dissatisfied
Dissatifdied
Satisfied
Very Satisfied
Back
Submit
Clear form
This form was created inside Universiti Poly-Tech Malaysia.
Does this form look suspicious? Report
Google Forms

UPTM

User Acceptance Testing (UAT) Form

Project Title: SPASALON: SMART CLIENT ENGAGEMENT WEB APP

Developed by: NURSYAZANA BINTI MOHAMAD NOH EZAM (AM2311015216)

Client's Name: NORHAPIZAH BINTI ABIDIN

Purpose: **The purpose of this UAT is to verify that the system meets the client's requirements, functions properly, and is easy to use. Feedback from this session will help ensure the system is ready for real implementation and further improvement.**

Section A: Main Website (Customer View)

Is the website convenient and easy for users to navigate?
YES

Section B: Loyalty & Feedback Features (Customer View)

Is the loyalty interface easy to use and well-organized?
YES

Does the QR scan feature and the feedback form working smoothly for collecting points?
YES

Is the process of redeeming rewards or claiming promotions efficient and easy to understand?
YES

Section C: Backend (Admin/Staff View)

Are the charts and data in the dashboard clear and easy to understand?
YES.

Is generating or managing QR codes straightforward for staff use?
YES

Is it easy to manage customers details, rewards, and promotions?
YES

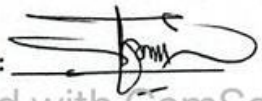
Section D: Overall System Evaluation

Did you face any errors or confusing parts while using the system?
No

What improvements or additional features would you recommend?
INCLUDE THE INITIAL DEPOSIT PAYMENT FOR BOOKING.

I confirm that I have tested the system and that it meets the agreed functional and business requirements.

☑ Yes ☐ No

Client's Signature: 

Date: 2/11/2025

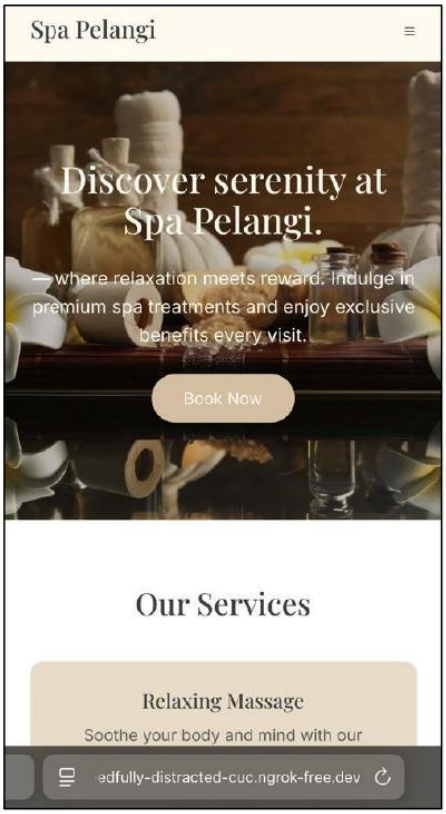
Appendix B – User Manual

USER MANUAL

SPA PELANGI | SPASALON: SMART CLIENT ENGAGEMENT WEB APP

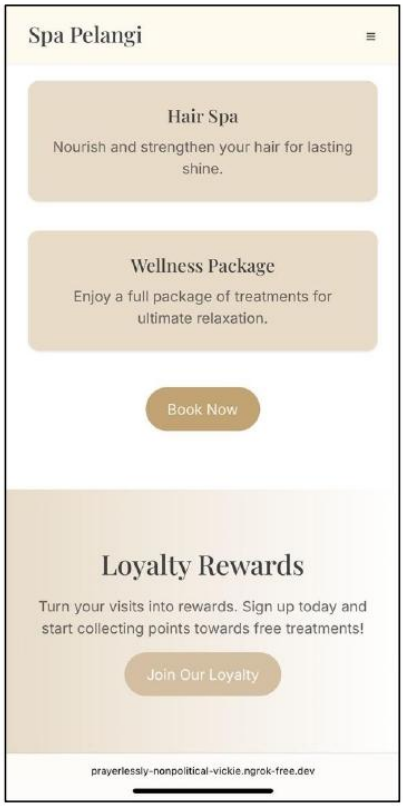
NURSYAZANA BINTI MOHAMAD NOH EZAM
BIT (HONOURS) IN BUSINESS COMPUTING
FACULTY OF COMPUTING AND MULTIMEDIA
UNIVERSITY POLY-TECH MALAYSIA
17 NOVEMBER 2025

Customer View



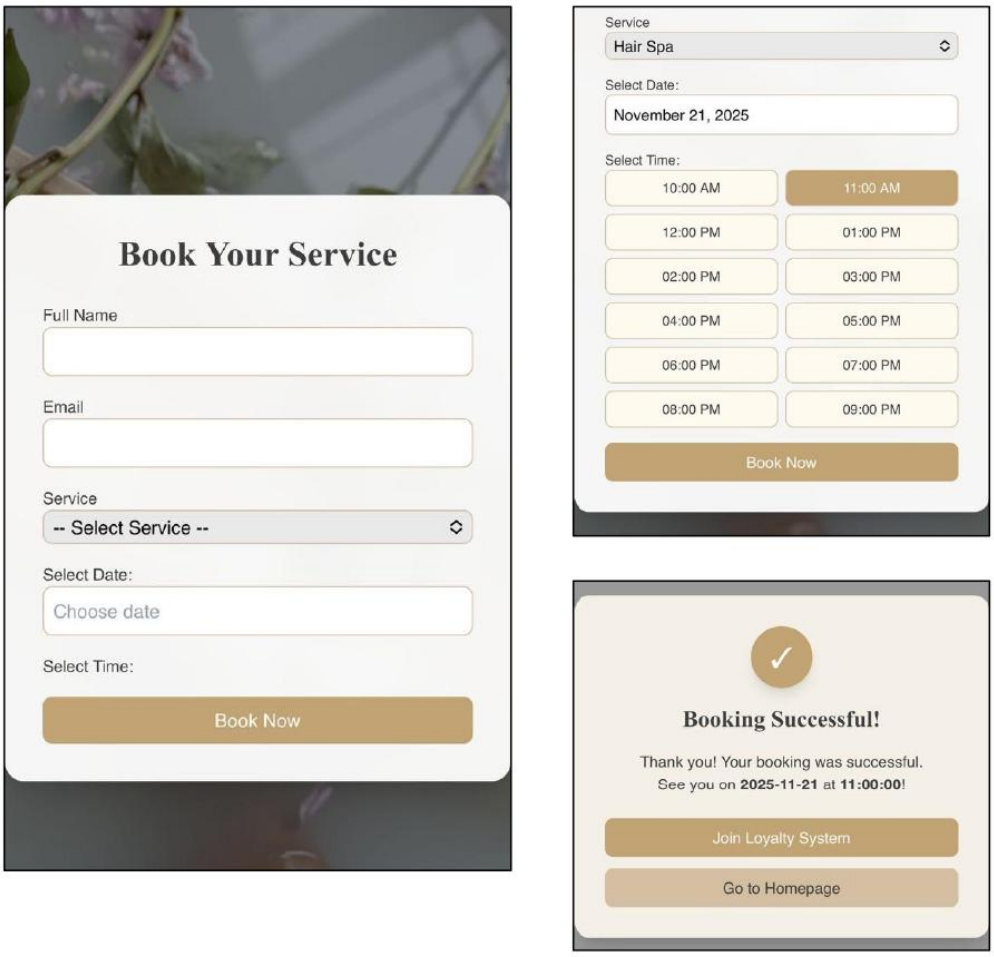
Home Page Overview

1. This is the Spa Pelangi website, divided into several sections for easy navigation.
2. Upon opening the website, the **Welcoming Page** is displayed to confirm the user is on the correct spa website.
3. To navigate through different sections of the website, click the **hamburger menu** located at the top-right corner of the page.
4. To book a service, click the **Book Now** button displayed on the page.



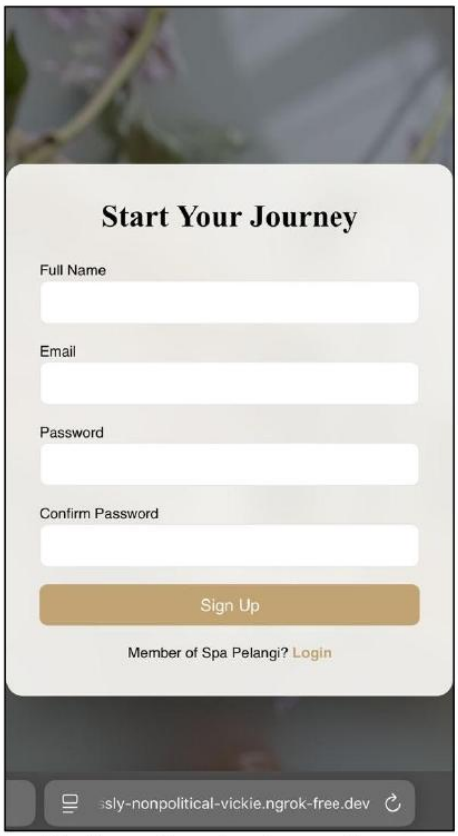
Scrolling and Loyalty Registration

1. Scroll down the page to view additional **Book Now** buttons for booking services.
2. To register a new loyalty account, click the **Join Our Loyalty** button.
3. Follow the on-screen instructions to complete the loyalty program registration process.



