PROJECT PROGRESS REPORT

GROUP PROJECT

CST 394-2

Group No: CST-22

Coral Stay

(Coral reef watching and hotel booking system)

Computer Science and Technology

Department of Computer Science and Informatics

Faculty of Applied Sciences

Uva Wellassa University of Sri Lanka

June 2025

Declaration

We hereby declare that the project will be developed by us and will be our own effort and that no part will be plagiarized without citations under the supervision of Mr. U.E. Ranasooriya, Department of Computer Science and Informatics. This Project Proposal is submitted for the partial fulfillment of the requirement of the course unit CST 394-2, Project II for the degree of Computer Science and Technology.

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Chapter 1. Introduction

1.1. Project Title

CoralStay (Coral reef watching and hotel booking system)

1.2. Project Description

CoralStay is an integrated web-based platform designed to revolutionize the way tourists plan and experience coral reef excursions and hotel accommodations. The system addresses major inefficiencies in the current manual booking methods, such as double bookings, lack of real-time availability, delayed confirmations, and insufficient awareness about the coral environment and optimal travel conditions. The platform allows users to seamlessly book both coral reefs watching tours and hotel rooms through a unified interface. Tourists benefit from live availability tracking, instant booking confirmations via email, and a personalized dashboard to manage reservations.

Additionally, a key novelty feature of CoralStay is the development of a **3D interactive virtual tour** that allows users to experience a simulated environment of the Hikkaduwa coral ecosystem **before their actual visit**. This function presents a sample coral reef environment rendered in 3D, where users can explore the marine surroundings interactively. Embedded within the environment are **educational hotspots** that deliver rich insights into coral species, their habitats, and conservation practices.

Another **novelty function** is the **Smart Itinerary Planner**, which integrates **real-time weather data** from external APIs. This ensures tourists are informed of the safest and most suitable times for reef activities, reducing environmental risks and last-minute cancellations.

With its innovative blend of travel booking, education, and environmental intelligence, CoralStay serves tourists, tour guides, and local operators by improving operational efficiency through digital interaction and informed decision-making.

1.3. Background and Motivation

1.3.1 Background

Coral reef tourism is a globally popular activity that contributes significantly to local economies, especially in coastal regions. However, in many destinations, the current process of booking coral reef tours and accommodations is fragmented and manually managed. This results in various challenges, including overbookings, poor coordination between tour and lodging services, last moment tour cancellations due to lack of real-time information regarding environmental conditions.

Tourists often arrive with limited knowledge about coral ecosystems and the best times for exploration, leading to safety concerns and reduced satisfaction. Meanwhile, local tour operators struggle to manage schedules and communicate efficiently with guests, especially when environmental conditions and weather can rapidly change due to tides and many other reasons.

The growing demand for eco-tourism and virtual experiences presents an opportunity to enhance traditional travel planning with modern, interactive, and informative solutions [3, 4]. CoralStay emerges in this context as a holistic platform that not only simplifies booking logistics but also promotes environmental education and awareness through technology.

By integrating virtual tours [4], real-time weather data [7], and smart planning tools, CoralStay aims to bridge the gap between technology and sustainable tourism. Empowering travelers with safer, smarter, and more meaningful coral reef experiences.

1.3.2 Motivation

Our motivation to develop CoralStay stems from a shared commitment to enhancing the business potential of coral reef tourism and hotel accommodations by attracting more customers through a streamlined, engaging digital experience. As students passionate about both technology and real-world impact, we saw an opportunity to support local tourism operators by addressing inefficiencies in booking systems and improving customer engagement [1, 2].

Tourists visiting coral reef destinations often face challenges in finding reliable booking options, understanding ideal travel times, and making informed decisions quickly. Similarly, local hotel and tour operators struggle with managing reservations and adapting to unpredictable weather conditions, which can lead to cancellations, dissatisfied customers, and lost revenue [5, 7].

Our primary goal is to increase bookings for both coral reef tours and hotel accommodations by providing a platform with real-time availability, instant booking confirmations, and smart itinerary planning [7, 8]. To enhance customer engagement and set CoralStay apart from conventional booking systems, we introduce novelty features such as the immersive 3D Virtual Coral Reef Tour [4] and real-time weather forecasting**.** These interactive and informative features allow users to explore a simulated coral environment and make well-informed travel decisions. While optional, these educational components are designed to add value to the user experience and encourage more visitors to engage with and book through the platform.

Through CoralStay, we aim to apply our software development skills to create real value for coastal businesses, improve tourist satisfaction, and contribute to the growth of sustainable tourism in marine regions [1, 6].

1.4. Problem in Brief

The current process of booking coral reef tours and hotel accommodations in hotel CoralStay is largely manual and fragmented. Tourists often face difficulties such as lack of real-time availability, delayed confirmations, and limited access to reliable information. These issues can lead to booking errors, poor customer satisfaction, and missed business opportunities.

Tour operators and hotel staff also face challenges in managing reservations efficiently, especially when dealing with sudden changes due to weather conditions. This lack of coordination affects the overall quality of service and reduces operational efficiency.

Furthermore, there is limited use of digital tools to attract and engage potential customers. Interactive features and educational content about coral reefs are not commonly integrated into existing systems, which reduces the appeal to environmentally conscious and experience-driven travelers.

As a result, both tourists and service providers experience inconvenience, and local businesses miss out on potential growth. There is a clear need for a centralized, smart platform that simplifies the booking process, enhances customer engagement, and supports business development in the marine tourism sector.

1.5. Proposed Solution

Our proposal, CoralStay, is a user-friendly web platform that integrates accommodation and tour reservations in a one location, thereby addressing the issues associated with booking coral reef tours. Travelers will be able to quickly check availability, make reservations, and organize their journeys with ease thanks to a personalized dashboard. A 3D virtual coral reef tour with educational materials to promote awareness of marine life will also be available on the site. To recommend the ideal times for activities, a smart itinerary planner will integrate real-time weather data. Through enhanced planning and educational resources, CoralStay will facilitate reservations, enhance security, and promote coral conservation.

Key features of our proposed web application include:

1. **Coral reef watching Booking-** Users can book available boat seats online. Users can select packages. Booked seats are marked unavailable to avoid double-bookings. Admin can update tour schedules, capacity, and monitor reservations.

2. **Virtual 3D Coral reef watching Tour -** Users can explore a sample coral reef environment through an interactive 3D model that simulates the Hikkaduwa marine ecosystem. Hotspots appear on marine life, revealing species names, images, habitats, fun facts, and conservation statuses on click or hover. This enhances accessibility and educational value.

3. **Smart Itinerary Planner with Real-Time Weather Data & Warnings –** The system checks real-time weather data (via APIs like OpenWeatherMap). It suggests optimal activity times and alerts users to unsafe conditions.

4. **Hotel Booking-** Users can view available rooms and their details. Users can select check-in and check-out dates. Users can book rooms. Admin can manage room availability and pricing.

5. **Provide Guide to do things around Hikkaduwa –** Give each user best places/Events/Activities to join around Hikkaduwa according to his or her Preference.

6. **Online Payment System-** Process payments securely for bookings and services, with instant confirmation via email.

7. **User Experience and Review Section –** Every active customer of this system will able to drop his/her experience, suggestions, reviews on the Website. It helps new Users to join with us.

By integrating these features into a single platform, we aim to provide a user-friendly, interactive, and engaging experience for users.

1.6. Project Aim and Objectives

1.6.1 Project Aim

To provide CoralStay with a centralized digital platform that streamlines coral tour and hotel booking operations, attracts more customers through interactive features (Virtual reef tour) and real-time planning tools (Real-Time Weather Data & Warnings), and supports business growth by enhancing the overall booking experience of CoralStay.

1.6.2 Project Objectives

Main Objective

To develop an all-in-one web-based system that allows tourists to easily book coral reef watching boat tours and hotel rooms through a single platform.

Sub Objectives

- ✓ **To implement a reliable online booking system** for both coral reef boat tours and hotel rooms, reducing manual errors and double bookings
- ✓ **To provide real-time availability updates** of boat seats and hotel rooms for users and administrators
- ✓ **To develop a secure and user-friendly online payment system** that confirms bookings instantly via email
- ✓ **To create a Virtual Coral Reef Tour experience** using a 3D interactive model that allows users to explore a simulated coral environment and learn about marine life and conservation through educational hotspots.
- ✓ **To build a Smart Itinerary Planner** that uses real-time weather data from external APIs to suggest the best times for coral-related activities
- ✓ **To empower admins with tools** to manage tour schedules, room pricing, and availability efficiently

- ✓ **To raise awareness about coral reef conservation** through engaging educational content and virtual exploration
- ✓ **To provide access to events/activities around Hikkaduwa** by our web site users can get notify about ongoing events and activities around Hikkaduwa

1.7. Significance of the Study

CoralStay is an all-in-one platform that streamlines coral reef tour and hotel bookings while promoting marine education and tourist safety through real-time planning tools. Unlike global platforms, it is specifically tailored to the needs of tourists and operators in Hikkaduwa, Sri Lanka, where booking systems are often manual and disconnected.

Popular platforms like Booking.com, Agoda, and Airbnb focus solely on hotel reservations and lack features like reef tour integration, smart itinerary planning, and virtual education. CoralStay fills this gap by enabling users to book both tours and rooms from a single dashboard with real-time availability, instant confirmations, and personalized tools.

Platforms such as TripAdvisor and Viator support global activity bookings but are too general for coral-specific environments. They lack hotel integration and do not use environmental data for trip planning. CoralStay addresses these issues by offering weather-based safety alerts, educational content, and flexible booking options.

Local sites like SriLankaTours offer basic reef tour booking, but often rely on manual processes with no real-time data or hotel links. CoralStay improves this by providing a responsive, centralized system with smart planning features and better user engagement.

In essence, CoralStay stands out as the first integrated solution in Sri Lanka that combines reef tourism, hotel booking, environmental education, and digital convenience—helping tourists make informed choices while supporting sustainable local tourism.

Chapter 2. Methodology

2.1. Introduction

To ensure a flexible and efficient development process, the Scrum framework under the Agile methodology was adopted for the CoralStay platform. This approach enables iterative delivery, continuous stakeholder feedback, and adaptive planning to meet the dynamic requirements of a tourism and hotel booking platform.

1. **Sprint 1: Planning & Initial Design**
    - ✓ Designed all website pages' UI using Figma.
    - ✓ Initialized the 3D virtual tour ride concept.

