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**Shadow Fit: Gym Management System**

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## 1. Introduction

Web-based services have been on the rise over the past few years for different industries, including health and fitness services. People now expect to access information, compare options, and make bookings online. Despite this, many small and medium-sized gyms rely heavily on traditional systems, manual registration like paper records or scheduling appointments by phone. This may be very time consuming and prone to errors, hence inconvenient for both clients and gym staff.

Shadow Fit is a web-based gym management and trainer booking system. It seeks to provide a digital platform through which one can effortlessly navigate services offered in the gym, trainers' profiles, training schedules, membership plans, and book training sessions. The system will also support secure login for users and an admin dashboard that will allow the gym administrator to manage trainers, schedules, and bookings.

The system will be developed using the Django framework for backend development and HTML, CSS, JavaScript, and Bootstrap for the frontend. Django will be used because it supports rapid development and has built-in features like authentication and database handling. On the other hand, Bootstrap is chosen to support responsive and user-friendly web page layouts.

### 1.2 Problem Scenario

Many gyms have operational problems because an effective digital management system is lacking. Among others, the common issues are:

- Most of the small and medium-level gymnasiums still use traditional methods of phone calls, word of mouth, and paper records for membership and training scheduling purposes. These often lead to misunderstandings, inefficiencies, and errors in scheduling.
- Customers often have problems accessing current information concerning trainers, pricing plans, and other services offered at the gym. Without a focal point that electronically keeps this information, users will often find themselves making uninformed choices.

- A lack of transparency in membership levels, costs of personal training, and service packages could discourage prospective clients from joining or continuing their patronage of the facility, as unclear pricing diminishes trust and motivation.
- Lack of online booking and scheduling systems means that customers must make session reservations manually; this increases the chances of double booking, lost reservations, and customer dissatisfaction.
- Modern customers are increasingly looking to digital accessibility in their search for services. It will be difficult for gyms that are not online to attract new members, especially those in younger and more tech-savvy demographics.
- With the fitness industry showing an increasing demand for personalized and trainer-guided workout experiences, users should have access to the profiles and expertise of the trainers before choosing training programs.
- Without a digital platform integrating information about trainers, schedules, booking, and membership plans, gyms struggle to engage their members, organize operations, or manage their services.

### **1.3 Project as a Solution**

The Gym Website project offers a practical solution to the issues and challenges that exist within the local gyms and their customers. The project has come up with a solution that offers customers access to the services that the gyms offer in an organized and attractive manner through the use of a digital platform. The customers are also in a position to book sessions with the gyms through the website.

The project responds to these challenges in the following ways:

- **Professional Online Presence:**  
The website provides the gym with an online presence that potential customers are able to browse before visiting the establishment.
- **Easy Access to Trainer Information:**

Offering comprehensive profiles about the trainers' specialties and rates ensures that users are well-informed about who to train with.

- **Automated Booking System:**

The users can check the schedules that are available and book training sessions right from the website without the need to manually call and book sessions.

- **Transparent Pricing and Membership Options:**

Every service package and membership option is prominently displayed on the website to eliminate ambiguities and build user trust.

- **Improved User Engagement:**

The inclusion of features such as interactive timelines, health calculators, blogs, and galleries keeps visitors to the website engaged.

- **Centralized Platform for Fitness Guidance:**

Tubes The user can get all the information, trainer advice and gym services in one platform without depending on other scattered resources.

In this way, the website provides benefits to the fitness club by offering solutions to its problems while improving the user experience to increase membership acquisition and retention.

## **1.4 Scope of Project**

The project scope of Shadow Fit includes the creation of a web-based system for gym membership administration and trainer scheduling. The system aims to enable the automation of important gym tasks, which are currently performed manually, such as gym membership administration, trainer scheduling, and payment registration.

In this regard, the system provides functionality for users to register and login, view the available gym membership plans, purchase plans, and schedule training sessions with trainers. The system further allows administrative users to view user data, membership plans, trainers, bookings, and payment data. Payment options are provided for the purchase of membership plans as well as

training sessions, where an external payment gateway is employed only for online payment options.

The project will involve the design and implementation of a relational database in order to ensure consistency and integrity of the data. Also, software engineering models including the use case diagram, the data flow diagram, the class diagram, and the collaboration diagram are used in the description of system functional and structural characteristics.

The Shadow Fit scope shall not include the implementation of sophisticated functionalities such as exercise tracking, diet planning, integration with wearable technology, application development on mobile platforms, or communication functionality. These are omitted with due consideration to ensure that system specification complexity is within acceptable boundaries suggested within academic software projects.

## 1.5 Resources Required

Developing a comprehensive and dynamic gym website requires a combination of frontend, backend, database, and design tools and resources. Each tool and resource plays a specific role in ensuring the website is functional, responsive, and user-friendly. The required tools and resources are described below:

### 1.5.1 Frontend Tools

- **HTML (Hypertext Markup Language):**



*Figure 1: HTML Logo*

HTML provides the fundamental structure of all web pages, organizing content such as headings, paragraphs, tables, images, links, and forms. It

is used to structure the gym website pages including homepage, trainer profiles, schedules, and booking forms. HTML is essential for creating semantic and accessible web pages, improving both usability and search engine optimization (Robbins, 2018).

- **CSS (Cascading Style Sheets):**



*Figure 2: CSS Logo*

CSS styles the website including layout, colours, fonts, spacing, and responsive behaviour. It's used to ensure that the gym website is visually appealing and consistent across devices. CSS allows separation of content from presentation, enhancing maintainability and user experience (Meyer & Weyl, 2017).

- **JavaScript:**



*Figure 3: JavaScript Logo*

JavaScript adds interactivity to web pages including dynamic schedules, form validation, interactive elements, and animations. It helps to enable features such as filtering training schedules, validating booking forms and dynamically updating content without page reloads. JavaScript improves

user engagement and supports real-time interaction which are critical for modern web applications (Flanagan, 2020).

- **Bootstrap:**



*Figure 4: Bootstrap Logo*

Bootstrap provides prebuilt responsive layouts, UI components, and design utilities. The project uses it to ensure the website is mobile-friendly and consistent across different screen sizes with minimal coding effort. Frameworks like Bootstrap reduce development time and maintain design consistency across projects (Spurlock, 2013).

### 1.5.2 Backend Tools

- **Django (Python Web Framework):**



*Figure 5: Django Logo*

Django handles all the server-side logic, database interaction, user authentication, routing and template rendering of the project. It helps to power dynamic content such as user accounts, booking systems, trainer management, and schedule updates in the project. Django uses a Model-

View-Template (MVT) architecture that separates concerns and enhances maintainability in web applications (Lathkar, 2025).

### 1.5.3 Database Tools

- **MySQL (Relational Database Management System):**



*Figure 6: MySQL Logo*

MySQL is used to store structured data such as user profiles, trainer information, schedules, bookings, and membership plans acting as the central repository for all persistent data ensuring data integrity, security and efficient querying. Relational databases are widely used for web applications due to their robustness and support for complex queries (Date, 2019).

- **Django ORM (Object-Relational Mapping):**

It provides a Python-based interface to interact with the database without writing raw SQL queries simplifying CRUD (Create, Read, Update, Delete) operations for trainers, users, schedules, and bookings. ORMs increase developer productivity and reduce the likelihood of SQL errors while maintaining data integrity (Gorodnichev, et al., 2020)

### 1.5.4 Design Tools

- **Figma / Canva:**

These tools are used for wireframing, prototyping, and visual mock-ups of the website, helping to plan page layouts, navigation flow, and visual design before actual coding. These are prototyping tools that enhances

collaboration between designers and developers and reduce design errors (Tidwell, 2019).

## **1.6 Aims and Objective**

The main aim of this project is to create a professional and user-interactive website that helps users to easily understand the gym's services, explore available trainers, check schedules, choose membership plans and directly book training sessions online. This project aims at making communication between the gym and its customers smoother with reduced manual work on both ends, while providing the user with the convenience of staying in touch with the gym any time.

### **1.6.1 Aims**

- To develop a web-based system to automate purchasing of gym membership plans and booking sessions with trainers.
- Providing an easy-to-use platform that would allow clients to view membership packages effortlessly and book trainers with ease.
- Implementing a safe and secure system for payment of membership subscription or trainers' booking through an external online payment gateway.
- To maintain precise, consistent, and properly normalized data storage within a relational database.
- Applying the principles of software engineering like requirements analysis, modelling, and modularity in the process of developing a real-world application.
- To show how standard system modelling methods, such as use case diagramming, data flow diagramming, class diagramming, and sequence/collaboration diagramming, can be applied.
- To create systems that are maintainable and scalable to allow future enhancements without much redesigning.
- These goals are in line with traditional best practices in software system development, as well as in the design of research projects in the field of computer science.



### 1.6.2 Objectives

- Create a user-friendly, responsive website interface that works perfectly on any device.
- To give full and clear profiles of personal trainers, including their specialties, experience, and pricing.
- To display the schedule of classes and timing of training sessions in a comprehensible, yet organized, manner.
- To enable users to create accounts, log in, and book training sessions or classes directly through the website.
- To showcase membership plans and pricing in a clear, easily comparable manner.
- Store and manage user data, trainer details, schedules, and booking information securely through a reliable database.
- To include a contact form and location details in order to make communication between the gym and users easier.
- To create an engaging website layout with appealing visuals that improves user experience and encourages user interaction.
- The purpose is to lessen manual workload for gym personnel by automating tasks like registration, booking, and management of schedules.
- Improved overall accessibility so that users can obtain necessary information about the gym at any time and from anywhere.

### 1.7 Expected Outcome

The expected outcomes of the Shadow Fit project define tangible and functional results to be delivered by means of the project. The focus of these outcomes is on delivering a complete, user-friendly, and interactive web-based platform for gym management and trainer bookings with the purpose of enhancing the overall experience for the gym's clients and staff, while at the same time reducing manual work and enhancing operational efficiency. The project is expected to produce the following key functional components:

### **1.7.1 Web-Based Gym Platform**

- A website accessible on desktops, tablets, and mobile devices, is responsive and interactive.
- The website shall include, among others, an About page, Services Offered, Trainer Profiles, Class Schedules, Membership Plans, and finally, ways to book.
- It will eventually act as the digital entity for the gym, bringing in new customers and maintaining the current members.

### **1.7.2 Trainer and Membership Management**

- A secure login system where gym administrators can manage trainers, membership plans, schedules, and bookings.
- The profiles for personal trainers will highlight their specialties, experience, certification, and pricing for the services offered.
- Membership plans will be clearly displayed for users to choose the most suitable package.

### **1.7.3 Booking and Scheduling System**

- Users will be able to view available training sessions and make an appointment on their own through the website.
- The system will automate scheduling, therefore eliminate double bookings and reduce human errors.
- Bookings will be easy to manage for both users and administrators.

### **1.7.4 Interactive User Features**

- Incorporating tools that engage the user, such as a BMI calculator, a workout tracker, and a diet planner.
- Blog and gallery sections displaying workout advice, success stories, and motivational content.
- Contact forms and maps for convenient communication and directions to the gym location.

### 1.7.5 Database and Backend Components

- MySQL relational database using Django ORM to persist data: user accounts, trainers' information, membership, and all the records of bookings.
- Secure storage and management of data to maintain privacy and information integrity.
- The backend logic involves supporting dynamic content through automated processes while ensuring smooth interactions between users and administrators.

### 1.8 Deliverables

Besides the functional system, the project will provide complete documentation to support end-users and administrators along with future developers:

- User Manual: A clear, step-by-step guide of how users can create their accounts, book sessions, go through trainer profiles, interact, and so on.
- Administrator Guide: Step-by-step guidance on how to manage the trainers, schedules, memberships, and bookings effectively.
- Technical Documentation: Full system architecture explanation, database schema, back-end logic, and code structure for maintenance, upgrade, and troubleshooting purposes.

The Shadow Fit project will provide a complete web-based gym management system, incorporating trainer management, membership plans, scheduling, and booking into one platform. Besides that, it will be supported by detailed documentation for users, staff of the gyms, and developers. This project will improve operational efficiency, enhance the user experience, reduce manual work, and provide a professional, reliable, and interactive platform for managing gym services.

## 2. Background

In Chapter 1, there was an introduction to the project for Shadow Fit, a website that will offer a digital platform to gyms and their users. Several small and medium-sized gyms use manual methods for membership and scheduling through paper records or over the phone.

It solves these problems by offering an online system in which users can view gym services, trainer profiles, schedules, membership plans, and book training sessions. It also allows administrators of the gym to manage trainers, schedules, and bookings efficiently through a secure dashboard.

The backend of the website will be designed using Django, incorporating secure login, database management, and dynamic content. The frontend will involve the use of HTML, CSS, JavaScript, and Bootstrap to ensure a responsive, interactive, and user-friendly website. In general, the system helps gym operations run more smoothly and provides users with easy access to online services in the gym.

### 2.1 Review of Journals and Articles

Various scholarly works were considered in a review to understand how web-based gym management systems work. These explained how online booking, membership management, and trainer information systems help gyms to work more smoothly. It also showed the problems gyms face when using manual methods and how these could be improved through digital solutions. Following are some articles of importance for the Shadow Fit project:

#### 2.1.1 ASGBOOKSYS: All Star Gym Booking System with Usability Heuristic Theory Adaptation

This study describes the development of an online booking system that replaces manual appointment arrangements in a Malaysian gym. The authors used the Waterfall development model and assessed usability by means of Heuristic Theory, reaching an average usability rating of 4.57 out of 5. The work underlines that making the process of creating a booking easy and free of errors for the user significantly enhances the latter's experience. The relevance to

your project is direct: one of your key features is a booking system, and this article shows what has been done and what user expectations are regarding usability (Ibrahim, et al., 2024).

### **2.1.2 Computerized System to Manage Business Functionalities for a Gymnasium**

The authors present in the paper a system built for a gymnasium that automates core business operations: trainer management, membership tracking, scheduling, and payments. The paper argues that manual methods lead to inefficiencies and error-prone operations, and the computerized system improves reliability, data integrity, and operational speed. This supports your "problem domain" section where you identify that many gyms still use manual systems (Gamage, et al., 2022).

### **2.1.3 Design of a Web-Based Membership Data Processing System at Vizta Gym using the Prototype Method**

This article focuses specifically on membership data and problems when multiple gym branches have inconsistent manual verification. The authors developed a web-based system through the prototype approach, which addresses issues of member verification, schedule information, and active memberships. It improves accessibility, speed, and accuracy. These features align with your project: membership plans, registration, and schedule display (Sembiring, et al., 2023).

### **2.1.4 Development of Web-Based Information System to Support Personal Trainers' Performance in Medan**

This article targets the trainer-side of gym operations. It reports on a web-based information system for personal trainers to log clients' training programs, body composition data, and progress tracking. It reveals that the overall feasibility stands at 94.75% and underlines how the digital system enhanced the efficiency of trainers, coupled with data-driven service. For your project, this

directly relates to the features "trainer profile" and "schedules + booking", in that your system provides access for users to data about trainers, while trainers have tools for managing their work (Tarigan, et al., 2025).

## **2.2 Comparison of Similar Application**

To better situate this project within what has already been done, this section presents several web-based gym/fitness management systems. These projects show how other developers approached booking, membership, trainer management, and online accessibility that the same problems our Shadow Fit system addresses:

### **2.2.1 Development of a Web-Based Gym Information System at Nahaga Sabu Seba**

The research describes how the gym changed from manual record-keeping to a completely web-based system that manages members, payment handling, and operations. The Agile development method is used and key features include membership registration, selection of membership packages, digital payment, downloading membership cards, and an administrative dashboard in real-time. It was designed to give remote access and to improve service quality. The kind of feature set directly matches the feature of the project to plan-member registration, payment, and dashboard for admins-along with the benefits of moving from manual to digital (Alboneh & Snae, 2025).

### **2.2.2 Design and Implementation of Web-based Gym Management System**

This project was undertaken in China, focusing on the design of the gym management system that would cover daily business operations both for the gym and its end-users. It employs the B/S architecture, adopting JSP technology as the front-end and MySQL database for backend storage. The system aims to deal with all kinds of data and information generated in daily gym business. It shows architecture and technical stack choices for web-based gym systems and gives insight into how to structure our own system in terms of backend, frontend, and database (Zhao, et al., 2023).

### **2.2.3 Designing a Web-Based Membership Data Processing System at Vizta Gym by the Prototype Method**

This article presents a fitness centre that has memberships across branches using manual verification and thus suffers from scheduling/verification problems. The authors designed a web-based system via prototype method and UML modelling, which improved the processing of data on the administrator side and also helped members to view schedules and transactions online. It aligns closely with the focus on membership plans, membership verification, and schedule visibility features that is included in Shadow Fit (Sembiring, et al., 2023).

### **2.2.4 Computerized System to Manage Business Functionalities for a Gymnasium**

This work describes a computerized system that manages trainers, memberships, scheduling, payments, and other business functionalities of a gym. The authors have pointed out that the paper/phone-based manual systems are inefficient and prone to errors. They also show evidence that a digital system enhances reliability and speed. It supports Shadow Fit project's problem domain of gyms using manual methods and hence the need for automation and web-based management (Gamage, et al., 2022).

### **2.2.5 MERN Architecture-based Full-Stack Gym Management System for Fitness Centres**

This article describes a full-stack system built using MongoDB, Express.js, React.js, and Node.js. It automates membership management, workout planning and progress tracking in fitness centres. The system addresses limitations imposed by paper or spreadsheet-based methods, showing one of the modern tech stacks for gym management. It provides a relevant example of a modern web tech stack for systems dealing with fitness/gym systems. This can inform design decisions and is good to get an idea of present trends (Hasan, et al., 2025).

## **2.3 Comparison with Similar Projects**

The review of previous projects on gym management reveals that most of the existing systems automate the basic functions of a gym: membership, trainer management, and dealing with financial activities. Shadow Fit will upgrade that by offering an interaction-based, more visually attractive, and user-friendly platform. Important comparisons are highlighted below:

### **2.3.1 System Objective**

- Most of the projects so far have focused on automating existing manual systems for registration, membership, and scheduling onto an online platform.
- Shadow Fit does not only focus on automating these processes but also enhancing user engagement, transparency, and accessibility.
- It includes additional features like blogs, health calculators, and communication tools that would help in motivating people and keeping them well-informed.

### **2.3.2 Technology Stack**

- Other systems used technologies like JSP + MySQL (Zhao, et al., 2023) and MERN stack (Hasan, et al., 2025).
- Backend operations are powered by Django (Python) while using HTML, CSS, JavaScript, and Bootstrap for the frontend.
- Django has an inbuilt authentication system, better security, and faster development compared to other frameworks.

