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Travel Planning Management System

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ABSTRACT

This project, "TRAVEL PLANNING MANAGEMENT SYSTEM", is used to automate all processes of travel and tourism, which deals with the creation, booking, confirmation, and user details. The project is designed with React JS as the front end and Spring boot as the backend, which works in any browser. A travel planning management system is used to book a tour from anywhere in the world by a single dynamic website which will help the user to know all about the places and travel details in a single web application. The admin can add travel packages to the system, transport services, place management, and hotels to create travel packages. Then the users can sign in and book each travel package, and also, they can book custom travel packages. The user can confirm their bookings by paying for the package. It is the most accessible platform for travellers who can easily book and know all details.

Keywords— Travel Planning Management, Travel Packages, Package Booking

I. INTRODUCTION

A travel application in the software context helps users to explore destinations to travel to and reserve related services such as accommodation, transportation services, outside activities providers, etc., which can be helpful while travelling.

Several characteristics can be particularly identified in travel applications currently available in the market. Due to the advancement of software development technologies, companies that provide travelling-related services can obtain the advantages of real-time and automated services. For example, update remaining services quantity upon travel users reserves them, acknowledge service providers about their received reservations real-time, etc. Moreover, to attract travellers from various countries and cultures, multilingual support is also available in most travel applications in the present day.

In the rest of the content, we are focusing on eliminating disadvantages, minor issues, and improvements that can be done to develop a more intuitive, helpful travel planning software application by comparing current travel software products in the software market. We considered a feature, user experience, and implementation-wise characteristics since the implementation of an application is a more crucial scenario when it comes to facilitating complex functionalities for many customers. The rest of the content in this paper is organized considering related work, server-side implementation and user experience flow, considered features, and a summary of the content in the body of this paper.

II. RELATED WORK/LITERATURE REVIEW

Considering the user experience and the functionalities of popular travel applications currently functioning in the software application market, we can mainly identify two types of travel applications.

1. Travel applications for search information and popular recommendations of various places* and destinations*
2. Travel applications for search and reserve services that can be required while travelling

Considering the first type, it provides information regarding the places* and destinations* and what to see and do, available transport service types, available accommodation service types, etc., in those mentioned locations. In these applications, moderators of the system are responsible for updating the information in the app with the latest information. Considering the second type provides a platform to reserve various services that can be useful while travelling, such as transport services, accommodation services, etc. In these applications, it can be limited to information provided by the commercial parties* since the information available in the application mainly depend on them because such types of travel applications are not intended to provide information that can be useful for a travelling user but to provide an intermediate platform for reserving services that can be useful for a traveller.

We tried to aggregate functionalities in the above types in our proposed system. And then eliminate the minorities in both kinds of travel applications. In brief, registered commercial parties*, travelling users, and moderators in our proposed system can propose new places* and destinations* with things that can see and do in those mentioned places* and destinations* or update existing ones as necessary. Furthermore, registered commercial parties can register their various services, which can be helpful. In contrast, travelling, such as transport services, accommodation services, and outside activities such as camping and glamping, etc., so that registered travel users can search for them and, if interested, reserve them.

In our proposed system, we tried to design a single user flow to plan a trip, starting from searching places* and destinations* to reserving each essential service. Travel users will be provided with a single-flow user experience. For example, a registered user can search the desired place*and destinations* or expect to visit, then reserve accommodation services as required, then book the transport services as required by considering the information and recommendations showing regarding the place and destinations, then reserve other services if wanted such as outside activities, spas, and wellness centres, etc., and organize the travel plan in a single flow. This can be considered an extension of the second type of travel app mentioned above since those applications provide this functionality on a modular basis, which means that travel users can reserve various services that can be useful while travelling, each individually but not in a single flow. Travel users may need to search for the services they need in such a travel application. Using our proposed system decreases the effort that a travelling user needs to explore each reserve each service needs since it will be shown all the optional and recommended services relating to a place* and destinations*. Moreover, it minimizes the possibility of missing any service a travelling user may want to reserve, as all the recommendations and options are shown in the flow.

Apart from the above-proposed travel planning flow, we tried to implement additional features in our travel application.

In our proposed system as a feature, we tried to implement personalized travel planning based on user interests by collecting users' search history, watched items history etc., inside the application. We followed a simple schedule reasoning method to analyze the user's collected data [1].

In our proposed system as a feature, we tried to implement a feature to recommend different routes that can travel during the travel planning process upon selected items/criteria to get concise information about travelling distance and cost using Google Maps API and used a customized Geometric Heuristic Search to estimate the cost of different routes and provide best cost-effective ways for the user [2].

This information will be saved along with the user's chosen travel services for later reference. As we observed, travel planning applications currently available in the market tried to implement such a feature using third-party services such as Google Maps API. In our proposed application, we wanted to implement it considering user-selected destinations, places, and other locations that provide additional services so that the user can quickly decide whether their expectations can be fulfilled with the current budget before reserving them to make payments.

III. METHODOLOGY

In this application, ReactJs is used as the front-end technology. ReactJs [5] is a front-end Javascript library for implementing user interfaces. The backend of this application is developed using SpringBoot. SpringBoot [6] is a java-based framework used to create a microservice. MongoDB is used as the database technology of this application. MongoDB is a document-oriented NoSQL database [7].

Junit4 and Mockito are used as unit testing tools. Junit [8] and Mockito are test frameworks [9]. Azure Board is used as the project management tool [10]. GitHub is used as the version control tool [11]. Selenium is used as a test automation tool [12]. SonarQube is used to inspect the code quality of the system [13].

A. Backend Processes

User Registration

In user registration, it takes the user input data like full name, email, password, and confirmed password. Then it validates that data. If there is a validation error, it will display it. It will check whether there is a user registered with the email that the user entered. If a user exists, it will display a message saying, "User Already exists." If the

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email is valid, it will check the password and confirm password matching. If not, it will display a message saying, "Password doesn't Match." After validating the password, if it is valid, it will hash the password using BCrypt. The new user will be saved in the database if all data is valid. The Below flow chart explains the backend process of user registration.