2. **Sprint 2: Core Functionality & Public Pages**
    - ✓ Implemented user registration and login functionality.
    - ✓ Developed secure user authentication system.
    - ✓ Built frontend for hotel room and reef tour package booking.
    - ✓ Created About Us and Contact Us pages.

3. **Sprint 3: Full Frontend & Booking Logic**
    - ✓ Completed user-side frontend for full user interaction.
    - ✓ Developed admin-side frontend for managing bookings and content.
    - ✓ Implemented backend for hotel room and reef tour package booking.
    - ✓ Added feature to list events happening around Hikkaduwa.

4. **Sprint 4: Advanced Features & Management Tools**
    - ✓ Developed admin-side reef tour booking management system.
    - ✓ Implemented booking email verification.
    - ✓ Hotel Room Booking backend.
    - ✓ Integrated 3D virtual tour showcasing marine life and coral reefs.

5. **Sprint 5: Final Enhancements & Smart Integrations**
    - ✓ Develop the **Admin interface and backend** for managing reef tours and packages.
    - ✓ Integrate a **secure payment gateway** into the booking system.
    - ✓ Build the **Smart Itinerary Planner** (frontend and backend) for customized trip planning.
    - ✓ Create **personalized user dashboards** to improve the user experience.
    - ✓ Enhance the **3D Coral Tour** to interactively educate users about marine life.
    - ✓ Implement an **AI-integrated chatbot** (frontend and backend) to assist users and handle inquiries.

The first four sprints of the CoralStay project have been successfully completed, each delivering essential components of the system—from UI design and core booking features to admin tools and the 3D virtual reef tour. These sprints laid a strong foundation for building a complete, interactive, and user-friendly platform. The final sprint is currently in progress and focuses on advanced integrations such as the Smart Itinerary Planner, AI-powered chatbot, and secure payment systems to enhance the overall user experience.

2.2. Requirements Identification

2.2.1 Functional and Non-functional requirements

a) Functional Requirements

1. Implement a user registration and authentication system to allow users to access personalized features.
    a. Users should be able to register for an account
    b. Users should be able to securely log in to their account
    c. Users should be able to reset or change their password

2. Enable online coral reef boat seat booking
    a. Users should be able to view available tours and book boat seats
    b. Booked seats should be marked unavailable to prevent double booking
    c. Admins should be able to manage tour schedules, boat capacity, and bookings

3. Implement hotel room booking functionality
    a. Users should be able to view room availability and details
    b. Users should be able to select check-in/check-out dates and make bookings
    c. Admins should be able to manage room availability, pricing, and reservations

4. Integrate a secure online payment system
    a. Users should be able to pay for bookings using secure payment methods
    b. The system should support multiple payment options
    c. Users should receive instant confirmation via email after payment

5. Develop a Virtual Coral Reef Tour experience
    a. Users should be able to explore reef environments through an interactive 3D model simulating the Hikkaduwa marine ecosystem
    b. Users should interact with hotspots to learn about marine species and habitats
    c. The 3D tour should include educational facts and conservation information

6. Create a Smart Itinerary Planner with real-time data integration
    a. The system should fetch weather data using external APIs
    b. Users should receive suggestions for the best activity times
    c. Users should receive alerts for unsafe conditions (e.g. rough seas, rain & wind)

7. Provide a personalized user dashboard
    a. Users should be able to view all their bookings
    b. Users should be able to track reservation history
    c. Users should be able to booking hotel and coral reef boat as preference

8. Enable admin control over system content and bookings
    a. Admins should manage boat tour schedules, room listings, and pricing
    b. Admins should be able to monitor all bookings and availability
    c. Admins should manage user feedback

b) Non-Functional Requirements

1. Usability:

a. The user interface should be simple, intuitive, and accessible for all user types (tourists, operators, and admins)
b. The platform should be responsive and function well on desktops, tablets, and mobile devices
c. Virtual tours and dashboards should be easy to navigate with clear labels and icons.
d. Tooltips, error messages, and user guidance (e.g., booking steps, alerts) should be provided to help users complete tasks easily

2. Security:

a. The system should use HTTPS to ensure secure data transmission between users and the server
b. User passwords must be stored using encryption/hashing (e.g., bcrypt)
c. The platform should implement role-based access control (e.g., user vs. admin privileges)
d. Input validation and protection against SQL injection, XSS, and CSRF attacks must be implemented

3. Compatibility:

a. The system should work on major web browsers including Chrome, Firefox, Safari, and Edge
b. The platform should support different screen sizes and resolutions (responsive design)
c. The system should integrate smoothly with third-party APIs (e.g., OpenWeatherMap for weather data, payment gateways)

4. Maintainability:

a. With proper file structure and separation of concerns (e.g., logic in backend, UI in frontend), the system remains clean
b. The codebase should follow clean coding practices and be well-documented for future updates
c. The system should be modular, allowing easy updates to individual components (e.g., virtual 3D tour, booking, payment)

2.2.2 User Roles

1. System Administrator

    a. Manage user accounts (create, update, delete users)
    b. Manage and monitor hotel room and boat tour availability
    c. Add, edit, or remove boat tours and hotel listings
    d. Set or update pricing, schedules, and availability for bookings
    e. View and manage all user bookings and cancellations
    f. Post educational content, news, and alerts (e.g. weather warnings)
    g. Receive and respond to user feedback

2. Registered Users (Tourist/Travelers)

    a. Manage the created user account
    b. Book coral reef tours and hotel rooms
    c. Make secure online payments
    d. View and manage their bookings via a personalized dashboard
    e. Explore virtual coral reef tours and access educational hotspots
    f. Receive booking confirmations and weather alerts

3. Visitors

    a. Create and manage personal accounts
    b. View available hotel rooms and coral reef tour details
    c. Explore the virtual coral reef tour (limited access)
    d. Read news and educational content
    e. Encouraged to register to access booking and personalization features

2.2.3 System Requirements

1. **Software:**

    a. Development Environment: IDEs (Integrated Development Environments) such as Netbeans, Visual Studio, and IntelliJ IDEA to write, compile, and debug code
    b. Diagram Designing Tool: StarUML and Draw.io to design and create diagrams
    c. Programming Languages: Node.js
    d. Database Management System (DBMS): MongoDB to store and manage data
    e. Web Development Frameworks: React with Vite for building and bundling the frontend components, Node.js, expressJs for backend development, Tailwind CSS for styling and Eloquent as ORM framework
    f. 3D Modeling Tool**:** Blender**,** used to create and export the 3D coral reef environment for the virtual tour experience
    g. Version Control System: Git for managing source code versioning and collaboration
    h. Online Collaboration Tool: Zoom and Microsoft Teams to conduct online meetings with clients and team members

2. **Hardware:**

    a. Servers: Apache web server that can host the system and handle HTTP requests
    b. Client Devices: Computers, laptops, tablets, and mobile devices for users to access and interact with the system

3. **Technology:**

    a. Web Technologies: HTML5, CSS3, and JavaScript with React for developing the user interfaces, Node.js and Express.js with for the back-end programming and Three.js to create and display animated 3D graphics within the web browser

    b. Payment Gateway: Payhere

    c. Email Gateway: Nodemailer

    d. Security Measures: Implementation of encryption, authentication, and authorization mechanisms to ensure data security and user privacy