### **2.3.3 Design and User Interface**

- For instance, previous projects like Vizta Gym System (Sembiring, et al., 2023) have focused mainly on functionality, with less attention to design.
- Shadow Fit focuses on responsive, attractive, and mobile-friendly design created using Bootstrap and Figma/Canva.
- It ensures consistency in the user experience across all devices.



#### **2.3.4 Feature integration**

- Most previous systems covered only basic modules, such as membership management and trainer scheduling.
- Shadow Fit puts everything in one place: trainer profiles, membership plans, schedules, bookings, and contact forms.
- It allows users to interact with trainers for instant booking, thus enhancing usability.

#### **2.3.5 Scope and Flexibility**

- Previous projects were primarily one-off designs for a single gym and lacked scalability.
- Shadow Fit is designed with a modular architecture, enabling its easy extension for multiple branches or the addition of new features, such as payment systems and progress tracking.
- Its architecture supports long-term adaptability and growth.

#### **2.3.6 Data Security and Management**

- Some older projects lacked proper data protection and relied on manual data storage.
- Shadow Fit uses Django's authentication system and MySQL database for secure data storage and encryption.
- Ensuring user data privacy and system reliability also applies here.

#### **2.3.7 User Engagement**

- Older systems were primarily transaction-based with less user interaction.
- Shadow Fit inspires interaction through the utilization of blogs, photo galleries, and health tools, among others.
- This keeps users connected and increases member retention for the gym.
- Shadow Fit synthesizes the strengths of prior projects and improves on their weaknesses.

It focuses on design quality, user interaction, transparency, and scalability. Hence, the project not only effectively manages gym operations but does so through a more modern, secure, and responsive platform for greater user satisfaction and engagement.

### **3. Methodology**

#### **3.1 Overview of the Software Development Lifecycle**

Software Development Life Cycle (SDLC) is a process of developing software in an organized and systematic manner. It assists in ensuring that software is developed based on user requirements, is of good quality, and developed in an effective manner. The Software Development Lifecycle consists of six stages: Requirement Analysis. In this stage, data regarding what a user wants from a software is collected. Designing of a system in which system architecture, components, and data structures are developed using techniques such as Use Case and Class Diagrams. Implementation & mash; Coding based on designs developed. It involves testing of a developed system to confirm if it works as required. It also involves the detection of defects in a developed system. It refers to making a developed system available to its users. Involves dealing with any changes, defects, and optimization in a developed system (Diba & Mohapatra, 2023).

#### **3.2 Software Development Methodology**

A software development methodology is a structured approach to developing, maintaining, and delivering software. It defines which activities are involved in the development process, the roles of different team members, the tools to be used, and what deliverables are produced at each stage (Ibrahim, et al., 2018). A good methodology makes sure that the software is developed in an efficient manner to meet users' requirements; it should also be able to accommodate scope or technological changes (Conceição, et al., 2023). The proper selection of methodology is relevant for time, resource, and risk management, as well as

quality management for such complex projects as web-based systems (Serebryantseva & , 2023).

The selection of an appropriate methodology in this project will serve to organize the development of ShadowFit-a website for managing gyms and booking trainers-such that features like membership management, trainer profiles, schedules, and booking can be implemented in such a systematic way that they are reliably delivered. The following are a number of popular software development methodologies, each with various strengths, weaknesses and applicability with respect to project type, size, and requirements:

### 3.2.1 Waterfall Model

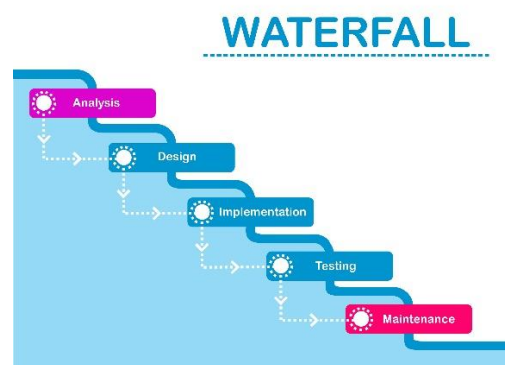


Figure 7: Waterfall Model Diagram

Waterfall is a linear, successive model where a phase starts once the previous one has been completed, such as; requirements, design, implementation, testing, deployment and maintenance. In this methodology, clear milestones are provided, documented and the progress is easily traceable. Whereas, accommodating changes is difficult and it has problems that only show up towards the end of the development. Its best use is when the requirements are clearly defined and unlikely to change (Pressman & Maxim, 2021).

### 3.2.2 Spiral Model

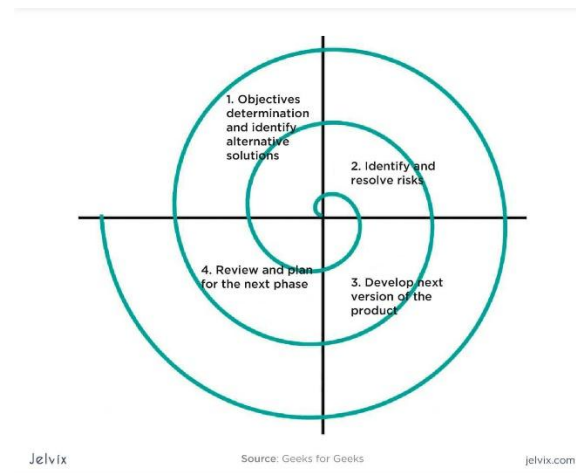


Figure 8: Spiral Model Diagram

The Spiral model is iterative and risk-driven and consists of repeated cycles of planning, risk analysis, development, and evaluation. It is good for large, high-risk projects and permits frequent reassessment of requirements. Whereas, it can be complex and expensive, requires experienced team members for risk assessment. It best applies to projects having high uncertainty or critical risk factors (Boehm & Turner, 2019).

### 3.2.3 Incremental Model

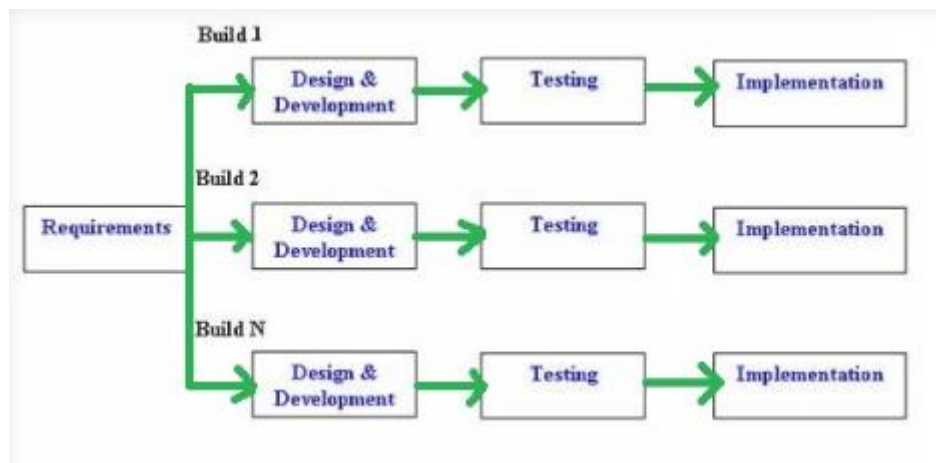


Figure 9: Incremental Model Diagram

In the Incremental model, the software system is built in small, functional pieces called increments. Rather than developing the entire system at once, each increment adds a part of the system's functionality as it builds in stages. It provides working software early thus; it allows the users to test features. Can

accommodate requirement changes during the development. Early problem discovery which reduces risk. It requires careful planning and integration management. This is more adaptable to projects where the features can be delivered step by step (Conceição, et al., 2023).

### 3.2.4 Agile Methodology

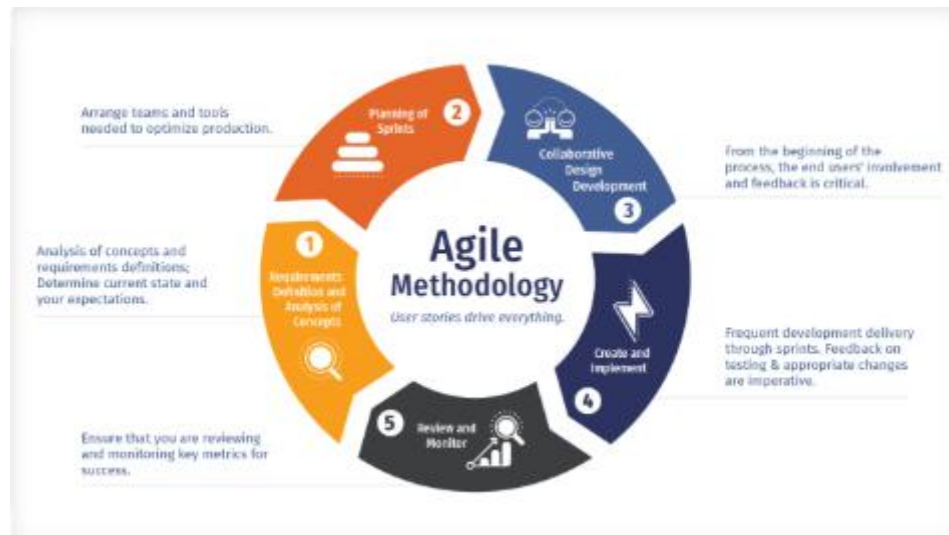


Figure 10: Agile Methodology Diagram

Agile focuses on flexibility, collaboration, and customer feedback. Methods include Scrum, Kanban, and Extreme Programming (XP). Agile projects work in short iterative sprints, delivering small increments frequently. It is highly flexible, encourages frequent user feedback, faster delivery. However, it requires less formal documentation and strong team coordination. It is best suitable for the projects with rapidly changing requirements and active user involvement (Kotaiah & Khalil, 2024).

### 3.3 Selected Development Methodology: Incremental Approach

Incremental Methodology has been chosen for the ShadowFit project. The reason being:

- **Feature-Based Delivery:** ShadowFit has a number of key features that will be implemented: trainer profiles, booking system, membership plans, schedules, admin dashboard. The incremental delivery means the

product is released in parts, so some functionality is delivered early while building other features.

- **Requirement Flexibility:** The user's requirements will probably get changed on the way. The incremental development allows features to be changed or enhanced based on early feedback, which a waterfall approach keeps rigid.
- **Risk Management:** Early delivery of small pieces enables the detection of technical or integration problems before the entire system is ever finished.
- **User Experience:** Early working versions mean that gym staff and clients can try the system, providing feedback on how to improve its usability and overall satisfaction.
- **Time and Resource Management:** In a final year project, the resources and time are not sufficient therefore, incremental methodology allows focused development in phases with the assurance that each portion is complete and functional.

Software development methodology represents a structured approach to how a software is built, tested, and maintained. Within the major models discussed, incremental methodology was chosen for Shadow Fit because of its flexibility, phased delivery, integration of user feedback, reduction of risk, and resource efficiency. The implementation of the project will be incremental, with each increment delivering workable features to the continuous testing and improvement of the product.

### **3.4 Work Breakdown Structure**

A WBS is the most critical project management tool which breaks down the whole project into minor, manageable sections to make the planning and execution systematic and organized. It gives a clear perspective that defines the work to be done, the sequence of doing it, and who will do it. WBS is a hierarchical decomposition of project scope, whereby the identification of deliverables takes place and the team efforts are organized. It forms the basis for scheduling, budgeting, and monitoring progress (Kerzner, 2022).

A WBS is necessary in software development projects for structuring tasks from the initial requirement phase down to final deployment. In addition, it ensures that every step of development, such as analysis, design, implementation, testing, and documentation, is well planned and executed sequentially. It allows for effective communications among the developers and stakeholders, enabling individual tracking of each activity until its completion (PMI, 2021).

The WBS for the Shadow Fit, gym management system is developed using an Incremental Software Development Methodology. This type of methodology breaks down the project into multiple increments or pieces and can be stated that each increment adds specific features to the system. An example could be that the first increment will incorporate the homepage and trainer profiles, the second increment will include membership and booking systems, while in later increments, admin and schedule management modules will be included. In this model, each stage produces an operational version of the software. It allows early testing and feedback that may be incorporated into improving the final product.

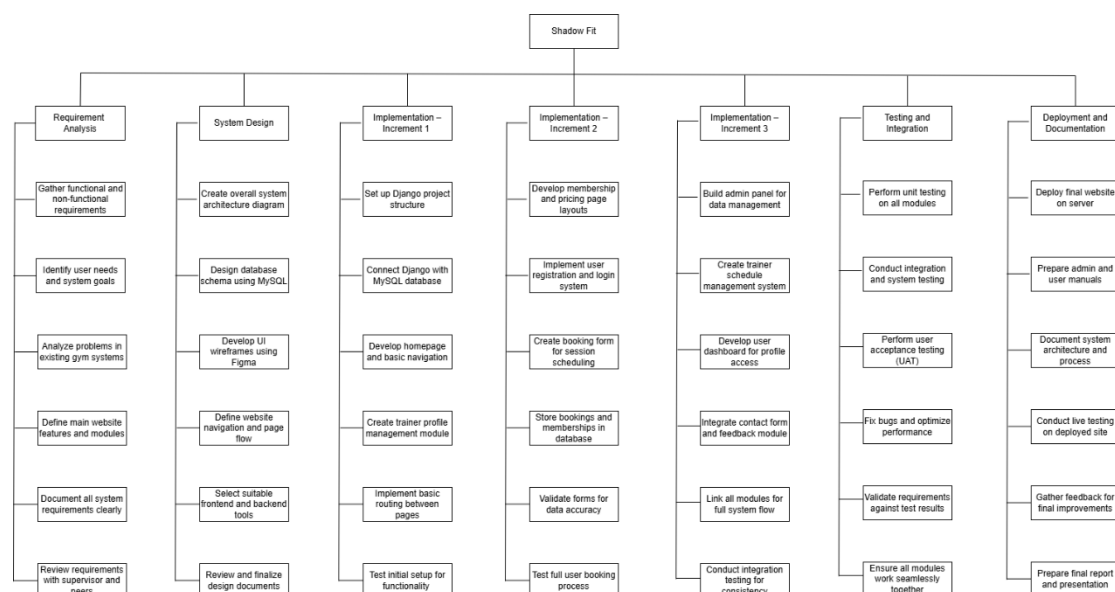


Figure 11: Work Breakdown Structure

The Shadow Fit project is being developed according to the Incremental Software Development Model, in which the work is divided into smaller stages that are more manageable. Each stage, or increment, focuses on implementing a set of related features.

First, the foundation is established in the first increment by setting up the environment in Django, designing the homepage, and creating trainer profiles. The second increment includes developing and testing the membership and booking systems. The third increment covers the construction of the admin dashboard and the trainer scheduling module.

Testing is done after every increment to identify and fix errors early. This is a step-by-step process to ensure that the system will be stable and functioning throughout development. The incremental approach also allows for user feedback continuously to improve usability and performance before the final deployment. WBS will ensure that the development activities are defined, there is timely completion, and there will be no budget or scope deviations. In this way, it provides a clear roadmap from initial planning to final delivery, ensuring successful completion of Shadow Fit Gym Management Website with proper documentation of results.

### **3.5 Milestones Listing**

A project milestone is a major point or event in a project that marks the completion of a major activity or phase. The milestones help in tracking progress, managing time, and ensuring that the project remains right on schedule. They also help the team verify if the project is on course to meet its objectives (Kerzner, 2022).

Generally, in software projects, the milestones are set for key stages: planning, requirement analysis, system design, development, testing, deployment, and documentation. Having clear milestones helps to organize the work better, ensuring progress towards meeting the objectives of the project (PMI, 2021).

For the Shadow Fit Gym Management System, milestones are planned in a way that applies to the Incremental Software Development Methodology, meaning the project is divided into smaller parts and each milestone represents the completion of one part or major feature. This approach allows features to be tested and improved step by step.

The project milestones are as following:



No.	Milestone	Description
1	Project Planning	Definition of project scope, objectives, tools and methodology.
2	Requirement Analysis	Gather functional and non-functional requirements and prepare SRS.
3	System Design	Design system architecture, database schema, and UI/UX wireframes.
4	Increment Development – 1	Develop homepage, trainer profile module, and basic navigation.
5	Increment Development – 2	Implement membership plans, booking system, and user authentication.
6	Increment Development - 3	Admin dashboard, trainer scheduling module, and feedback system development.
7	Testing & Integration	Conduct unit, integration, system, and user acceptance testing.
8	Deployment	Deploy website on server, make sure all modules work.
9	Documentation	Prepare user manual, admin guide and technical documentation.
10	Final Review & Submission	Review project deliverables, submit report and present project.

*Table 1: Milestones List Table*

The Shadow Fit Gym Management System is developed following the Incremental Software Development approach, splitting the entire work into manageable milestones. Each milestone encompasses the development of the project features step by step. Planning and requirement analysis, system design comprising architecture, database, and UI wireframes, are the initial steps of the project. Then, the implementation is done incrementally: first, the homepage and trainer profiles, followed by membership and booking features; and lastly, the admin dashboard and scheduling modules. Each increment is tested and integrated before proceeding to the next. The final milestones include deployment, documentation, and a review of the project. This ensures

feedback early on, orderly development, and the delivery of functional modules reliably. This incremental milestone-based approach enables the completion of the project step by step, allows for early detection of errors, includes feedback, and makes sure each part of the system is working effectively before moving on to the next stage.

### 3.6 Gantt Chart

A Gantt chart is a project-planning tool that displays project tasks on a timeline using horizontal bars. It shows when each task begins, how long it will take, and when it should be completed. This helps in organizing work, understanding task sequences, and tracking progress throughout the project. Gantt charts are widely used in software development because they make scheduling and monitoring activities clearer and more efficient (Larson & Gray, 2021).