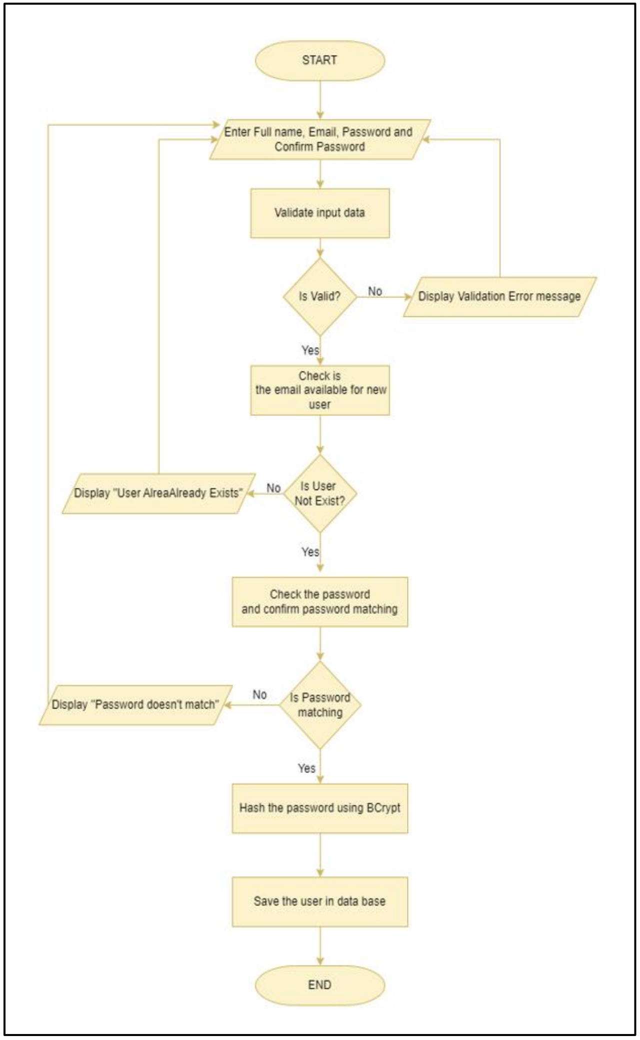
START
Enter Full name, Email, Password and Confirm Password
Validate input data
Is Valid?
No
Display Validation Error message
Yes
Check is the email available for new user
Display "User AreaAlready Exists"
No
Is User Not Exist?
Yes
Check the password and confirm password matching
Display "Password doesn't match"
No
Is Password matching
Yes
Hash the password using BCrypt
Save the user in data base
END

Figure 1: User Registration flow chart

Sign-in and Authentication

In sign-in and authentication, it takes email and password and validates that data. If there is any validation error, it will display an error message. Then it will get the user from the database using email. If there is no use for that email, it will return a bad request error saying the user doesn't exist. If the user exists, it will get the hashed password from the database and check it with the user-entered password. If the password matches, it will generate a JSON Web Token with the user id and email and return it.

The Below flow chart explains the backend process of Sign-in and Authentication.

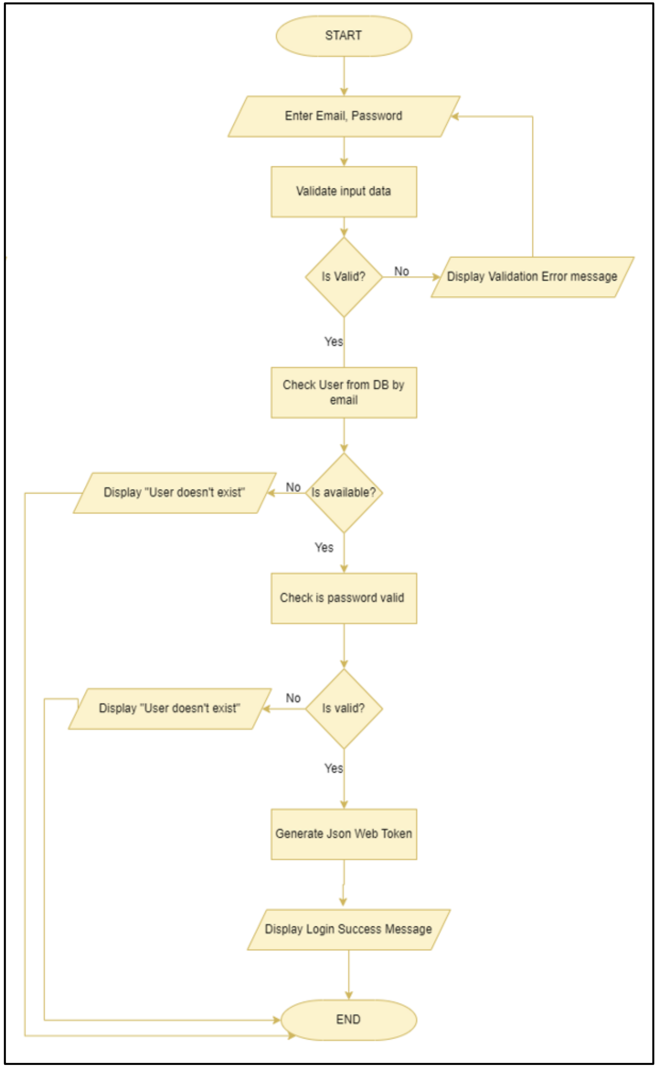
START
Enter Email, Password
Validate input data
Is Valid?
No
Display Validation Error message
Yes
Check User from DB by email
Display "User doesn't exist"
No
Is available?
Yes
Check is password valid
Display "User doesn't exist"
No
Is valid?
Yes
Generate Json Web Token
Display Login Success Message
END

Figure 2: Sign-in and Authentication flow chart

Update User Profile

In the profile update process, users can update their existing data or add new data like address and phone number. Once the user enters these data, it will validate them, and if there are any validation errors, it will return an error message. Otherwise, it will update the user data in the database and return a success message.

Users can add a profile picture if they want. The profile picture will check the type of file the user uploaded and the size of the picture. It will return an error message if it is not a valid image type or is larger than the max size. If it is valid, it will show a success message.

Users can also update their password by entering the current password, new password, and confirm password. First, it will check the current password by taking the user password saved in the database and compare with the current password. If it is incorrect, it will return an error A message is saying incorrect password. If it is correct, it will check the new password and confirm password is valid. If it is not valid, it will return a validation error. If the passwords are valid, it will check if those passwords match. If not, it will produce an error message. Otherwise, it will change the user password and update the database. The Below flow chart explains the backend process of Update User Profile.