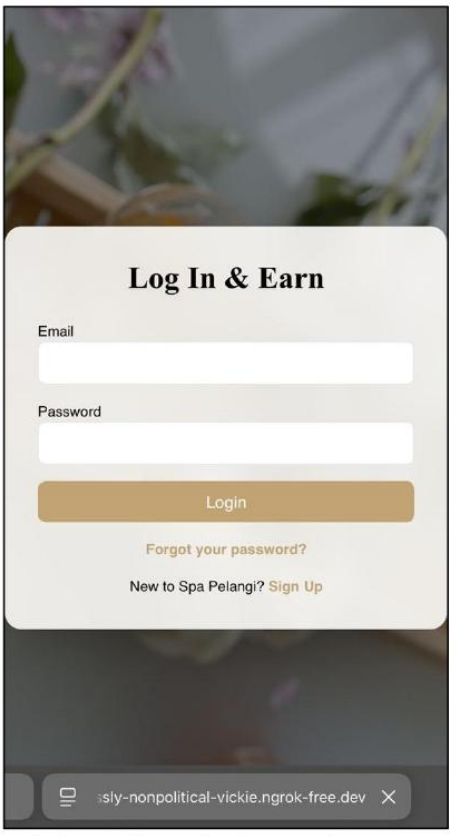
Booking Form

1. Enter your **full name** and **email address**.
2. Select the desired **service** from the list.
3. Choose an **available date** and **time** for the booking.
4. Click the **Book Now** button to submit your service booking.
5. A **Booking Successful** notification will appear on the screen, indicating that the booking has been sent to Spa Pelangi.
6. To join the loyalty system, click the **Join Loyalty System** button.
7. If you only want to book a service without joining the loyalty program, click the **Go to Homepage** button.



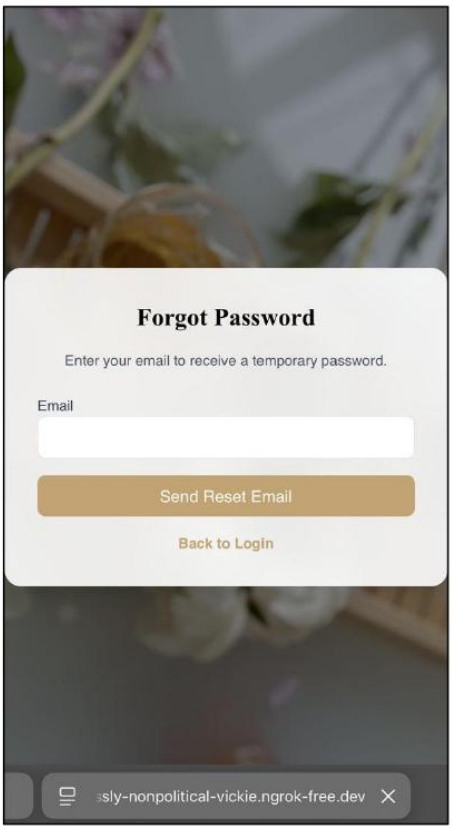
Sign Up Form (Loyalty System)

1. Enter your **full name** and **email address**.
2. Create a **new password** and confirm it in the **Confirm Password** field.
3. Click the **Sign Up** button to register for the loyalty system.
4. A **Sign Up Successful** notification will appear on the screen, confirming your registration.



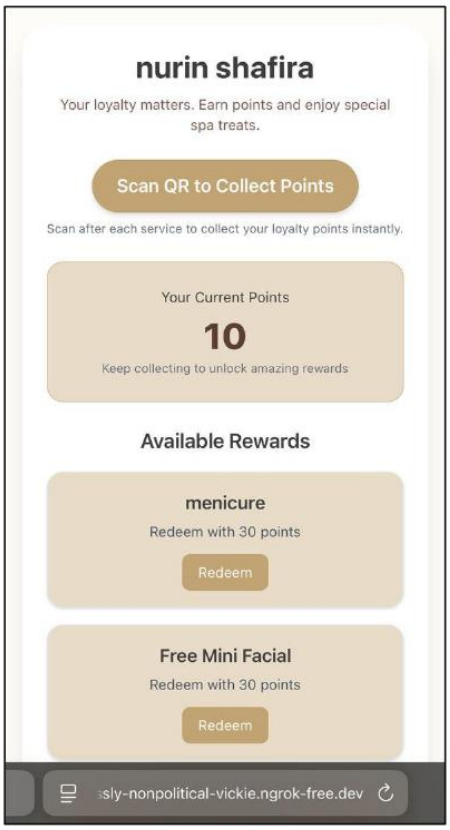
Log In Form (Loyalty System)

1. Enter the **registered email address**.
2. Enter the **correct password** associated with the account.
3. Click the **Log In** button to access your loyalty account.
4. If you forget your password, click the **Forgot Password** link to reset it.



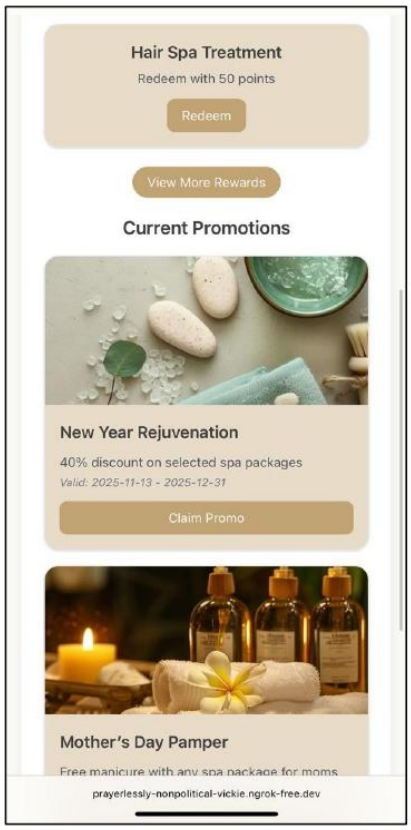
Forgot Password Page (Loyalty System)

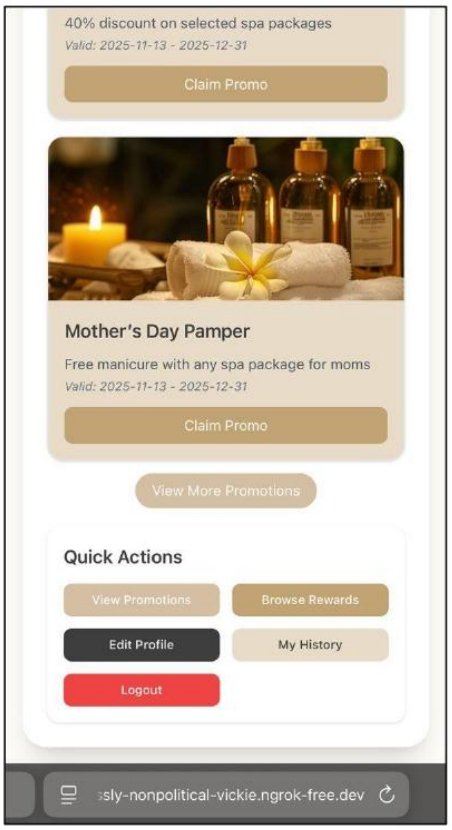
1. Enter the **registered email address**.
2. A notification will appear, confirming that a password reset email has been sent.
3. Wait for the email notification.
4. Open the email, which contains the **new password**.
5. Use the new password to log in to your loyalty account.



Main Loyalty Page

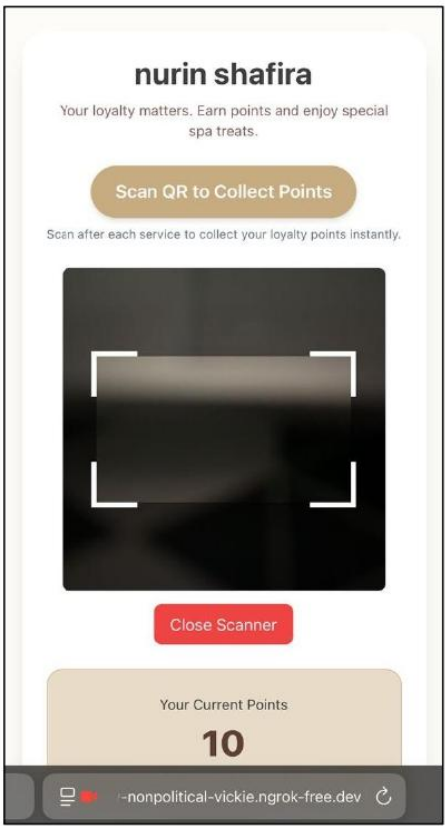
1. The **user's name** will be displayed at the top of the page once logged in.
2. Each new user automatically receives **10 points** in the loyalty system.
3. Click the **Scan QR** button to earn points from Spa Pelangi.
4. The **Top 3 Rewards** are listed; click the **Redeem** button to claim a reward. The corresponding points will be deducted from your balance.
5. Click the **View More Rewards** button to see additional available rewards.