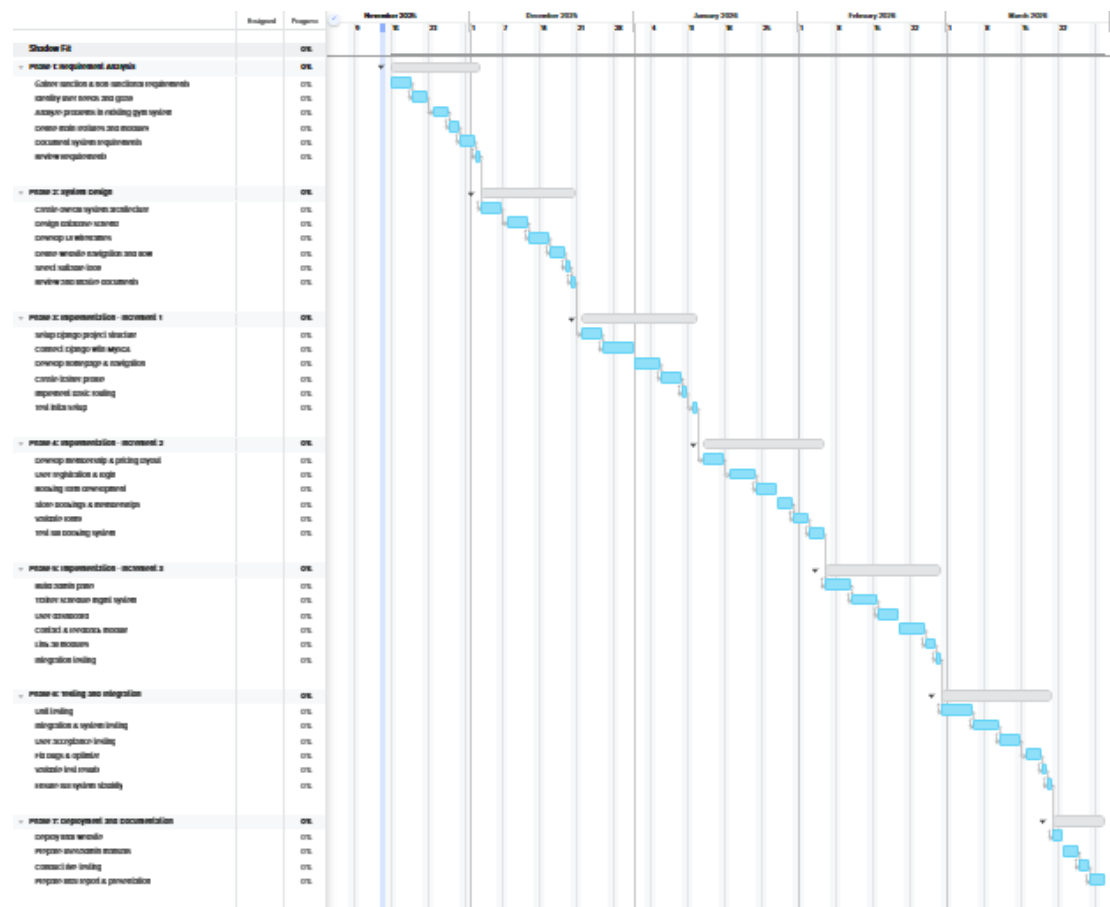


Figure 12: Gantt Chart

The Gantt chart for the Shadow Fit project outlines all the major activities, from requirement analysis to deployment, in a planned timeline ranging from mid-November to late March. In addition, each task is placed in its appropriate dependencies, such as Finish-to-Start and Start-to-Start, to illustrate how the continuity from one activity leads to another. Since the project involves an Incremental methodology, the chart further divides the development work into three increments that add essential features of the system in steps. Furthermore, it excludes Saturdays to make the academic schedule realistic. This Gantt chart will ensure that the project proceeds in a properly organized, controlled, and timely manner.

## 4. Work Done

### 3.1 Entity Relationship Diagram

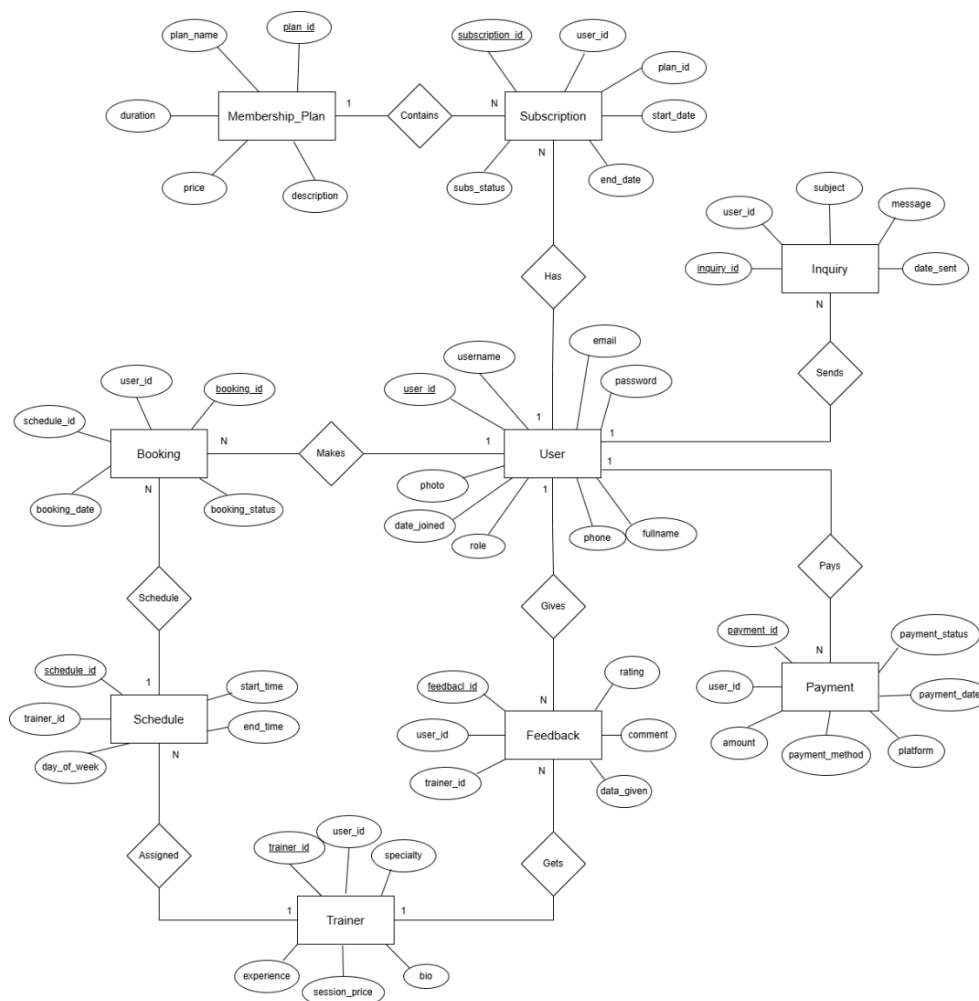


Figure 13: Initial ERD of the Project

### 3.1 Data Dictionary

#### 3.1.1 User Table

Attribute	Data Type	Description
user_id	INT PRIMARY KEY	Unique identifier for each user
username	VARCHAR(100)	Login username
email	VARCHAR(120)	User email address
password	VARCHAR(255)	Hashed password
fullname	VARCHAR(120)	Full name of the user
phone	VARCHAR(20)	User contact number
role	VARCHAR(20)	Account type: 'Admin', 'Member', or 'Trainer'
date_joined	DATETIME	Timestamp of account creation
photo	VARCHAR(200)	File path or URL of profile photo

Figure 14: Data Dictionary of User Table

#### 3.1.2 Trainer Table

Attribute	Data Type	Description
trainer_id	INT PRIMARY KEY	Unique identifier for each trainer
user_id	INT	FK referencing User.user_id
specialty	VARCHAR(100)	Area of expertise (e.g., Strength, Yoga)
experience	INT	Years of professional experience
session_price	DECIMAL(8,2)	Cost per training session
bio	VARCHAR(250)	Background information of the trainer

Figure 15: Data Dictionary of Trainer Table

### 4.2.3 Membership\_Plan Table

Attribute	Data Type	Description
plan_id	INT PRIMARY KEY	Unique identifier for each membership plan
plan_name	VARCHAR(50)	Name of the plan (e.g., Basic, Premium)
duration	INT	Duration in months
price	DECIMAL(8,2)	Price of the plan
description	VARCHAR(200)	Details of what the plan includes

Figure 16: Data Dictionary of Membership\_Plan Table

### 4.2.4 Subscription Table

Attribute	Data Type	Description
subscription_id	INT PRIMARY KEY	Unique subscription ID
user_id	INT	FK referencing User.user_id
plan_id	INT	FK referencing Membership_Plan.plan_id
start_date	DATE	Subscription start date
end_date	DATE	Subscription end date
subs_status	VARCHAR(20)	Status: 'Active', 'Expired', or 'Cancelled'

Figure 17: Data Dictionary of Subscription Table

### 4.2.5 Schedule Table

Attribute	Data Type	Description
schedule_id	INT PRIMARY KEY	Unique schedule ID
trainer_id	INT	FK referencing Trainer.trainer_id
day_of_week	VARCHAR(20)	Day of the week (e.g., Monday, Friday)
start_time	TIME	Session start time
end_time	TIME	Session end time

Figure 18: Data Dictionary of Schedule Table

#### 4.2.6 Booking Table

Attribute	Data Type	Description
booking_id	INT PRIMARY KEY	Unique booking ID
user_id	INT	FK referencing User.user_id
schedule_id	INT	FK referencing Schedule.schedule_id
booking_date	DATETIME	Date and time the booking was made
booking_status	VARCHAR(20)	Status: 'Pending', 'Confirmed', 'Cancelled', or 'Completed'

Figure 19: Data Dictionary of Booking Table

#### 4.2.7 Inquiry Table

Attribute	Data Type	Description
inquiry_id	INT PRIMARY KEY	Unique inquiry ID
user_id	INT	FK referencing User.user_id
subject	VARCHAR(150)	Inquiry subject/title
message	VARCHAR(500)	Body/content of the inquiry
date_sent	DATETIME	Timestamp when the inquiry was submitted

Figure 20: Data Dictionary of Inquiry Table

#### 4.2.8 Feedback Table

Attribute	Data Type	Description
feedback_id	INT PRIMARY KEY	Unique feedback ID
user_id	INT	FK referencing User.user_id
trainer_id	INT	FK referencing Trainer.trainer_id
rating	INT	Rating given by user (e.g., 1–5)
comment	VARCHAR(500)	Feedback comment
date_given	DATETIME	Timestamp when feedback was submitted

Figure 21: Data Dictionary of Feedback Table

#### 4.2.9 Payment Table

Attribute	Data Type	Description
payment_id	INT PRIMARY KEY	Unique payment ID
user_id	INT	FK referencing User.user_id
amount	DECIMAL(8,2)	Amount paid
payment_method	VARCHAR(20)	Method: 'Cash', 'Online', 'Card', or 'Other'
platform	VARCHAR(20)	Online platform: 'Khalti', 'eSewa', 'Bank', or NULL
payment_date	DATETIME	Date and time of payment
payment_status	VARCHAR(20)	Status: 'Pending', 'Completed', or 'Failed'