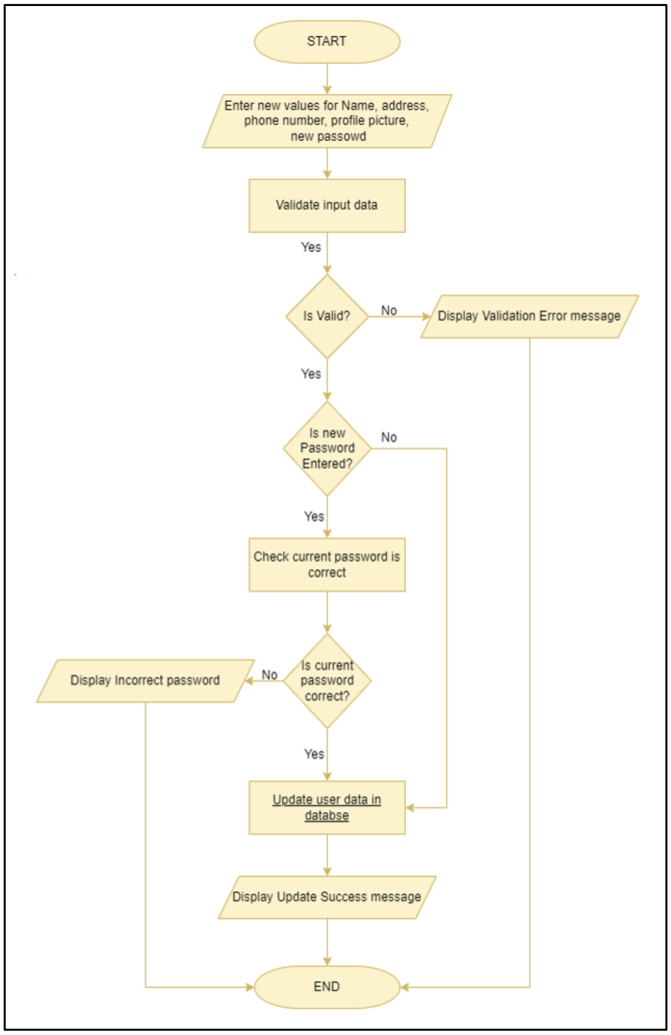
START
Enter new values for Name, address, phone number, profile picture, new passowd
Validate input data
Yes
Is Valid?
No
Display Validation Error message
Yes
Is new Password Entered?
No
Yes
Check current password is correct
Display Incorrect password
No
Is current password correct?
Yes
Update user data in databse
Display Update Success message
END

Figure 3: Update User Profile flow chart

Create a Trip Plan

In creating a trip plan, users can enter a title, the type of the trip plan(Individual, Couple, Family, and Friends), the trip's start date, and the trip's end date. These data will be validated, and if there is any validation error, it will return a validation error message. Users can enter place details by selecting a place and selecting travelling sites. The user can enter accommodation details by choosing the Hotel, number of members, room category, and appointed rooms. Then users can select a transport service, no of kilometres, vehicle type(Car, Van, Mini-bus), and chosen vehicles. If the data is filled, it will calculate the total cost and save the trip plan in the database. The below flow chart explains the backend process of Creating a Trip Plan.

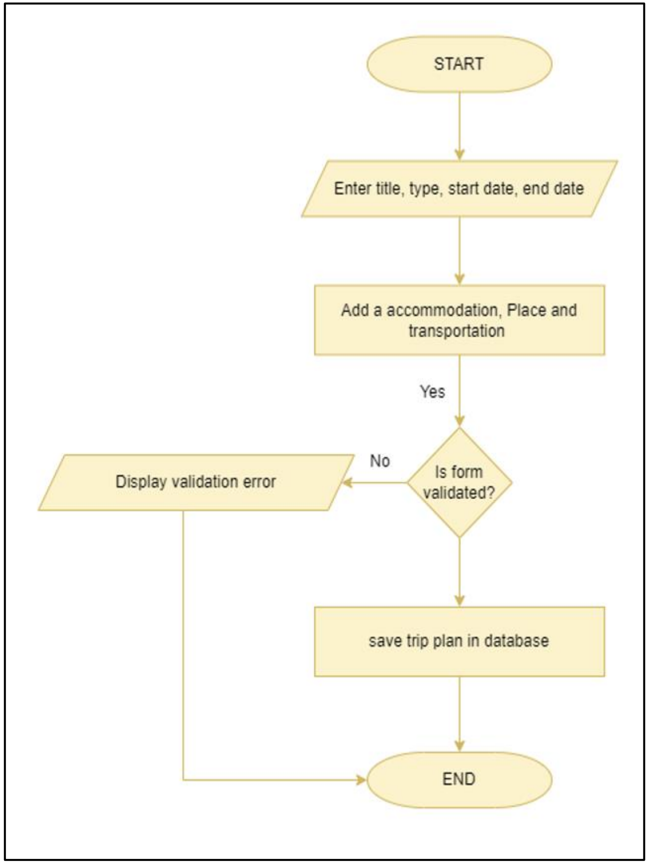
START
Enter title, type, start date, end date
Add a accommodation, Place and transportation
Yes
Display validation error
No
Is form validated?
save trip plan in database
END

Figure 4: Create a Trip Plan flow chart

Payment Process

The payment process takes the user name, card number, expiration date, and CVC number. Those data will be validated. If there are any validation errors, it will display a validation error. Otherwise, it will continue the payment process. If the payment is successful, it will display a message saying, "Payment Successful." If the payment fails, it will display a statement saying, "Payment Failed." Then it will save the payment details in the database and update the trip plan status to paid. The Below flow chart explains the backend process of the Payment Process.