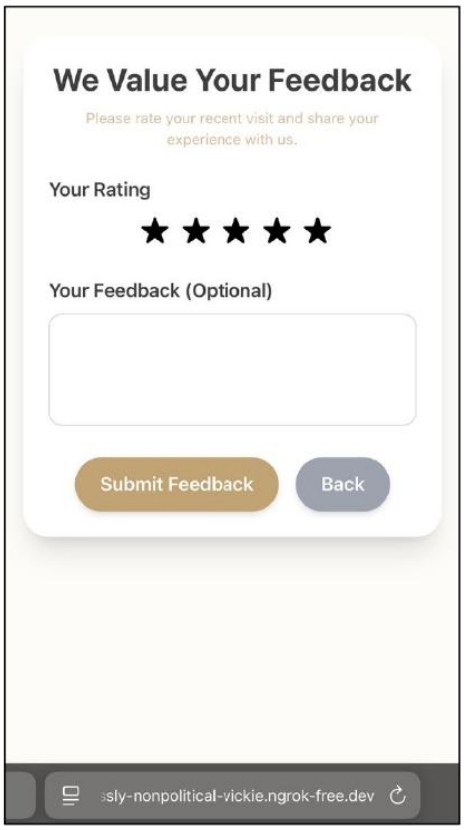




Main Loyalty Page (continued)

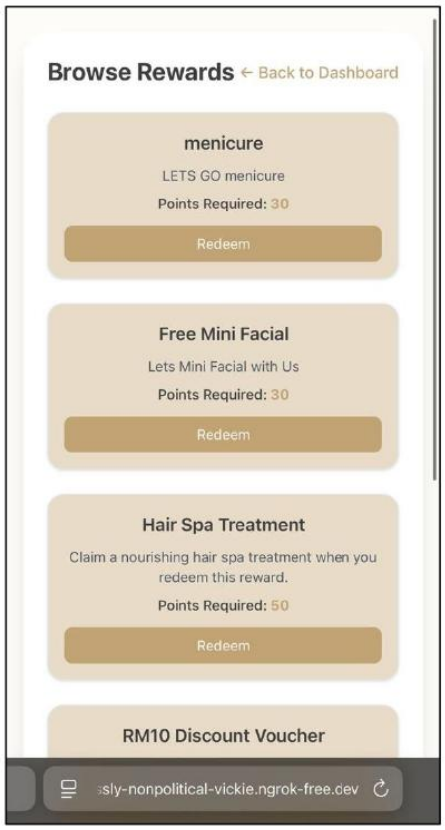
1. The **Top 2 Promotions** are displayed; click the **Claim Promotion** button to redeem a promotion.
2. Click the **View More Promotions** button to explore more available promotions.
3. Under **Quick Actions**, click **My History** to view your booking history, redeemed rewards, and claimed promotions.
4. Click the **Logout** button to exit the loyalty system.

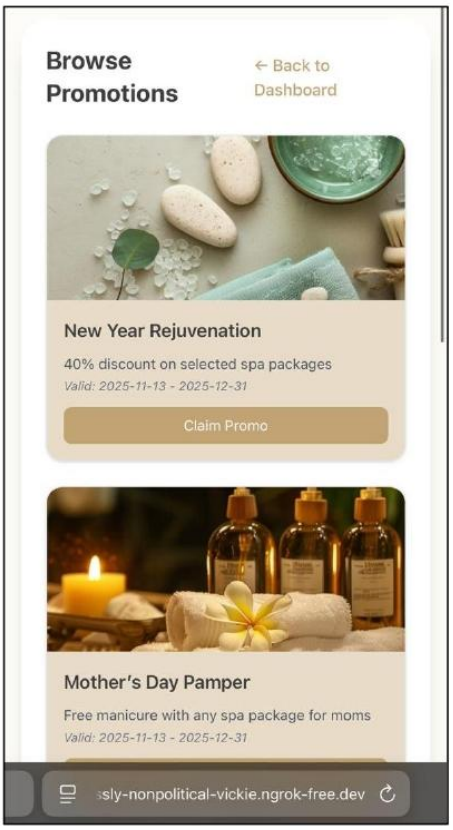




Submit Feedback (QR Section)

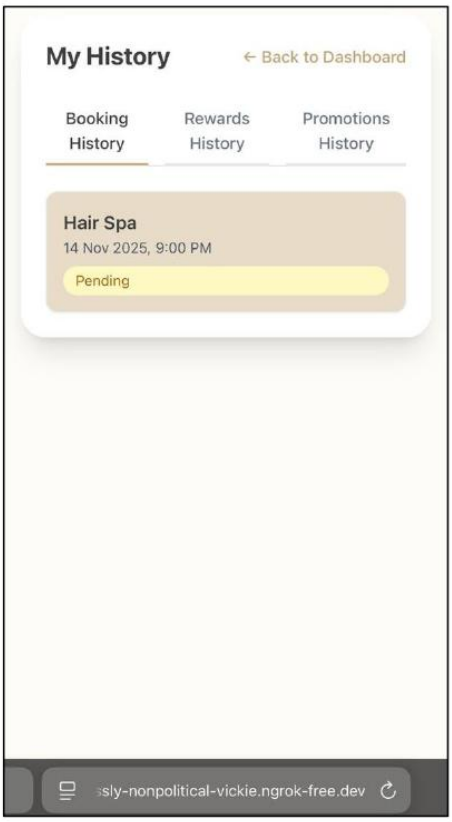
1. Click the **Scan QR** button; the camera interface will appear (ensure camera access is always allowed).
2. Scan the QR code provided by Spa Pelangi.
3. After a successful scan, fill in your **rating** and **feedback**.
4. Click the **Submit Feedback** button to earn points.
5. A small notification, **"Thank you for your feedback"**, will appear, confirming that points have been added to your account.

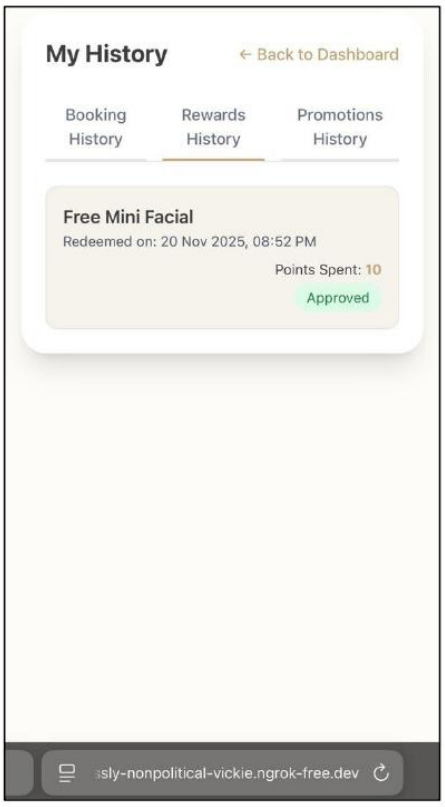




List Rewards and Promotions

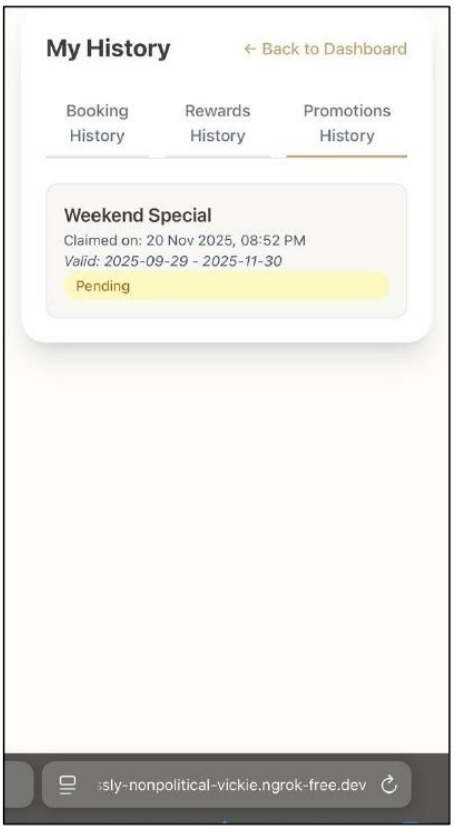
1. To browse rewards, click the **View More Rewards** button.
2. Click the **Redeem** button to claim a reward. The corresponding points will be deducted from your balance.
3. To browse promotions, click the **View More Promotions** button.
4. Click the **Claim Promo** button to redeem the promotion.