Figure 22: Data Dictionary of Payment Table

### 4.3 Use Case Diagram

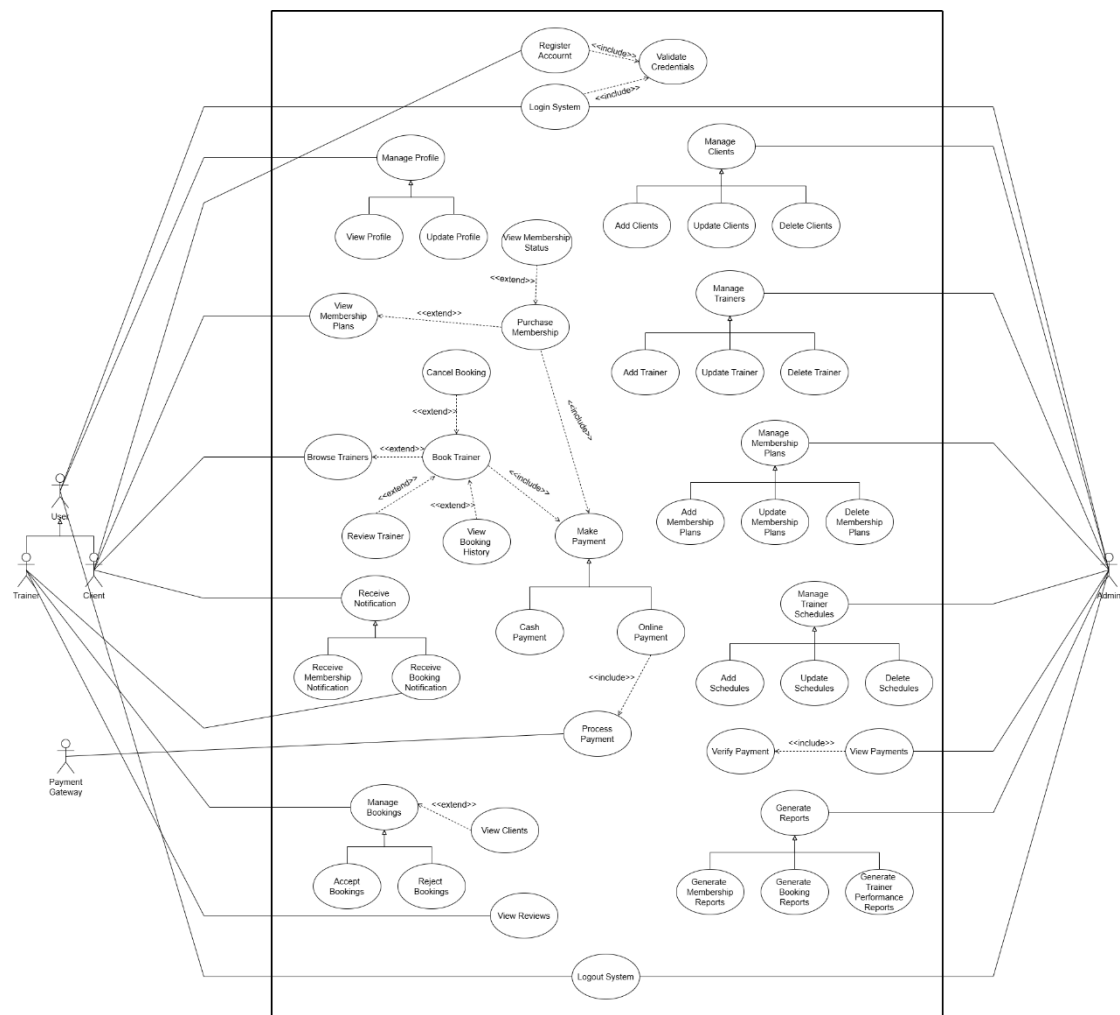


Figure 23: Use Case Diagram of Whole System



## 4.4 Data Flow Diagram

### 4.4.1 Context Level Diagram

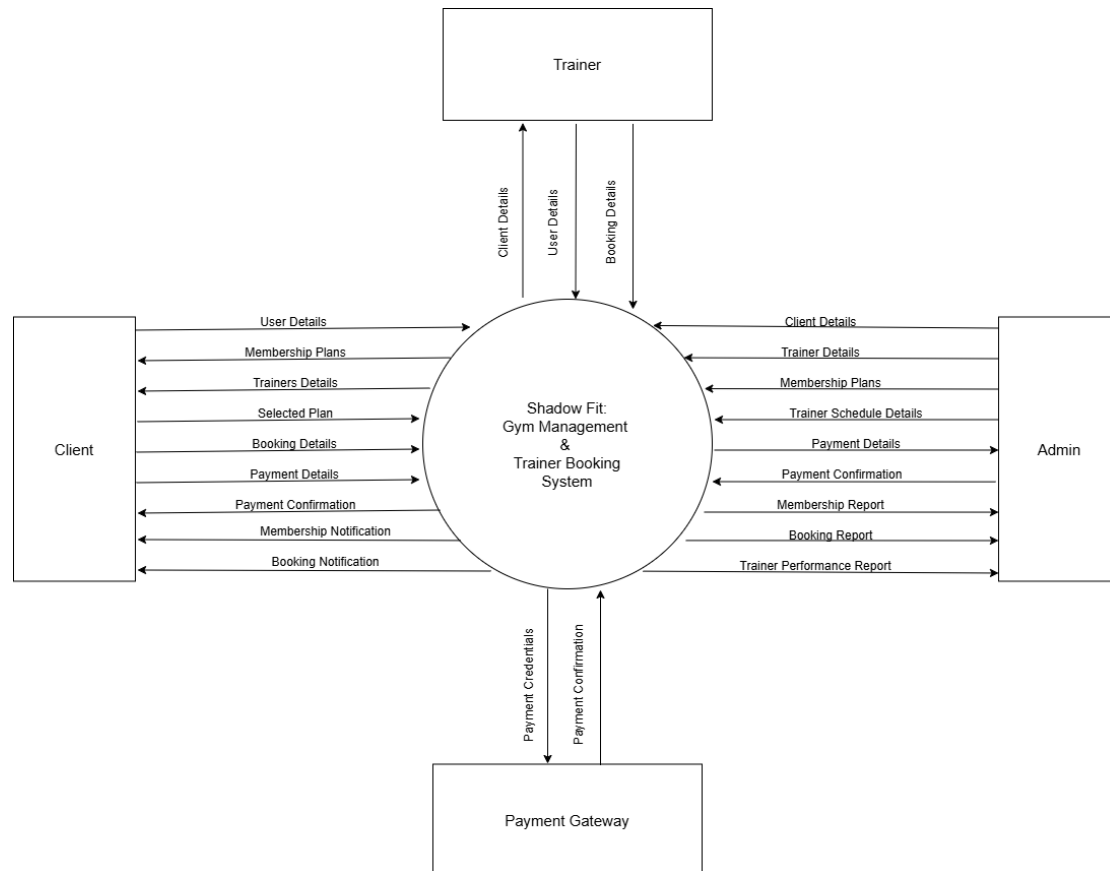


Figure 24: Context Level Diagram of Whole System

## 4.4.2 DFD Level 1

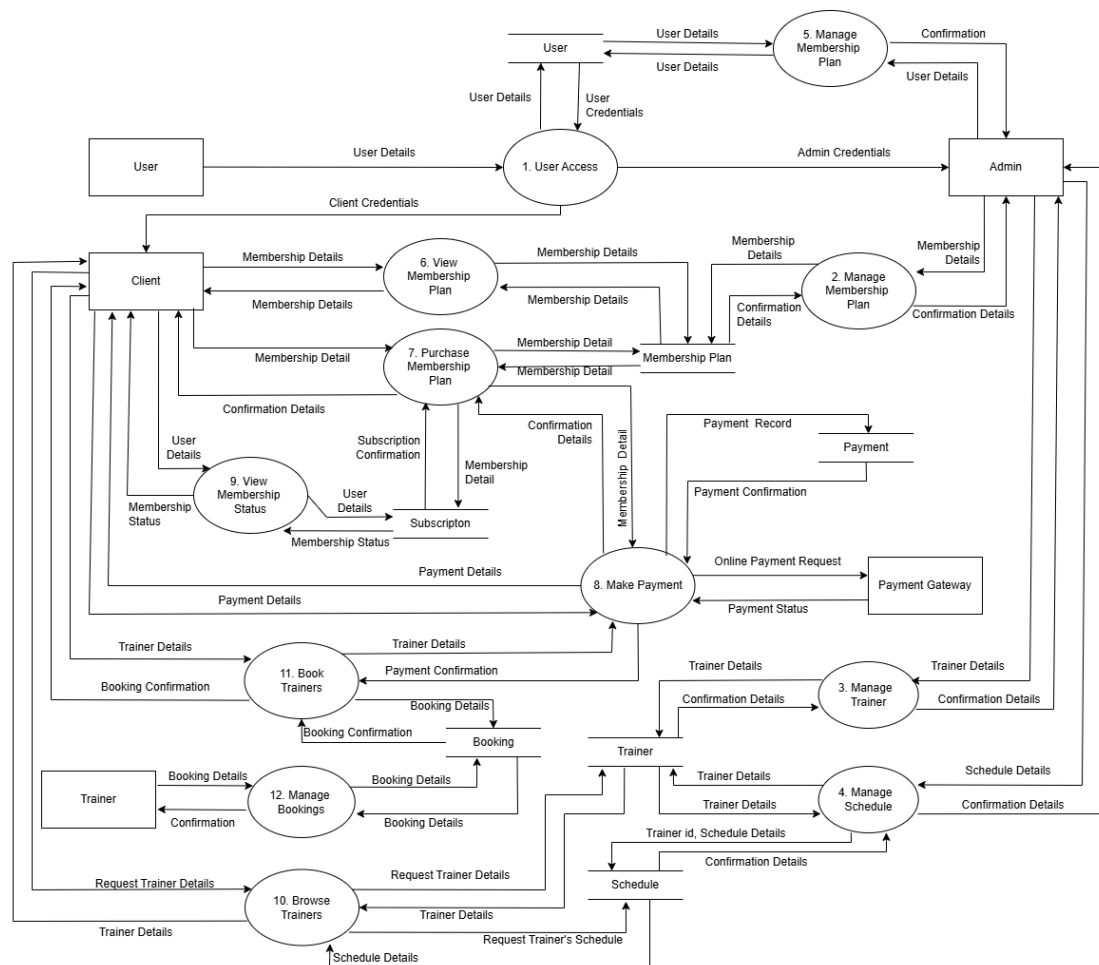


Figure 25: DFD Level 1 of Whole System

### 4.4.3 DFD Level 2

- Purchase Membership

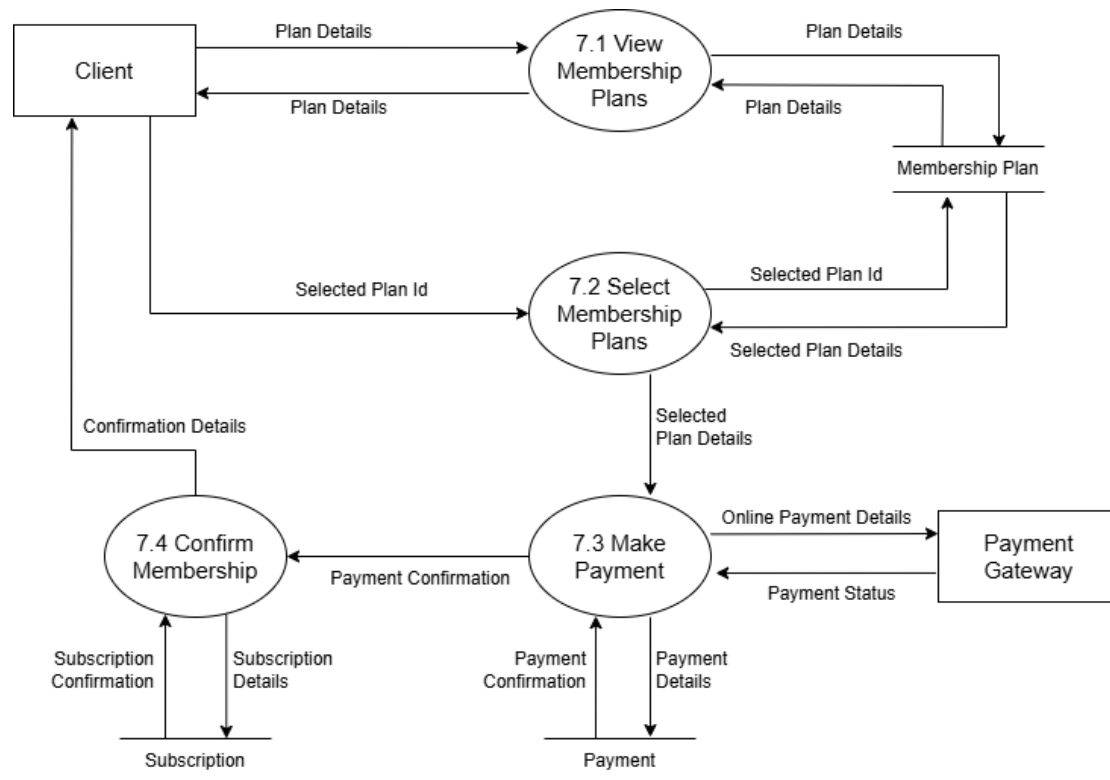


Figure 26: DFD Level 2 of Purchase Membership

- Book Trainer

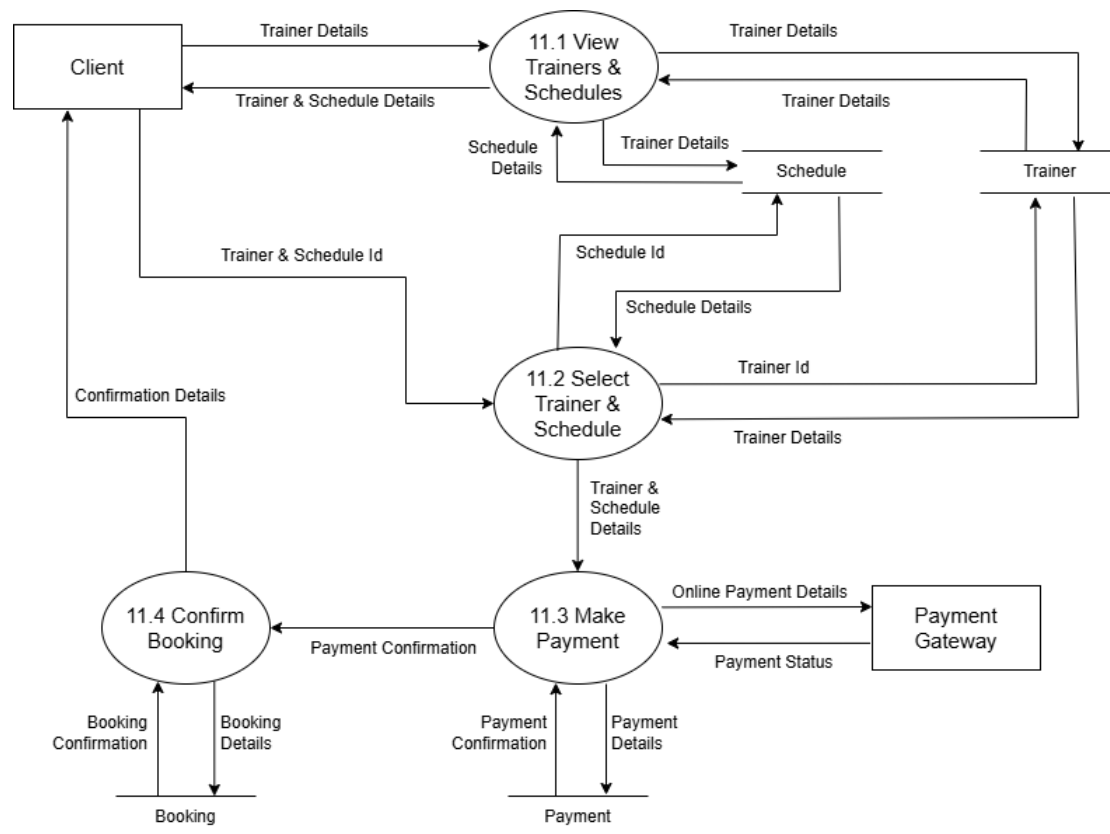


Figure 27: DFD Level 2 of Book Trainer

## 4.5 Class Diagram

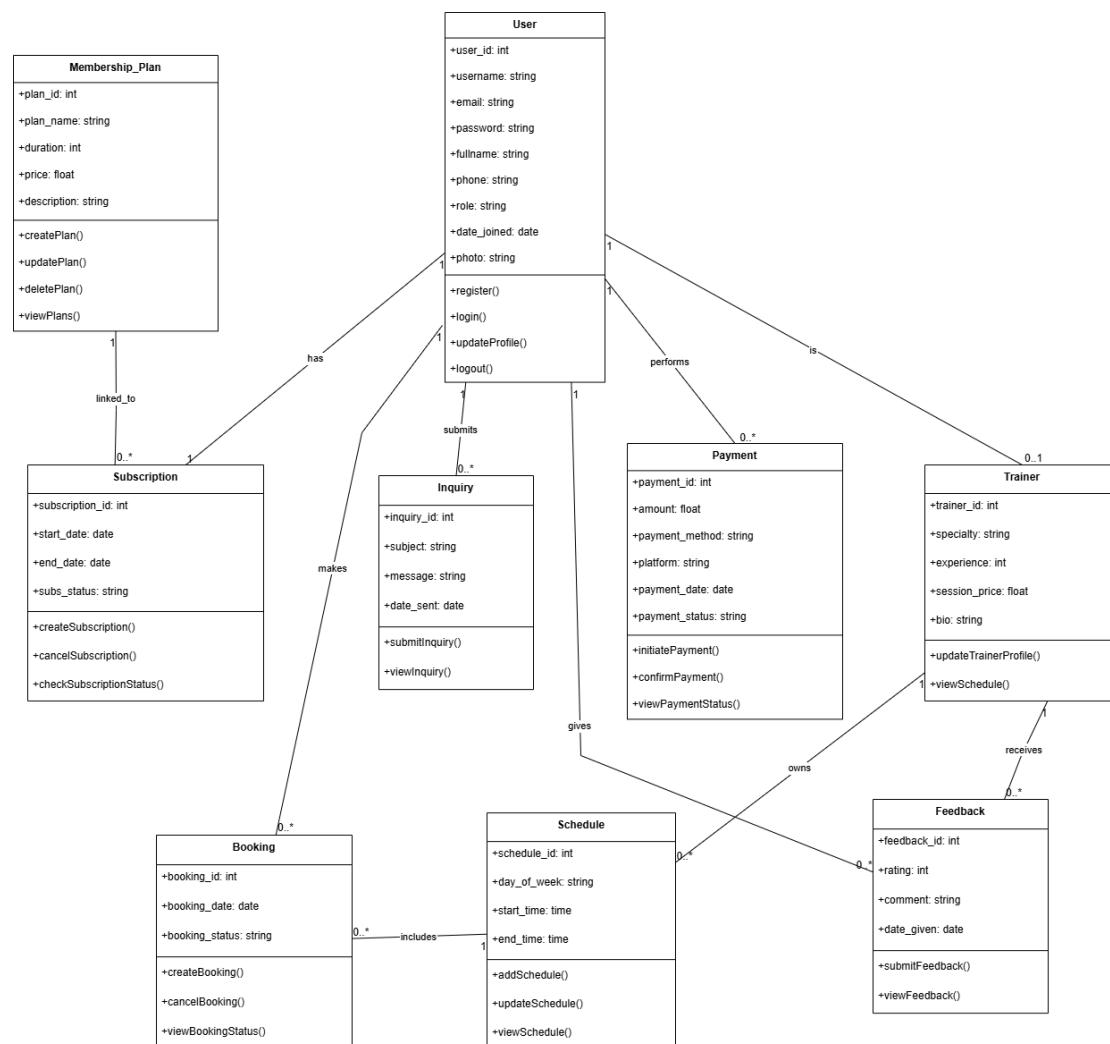


Figure 28: Class Diagram of Shadow Fit

## 4.6 Software Requirement Specification (SRS)

### 4.6.1 Introduction

Currently, the fitness industry uses several digital means to handle membership subscriptions, class bookings, and payments. However, manual systems take a lot of time and cannot avoid errors. Most importantly, such methods are inconvenient for the clients and the gym staff. Shadow Fit is a web application designed to handle gym memberships and trainer bookings in such a manner that handling will be the least cumbersome for the users.

The following document provides the outlines of the requirements for Shadow Fit, against which developers, evaluators, and users will have a common

understanding of what functionalities, performance, and constraints the system will be imposing.

#### **4.6.1.1 Purpose**

This SRS was drawn up to specify the functionality and non-functionality requirements of Shadow Fit. It will be guiding system developers on how to design and implement the system properly, and testers and supervisors as to how the system meets intended objectives.

#### **4.6.1.2 Scope**

Shadow Fit is an online gym service management solution that has been designed to handle necessary gym-related services via an online interface. This website-based tool enables clients to:

- Viewing and acquiring membership plans for the gym
- Viewing available trainers and booking trainer sessions
- Payment for memberships, trainers, and other charges

It can handle administrative activities, including user, plan, trainer, booking, and payment management. Online payments are processed using a Payment Gateway, while offline payments are processed bypassing it. The system currently does not include any non-core functionalities, including tracking and nutrition.

#### **4.6.1.3 Objectives**

The key goals of the Shadow Fit system are:

- To make an online purchasing membership of a gym
- To make a simpler trainer appointment service with a user-friendly online platform
- To minimize gym management activities that are carried out manually or in paper format
- For a secure payment system
- Ensuring the correct and secure processing of user data and payments
- For the purposes of illustrating the correct application of software engineering techniques and database design concepts.

### 4.6.2 System Overview

The architecture used in the design of Shadow Fit is based on a client server architecture. The clients can communicate with the system through a web interface. The requests for the operation will be processed through a server, and the information is stored in a relational database.

Users are classified into Clients and Admins and have access to various system functions on the basis of their roles. The main modules are:

- User Management: registration, login, maintenance
- Membership Management: membership plans view & buy
- Trainer Management: trainer Profiles & Availability
- Booking Management: book trainer sessions
- Payment Management: Online Payment & Offline Payment

The system is based on modularity, data integrity, and security, which ensures all financial transactions and data are authentic and traceable.

### 4.6.3 Functional Requirements

- User Registration and Login
  - Users can register with personal details.
  - Users can safely log in with their username and password.
- User Profile Management
  - Users' personal details, as well as contact information, are stored.
  - Role information (whether Client or Admin) is handled by the system.
- View Membership Plans
  - Clients can see the plans available with details like cost, time duration, and others.
- Buy Membership Plan
  - A client is able to choose and pay for a subscription.
  - The subscription is established in the database upon a successful payment.
- Trainer Management

- Profiles of the trainers are maintained with attributes of specialization and availability.
  - Admins can add, modify, or delete trainer profiles.
- Trainer Booking
  - Clients can schedule sessions with the trainers based on the trainers' availability.
  - Booking records contain date, time, and trainer information.
- Payment processing
  - Payment options are available for membership and training classes.
  - Online payment systems employ a Payment Gateway. Payment Gateways are not used in offline payment systems.
  - All transactions are documented in the system.
- Data Management
  - Data storage uses the normalized relational database system.
  - The primary and foreign keys help in the maintenance of consistency.

#### **4.6.4 Non-Functional**

- Usability: The system offers an easy-to-use interface.
- Performance: It responds to user requests quickly, even when under normal loads.
- Security: User login and sensitive information like payments are secure.
- Reliability: Essential services are available with minimal disruptions.
- Maintainability: The design is modular, allowing the system to be updated.
- Data Integrity: The data accuracy is guaranteed, and unauthorised changes are not allowed.