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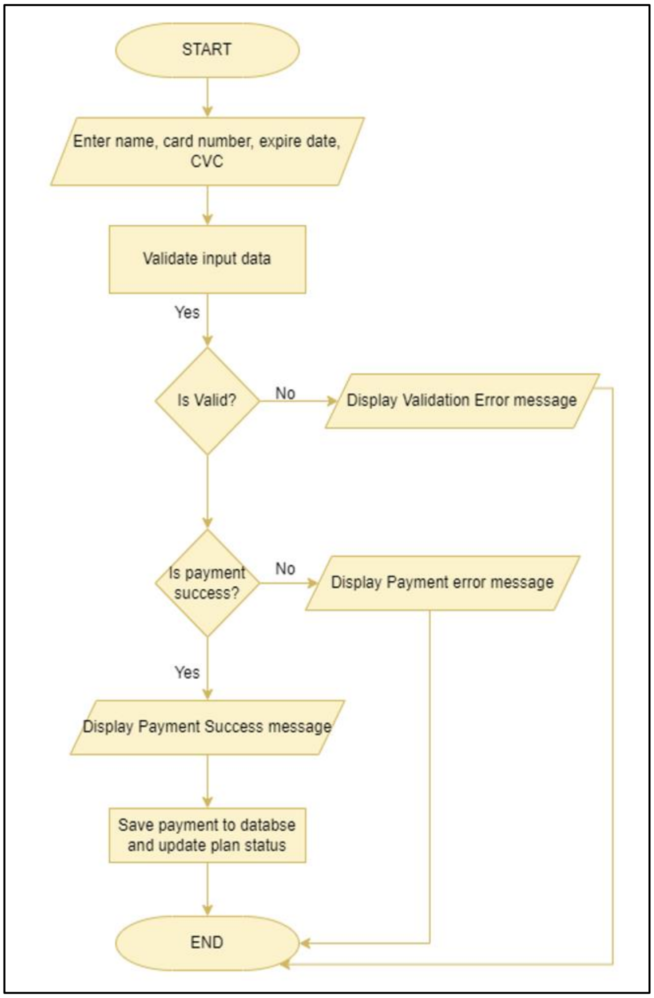
START
Enter name, card number, expire date, CVC
Validate input data
Yes
Is Valid?
No
Display Validation Error message
Is payment success?
No
Display Payment error message
Yes
Display Payment Success message
Save payment to databse and update plan status
END

Figure 5: Payment Process flow chart

Create Place Function

The create place backend function needs RequestBody, then execute the try-catch block. The try block executes the save method in the placeManagementRepository. Then return HttpStatus.CREATED. in the catch block exception handle execute and return HttpStatus.INTERNAL_SERVER_ERROR. The Below flow chart explains the backend process of Create Place Function.

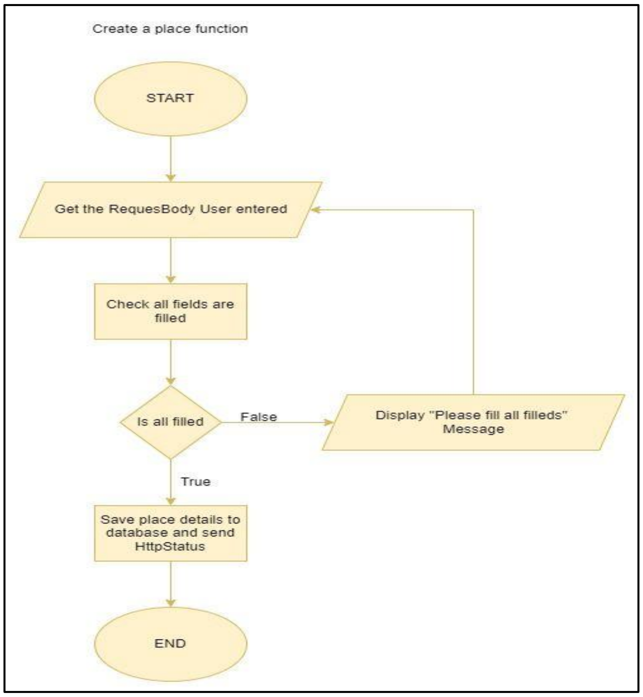
Create a place function
START
Get the RequesBody User entered
Check all fields are filled
Is all filled
False
Display "Please fill all filleds" Message
True
Save place details to database and send HttpStatus
END

Figure 6: Create Place Function flow chart

Update Place Data

The update place data backend function needs PathVariable("id") and the request body. Then it executes the findById method in the placeManagementRepository. Then in the if statement, check placeData.isPresent(). If true, execute the save method in the placeManagementRepository and return HttpStatus.OK. If not, placeData.isPresent() return status HttpStatus.NOT_FOUND. The Below flow chart explains the backend process of Update Place Data.

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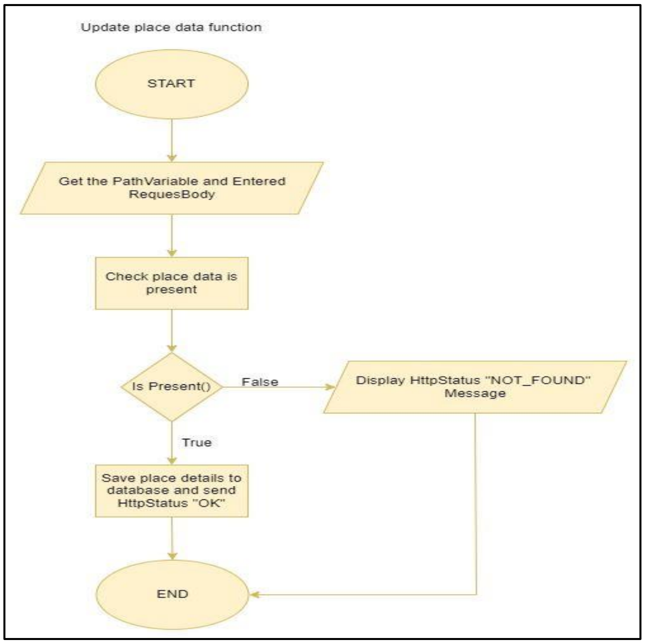
Update place data function
START
Get the PathVariable and Entered RequesBody
Check place data is present
Is Present()
False
Display HttpStatus "NOT_FOUND" Message
True
Save place details to database and send HttpStatus "OK"
END

Figure 7: Update Place flow chart

Get Place Function

The get place backend function needs an (optional) name. after that function executes the try-catch block. in the try-block if(name == null) execute findAll method in placeManagementRepository. else it executes findByNameContaining method in placeManagementRepository. After that, there is another if statement to check data is empty. It indeed returns HttpStatus.NO_CONTENT. Else it returns HttpStatus.OK.in the catch block exception handle execute and return HttpStatus.INTERNAL_SERVER_ERROR. The Below flow chart explains the backend process of the Get Place Function.