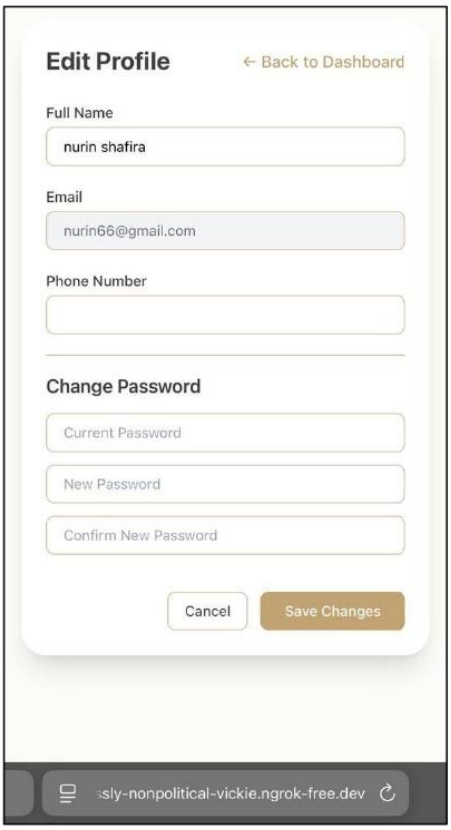
History Page

1. All services that have been **booked**, rewards that have been **redeemed**, and promotions that have been **claimed** will be displayed on this page.
2. Click the **Booking History** tab to view details of all bookings.
    - **Status Pending** indicates that Spa Pelangi has not yet confirmed the booking (status updates are managed by the spa admin).
3. Click the **Rewards History** tab to view details of all redeemed rewards.
    - **Status Approved** indicates that the admin has approved the reward redemption (status updates are managed by the spa admin).
4. Click the **Back to Dashboard** button to return to the main loyalty page.



History Page (continued)

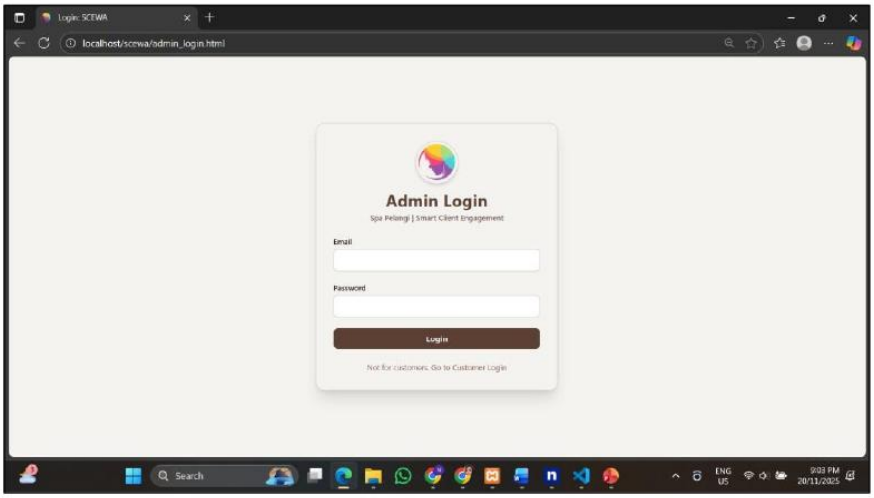
1. Click the **Promotions History** tab to view details of all claimed promotions.
    - **Status Pending** indicates that the admin has not yet approved the promotion claim (status updates are managed by the spa admin).
2. Click the **Back to Dashboard** button to return to the main loyalty page.



Edit Profile Page

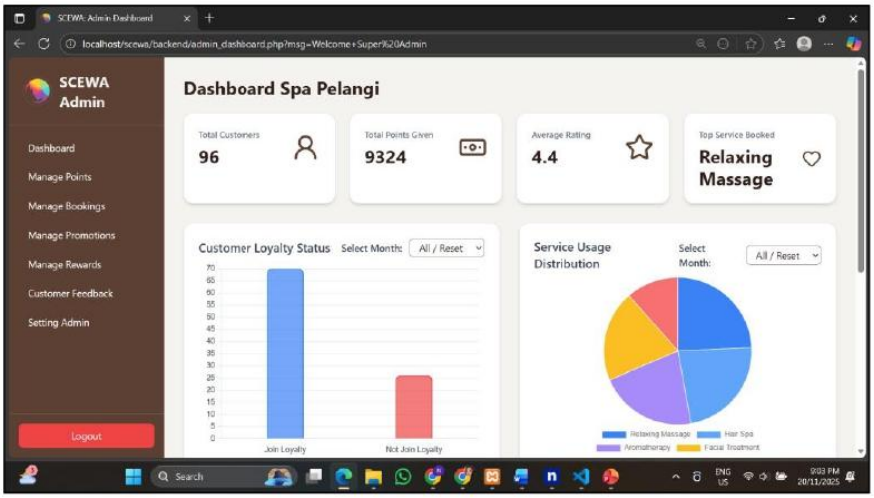
1. Edit your **name** or **phone number** if necessary.
2. To change your password, enter your **current password** and create a **new password**.
3. Click the **Save Changes** button to save your profile details.
4. Click the **Back to Dashboard** button to return to the main loyalty page.

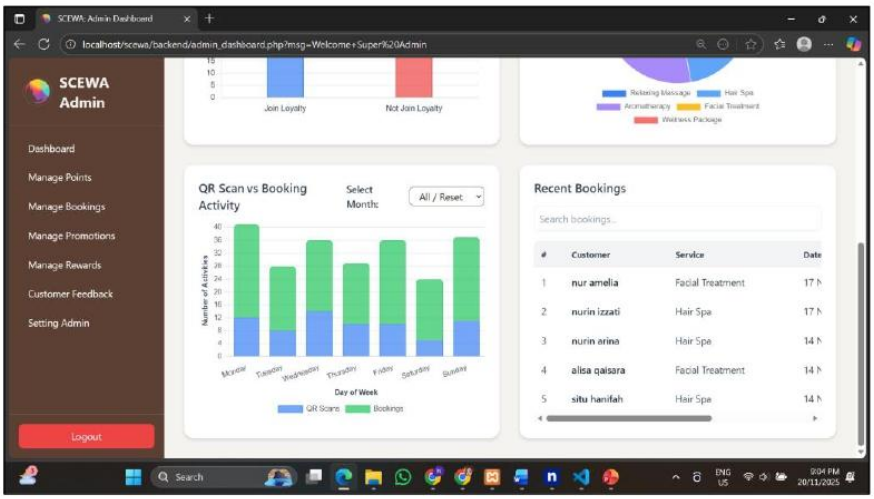
Admin View



Admin Login Page

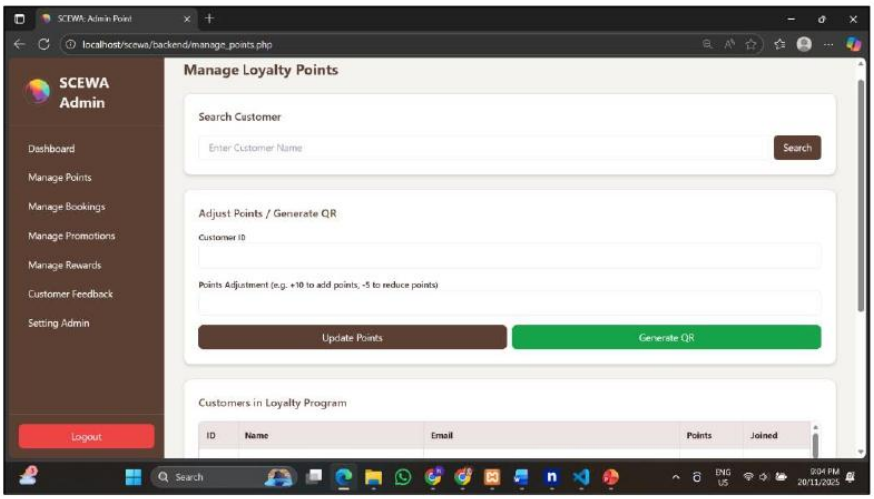
1. Enter the **registered admin email** and **correct password** in the login form.
2. Click the **Login** button to access the Spa Pelangi Administration System.