## 4.7 Sequence Diagram

### 4.7.1 Make Payment System

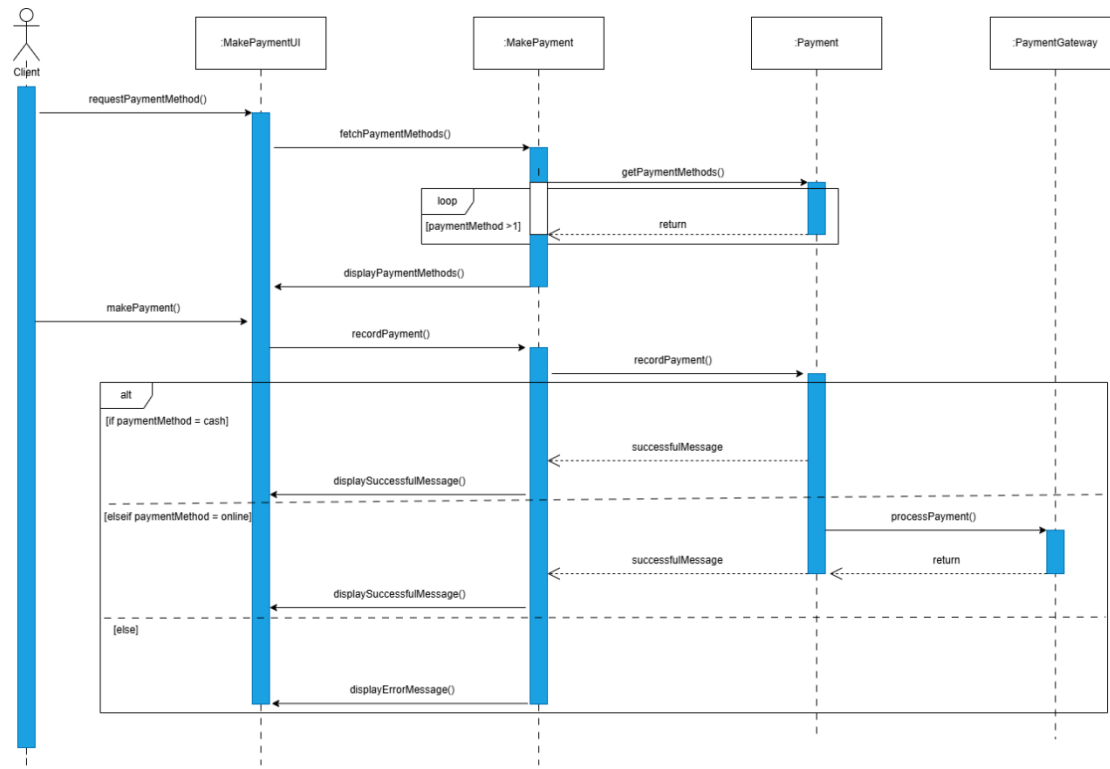


Figure 29: Sequence Diagram of Make Payment System

### 4.7.2 Update Profile System

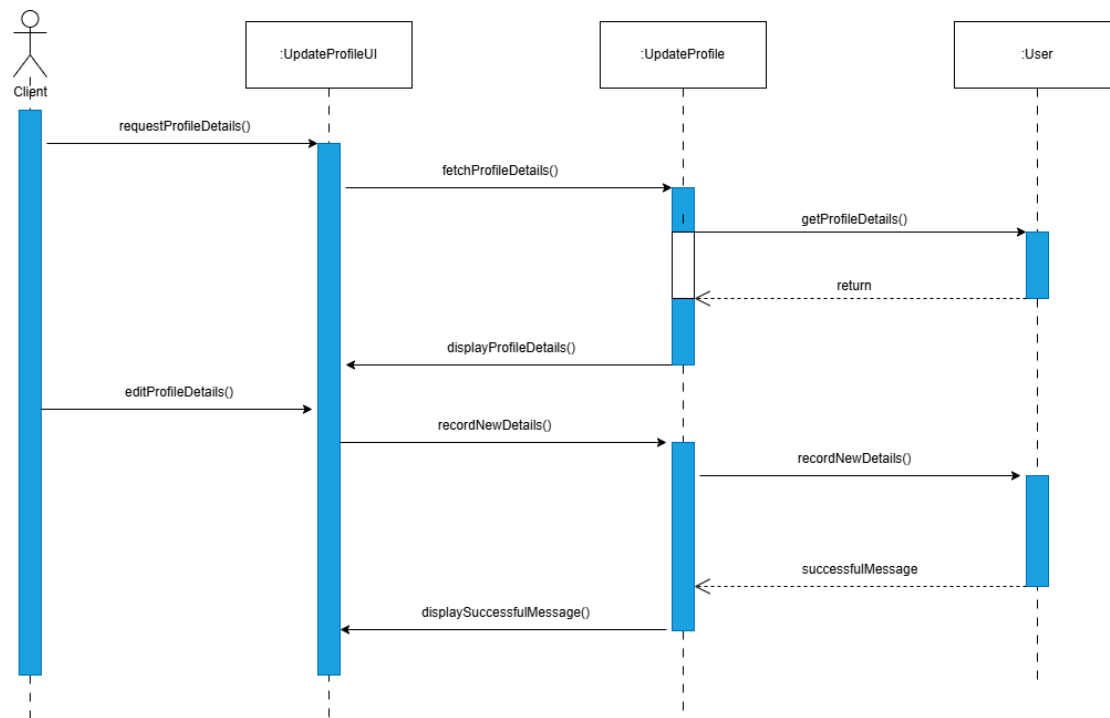


Figure 30: Sequence Diagram of Update Profile System

## 4.8 Collaboration Diagram

### 4.8.1 Purchase Membership System

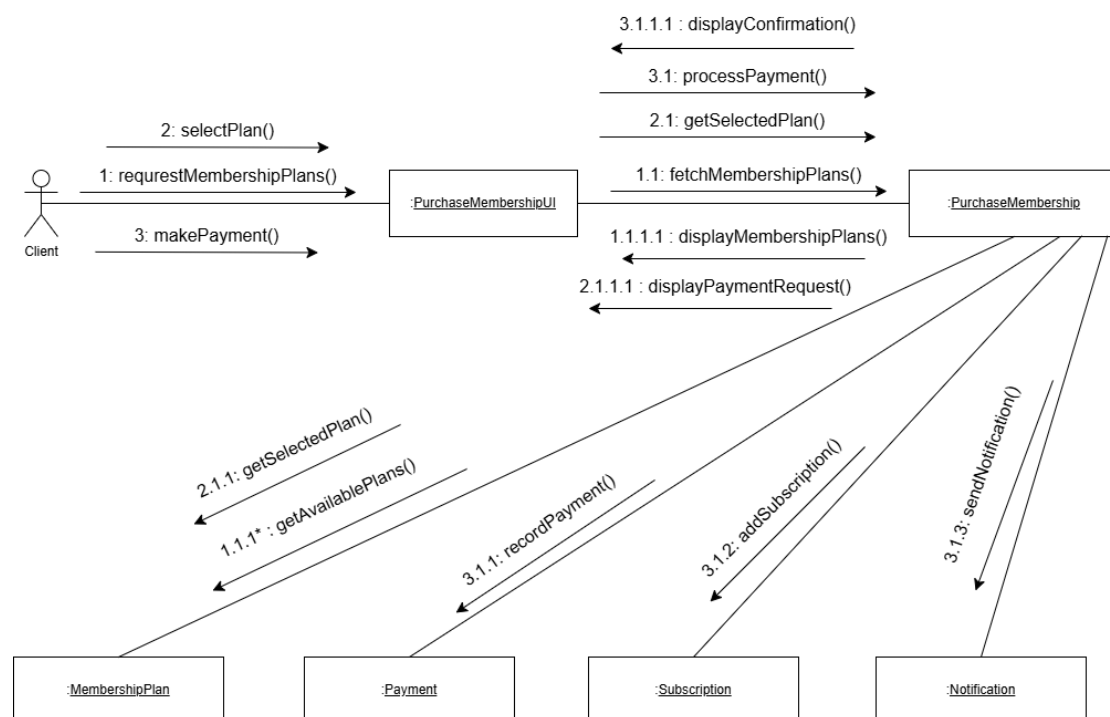


Figure 31: Collaboration Diagram of Purchase Membership System

## 4.8.2 Book Trainer System

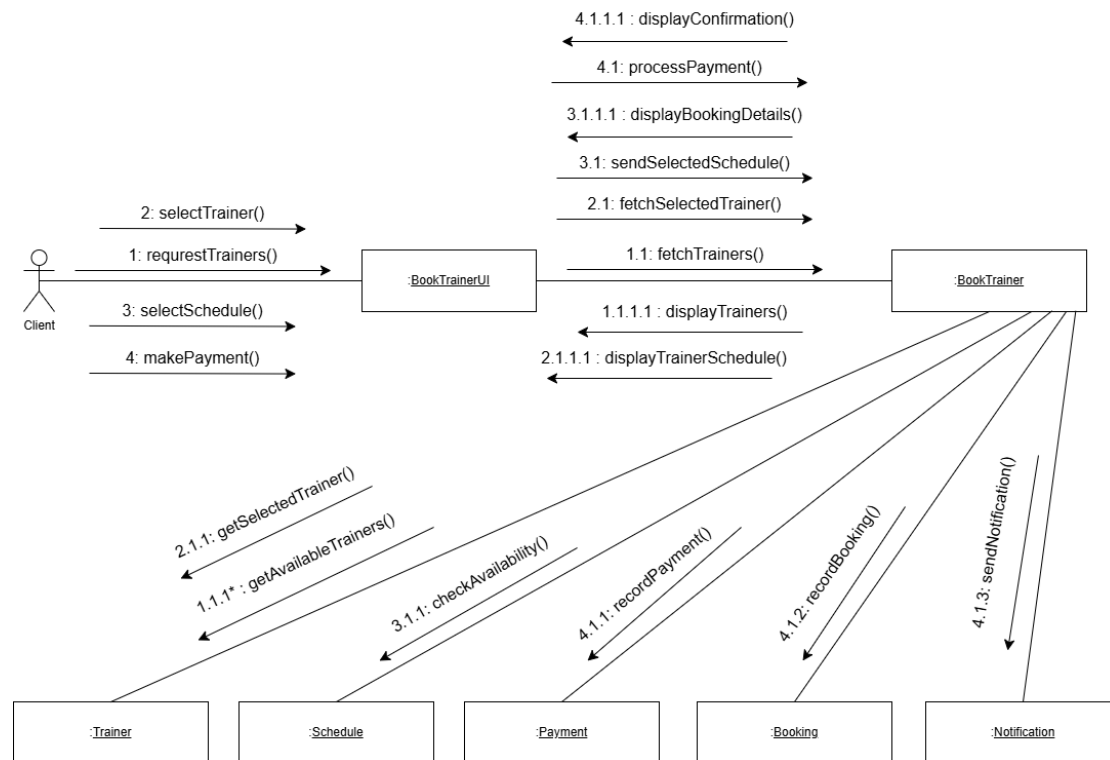


Figure 32: Collaboration Diagram of Book Trainer System

## 4.9 Flowcharts

### 4.9.1 View Membership Status

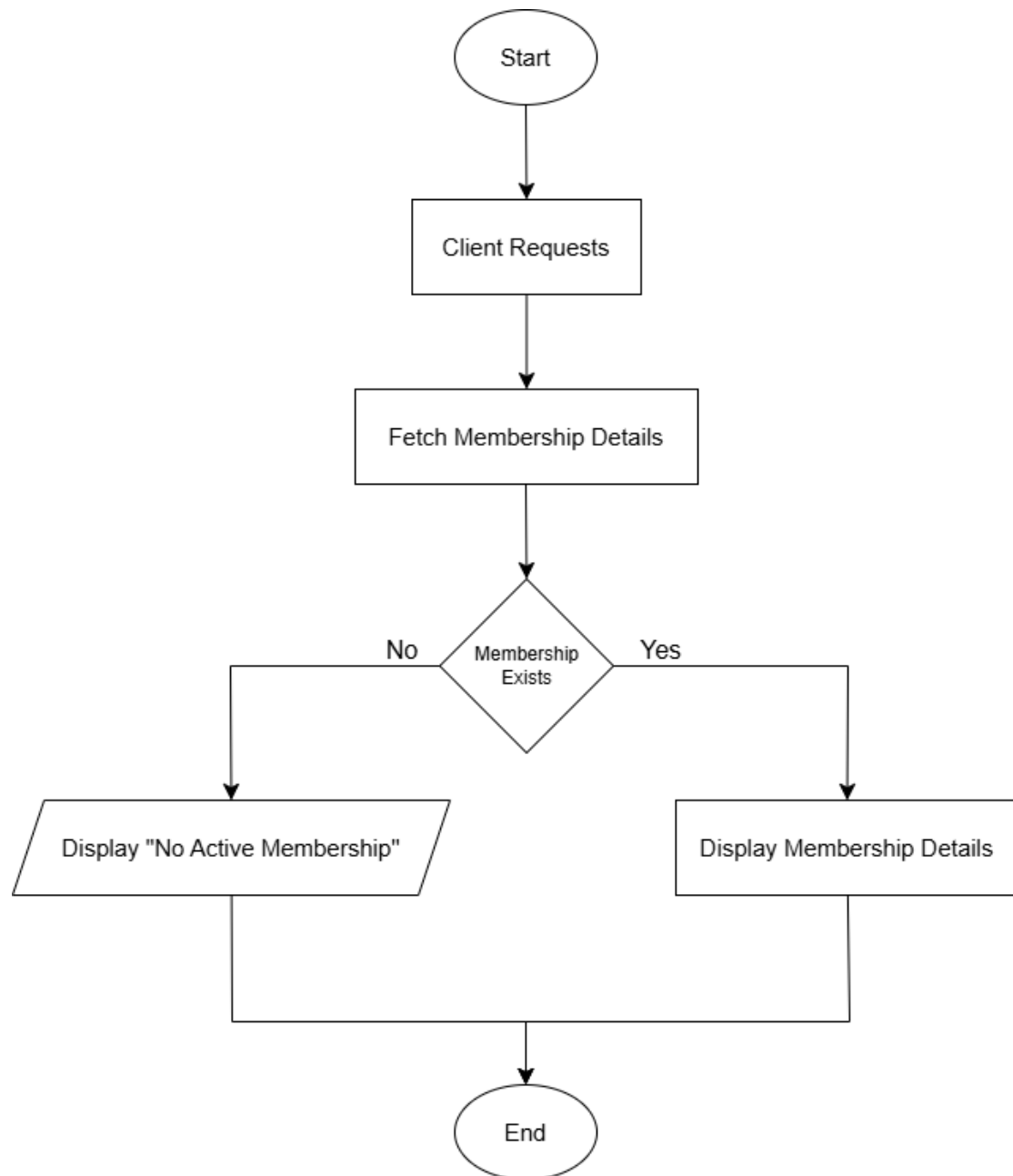


Figure 33: Flowchart of View Membership Status

#### 4.9.2 Cancel Booking System

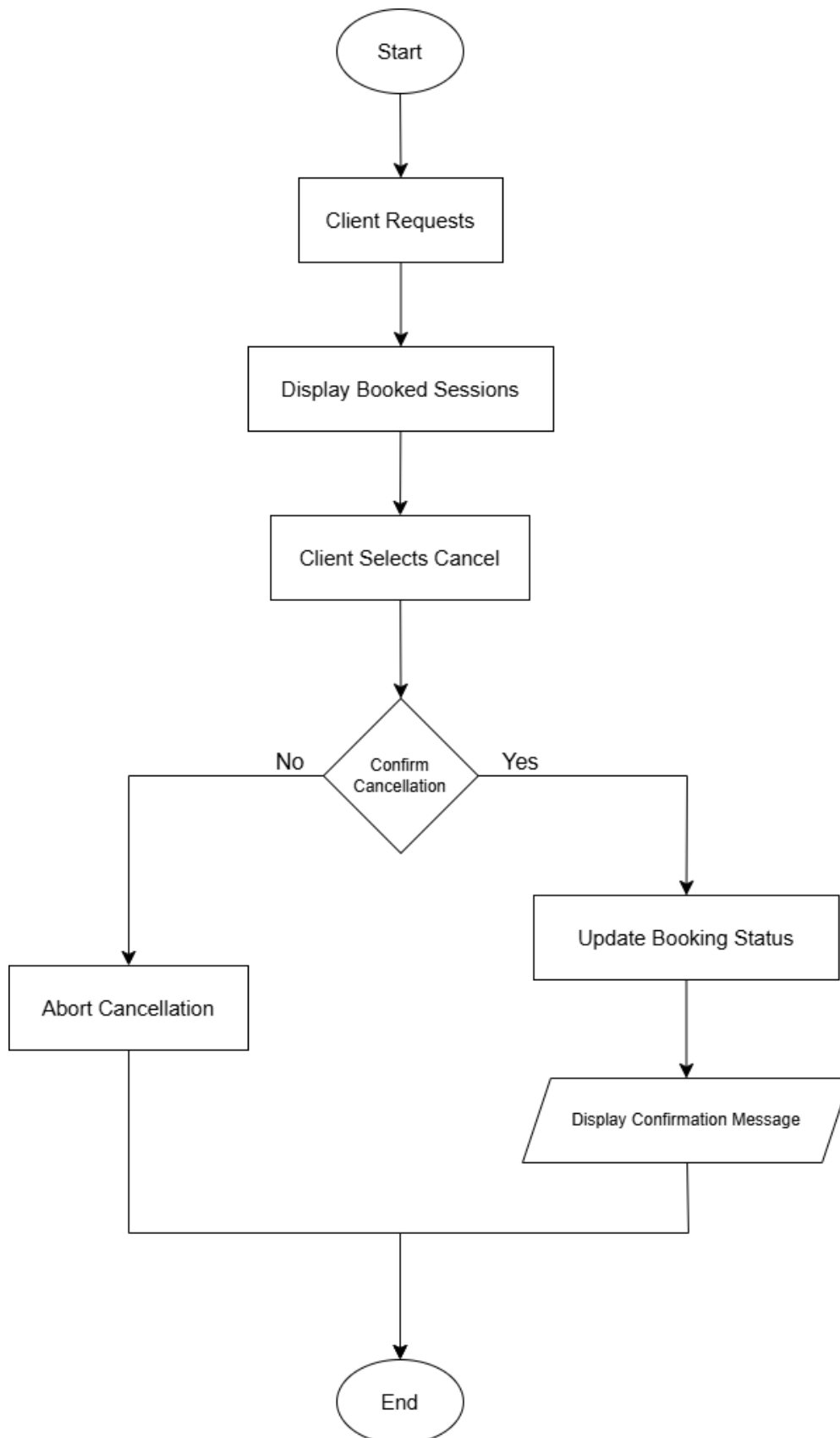


Figure 34: Flowchart of Cancel Booking System

## 4.10 Wireframes

### 4.10.1 Login Page Wireframe

The wireframe shows a web browser window titled "Shadow Fit" with the URL "https://shadow-fit.com". The main content is a login form with the title "Login". It includes fields for "Username:" and "Password:", a "Remember Me" checkbox, a "Forgot password?" link, a "Login" button, and a section for users without an account, including a "Don't have an account?" prompt and a "Click Here to Sign Up!" link.

Shadow Fit

https://shadow-fit.com

### Login

Username:

Password:

☒ Remember Me [Forgot password?](#)

OR

Don't have an account?

[Click Here to Sign Up!](#)

Figure 35: Login Page Wireframe

### 4.10.2 Sign Up Page Wireframe

The wireframe shows a web browser window titled "Shadow Fit" with the URL "https://shadow-fit.com". Inside the browser, there is a central "Sign Up" form. The form contains the following elements:

- Sign Up** (Section Header)
- Full Name:** [Text Input Field]
- Username:** [Text Input Field]
- Email:** [Text Input Field]
- Phone No.:** [Text Input Field]
- Password:** [Text Input Field] with a help icon (?)
- Re-type password:** [Text Input Field]
- Upload Profile Pic:** [Image Upload Icon]
- ☐ I agree to the [Terms of Use](#) and [Privacy Policy](#).
- Sign up** (Button) and [Learn more](#) (Link)
- OR** (Text separator)
- Already have an account?**
- [Click Here to Login!](#) (Link)