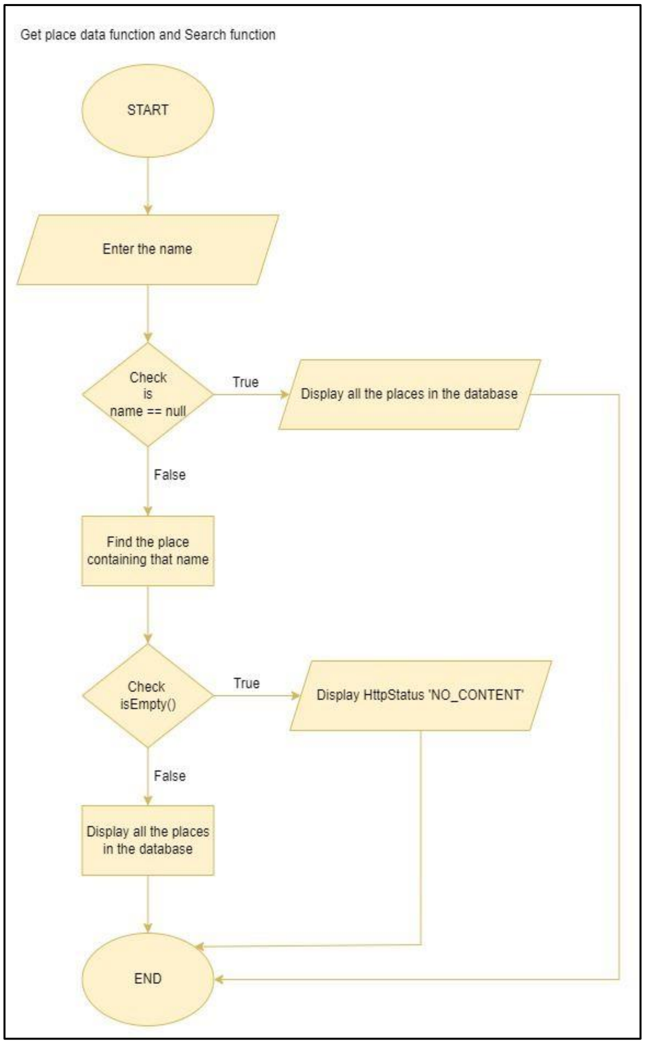
Get place data function and Search function
START
Enter the name
Check is name == null
True
Display all the places in the database
False
Find the place containing that name
Check isEmpty()
True
Display HttpStatus 'NO_CONTENT'
False
Display all the places in the database
END

Figure 8: get place flow chart

Transportation Management

In transport management services, a single API is used to register and update transport service details in the system. To approve or reject a transport service registration, a single API is used in the same manner described before in register and update transport service.

They are registering and updating a transport service check whether a transport service record/record is already associated with the received email address. Data would be registered in the system if the email address was not received. Else the transport services details will be updated on the received email address. Users will not be allowed to change their email address corresponding to its registered transport services for privacy and disclosure regulation reasons. The Below flow chart explains the backend process of Transportation Management.

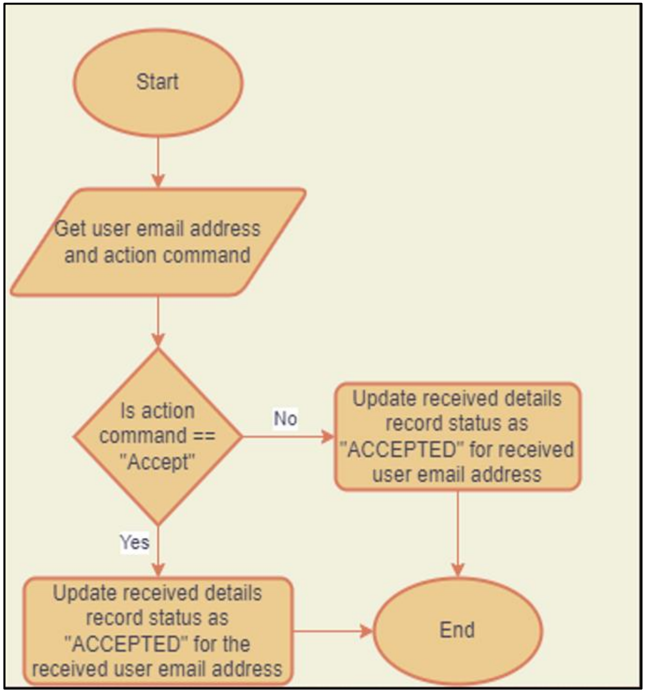
Start
Get user email address and action command
Is action command == "Accept"
No
Update received details record status as "ACCEPTED" for received user email address
Yes
Update received details record status as "ACCEPTED" for the received user email address
End

Figure 9: Transport service registration and update flow chart

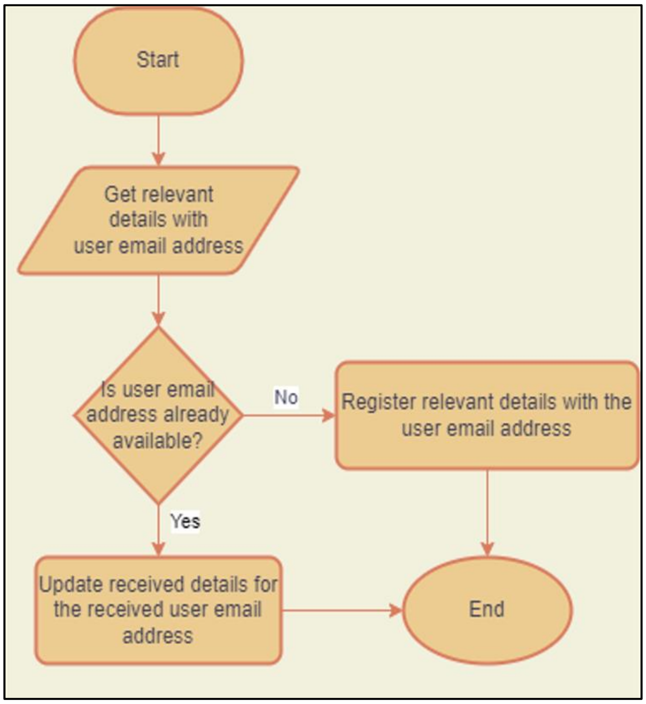
Start
Get relevant details with user email address
Is user email address already available?
No
Register relevant details with the user email address
Yes
Update received details for the received user email address
End

Figure 10: Transport services requests flow chart

Accommodation Management

After submitting the hotel details system will validate the entered details. If there are any errors, the system will pass the exception. If the input entered details are valid, the system will save the submitted Hotel into the database. The Below flow chart explains the backend process of Accommodation Management.