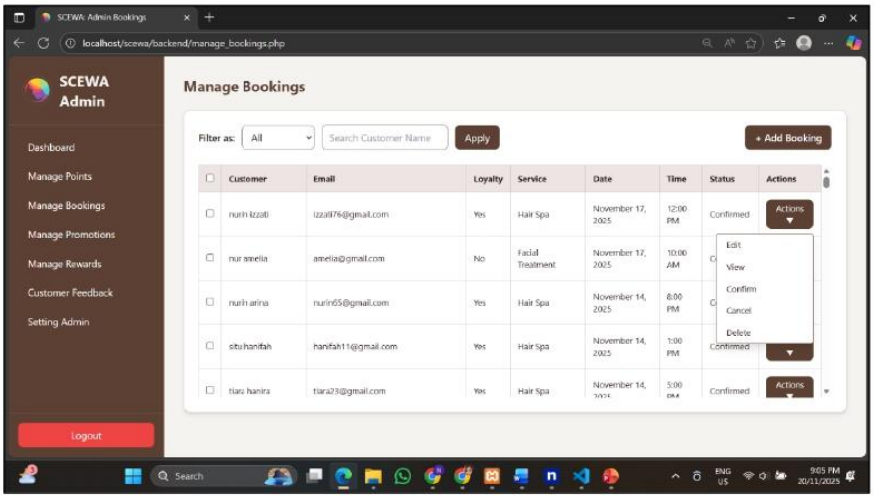
Dashboard Overview

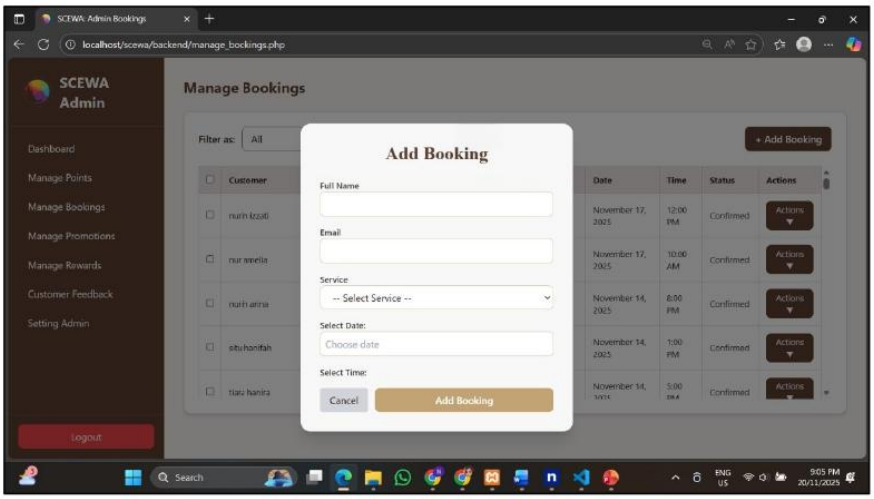
1. The top section displays **four summary cards**:
    - **Total Customers**
    - **Total Points Issued**
    - **Average Spa Rating**
    - **Top Service**
2. Three interactive graphs are available on the dashboard:
    - **Customer Loyalty Status**
    - **Service Usage Distribution**
    - **QR Scan vs Booking**
3. Click the **dropdown button** and select a month to filter the dashboard data for the selected month.
4. Hover your mouse over any coloured section in each graph to view detailed values.
5. Use the **Enable/Disable** toggle buttons under the graph legend (List of Services, QR Scan, Bookings) to show or hide specific data.
6. The dashboard includes one interactive table:
    - Click **Search Bookings** and enter the customer's name to view their booking information.



Manage Points

1. **Section 1: Search Customer Name**
    - Enter the **customer name** to retrieve their **ID**, **name**, **email**, and **current points**.
2. **Section 2: Adjust Points / Generate QR**
    - Enter the **customer ID** that was retrieved from the search.
    - Enter the number of **points to add or deduct**.
    - Click the **Generate QR** button to display a QR code (the customer will scan this to receive points).
    - Click **Update Points** to manually add or deduct points without using the QR code.
3. **Section 3: List of Customers**
    - Displays all customers who have joined the loyalty system.





Manage Bookings

1. All customer service bookings are listed on this page.
2. Click the **Actions dropdown** for each booking to perform the following:
    - **Edit** – Update customer booking details
    - **View** – View full customer details
    - **Confirm** – Approve the booking
    - **Cancel** – Cancel the booking
    - **Delete** – Remove the booking record
3. Use the **Pending, Confirmed, or Cancelled** dropdown filter to view bookings by status.
4. Use the search bar to search for a specific customer by name.
5. Click the **Add Booking** button to create a new booking for a customer.

6. Fill in the booking form with the following details:

   Full Name

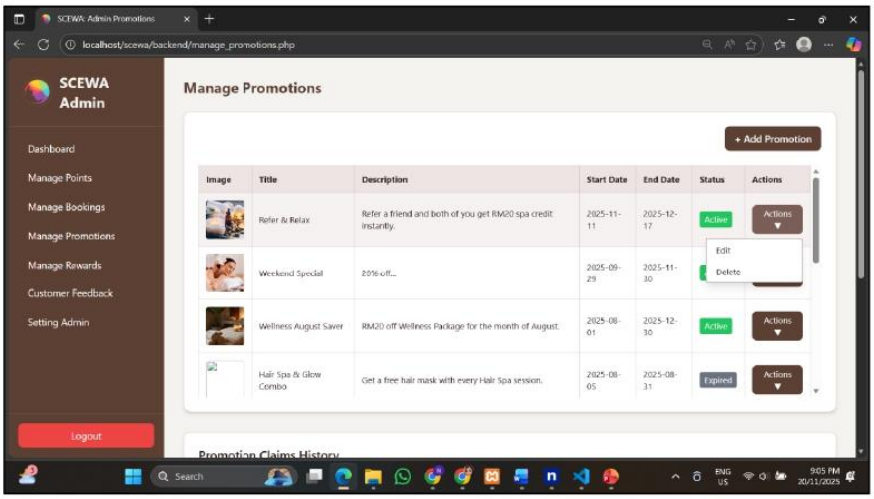
   Email Address

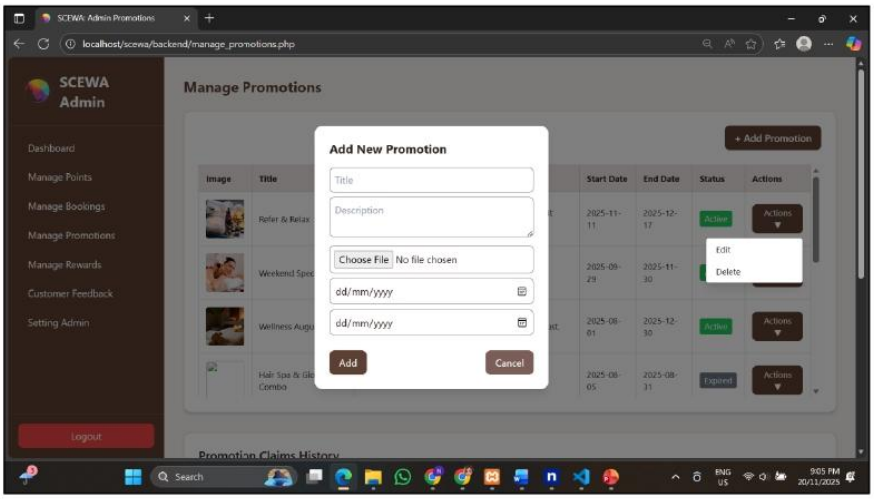
   Selected Service

   Available Date

   Available Time

7. After completing the form, click **Submit** to add the new booking to the system.
8. The newly added booking will appear in the booking list and can be managed through the **Actions** dropdown.