Figure 36: Sign Up Page Wireframe

### 4.10.3 Homepage Wireframe

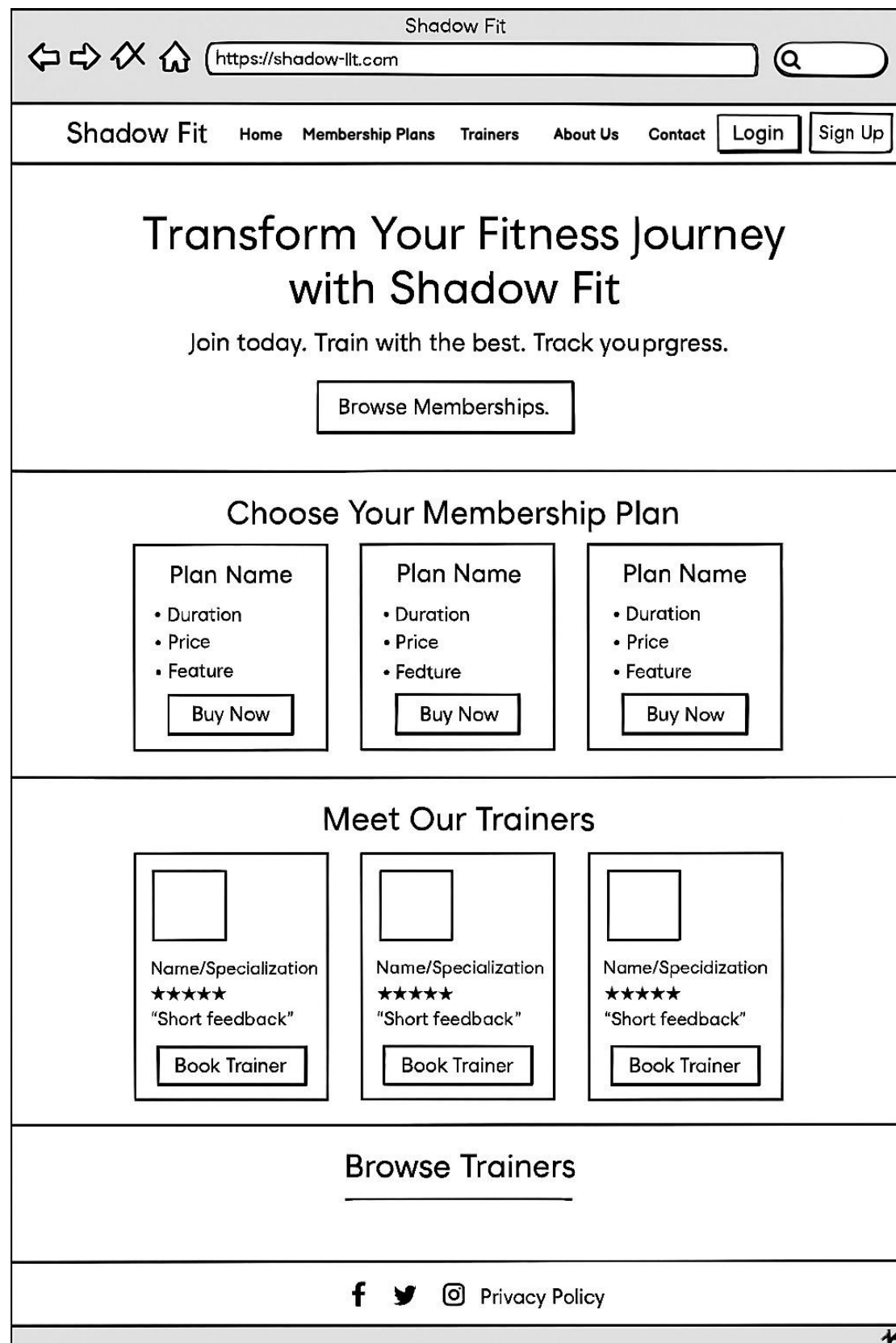


Figure 37: Homepage Wireframe



#### 4.10.4 Membership Page Wireframe

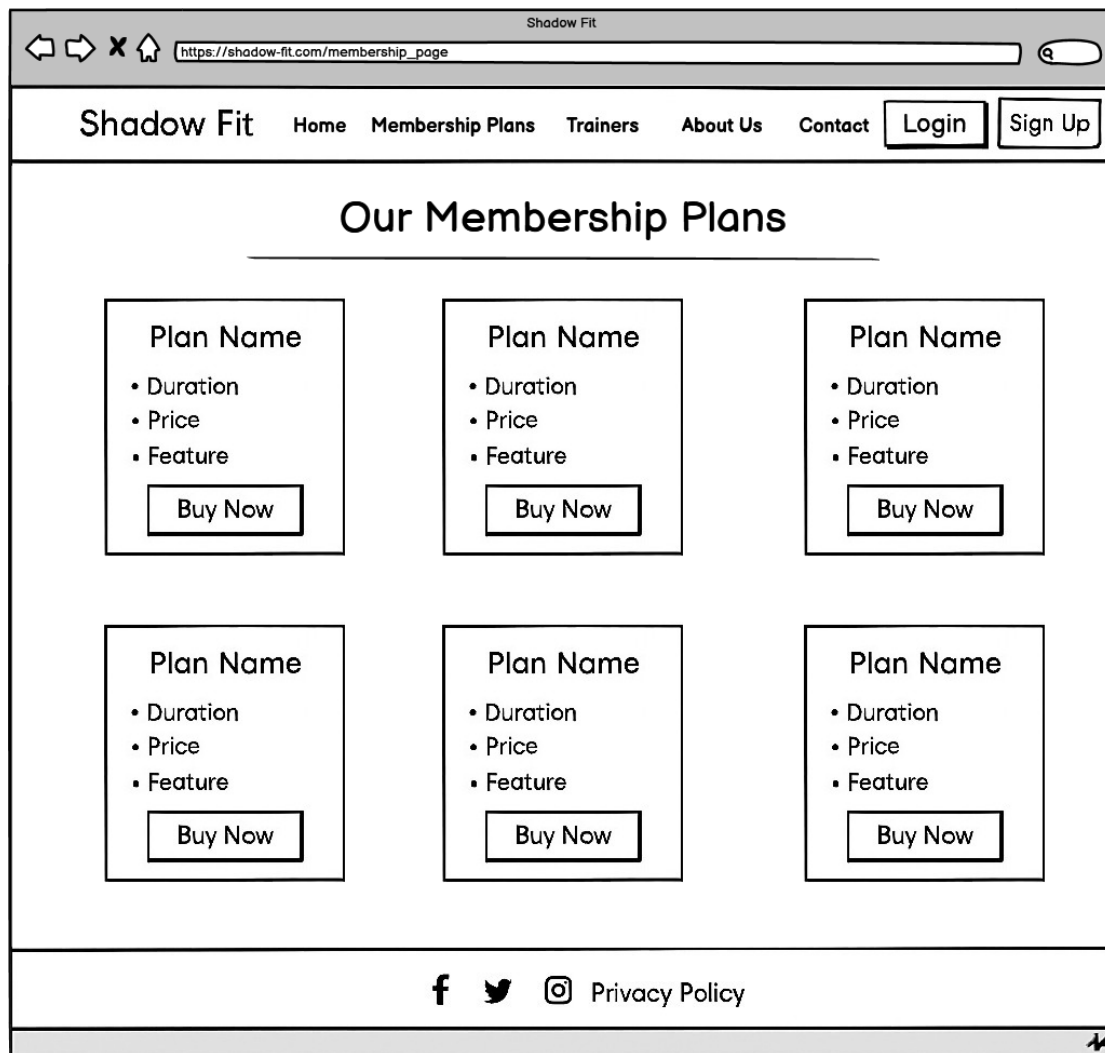


Figure 38: Membership Page Wireframe

#### 4.10.5 Trainer Page Wireframe

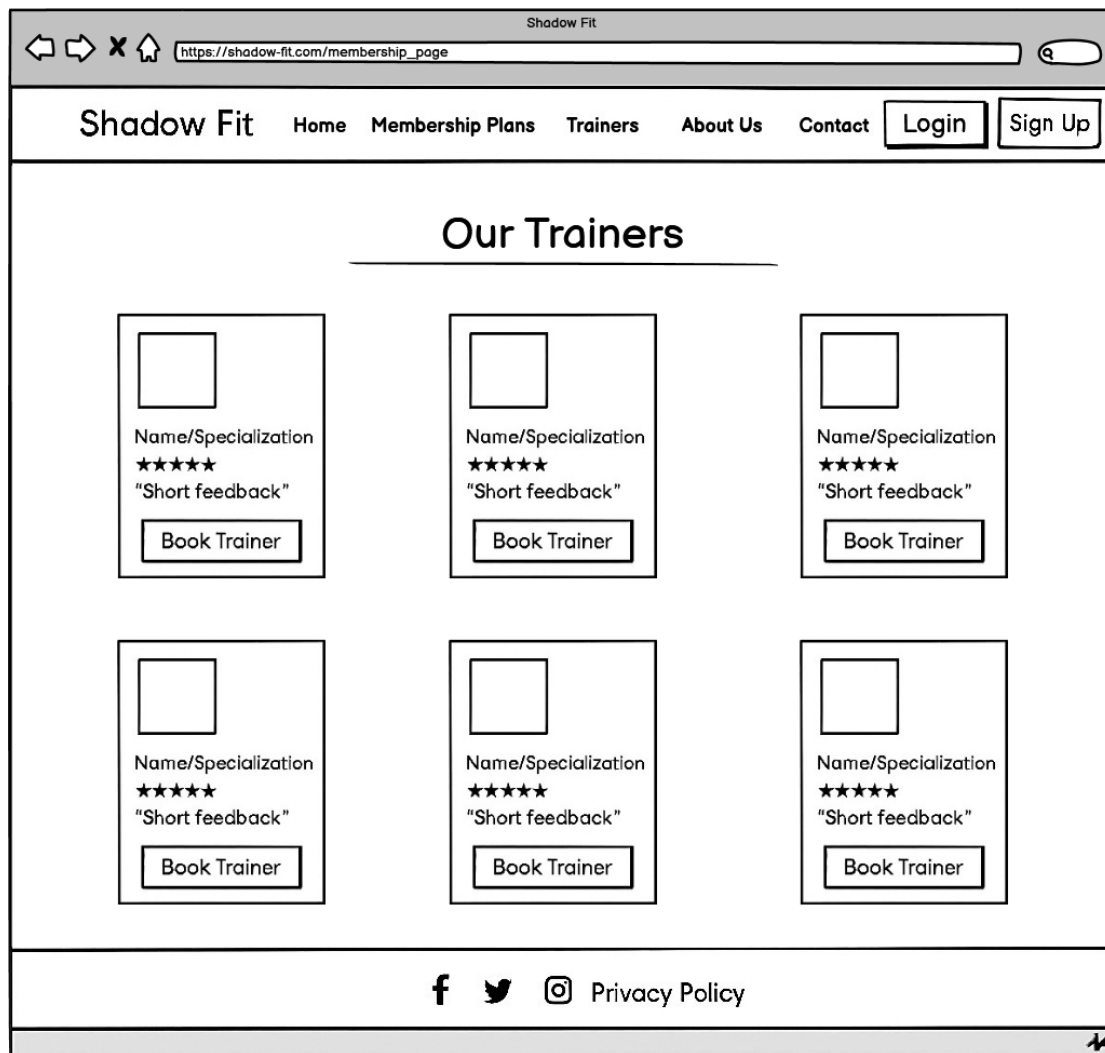


Figure 39: Trainer Page Wireframe

#### 4.10.6 About Us Page Wireframe

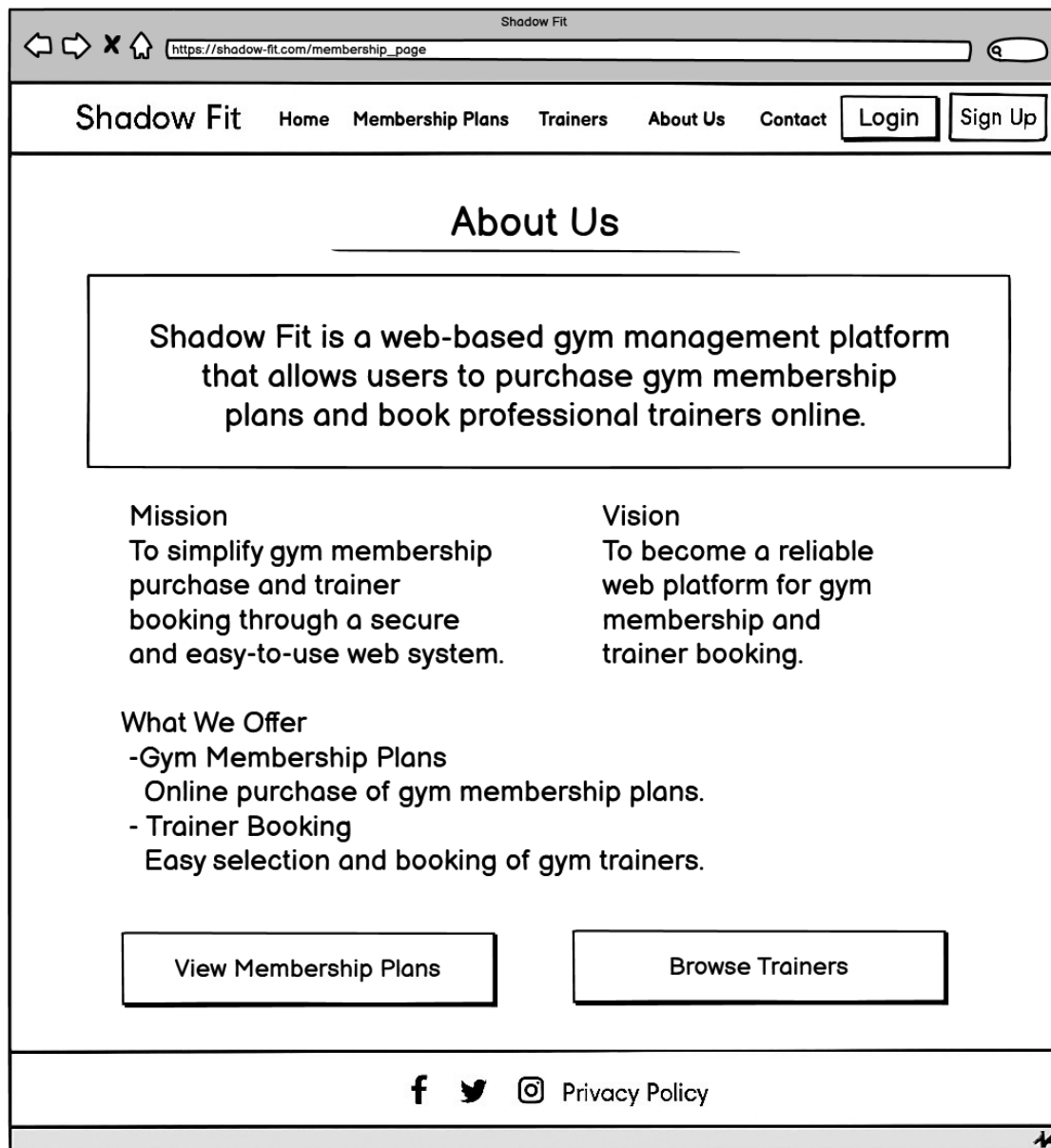


Figure 40: About Us Page Wireframe

#### 4.10.7 Contact Us Page Wireframe

Shadow Fit

Home Membership Plans Trainers About Us Contact Login Sign Up

## Contact Us

"We're here to help. Reach out anytime!"

### Contact Information

Address: Nayabazar, Pokhara, Nepal  
Phone: +977 9801234567  
Email: shadow-fit@gmail.com  
Working Hours: Sun – Fri: 5:00 AM – 9:00 PM  
Sat: Closed

### Contact Form

Full Name:

Email:

Subject:

Message:

f t i Privacy Policy

Figure 41: Contact Us Page Wireframe

#### 4.10.8 Payment Page Wireframe



The wireframe shows a web browser window with the URL `https://shadow-fit.com/membership_page`. The page has a navigation bar with links: Home, Membership Plans, Trainers, About Us, and Contact. The main content area is titled "Confirm Payment" and contains the following elements:

- Item Types:** A dropdown menu currently showing "Membership".
- Items Details:** Text indicating "Membership: Plan Name, Duration, Price".
- Total Amount:** Text indicating "Rs. XXXX.XX".
- Choose Payment Method:** Two radio buttons. The first is selected and labeled "Online Payment". The second is unselected and labeled "Cash Payment".
- Confirmation Message:** A text box containing the message "Complete your payment securely to confirm your selection."
- Buttons:** Two buttons at the bottom: "Confirm Payment" and "Cancel".

The footer contains social media icons for Facebook, Twitter, and Instagram, followed by a link to the "Privacy Policy".