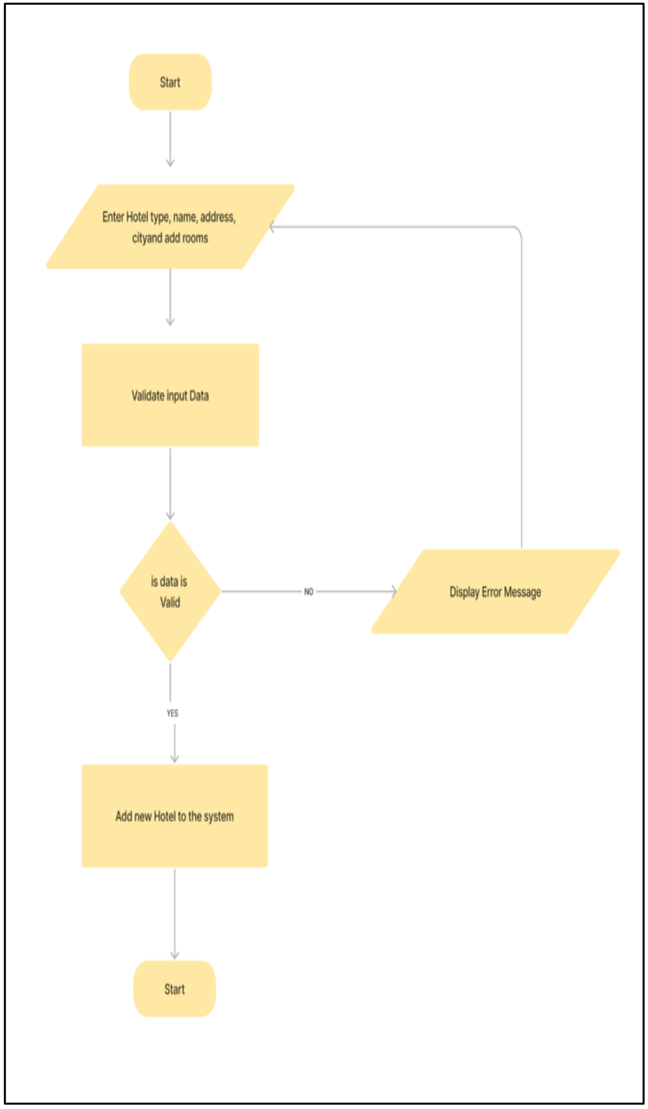
Start
Enter Hotel type, name, address, cityand add rooms
Validate input Data
is data is Valid
NO
Display Error Message
YES
Add new Hotel to the system
Start

Figure 11: Create a hotel flow chart

IV. PROPOSED SYSTEM

When developing a suitable travel planning system, there are a few things that we need to think about. A good travel planning tool makes life easier for our customers, and this web application should free customers from tedious and time-consuming work. So, to help customers a little more, we are creating new features they should consider when choosing our online travel planning system.

A. Hotel Management

This is a critical part of our travel planning system. Using our system allows hotels to leverage the marketing

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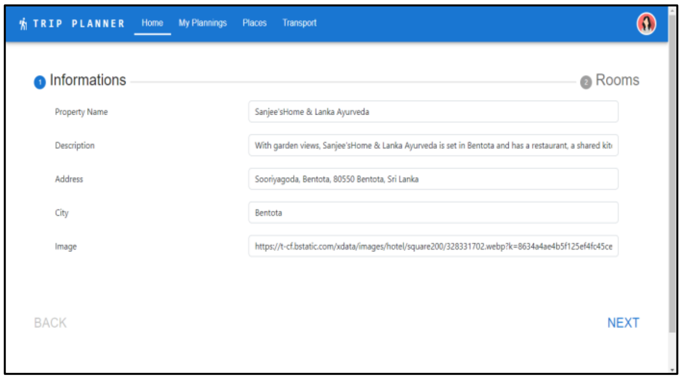
power of online travel agencies, bring potential bookers directly to hotels and avoid paying commissions to OTA portals. With reasonable rates, distribution strategy, and direct booking offers, hotels worldwide can easily register their hotels in our system, which is the most profitable booking channel. System Admin can add new hotels to the system in figure 12. To create a unique hotel admin needs to insert the hotel name and address. Also, they can upload images to the system. To add new rooms to the system, the admin needs to provide information and add a new hotel. The user is free to select the accommodation type, and the system will display details according to the selection. For example, if users choose hotels as an accommodation system, they will show available rooms, and if they select restaurant system will not, but here it will display other details.



Property Name: Sanjee'sHome & Lanka Ayurveda
Description: With garden views, Sanjee'sHome & Lanka Ayurveda is set in Bentota and has a restaurant, a shared kit
Address: Sooriyagoda, Bentota, 80550 Bentota, Sri Lanka
City: Bentota
Image: https://t-cf.bstatic.com/xdata/images/hotel/square200/328331702.webp?k=8634a4ae4b5f125ef4fc45ce

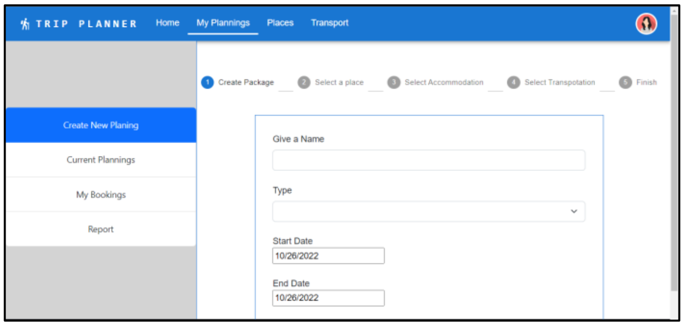
Figure 12: Add new Hotel

It's essential to update hotel details. For that admin can select a specific Hotel and can update hotel details. For the hotel management function, the admin can generate reports related to the hotels. Data plays a vital role in the travel planning system. With the correct data at your fingertips, you can effectively measure and optimize system performance to provide a personalized experience for visitors. The hotel management segment has access to critical data to make informed choices.