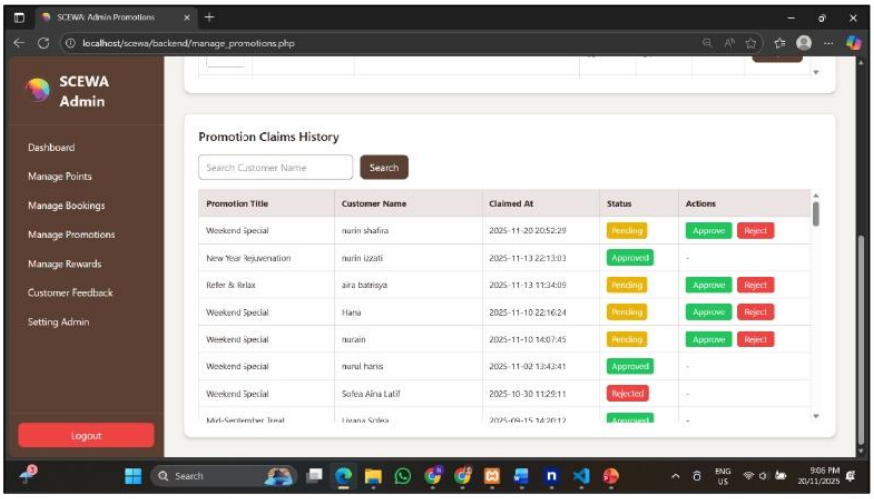




Manage Promotions

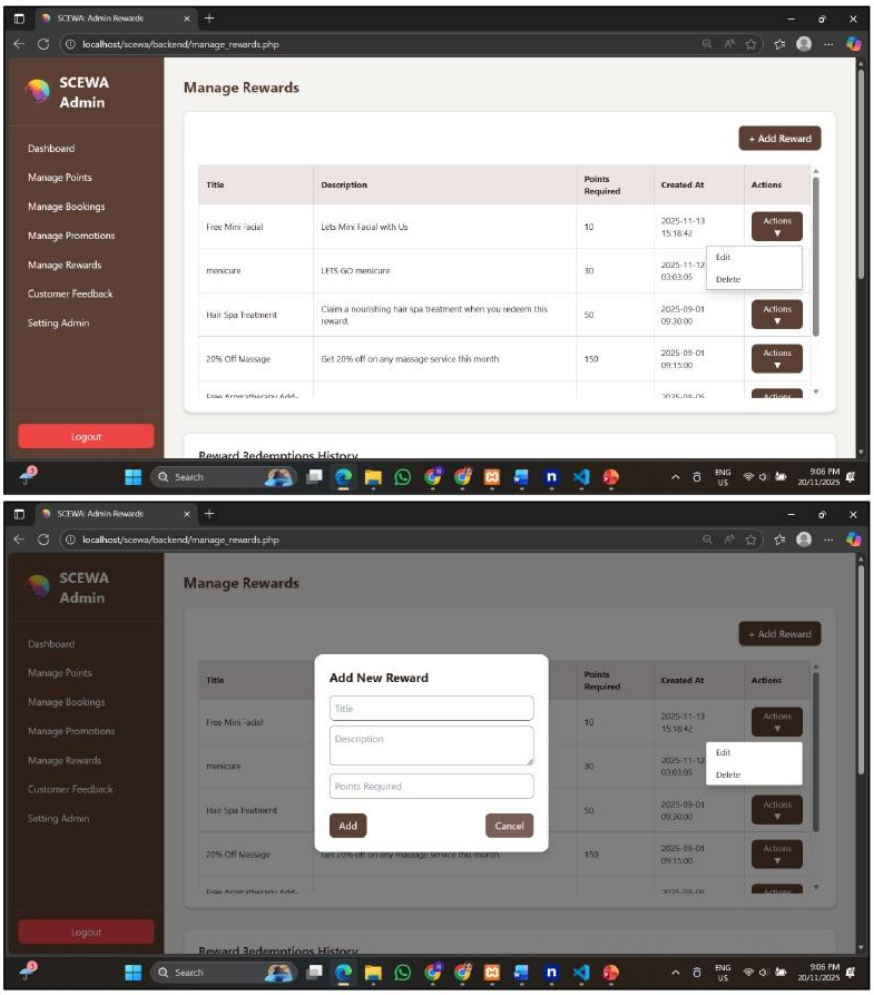
1. All available promotions are listed on this page.

2. Click the **Actions** dropdown for each promotion to:
    - **Edit** – Update promotion details
    - **Delete** – Remove the promotion from the system
3. Click the **Add Promotion** button to create a new promotion.
4. Fill in the **New Promotion Form**:
    - **Title**
    - **Description**
    - **Upload Image**
    - **Start Date** and **End Date** for promotion availability
5. Promotions with **Active status** will appear in the customer loyalty system.
6. Promotions with **Expired status** will automatically be hidden from the loyalty system.



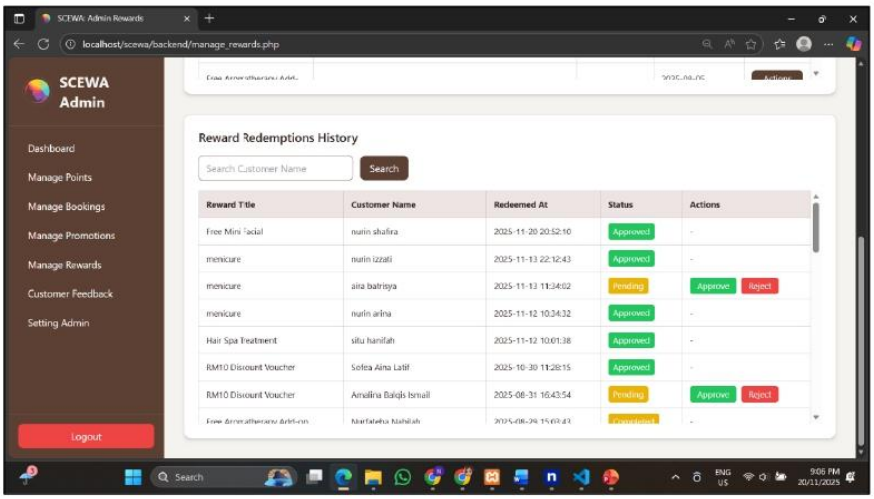
List of Customer Promotion Claims

1. Use the **Search Customer Name** bar to locate a customer's claim.
2. Click **Approve** or **Reject** for promotions that customers have claimed.
3. The status will automatically update in the customer's loyalty account.



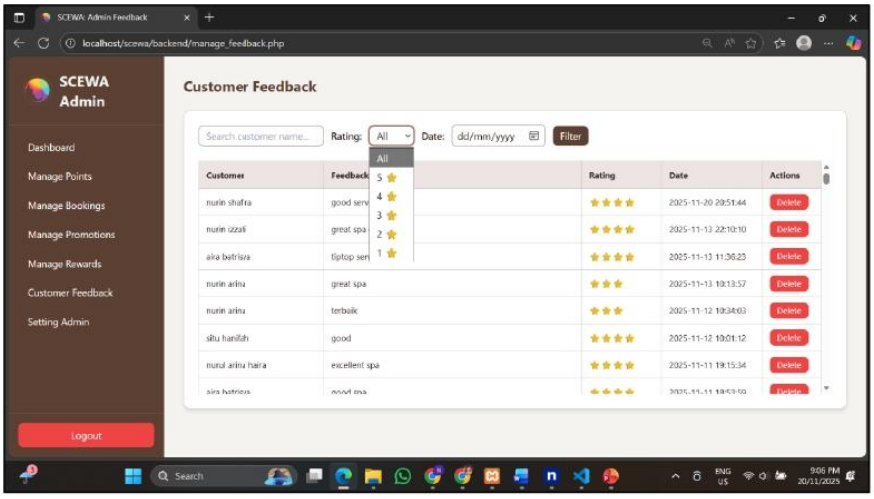
Manage Rewards

1. All available rewards are listed on this page.
2. Click the **Actions** dropdown for each reward to:
    - **Edit** – Update reward details
    - **Delete** – Remove the reward
3. Click the **Add Reward** button to create a new reward.
4. Fill in the **New Reward Form**:
    - **Title**
    - **Description**
    - **Points Required** to redeem the reward



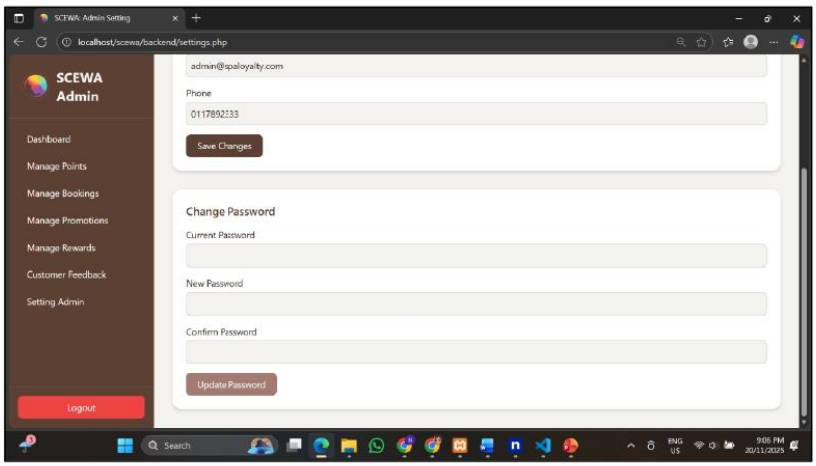
List of Customer Reward Redemptions

1. Use the **Search Customer Name** bar to find customers who have redeemed rewards.
2. Click **Approve** or **Reject** for each redemption request.
3. The redemption status will be updated in the customer's loyalty account.