Figure 42: Payment Page Wireframe

#### 4.10.9 Confirmation Page Wireframe

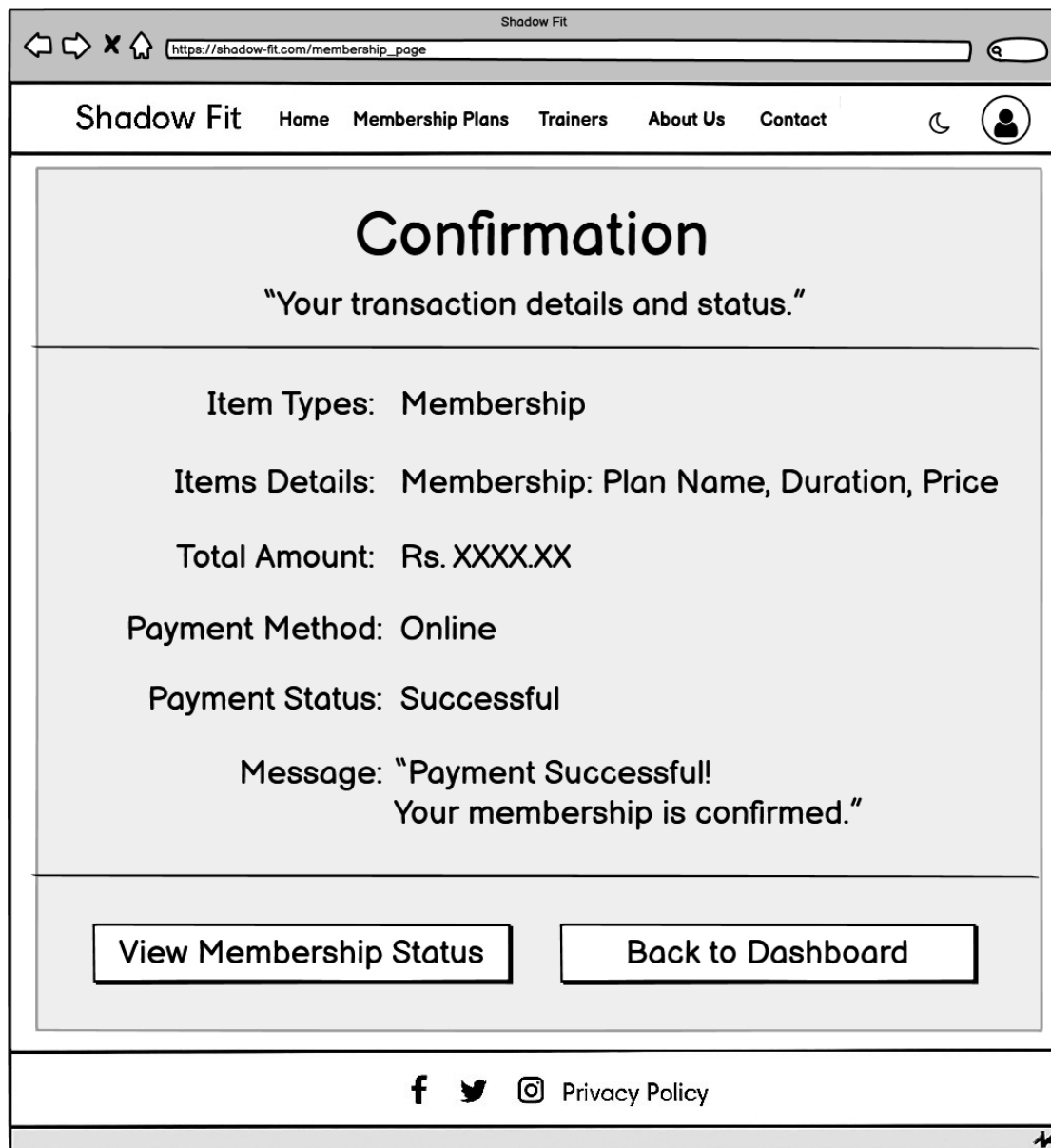


Figure 43: Confirmation Page Wireframe

## 4.11 Prototypes

### 4.11.1 Login Page Prototype

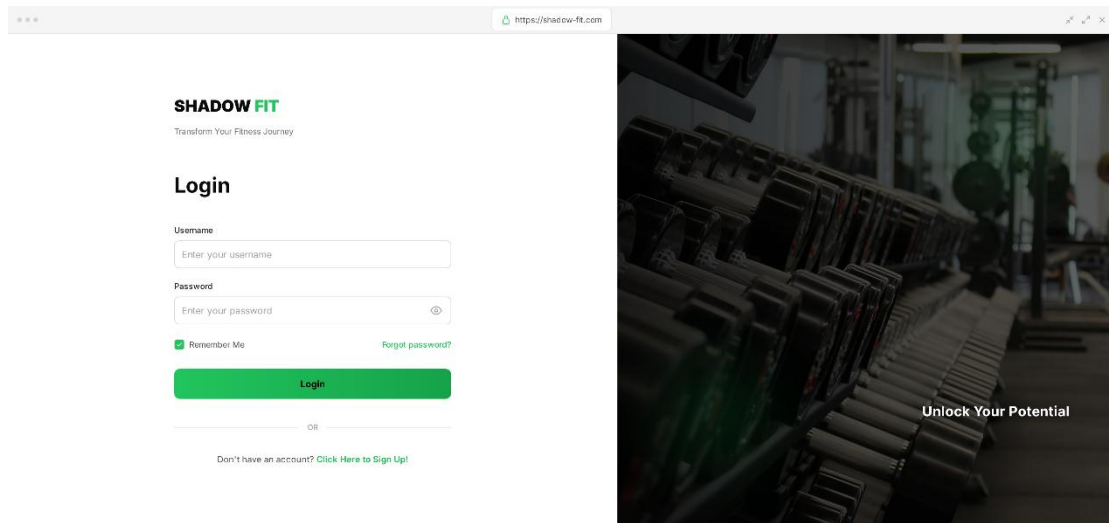
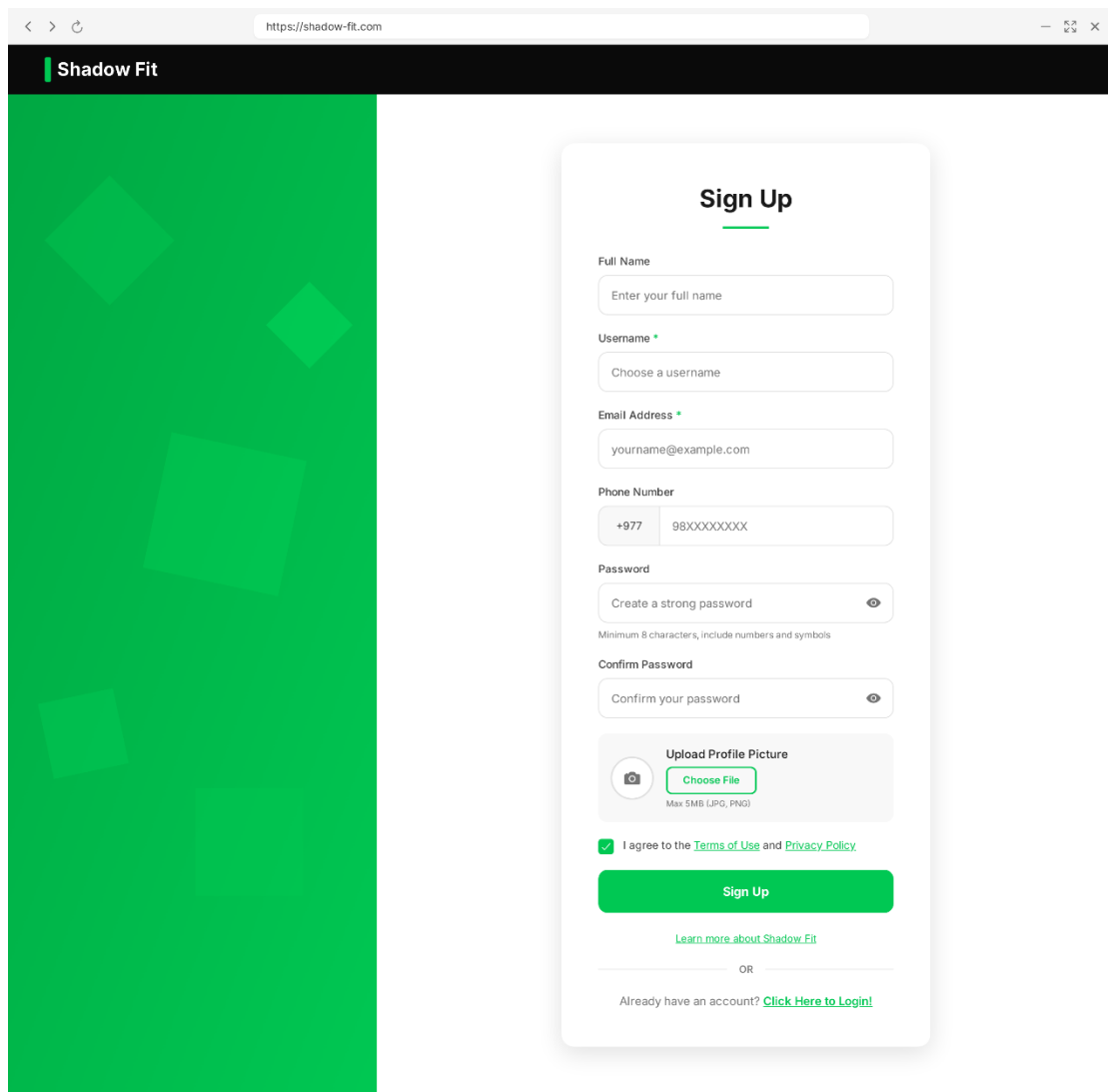


Figure 44: Login Page Prototype:

### 4.11.2 Sign Up Page Prototype



The image shows a web browser window with the URL <https://shadow-fit.com>. The page has a black header with the "Shadow Fit" logo. The main content area is split: the left side is a solid green rectangle, and the right side contains a white "Sign Up" form. The form includes fields for Full Name, Username, Email Address, Phone Number, Password, and Confirm Password. It also features a profile picture upload section, a checkbox for terms and conditions, a green "Sign Up" button, and links for "Learn more about Shadow Fit" and "Click Here to Login!".

Shadow Fit

## Sign Up

Full Name  
Enter your full name

Username \*  
Choose a username

Email Address \*  
yourname@example.com

Phone Number  
+977 98XXXXXXX

Password  
Create a strong password

Minimum 8 characters, include numbers and symbols

Confirm Password  
Confirm your password

Upload Profile Picture  
Choose File  
Max 5MB (JPG, PNG)

☒ I agree to the [Terms of Use](#) and [Privacy Policy](#)

[Sign Up](#)

[Learn more about Shadow Fit](#)

OR

Already have an account? [Click Here to Login!](#)