B. Plan & Package Management

This is a central part of the trip planning system. With online trip planning, planners can tailor their trips using our system. Users can select multiple locations and add them to their custom plans. With this feature, the system will display hotels according to the city. Guests can lock their places in our system by paying the deposit amount. They are ready and confident to book their flights.

Everyone has individual preferences when it comes to paying for online travel planning. Some people like the convenience of using PayPal, while others prefer to pay by credit card or bank transfer. We can increase the number of online bookings on our website by expanding our guest options. Working with advertising campaigns is a great way to extend our target audience. A sound travel planning system should allow users to apply promotional codes. It should not come down to simple one-time discounts and vouchers. Best trip planning enables guests to configure discounts on products, specific time limits, the total amount spent, or the number of people booked. A state-of-the-art trip planning system allows the administrator to get a quick overview of how the trip planning business is doing so visitors can take immediate action. And also, travellers can pick already created travel packages through our system. There are five steps to complete to create a new package in figure 13. The first traveller needs to give a name for the box and select the type of trip out of family, couple or individual. The need to enter the date that plans to go.
In the next step, the traveller can select the location and places planning to visit. In the third step, the traveller must choose a place for accommodation. The fourth step is that the traveller can select a travelling vehicle. In the last step, the traveller has to confirm and click the finish. Travellers can view all plannings by clicking them and can delete current plannings by clicking the delete button. The traveller can navigate the payment page by clicking the Book button.



Start Date: 10/26/2022
End Date: 10/26/2022

Figure 13: Create Plan

On the payment page, travellers can add their payment details to the system, which will validate in figure 14. After payment is a success, they can book their created package. On the home page, travellers can see places to visit and travel packages, and users can filter them. From the home page, the user can navigate to other system sections. Admin can give a title to the newly created package and select the type out of budget, midrange and premium. Then we need to set the number of days for the package and can give a discount. Then admin can select a place, accommodation, and transport and submit it.

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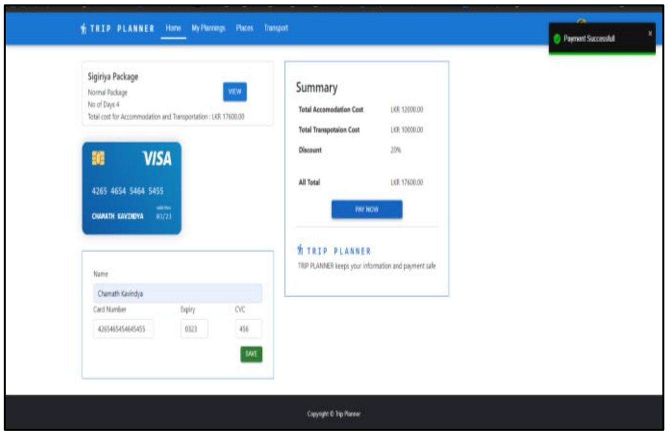


Sigiriya Package
Normal Package
No of Days 4
Total cost for Accommodation and Transportation : LKR 17600.00

Name: Chamath Kavindya
Card Number: 4265465454645455
Expiry: 0323
CVC: 456

Summary

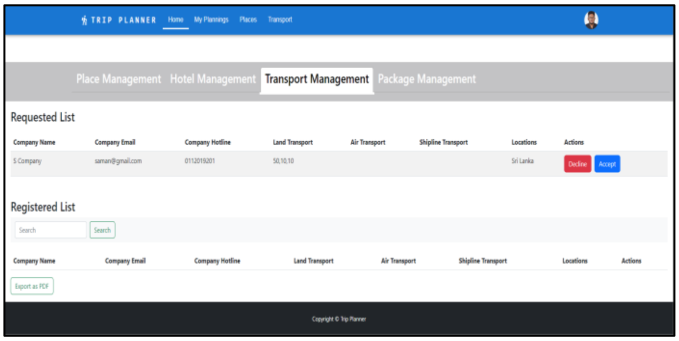
Total Accomodation Cost	LKR 12000.00
Total Transpotaion Cost	LKR 10000.00
Discount	20%
All Total	LKR 17600.00

TRIP PLANNER keeps your information and payment safe

Figure 14: Pay for the Package

C. Transport Management

Transport management is used to provide transportation services to travellers. For that, they can pick the vehicle through our planning process. Only they must choose the vehicle and destination in our planning process. And also, any company with direct responsibility for transporting travellers can register their services to our system. They can register their services to our system as a user or through our admin. After submitting the transport registration form, the registration request sends to the admin. In the admin dashboard, they can view available requested transport services. Admin can approve or reject those requests. The service provider can enter full details about the vehicle and others to register the transport service. When the service provider logs in to its account, a button will be shown as "Register Services", and the service provider can access the "Transportation Services Registration" form in figure 15.



Requested List

Company Name	Company Email	Company Hotline	Land Transport	Air Transport	Shipline Transport	Locations	Actions
S Company	saman@gmail.com	0112019201	50,10,10			Sri Lanka	Decline Accept

Registered List

Company Name	Company Email	Company Hotline	Land Transport	Air Transport	Shipline Transport	Locations	Actions

Figure 15: Transportation Services Registration

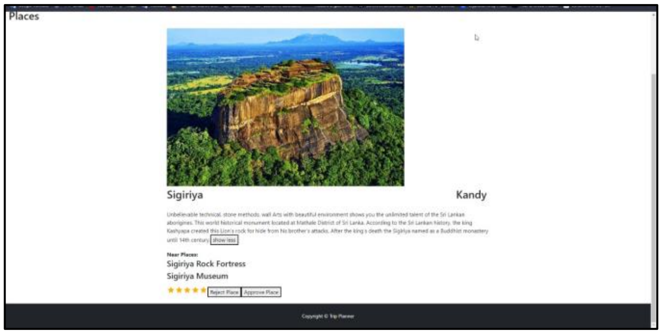
This page was designed to achieve one specific task: requesting registration for transportation services. Admin can view all the requests. The "Register Services" page will display all the statuses of the submitted request registration for transportation services form. When the service provider logs in to its account, a button will be shown as "Register Services"; the service provider can see this section from there.