Customer Feedback Page

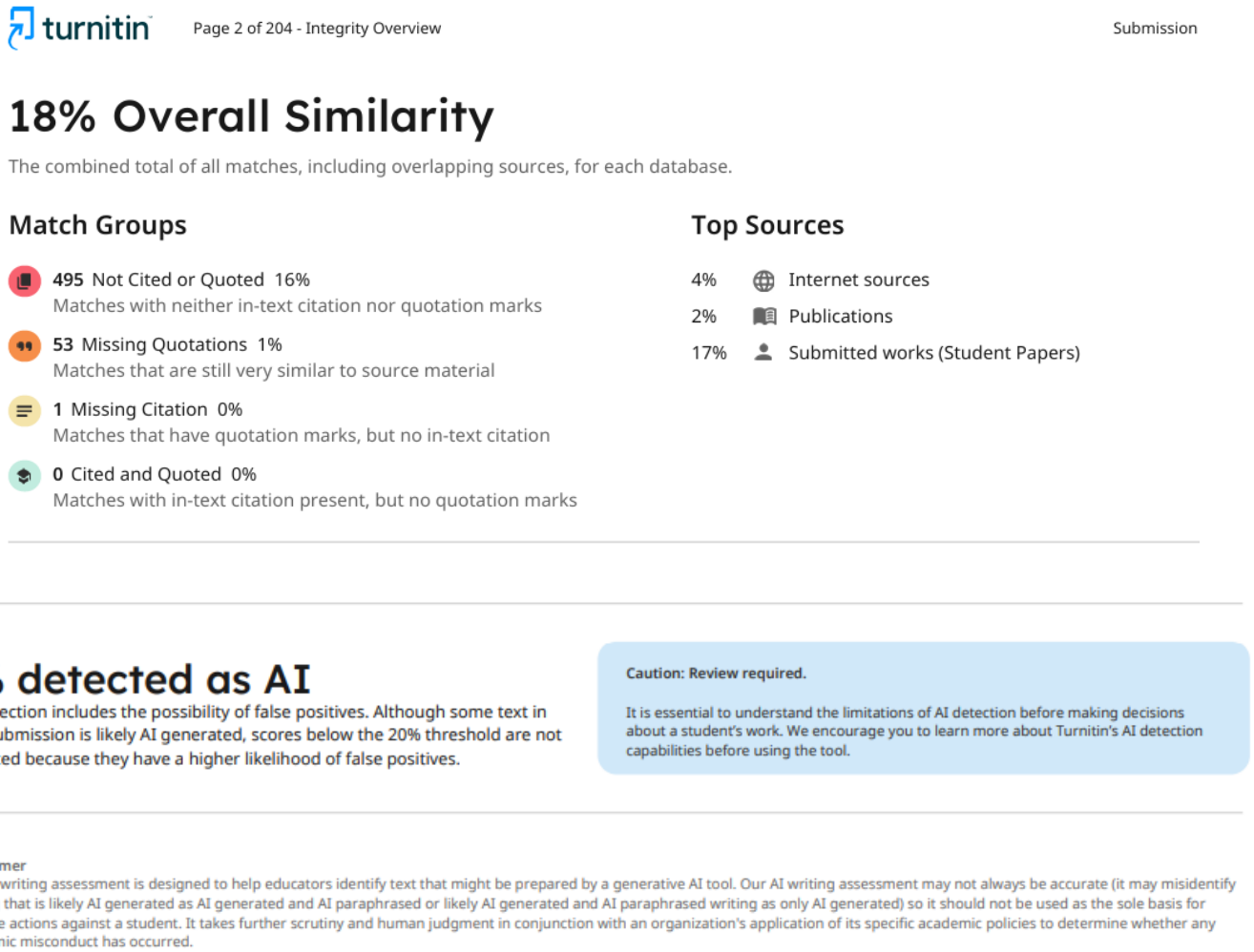
1. Search for the customer's name using the **Search bar**.
2. Use the **Rating Filter dropdown** to view feedback based on specific ratings.
3. Select a **Date**, then click the **Filter** button to filter feedback records.
4. Click the **Delete** button to remove specific customer feedback from the system.



Admin Settings Page

1. Update **name**, **email**, and **phone number** if necessary.
2. Click **Save Changes** to update the admin profile details.
3. To change the password, enter a **new password**, then click **Update Password** to save the changes.

Appendix C – Turnitin and AI Result



turnitin Page 2 of 204 - Integrity Overview Submission

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Matches that have quotation marks, but no in-text citation

0 Cited and Quoted 0%
Matches with in-text citation present, but no quotation marks

Top Sources

4% Internet sources
2% Publications
17% Submitted works (Student Papers)

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Appendix D – Log Book

CT203/BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN BUSINESS COMPUTING

FACULTY OF COMPUTING & MULTIMEDIA (FCOM)

BUSINESS COMPUTING PROJECT

(FYP4105)

LOG BOOK

STUDENT'S NAME : NURSYAZANA BINTI MOHAMAD NOH EZAM

ID NO. : AM2311015216

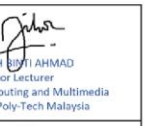
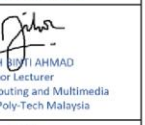
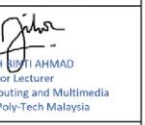
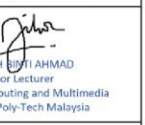
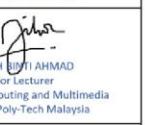
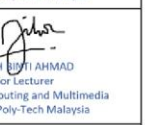
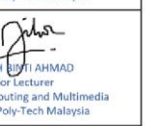
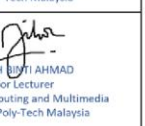
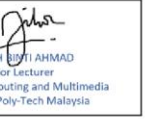
SUPERVISOR : PUAN JIHADAH BINTI AHMAD

PROJECT TITLE : SPASALON: SMART CLIENT ENGAGEMENT WEB APP

CT203/BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN BUSINESS COMPUTING

Date/ Week		Agenda	Next Agenda	Signature (Supervisor / Coordinator)
19/5/2025	1	Find potential Supervisors	Finalize topic and title with SV	
26/5/2025	2	Discuss the topic and title with SV	Draft problem statement and project objective	
2/6/2025	3	Set date and time to consult proposal with SV	Start write proposal	
9/6/2025	4	Discuss proposal with SV in Google Meet Submit Proposal	Start write Chapter 1 and 2	
16/6/2025	5	Discuss questionnaire with SV	Prepare and distribute questionnaire form Prepare interview questions	
23/6/2025	6	Interview with client	Analyze feedback and write Chapter 3 and 4 Prepare slide presentation	
2/7/2025	7	Presentation FYP 1	Continue write Chapter 5 Submit final report and slide	
4/8/2025	**8**	**Get feedback from SV about report FYP 1**	Start with divide the modules for the system.	
11/8/2025	**9**	**Start designing the wireframes**	Connect to database and start developing	
18/8/2025	**10**	**Update starting coding system with sign up and login system to SV**	Continue developing qr function in customer and admin part	
25/8/2025	**11**	**Start developing for promotions and rewards features in customer part**	Continue with create functions in manage promotions for admin part	

CT203/BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN BUSINESS COMPUTING

1/9/2025	**12**	**Develop the same functions in manage rewards for admin part**	check that all function CRUD and qr function in admin part are work smoothly	
9/9/2025	**13**	**Update on implementation system**	Add features for feedback page in admin part	
22/9/2025	**14**	**Add setting page in admin part to make the system are fully complete**	Preparing the dummies data for making an interactive dashboard	
29/9/2025	**15**	**Create a dashboard start with 3 interactive graphs in part admin**	Continue with add cards and another interactive table in dashboard page	
7/10/2025	**16**	**Update last progress before proceed client and final present**	Continue write report chapter 6	
13/10/2025	**17**	**prepare screenshots to attach in report**	Continue write report chapter 7	
20/10/2025	**18**	**Fix all the errors and certain bugs**	Check again make sure system fully functioning and work smoothly without any bugs	
29/10/2025	**19**	**Show the whole of the system to SV before final present with examiner**	Prepare the questions for interview and questionnaire google form for customer	
5/11/2025	**20**	**Present to client with fully function system to get UAT testing on 2/11/2025.** **Show slide presentation with SV through Google Meet**	Write report chapter 8 from UAT answer with client Adjust and finalize slide and poster for final presentation	
12/11/2025	**21**	**Final presentation with examiner with demonstration of the system**	Submit full final report, slides and poster	

References

Akhilesh Ghritlahare. (2025). The Role of Flowcharts in Problem Solving and Process Visualization. *ResearchGate*. https://doi.org/10.5281/zenodo.15358152

Anjalee. (2025, July 27). *Understanding SDLC: The Blueprint Behind Every Successful Software Project*. Medium. https://medium.com/%40amarakoonanjalee11/understanding-sdlc-the-blueprint-behind-every-successful-software-project-a23bebbb8e8a

ASEAN Briefing. (2025). *Malaysia Tightens Data Protection from June 2025*. ASEAN Business News. https://www.aseanbriefing.com/news/malaysia-tightens-data-protection-from-june-2025/

Atlassian. (2025). *What Is a UML Diagram: Types, Examples, and Uses | Atlassian*. Atlassian. https://www.atlassian.com/work-management/project-management/uml-diagram

Black, H. (2020, April 29). *5 effective customer loyalty programs and how they work*. Zendesk. https://www.zendesk.com/blog/loyalty-rewards/

Bloom Wellness Spa | Let Your Beauty Bloom. (2024). Bloomspa.com.my. https://www.bloomspa.com.my/

Bourque, P., & Fairley, R. E. (2024). *Guide to the Software Engineering Body of Knowledge (SWEBOK)*. IEEE Computer Society.

Chai, W., & Awati, R. (2021, April). *What is Google Analytics and how does it work?* SearchBusinessAnalytics. https://www.techtarget.com/searchbusinessanalytics/definition/Google-Analytics

Coronel, C., & Morris, S. (2023). Database Systems: Design, Implementation, & Management (14th ed.). Cengage Learning. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2024). Database System Concepts (8th ed.). McGraw-Hill Education.