2.2.4 System Analysis and Design

a) Use Case Diagram

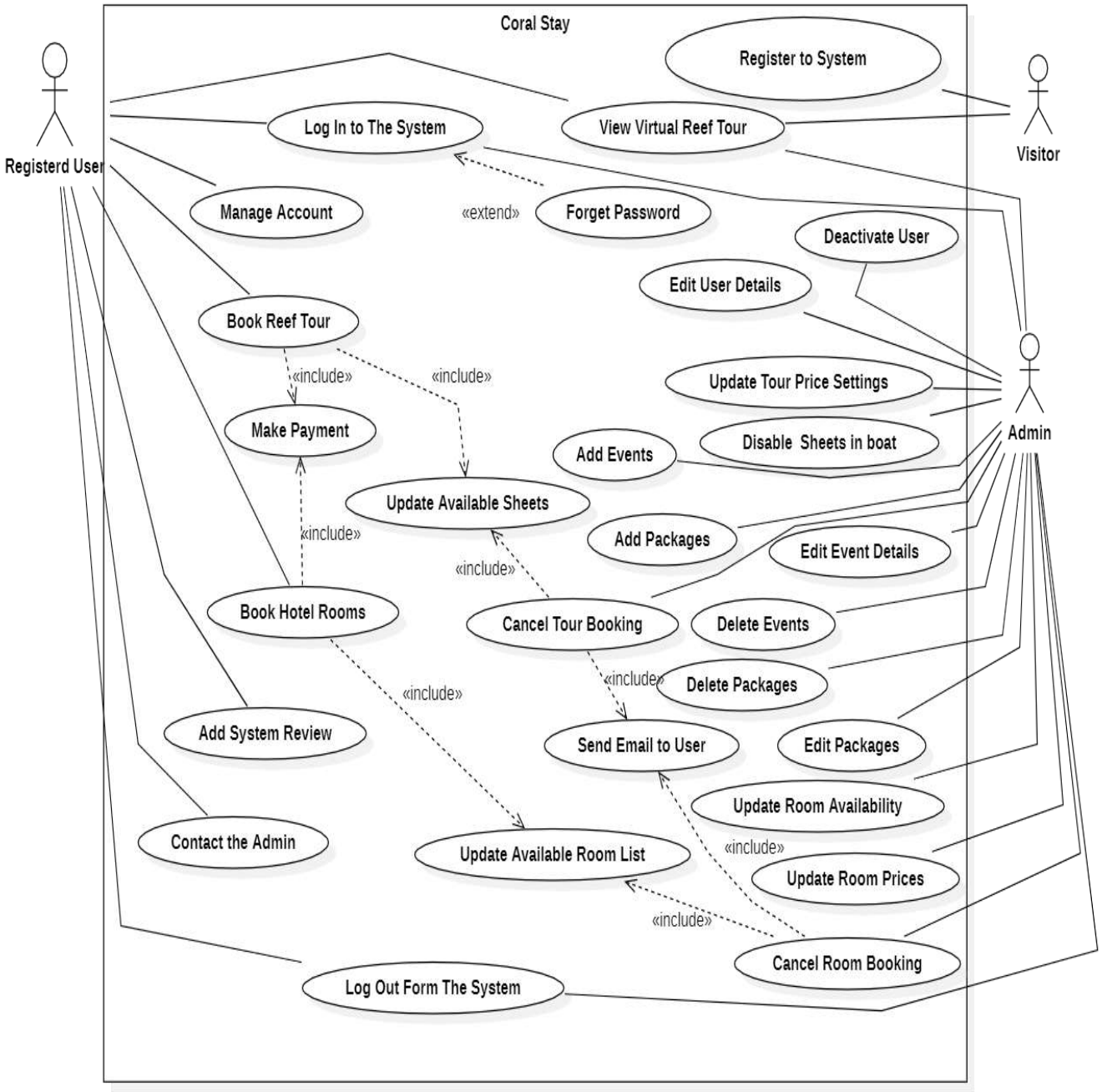

Figure 1: Use Case Diagram

b) UML Class Diagram

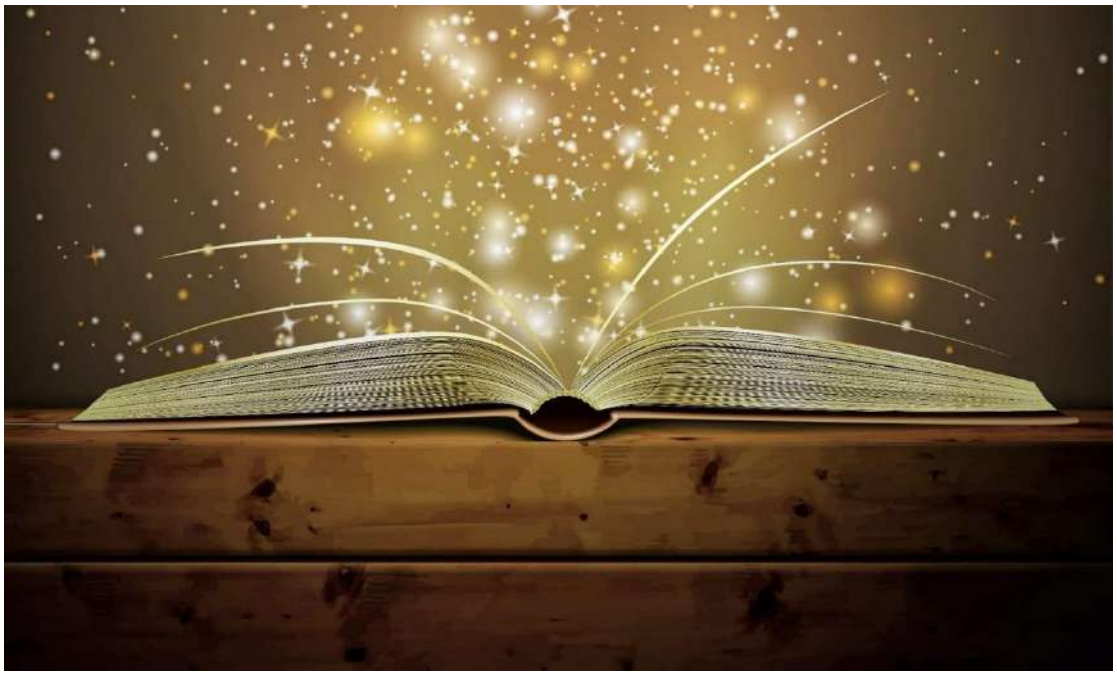

Figure 2:UML Class Diagram

c) Database Structure

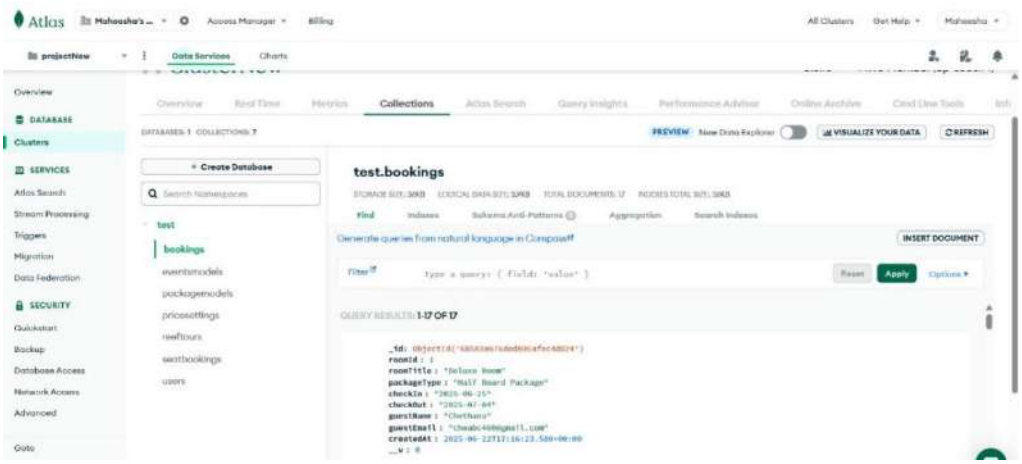

Figure 3:Database Structure- 01

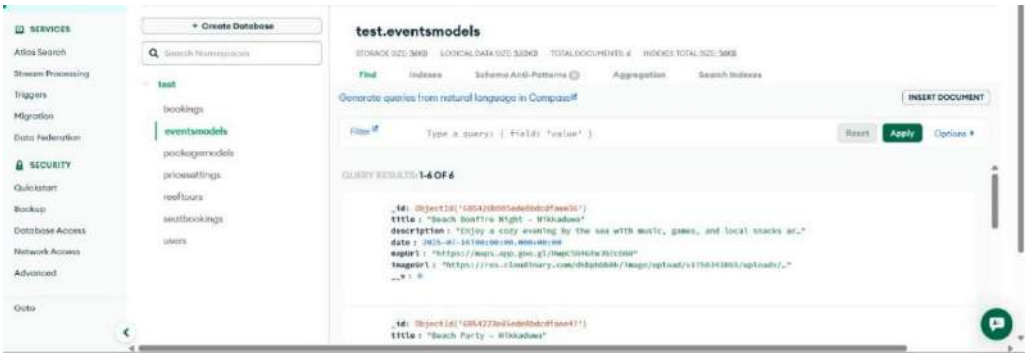

Figure 4:Database Structure- 02

Figure 5:Database Structure- 03

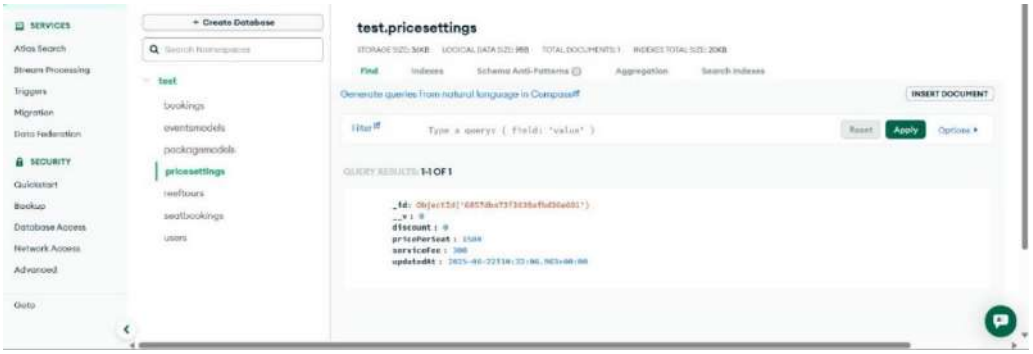

Figure 6:Database Structure- 04

Figure 7:Database Structure- 05

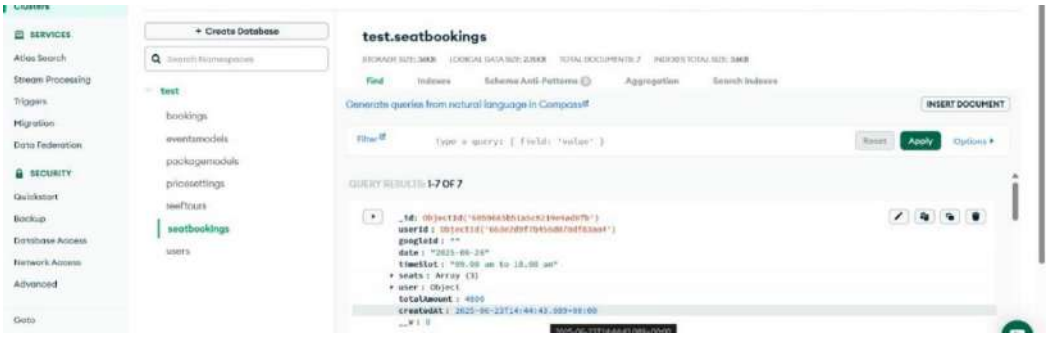

Figure 8:Database Structure- 06

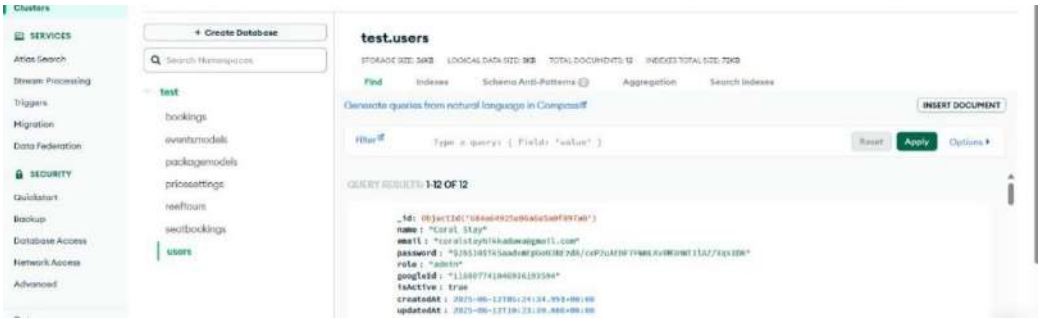

Figure 9:Database Structure- 07

Chapter 3. Project Plan

3.1. Gantt chart

TASK	April	May				June				July				August	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Requirements Planning															
Sprint Planning & Sprint 1 Execution															
Sprint 2 Execution & Sprint 3 Planning															
Sprint 3 Execution & Sprint 4 Planning															
Sprint 4 Execution & Sprint 5 Planning															
Sprint 5 Execution & Complete Development															
Final Testing & Deployment															
Documentation															