The complexities of today's transportation regulations make the task nearly impossible without computerization. Automating these complex transportation processes for travellers helps ensure that transportation services are secured at the lowest possible cost without sacrificing quality or efficiency.

D. Place Management

Place management helps travellers choose their destinations and plan their travel plans. Using place management, travellers can achieve their goals and thus unlock many benefits, such as delighting tourists so that they return to their destination. Using our system, they can select their destination in their preferences. For that, they can filter the places by selected district or city. Through our planning process, they can add their destinations to the system. Admin can add new places to the system, and users can add beautiful places to the system. After users submit the places, that request will display to the system admin. For beautiful places, travellers can add their feedback or rate those places. Admin can update the places, and also, they can delete selected places. Only admin can be used to delete specific places from the system. In the beginning, the traveller needs to fill in the name, description of the place, location, rating, and image of the place. After that, the traveller can submit the form to the system. This page was designed by focusing on one specific task: adding the place to the system. If the admin needs to update or delete a particular place, they must choose what place they want to delete or edit. Then the admin can edit or delete using the edit & delete button.

Anyone can display all the available places from the system in figure 16. Initially, the system will show all places already added to the system. If a traveller/admin wants to add a place to the system, they can add it using the "add" button. Also, users can search for places using a search bar.


Places

Sigiriya
Kandy

Unbelievable technical, stone methods, wall Arts with beautiful environment shows you the unlimited talent of the Sri Lankan aborigines. This world historical monument located at Mathale District of Sri Lanka. According to the Sri Lankan history, the king Kashyapa created this Lion's rock for hide from his brother's attacks. After the king's death the Sigiriya named as a Buddhist monastery until 14th century

Near Places:
Sigiriya Rock Fortress
Sigiriya Museum

Figure 16: Display All the Places

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V. DISCUSSION

In the existing system, there is no way to manage all places, accommodations, and transportation in one place. Users had to book them separately, which is a tidies work. And there are no packages included in all three services. Also, there is no way to display all details in one place and no meaningful reports to generations.

In the proposed system, those drawbacks are addressed to give more user experience to the users.

Testing Methods

As the testing methods in the system, JUnit and Mockito are used in the backend for unit testing. In trip plan management, all functions(create a trip plan, get all trip plans, get a trip plan by id and delete trip plan by id) are covered using unit testing. In user management, adding a new user, authenticating a user, updating a user, getting a user by id, delete user methods are covered with unit testing. In Travel package management, creating a package, updating a package, getting all packages, getting a package by id, and deleting a package are covered with unit testing. The payment function is also covered with unit testing.

Unit testing covered all controller, service, model, and DAO layers to get 100% coverage on each feature. Integration testing can be done to test how each layer communicates with the others and what are the errors and missing points.

Selenium is used for automation testing to check whether the system is working as expected. All the features in the system are tested with selenium. The below figures show the SonarQube report of the front and backend.

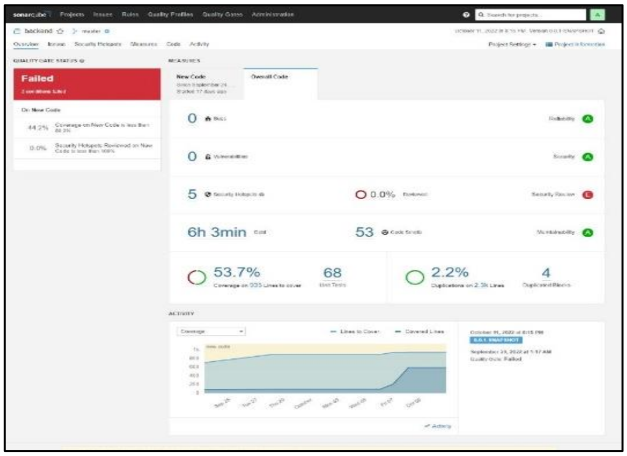

Figure 17: Backend SonarQube report

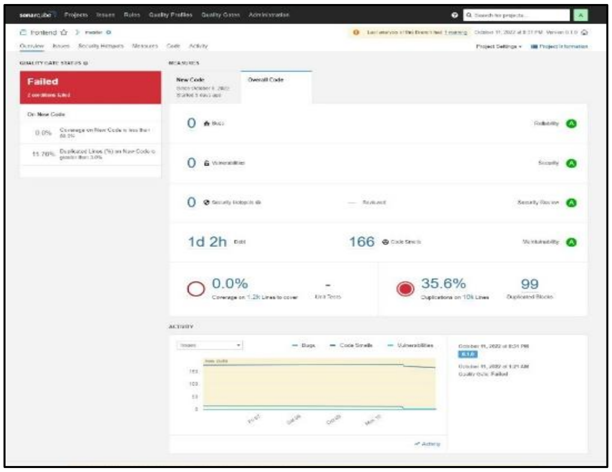

Figure 18: Frontend SonarQube report

VI. CONCLUSION

This travel web application was successfully created and stored all the travel admins, users, places, hotel bookings, travel transportation, managing, and tour details in the database.

The web application was tested very well, using Selenium and SonarQube, and the errors were adequately debugged. All the necessary output results are generated. The SonarQube system thus provides an easy way to automate all web application functionalities. This web application is implemented in a few areas like transportation, places, booking, and packages, but it covers the complete tour for users, and the web application will be helpful in many areas.

Further enhancements can be made to the project so that it functions much more attractive and valuable than the present one. It is concluded that the application works well and satisfies the needs.

*places/place – From the term places/place, it is assumed that the cities and villages which travellers are interested in exploring.

*destinations/destination – From the term destination, it is assumed that historical places, popular natural environments such as forests, beachside, etc., in a specific location or a place as in the above section.

*commercial parties – From the term commercial parties, it is assumed that the businesses registered in the system intended to provide various services for a wide range of travel users registered in the system.

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