Figure 45: Sign Up Page Prototype



### 4.11.3 Homepage Prototype

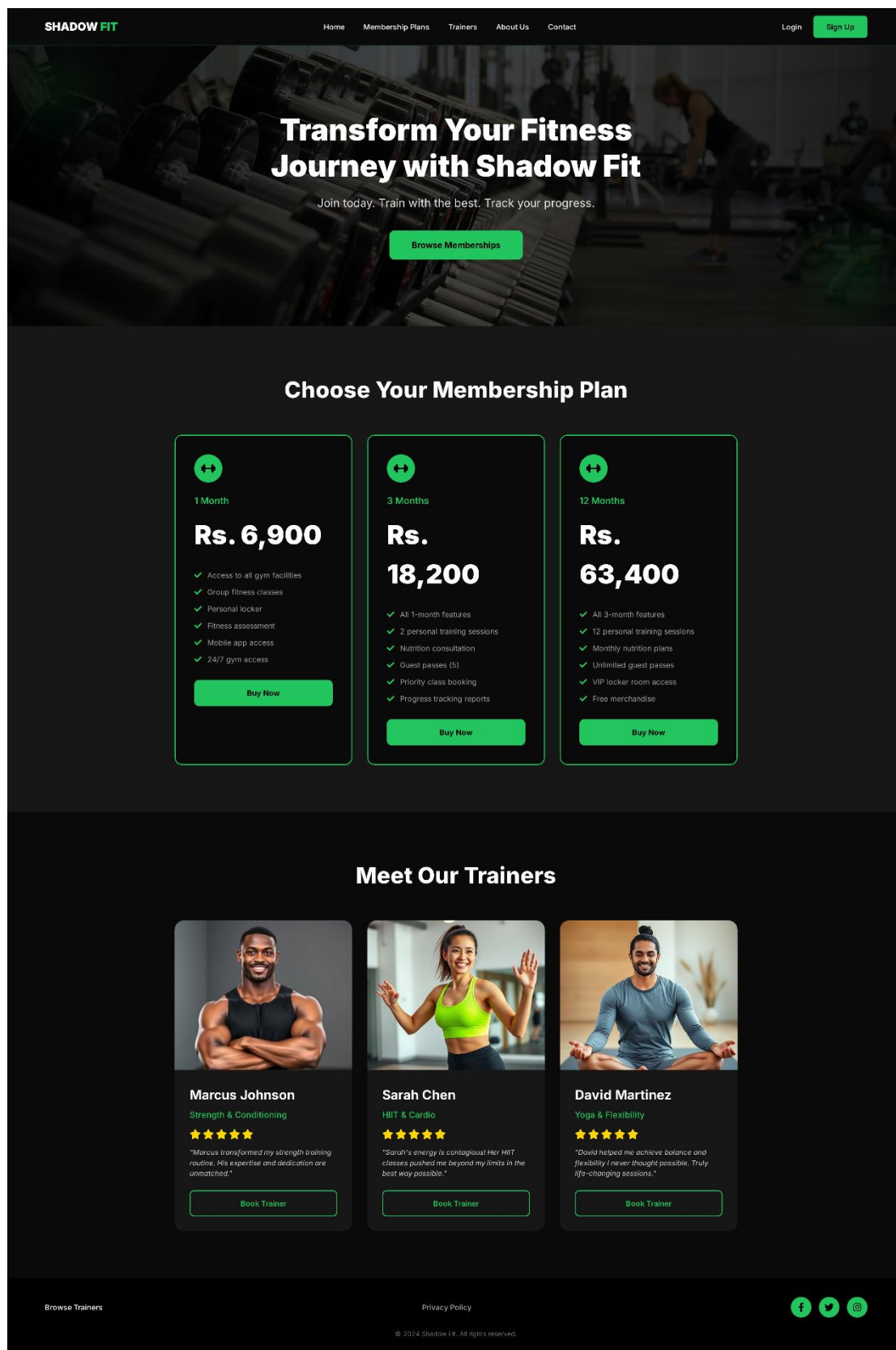


Figure 46: Homepage Prototype

4.11.4 Membership Page Prototype

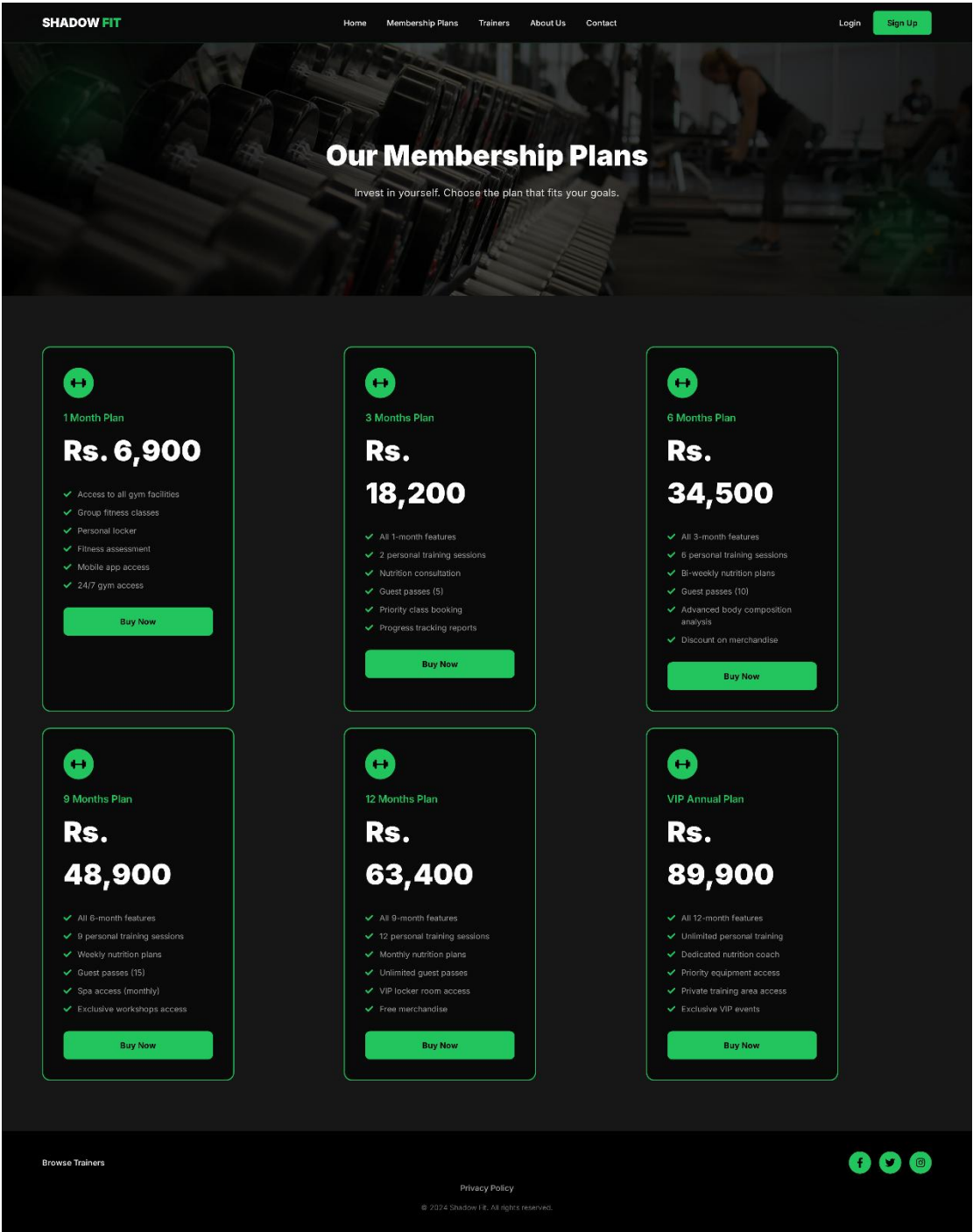


Figure 47: Membership Page Prototype

4.11.5 Trainer Page Prototype

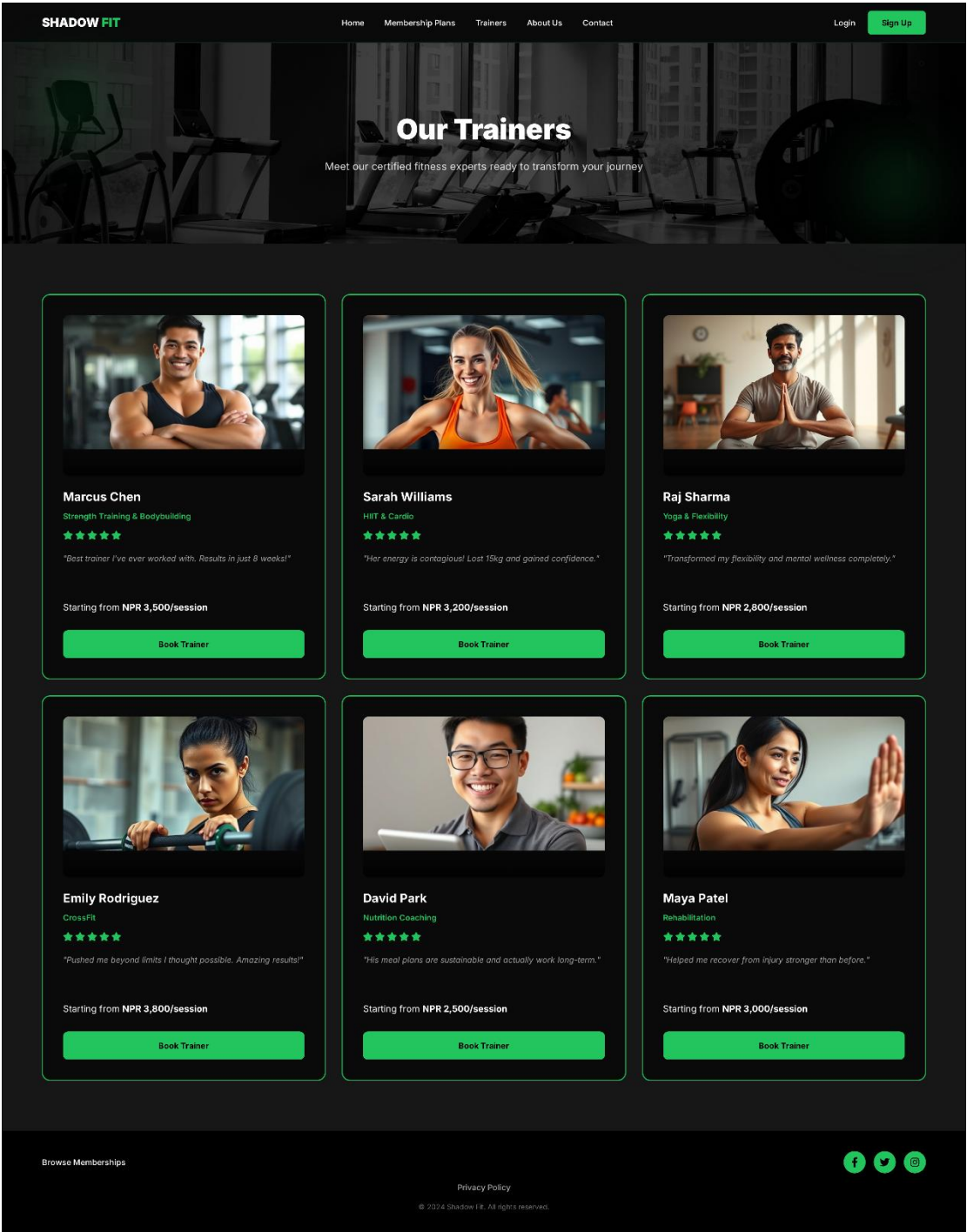


Figure 48: Trainer Page Prototype

4.11.6 About Us Page Prototype

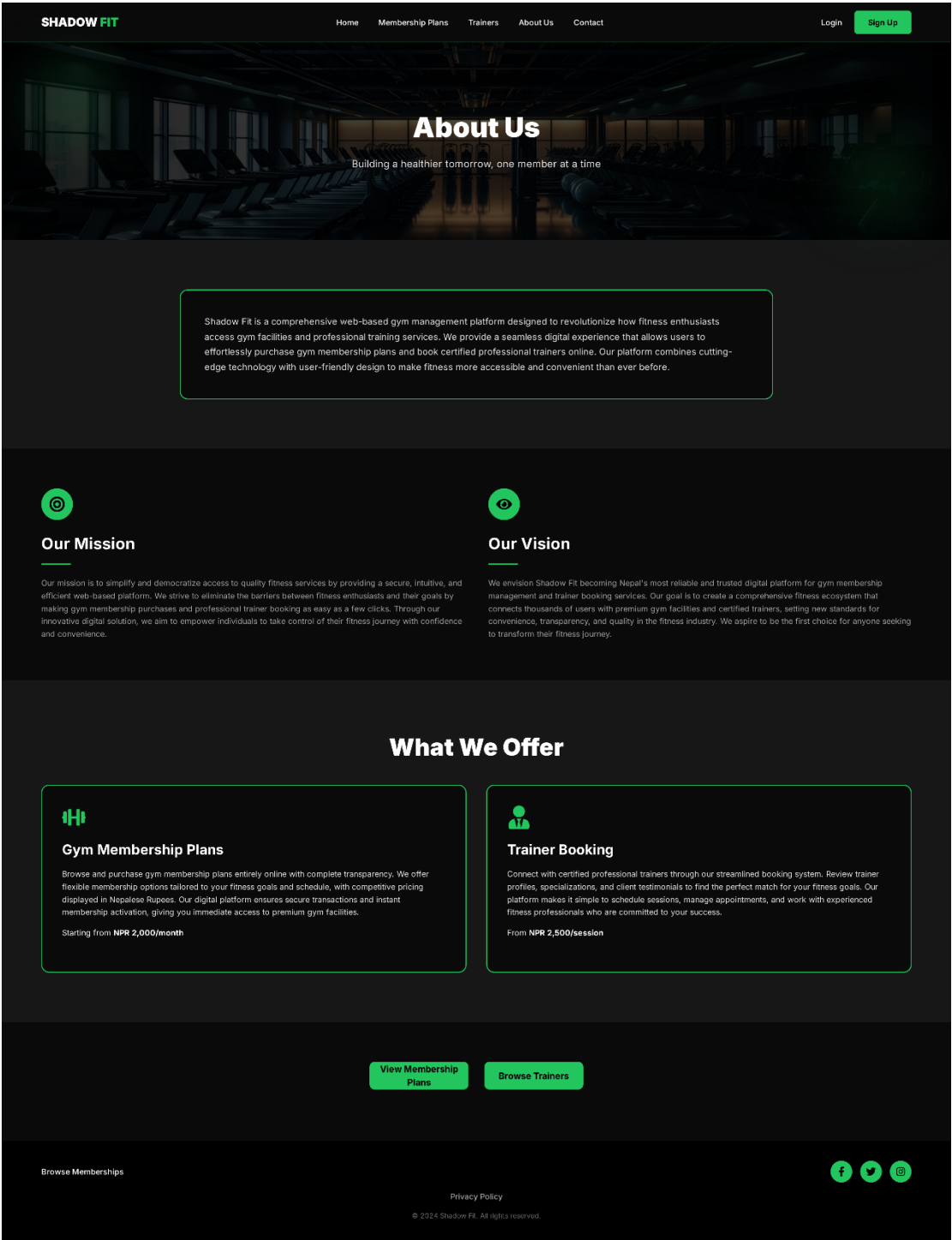


Figure 49: About Us Page Prototype

4.11.7 Contact Us Page Prototype

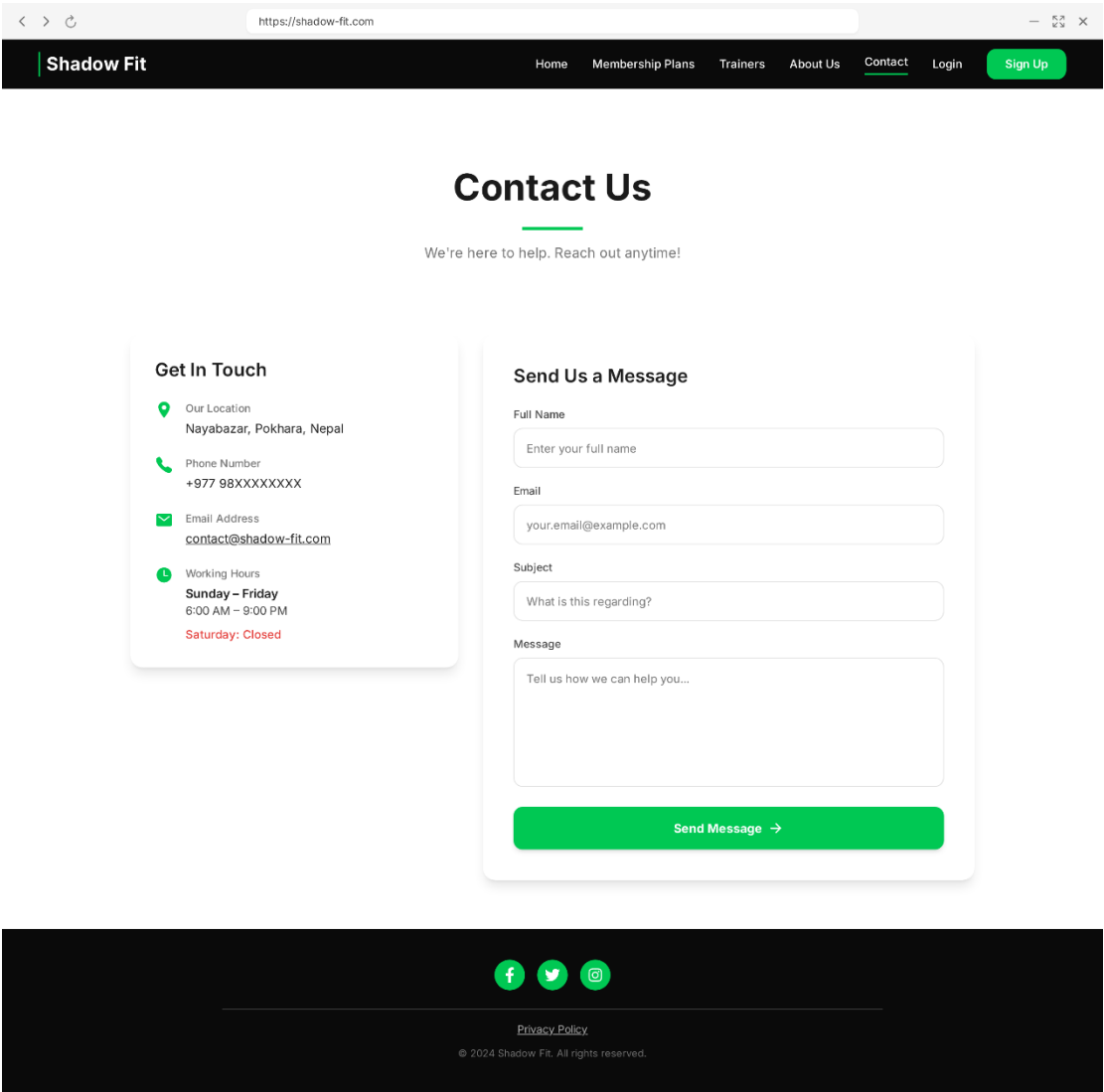


Figure 50: Contact Us Page Prototype

4.11.8 Payment Page Prototype

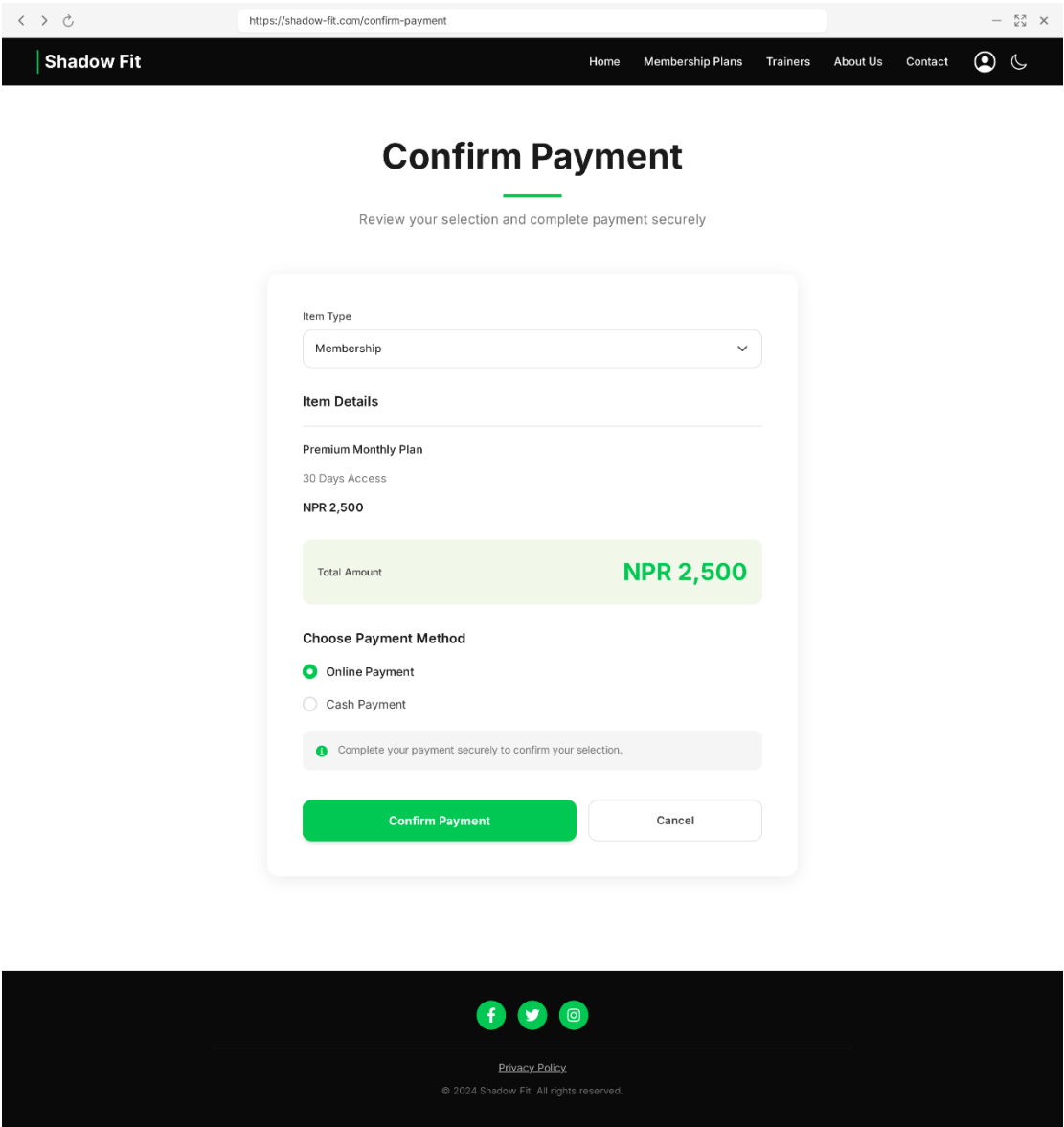
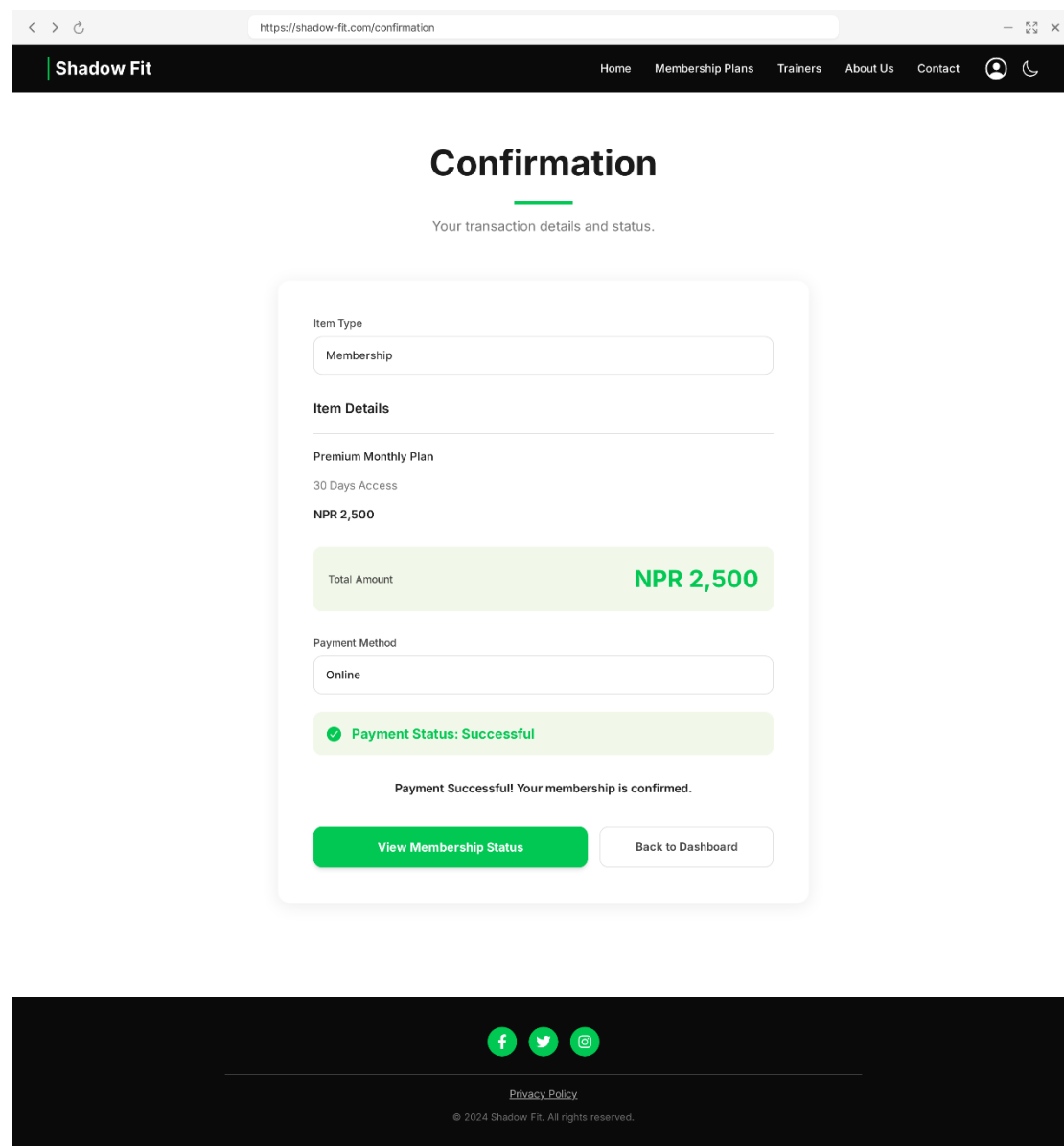


Figure 51: Payment Page Prototype

### 4.11.9 Confirmation Page Prototype



The image shows a web browser window displaying the 'Confirmation' page of the 'Shadow Fit' application. The browser's address bar shows 'https://shadow-fit.com/confirmation'. The page has a dark header with the 'Shadow Fit' logo and navigation links: Home, Membership Plans, Trainers, About Us, and Contact. The main content area is titled 'Confirmation' with a subtitle 'Your transaction details and status.' Below this, a white card displays the transaction details: 'Item Type' is 'Membership', 'Item Details' is 'Premium Monthly Plan' with '30 Days Access' and a price of 'NPR 2,500'. A green box highlights the 'Total Amount' as 'NPR 2,500'. The 'Payment Method' is 'Online'. A green box with a checkmark indicates 'Payment Status: Successful'. Below this, a message states 'Payment Successful! Your membership is confirmed.' At the bottom of the card are two buttons: 'View Membership Status' (green) and 'Back to Dashboard' (white). The footer is dark and contains social media icons for Facebook, Twitter, and Instagram, a 'Privacy Policy' link, and a copyright notice: '© 2024 Shadow Fit. All rights reserved.'

Figure 52: Confirmation Page Prototype

## 5. Further Work

Although a large portion of Shadow Fit has been developed, there are a few crucial areas of work to be accomplished in order to complete the development of the project. These are listed below:

## 5.1 Frontend Development

- **Membership Purchase Page:** Implement the interface for subscription selection, pricing calculation, and input validation before making the purchase.
- **Trainer Booking Page:** It should have full functionality related to the selection of trainers and available time slots for booking.
- **Responsive Design:** The app should run perfectly on any device, including smartphone, tablet, and computer screens.
- **Form Validation:** Implement form validation mechanisms that ensure invalid data is not submitted in forms.

## 5.2 Backend Development

- **Payment Integration:** Implementation of the full Khalti online payment gateway solution involving successful transactions as well as failed transactions.
- **Handling Payments When No Internet Connectivity:**
- **Add functionality to mark payments as "pending"** when processing offline payments and update the status after confirmation.
- **Subscription Management:** Make sure user subscriptions are properly added/updated when memberships are bought.
- **Trainer Booking Management:** Implement backend functionality to handle trainer scheduling, confirmation, and trainer availability.
- **Notification System:** The notification system needs to be automated to remind the user of payment receipts, bookings, and the expiration of subscription services.

## 5.3 Database and Data Handling

- **Database Finalization:** Ensure completion of the tables, relations, and constraints. For instance, the database may be completed by including the following tables
- **Data Security:** The passwords and payment details need to be secured through encryption and hashing.



- Optimization and Testing: Optimize database queries to run efficiently and perform data consistency testing.

#### **5.4 Testing and Quality Assurance**

- Unit Testing: Test individual frontend and backend components to ensure they function properly.
- Integration Testing: Testing to ensure all system pieces are integrated well with regards to payment and update processes.
- User Testing - Test the product with actual users to verify that it is usable and discover bugs that need to be fixed.

#### **5.5 Documentation and Deliverables**

- Report Completion: Including pictures of and descriptions of what has been implemented.

#### **5.6 Optional Improvements**

- Reporting and Analytics: Include basic reports of user activity, memberships, and bookings.
- Extra Payment Options: If time permits, add more online payment options.
- User Profiles: Enable customers to view their booking, payment, and subscription history.
- Admin Panel: Implement a better admin panel interface for easy handling of trainers, memberships, and bookings.

Thus, the remaining tasks include the fulfilment of the frontend and backend functionalities, addition of payments, completion of the database, and testing of the application. After the completion of all the tasks, Shadow Fit will be ready to submit as per the requirements of the program.

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