Figure 10: Project Gantt Chart

3.2. Individual Contribution

Enrollment No:	UWU/CST/ 21/022	UWU/CST/ 21/040	UWU/CST/ 21/050	UWU/CST/ 21/086
Name:	V.A.K.M. Nethmina	K.L.T. Lakchani	W.D.V.A. Weerasinghe	C.S.M. Marsinghe
Contribution:	User login & Authentication Frontend & Backend Reef Tour Booking & User Management Backend Documentation & Diagrams Implementation UI/ UX Figma Design	Home Page, Reef Tour, Event, Packages, About Us, Stays Page(Frontend) Events and Packages Backend Documentation & Diagrams Implementation	Virtual 3D Coral Reef Tour Model Hotel Booking Frontend User Reviews Frontend & Backend Documentation & Diagrams Implementation	Stays Page, Room Booking & Contact Us (Frontend) Stays, Contact Us Backend Room Booking Backend Documentation & Diagrams Implementation

Figure 11:Individual Contribution

3.3. Future Work

Enrollment No:	UWU/CST/ 21/022	UWU/CST/ 21/040	UWU/CST/ 21/050	UWU/CST/ 21/086
Name:	V.A.K.M. Nethmina	K.L.T. Lakchani	W.D.V.A. Weerasinghe	C.S.M. Marsinghe
Future Work:	Admin Interface and Backend of Reef Tours & Packages Integrating Payment Gateway to the System	Smart Itinerary Planner Frontend & Backend	Personalized user Dashboard Representing Marine Life Education via 3D Coral Tour	AI integrated Chat Bot Frontend and Backend

Figure 12:Future Work

Chapter 4. References

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Chapter 5. Appendixes

UI Design (Figma) Link:
https://www.figma.com/design/AeMoXvvEQHoqYgQEOlX7qO/Untitled?node-id=2-2&t=9Vc03oGSxW2ehupx-1

GitHub Repository **Frontend** Link:
https://github.com/Maheesha-Nethmina/Coral-Stay_Frontend.git

GitHub Repository **Backend** Link:
https://github.com/Maheesha-Nethmina/Coral-Stay_Backend.git

User Interfaces

Home Page:

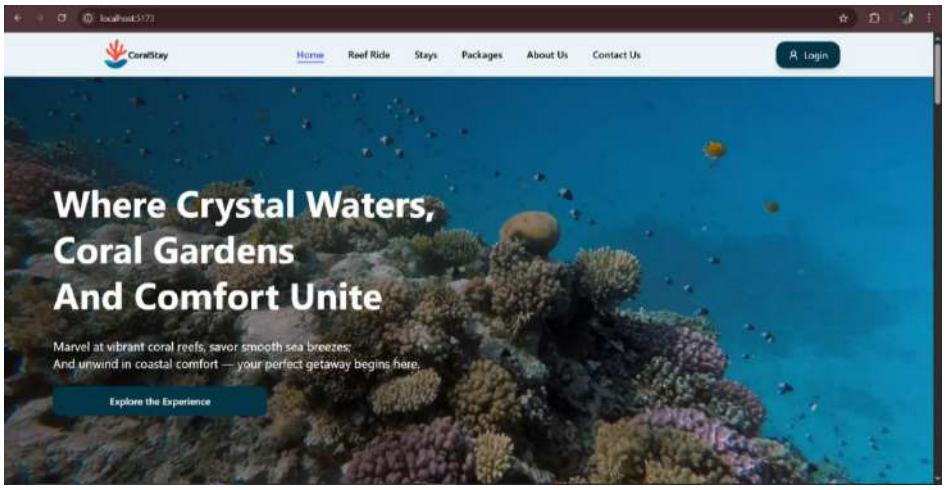

Figure 13:Home Page-01

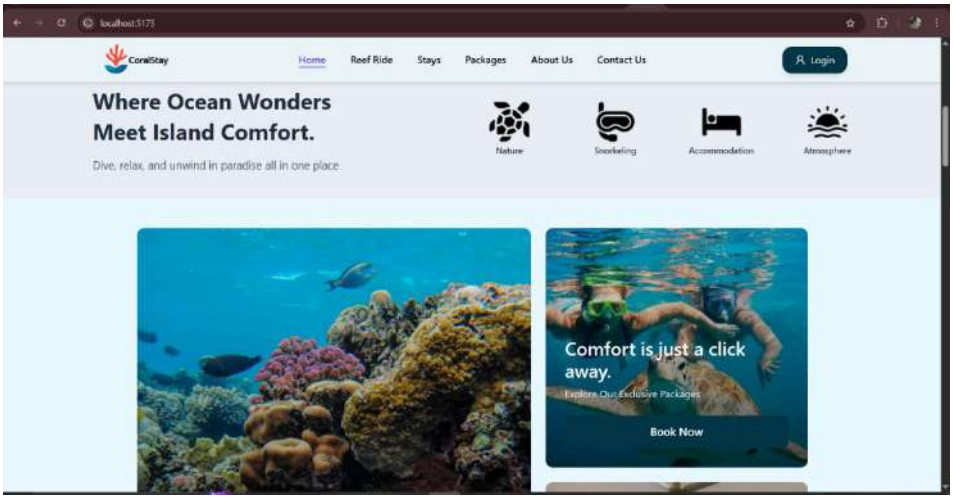

Figure 14:Home Page-02

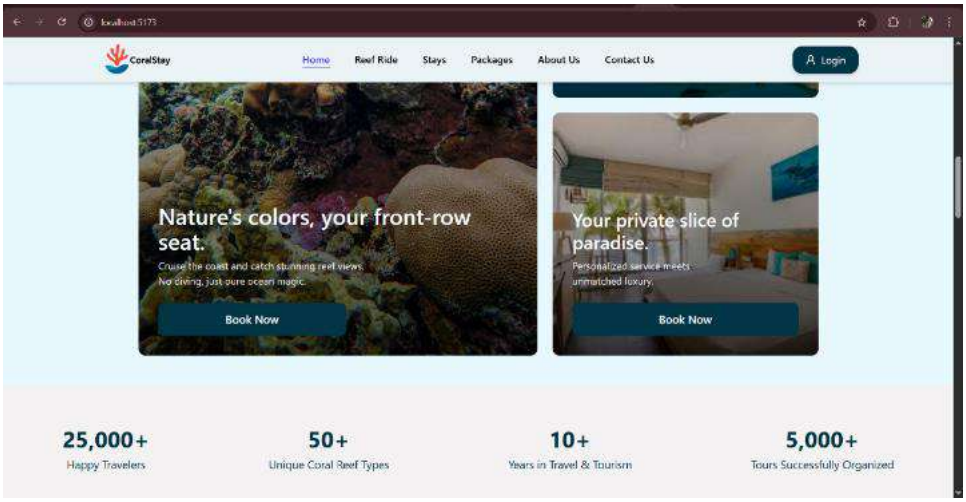

Figure 15:Home Page-03

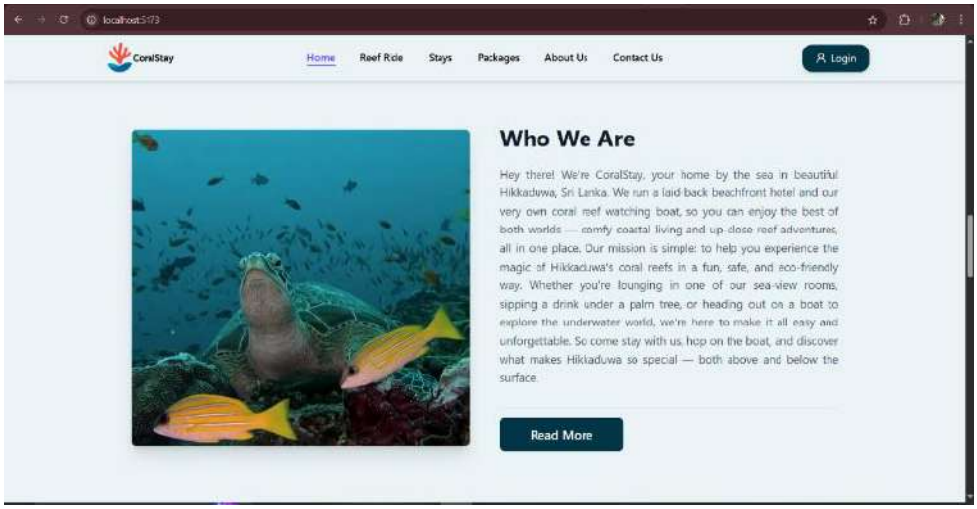

Figure 16:Home Page-04

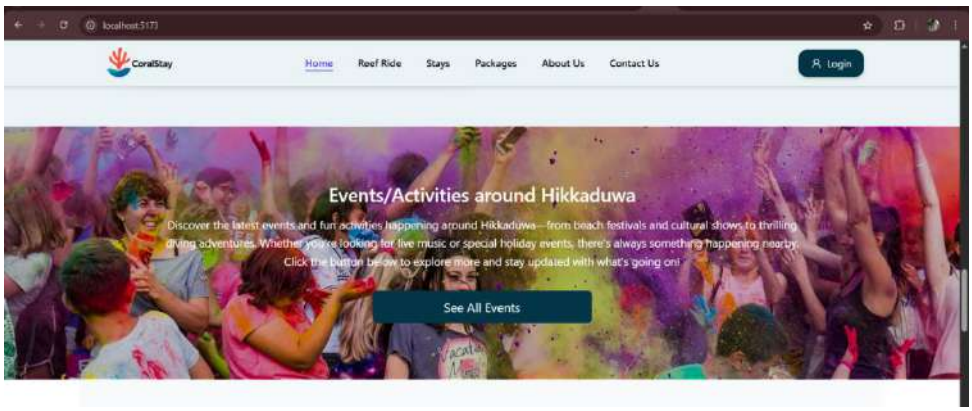

Figure 17:Home Page-05

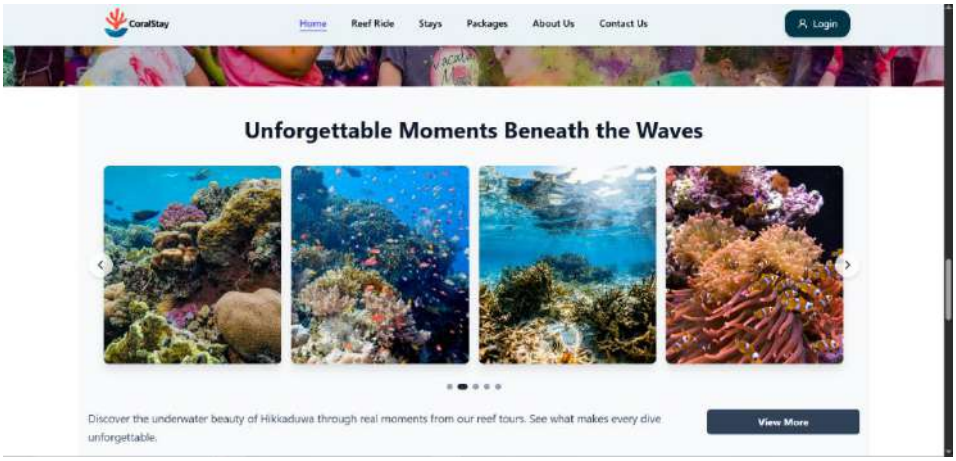

Figure 18:Home Page-06

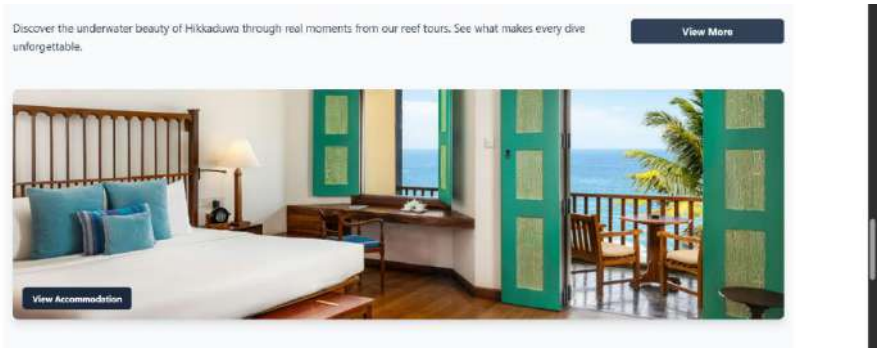

Figure 19:Home Page-07

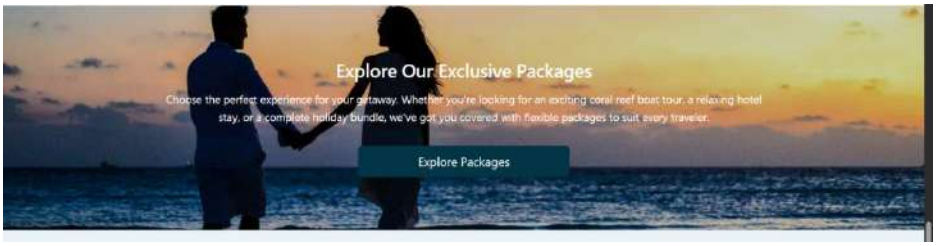

Figure 20:Home Page-08

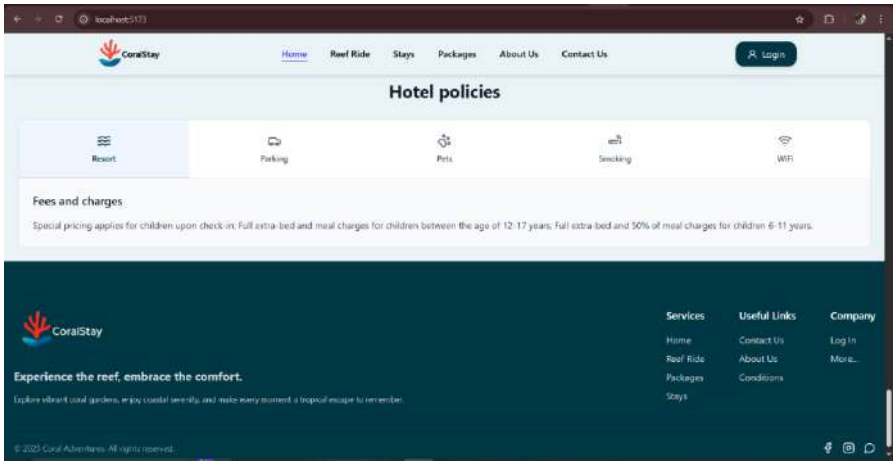

Figure 21:Home Page-09

Login:

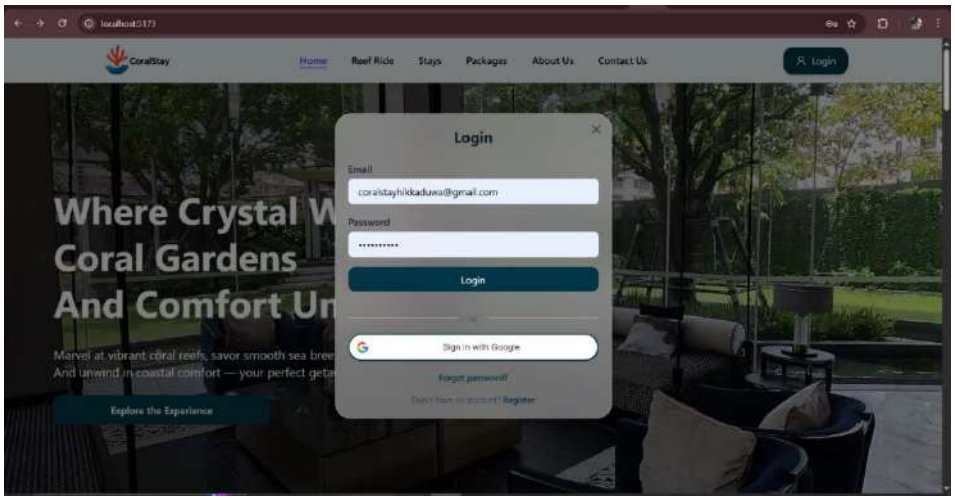

Figure 22:Login

Forgot Password:

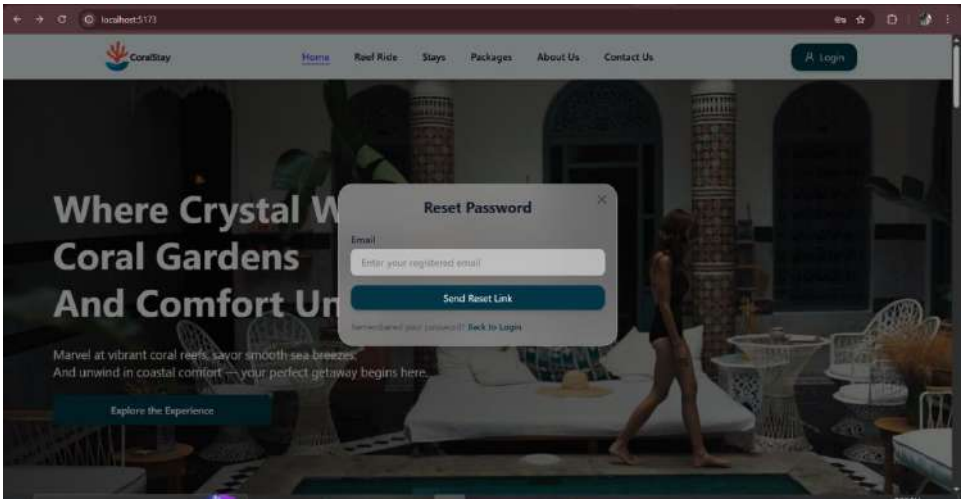

Figure 23: Forgot password

Register:

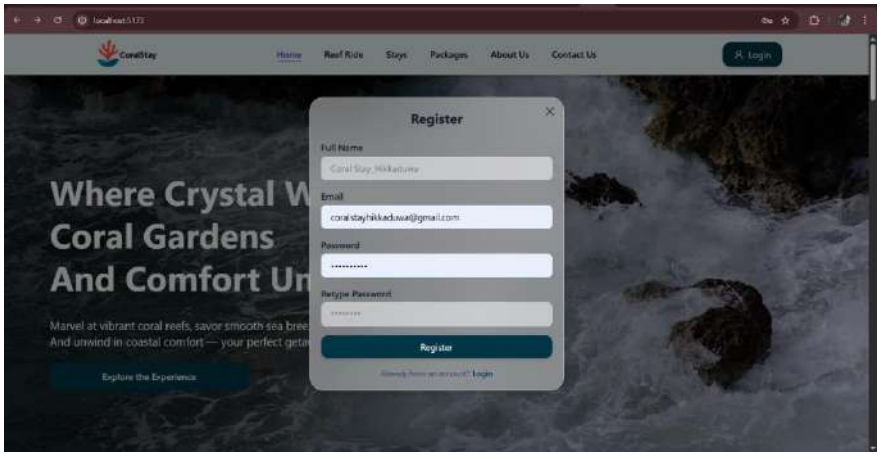

Figure 24:Register

Events:

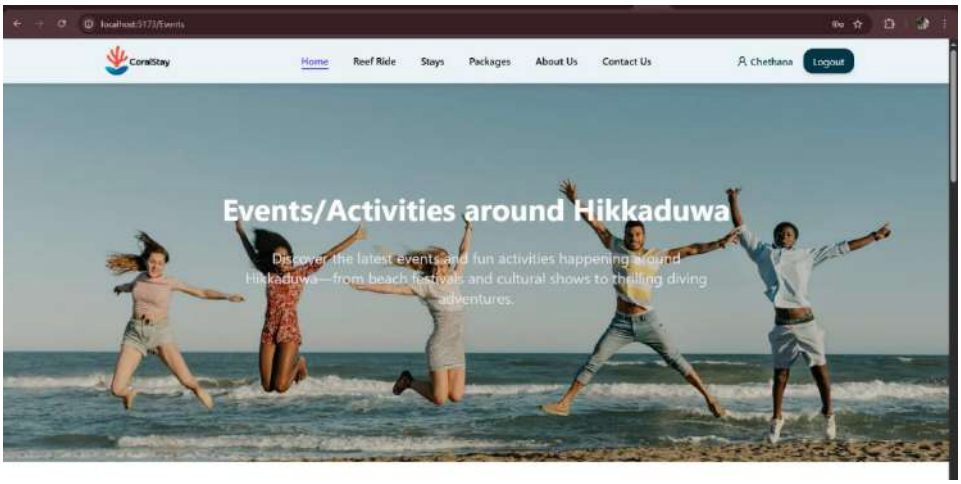

Figure 25:View Events & Activities around Hikkaduwa

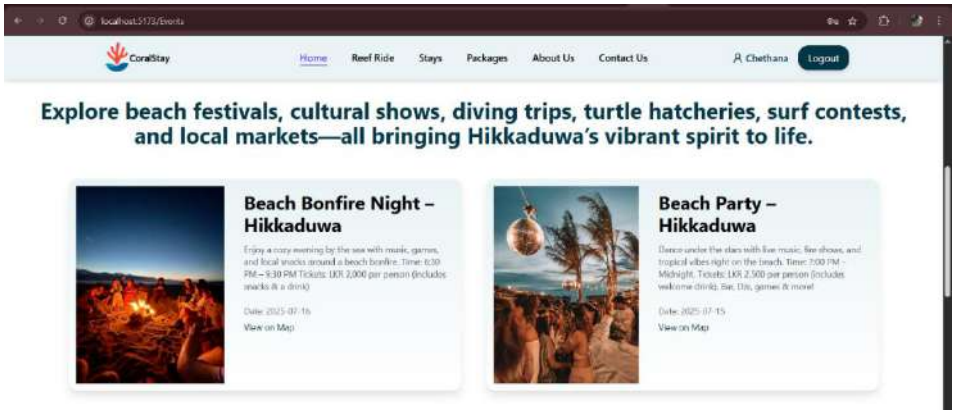

Figure 26:Events list

Reef Ride Page:

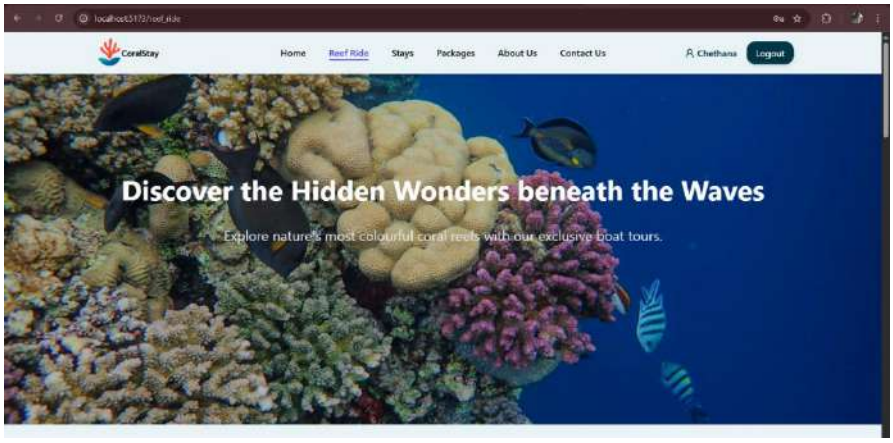

Figure 27:Reef Ride Page 01

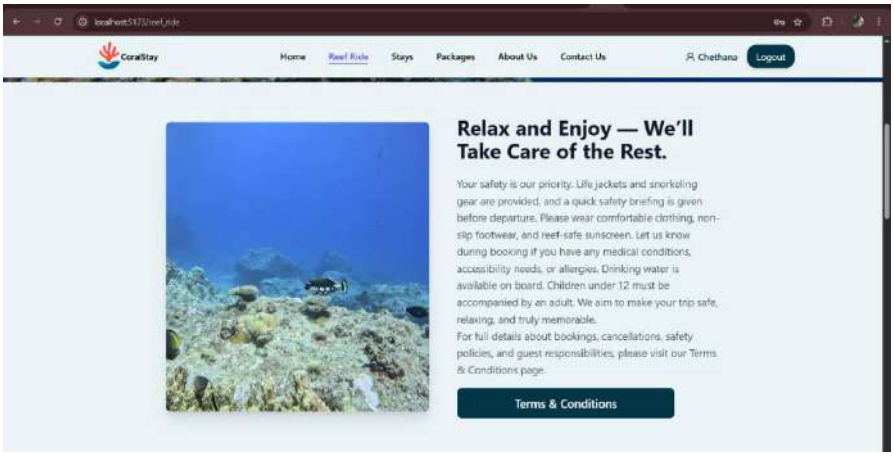

Figure 28:Reef Ride Page 02

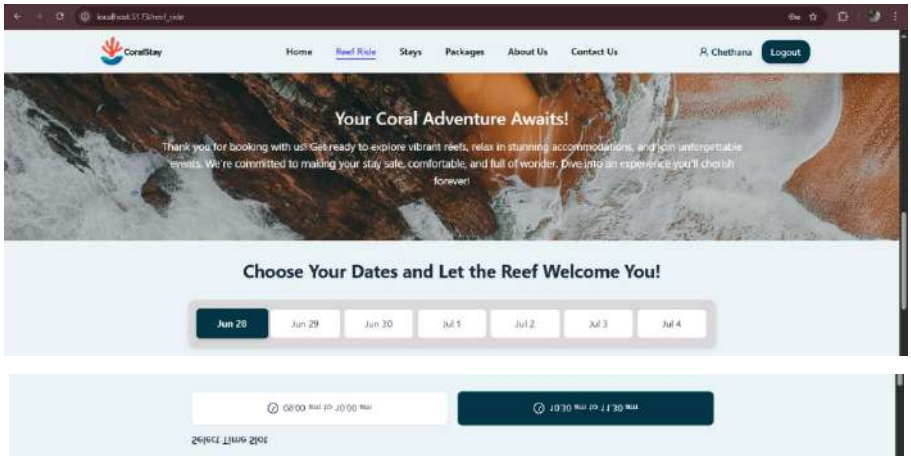

Figure 29:Choosing date & Time for Reef Ride Boat

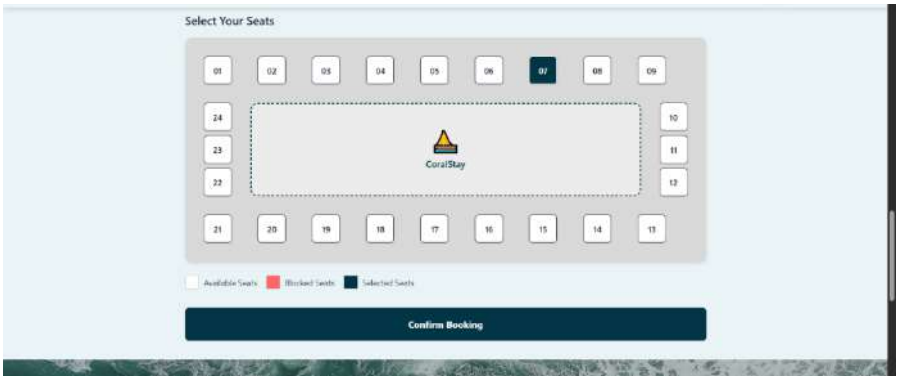

Figure 30: Selecting Boat Seat

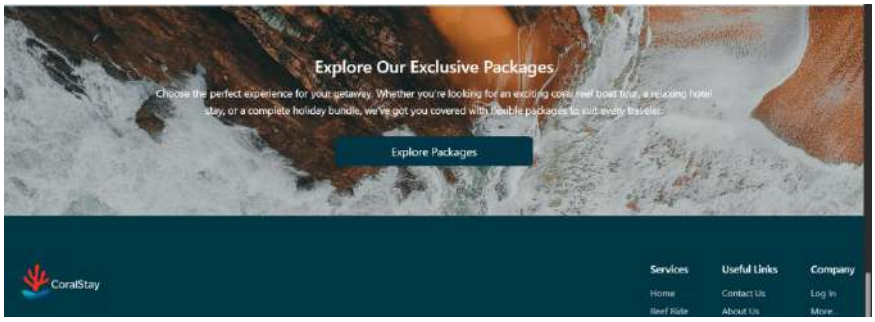

Figure 31: Redirecting to the Packages Page

Stays Page:

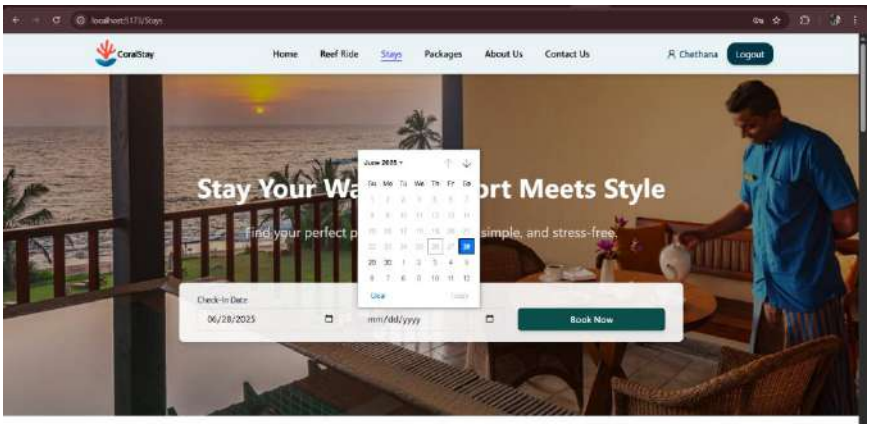

Figure 32:Stays Page- Check in Check out Date Selection

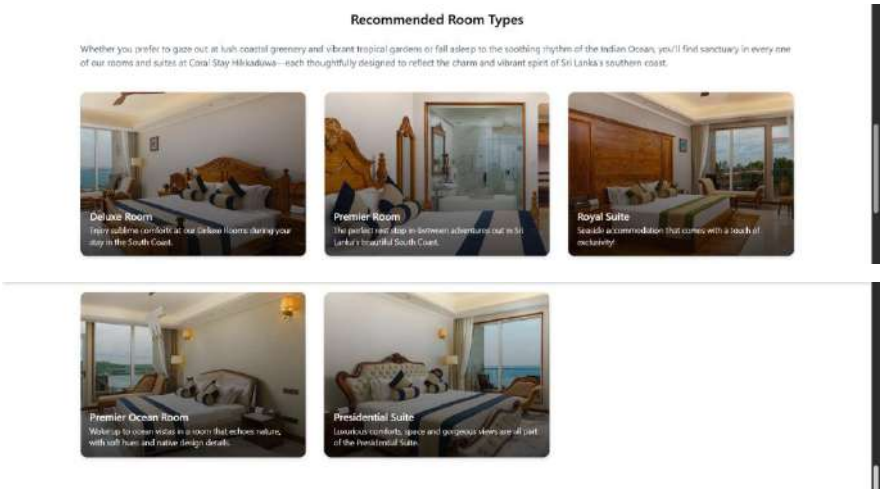

Figure 33: Stays Page-Room Selection

Room Booking Page:

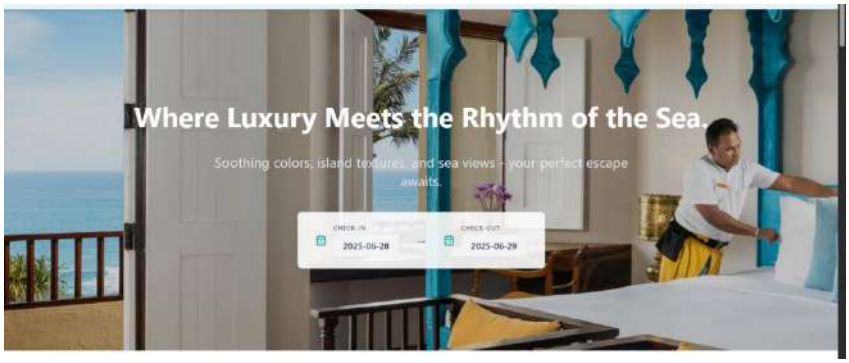

Figure 34:Room Booking - Check in & Check out Dates

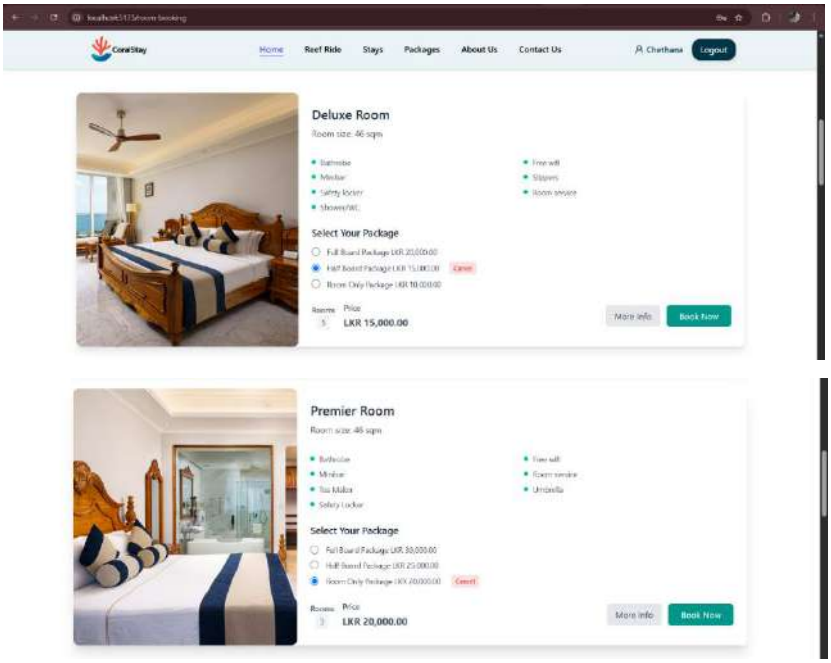

Figure 35: Room Booking Page -Selecting Rooms & Packages

Packages Page:

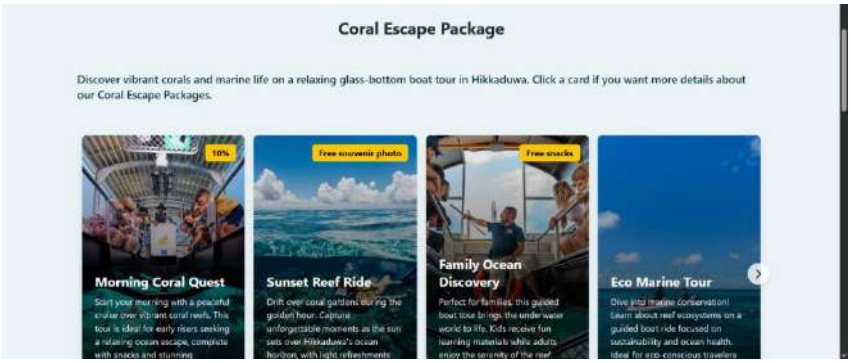

Figure 36:Packages Page-Selecting Coral Escape Packages

Coral Escape Package Booking:

Figure 37:Redirecting to the Booking Page

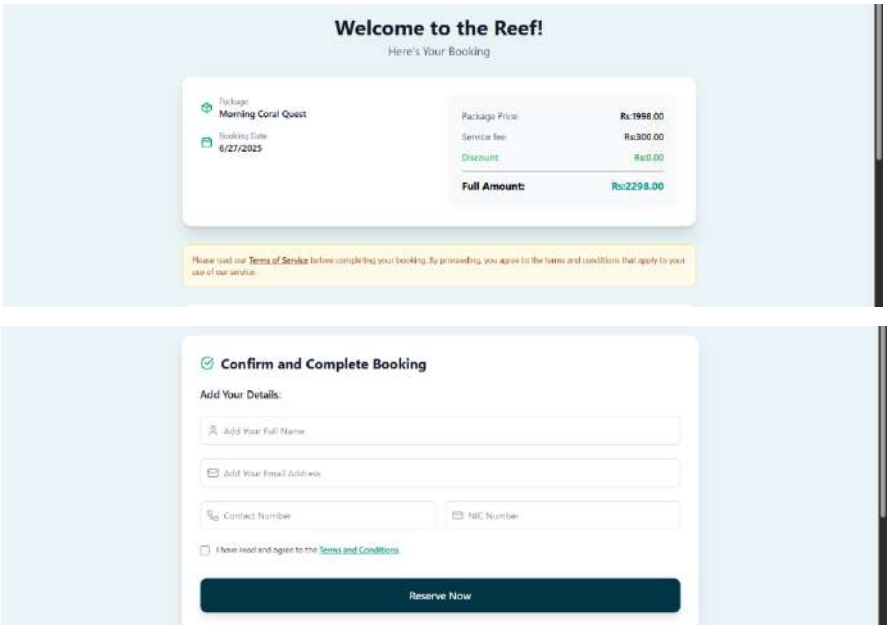

Figure 38: Package Booking

Coral Escape and Hotel Packages:

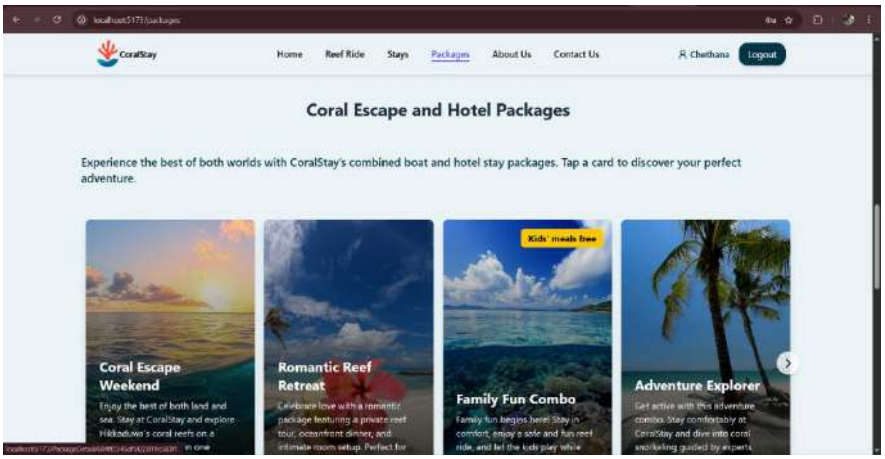

Figure 39:Selecting Coral Escape and Hotel Packages

Hotel Packages:

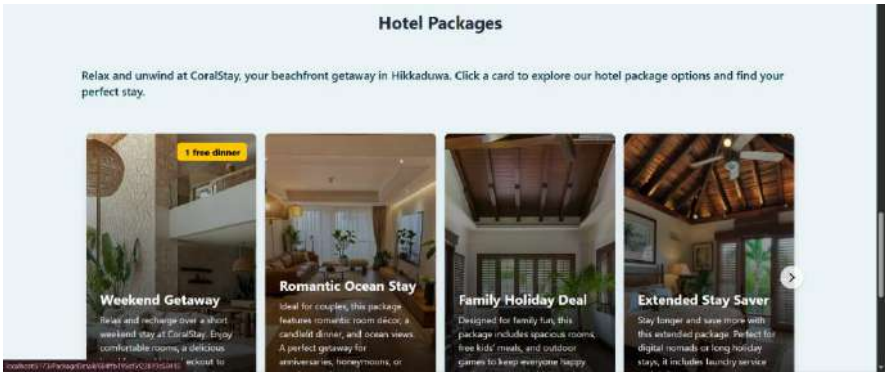

Figure 40:Selecting Hotel Packages

About Us Page:

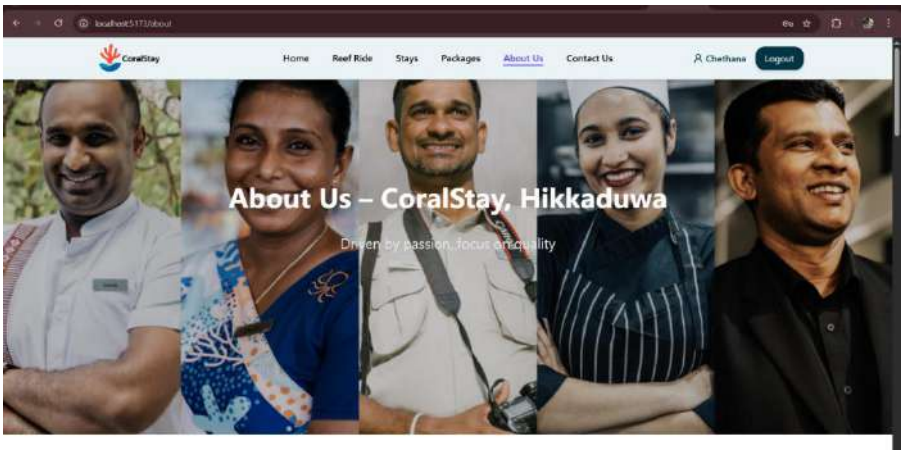

Figure 41:About Us Page 01

Figure 42:About Us Page 02

Figure 43:About Us Page 03

Figure 44:About Us Page 04

Contact Us Page:

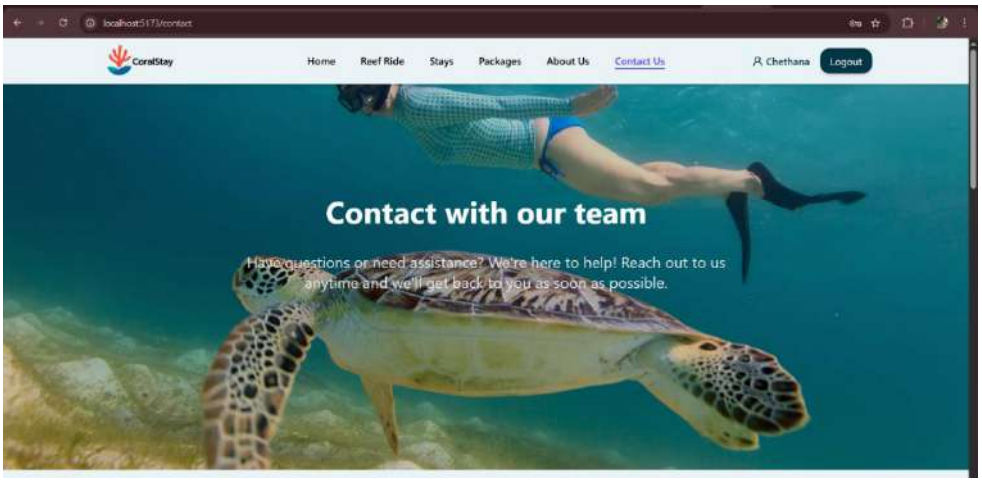

Figure 45:Contact Us Page

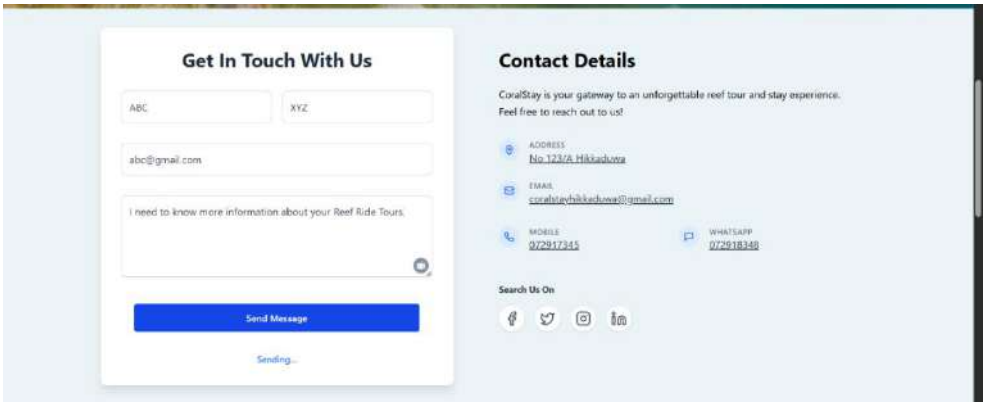

Figure 46:Sending a Message

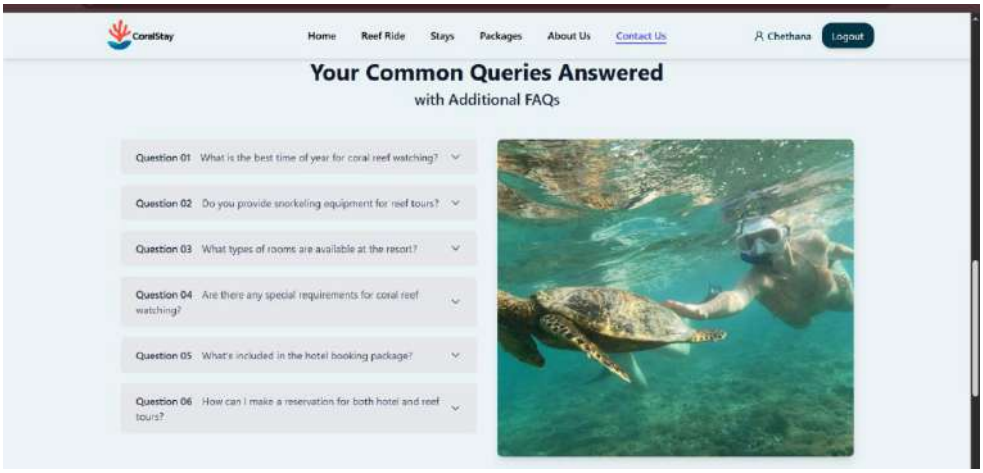

Figure 47:FAQ Section

Admin

Dashboard

Figure 48:Admin Dashboard

User Details

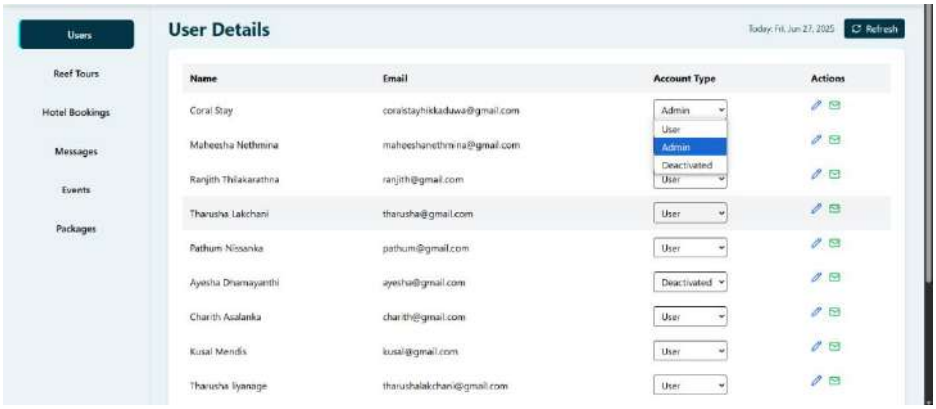

Figure 49:User Details

Edit User Detail

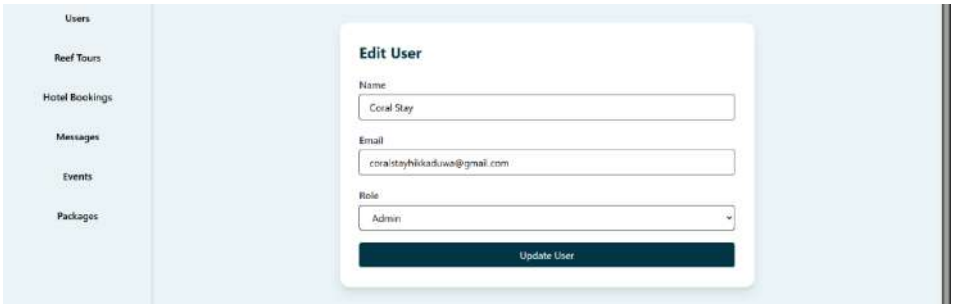

Figure 50:Edit User Details & User Role

Send Email

Figure 51:Send an Email to the User

Reef Tour Booking Management

Figure 52:Reef Tour Booking Details

Disable Selected Seats

Figure 53:Boat Tour Seat Booking Management

Update Price Settings

Figure 54:Update Prices

Events Management

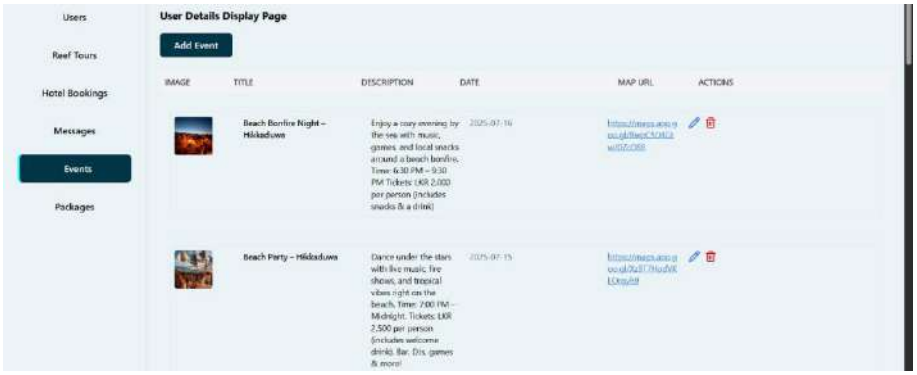

Figure 55:Events Management

Add an Event

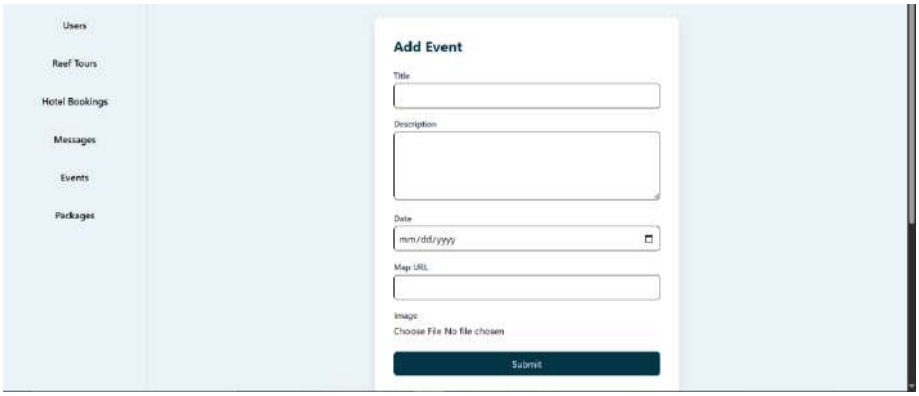

Figure 56:Adding an event

Packages

Figure 57:View Package Details

Add Packages

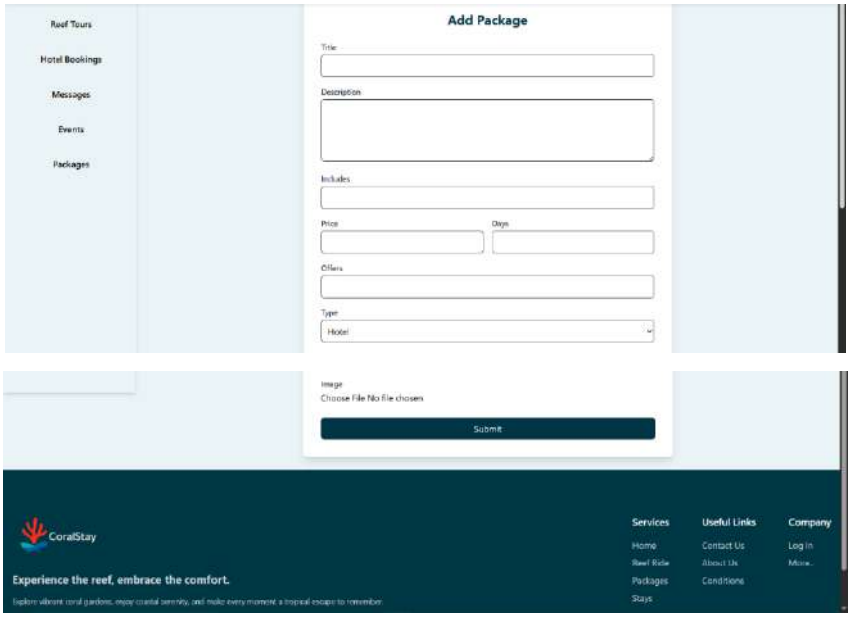

Figure 58:Add New Package Details