Dimovska, J. (2025). *Why does your salon or spa need a loyalty program?* Pabau. https://pabau.com/blog/why-does-your-salon-or-spa-need-a-loyalty-program/

DongYu. (2025, March 31). *Web Programming Languages: Which One Will Dominate 2025?* Stepmedia Software. https://stepmediasoftware.com/blog/web-programming-languages/

Dr Faiz Rasool. (2024, June). *What is Project Scheduling in Project Management?* PM Training School. https://www.pmtrainingschool.com/blog/what-is-project-scheduling-in-project-management/

Dziak. (2023). *Unit testing | Research Starters | EBSCO Research*. EBSCO. https://www.ebsco.com/research-starters/computer-science/unit-testing

GeeksforGeeks. (2020, July 2). *Short note on Project Scheduling*. GeeksforGeeks. https://www.geeksforgeeks.org/software-engineering/short-note-on-project-scheduling/

GeeksforGeeks. (2021, September 20). *What is a Flowchart and its Types?* GeeksforGeeks. https://www.geeksforgeeks.org/computer-science-fundamentals/what-is-a-flowchart-and-its-types/

GeeksforGeeks. (2023, November 24). *Use Case Diagram Unified Modeling Language (UML)*. GeeksforGeeks. https://www.geeksforgeeks.org/system-design/use-case-diagram/

GeeksforGeeks. (2025). *Functional vs. Non Functional Requirements*. GeeksforGeeks. https://www.geeksforgeeks.org/software-engineering/functional-vs-non-functional-requirements/

Gideon Todes. (2023, May 10). *A Member Engagement Guide for Spas and Wellness Studios*. Wellyx. https://wellyx.com/blog/member-engagement-guide-for-spas-and-wellness-studios/

Growave. (2024). *Digital Loyalty Programs: Types and Benefits for Businesses | Growave*. Growave.io. https://www.growave.io/blog/digital-loyalty-programs

Harrison, T., & Andrews, L. (2020). *Project Management Structures and Techniques*. Oxford Press. Lee, H., & Kumar, S. (2022). *Agile Web Development Practices and Continuous Testing*. Springer. Rahman, N., & Idris, M. (2021). *Modern Agile Methodologies in System Development*. University Publishing.

IBM. (2024, June 25). *What is Business Process Modeling and Notation (BPMN)? | IBM*. Ibm.com. https://www.ibm.com/think/topics/bpmn

ITU Online. (2024). *What Is XAMPP? - ITU Online IT Training*. ITU Online IT Training. https://www.ituonline.com/tech-definitions/what-is-xampp/

Jabatan Digital Negara. (2024, July). *Surat Pekeliling Am Bilangan 7 Tahun 2024 – Garis Panduan Permohonan Kelulusan Teknikal dan Pemantauan Projek Teknologi Maklumat dan Komunikasi (ICT) Sektor Awam – Laman Web Rasmi Jabatan Digital Negara*. Jdn.gov.my. https://www.jdn.gov.my/surat-pekeliling-am-bilangan-7-tahun-2024-garis-panduan-permohonan-kelulusan-teknikal-dan-pemantauan-projek-teknologi-maklumat-dan-komunikasi-ict-sektor-awam/

Kassim, S. A., et al. (2022). Benefits and limitations of business process model notation — A review.

BMC.

Khatun, M. T., Hiekata, K., Takahashi, Y., & Okada, I. (2022). Design and management of software development projects under rework uncertainty: a study using system dynamics. *Journal of Decision Systems*, *32*(2), 1–24. https://doi.org/10.1080/12460125.2021.2023257

Kinza Yasar. (2023). *What Is Web Application (Web Apps) and Its Benefits*. SearchSoftwareQuality. https://www.techtarget.com/searchsoftwarequality/definition/Web-application-Web-app

Laoyan, S. (2025). *What is agile methodology? (A beginner's guide)*. Asana. https://asana.com/resources/agile-methodology

Lizz. (2024). *Navigating The 2025 Data Privacy Compliance Requirements*. Vubiz.com. https://vubiz.com/navigating-the-2025-data-privacy-compliance-requirements

Lucidchart. (2023, August 22). *UML Use Case Diagram Tutorial*. Lucidchart. https://www.lucidchart.com/pages/tutorial/uml-use-case-diagram

Mahbubeh, P. (2021). Design and management of software development projects under uncertainty. Journal of Software Project Management, 35(2), 145–160. https://doi.org/10.1080/12460125.2021.2023257

Manawis, R. (2023, December 13). *Data Collection Techniques - A Guide*. SafetyCulture. https://safetyculture.com/topics/data-collection/data-collection-techniques/

Maria . (2023). *What Is Github: Main Features, Benefits, Pricing [2023]*. Everhour Blog. https://everhour.com/blog/what-is-github/

Microsoft. (2021, November 3). *Visual Studio Code*. Visualstudio.com; Microsoft. https://code.visualstudio.com/docs/setup/vscode-web

Nulab. (2021). *Business Process Model & Notation™ (BPMN™) | Object Management Group*. Omg.org. https://www.omg.org/bpmn

OpenTEAM. (2023, November 6). *Software Platform – OpenTEAM*. Openteam.community. https://openteam.community/glossary-full/software-platform/

Ozkaya, M. (2023). Visualizing Software Architecture: The Role of Diagrams in Modern Development. *Journal of Systems and Software, 198*, 111–125. https://doi.org/10.1016/j.jss.2023.111602

PDP. (2023). *FAQ • Personal Data Protection*. Perlindungan Data Peribadi (PDP). https://www.pdp.gov.my/ppdpv1/en/faq/

Prasad, J. (2024, July 17). *Laravel vs PHP: Comparing Frameworks, Pros, Cons, and Use Cases*. Web Hosting Blogs by MilesWeb | WordPress, Cloud & SEO Tips. https://www.milesweb.com/blog/technology-hub/laravel-vs-php/

Project Management Institute. (2024). *What Is Project Management, Approaches, and PMI*. Pmi.org. https://www.pmi.org/about/what-is-project-management

Qin, R., Wang, Z., Huang, S., & Huangfu, L. (2023). MSTIL: Multi-cue Shape-aware Transferable Imbalance Learning for effective graphic API recommendation. *Journal of Systems and Software*, *200*, 111650. https://doi.org/10.1016/j.jss.2023.111650

Requirements.com. (2024). *What are System Requirements?* Requirements.com; Requirements.com. https://requirements.com/Content/What-is/what-are-system-requirements

Safna. (2025). *10 Essential Consumer Data Protection Practices for 2025 - CookieYes*. CookieYes. https://www.cookieyes.com/blog/consumer-data-protection/

Salma. (2025). *Malaysia's 2025 Data Protection Guidelines: DPO Appointment and Breach Notification - Securiti*. Securiti. https://securiti.ai/malaysia-data-protection-guidelines-dpo-appointment-and-breach-notification/

Salsabila. (2020). *LinkedIn*. Linkedin.com. https://www.linkedin.com/pulse/understanding-agile-salsabila-hava-qabita

Samuel. (2024). Software Testing Techniques and Levels in Software Development. *International Journal of Advancements in Computing Technology*, *2*(1 February 2024), 10–19. https://doi.org/10.56472/25838628/IJACT-V2I1P102

shopuddy. (2022). *Digital loyalty card VS Physical loyalty Card (Stamp Card, Membership Card) 2023*. Www.shopuddy.com. https://www.shopuddy.com/en/blog/digital-loyalty-card-vs-physical-loyalty-card

Sommerville, I. (2021). *Software engineering* (11th ed.). Pearson.

Splice. (2025, February 14). *5 Ways To Improve Customer Engagement In Your Salon or Spa - The Splice Blog*. The Splice Blog. https://blog.withsplice.com/business-tips/how-to-improve-your-salon-or-spas-customer-engagement-in-nigeria/

Taylor. (2023, March 13). *Complete Guide to Software Development Requirements*. Trusted IT Outsourcing Provider. https://rikkeisoft.com/blog/software-development-requirements/

TechTarget. (2023). *TechTarget*. TechTarget. https://www.techtarget.com/

TestRail. (2025, August 14). *How Unit Testing Supports Reliable Code and Stronger Development Teams - TestRail*. TestRail | the Quality OS for QA Teams. https://www.testrail.com/blog/unit-testing/

Tong, R. T. Y., Yuan, Y. K., Dong, N. W., & Ramasamy, R. K. (2022, December 26). *A Review: Methods of Acceptance Testing*. Www.atlantis-Press.com; Atlantis Press. https://doi.org/10.2991/978-94-6463-080-0_7

TutorialsPoint. (2024). *phpMyAdmin - Features*. Www.tutorialspoint.com. https://www.tutorialspoint.com/phpmyadmin/phpmyadmin_features.htm

UR Loyalty Club. (2025). URBAN RETREAT. https://www.urban-retreat.com/pages/ur-loyalty-club

Visual Paradigm. (2019). *Ideal Modeling & Diagramming Tool for Agile Team Collaboration*. Visual-Paradigm.com. https://www.visual-paradigm.com

Walking On Sunshine Malaysia. (2024). Walking on Sunshine Malaysia. https://walkingonsunshine.my/

Woolnough-Rai, M. (2025). *Five Benefits of a Loyalty Program - LoyaltyLion*. LoyaltyLion. https://loyaltylion.com/blog/five-benefits-of-a-loyalty-program