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# Egypt Smart Journey Planner

**Graduation Project - Part 2**

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**2025**

## ABSTRACT

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Rahhal is an intelligent system designed to make travel experiences in Egypt easier and more enjoyable. It creates personalized plans for tourists, suggesting historical places to visit, nearby hotels, and more based on the type of experience they want to have.

Users provide a description of their desired experience, whether they are international tourists visiting Egypt or Egyptians exploring their own country.

Based on this input, Rahhal generates a tailored plan that meets their preferences and expectations.

Additionally, the system connects users with recommended trips organized by tourism companies that align with their interests. By offering personalized and convenient recommendations, Rahhal aims to enhance travel planning and ensure a memorable journey for all.

In conclusion, Rahhal makes travel planning in Egypt easier and more enjoyable by offering personalized recommendations based on each person's preferences. It helps both tourists and locals have better experiences while also supporting local tourism businesses. With Rahhal, exploring Egypt becomes simple, fun, and memorable for everyone.

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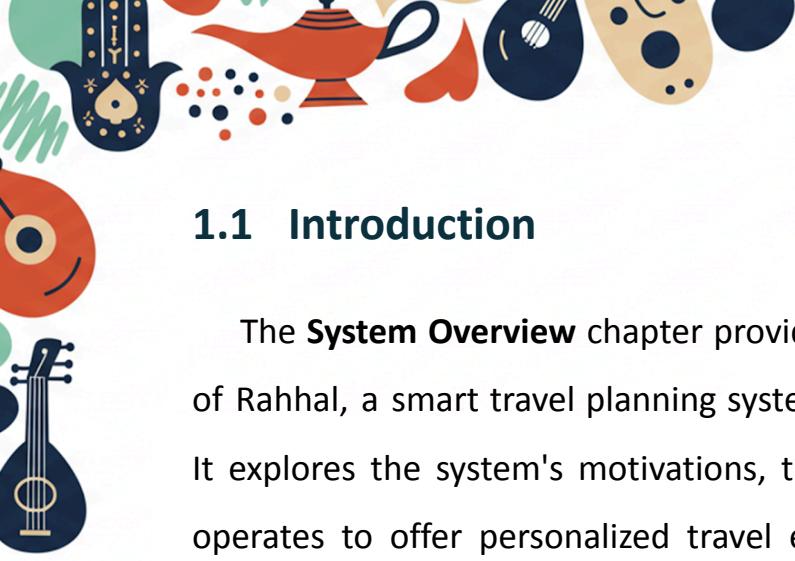


# Chapter 1

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## System Overview

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## 1.1 Introduction

The **System Overview** chapter provides an in-depth look at the core aspects of Rahhal, a smart travel planning system tailored for tourists exploring Egypt. It explores the system's motivations, the challenges it addresses, and how it operates to offer personalized travel experiences. By focusing on delivering convenience, personalization, and efficiency, Rahhal aims to bridge the gap between travelers' unique needs and the vast opportunities Egypt has to offer.

This chapter will detail Rahhal's mission to simplify travel planning, its approach to tackling common travel problems, and the innovative features that set it apart. From identifying user preferences to connecting them with tailored recommendations and tourism company offerings, Rahhal ensures a seamless, enjoyable journey for both local and international tourists.

## 1.2 Motivation

Rahhal is an intelligent system designed to make travel experiences in Egypt easier and more enjoyable. It creates personalized plans for tourists, suggesting historical places to visit, nearby hotels, and more based on the type of experience they want to have.

Users provide a description of their desired experience, whether they are international tourists visiting Egypt or Egyptians exploring their own country. Based on this input, Rahhal generates a tailored plan that meets their preferences and expectations.

Additionally, the system connects users with recommended trips organized by tourism companies that align with their interests. By offering personalized



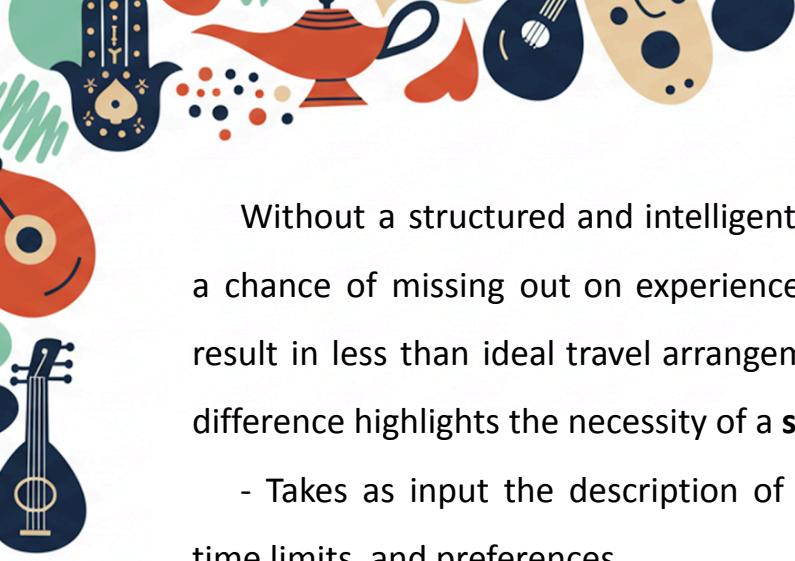
and convenient recommendations, Rahhal aims to enhance travel planning and ensure a memorable journey for all.

In conclusion, Rahhal makes travel planning in Egypt easier and more enjoyable by offering personalized recommendations based on each person's preferences. It helps both tourists and citizens have better experiences while also supporting local tourism businesses. With Rahhal, exploring Egypt becomes simple, fun, and memorable for everyone.

### 1.3 Problem Statement

Egypt is a popular travel destination because of its great history, wide range of landmarks and unique cultural experiences. However, arranging a trip to Egypt might be difficult due to the huge number of cities landmarks, and activities offered. Tourists encounter a number of difficulties:

- 1. Limited Time and Resources:** Tourists often only have a few days to explore, making it difficult to rank the most worthwhile stops and activities.
- 2. Seasonal Preferences:** Tourists may not be aware of the fact that some places are more appropriate for particular seasons.
- 3. Individual Preferences:** Specific hobbies of tourists, including historical research or adventurous sports, can be missed by general planning techniques.
- 4. Information Overload:** Although there is a wealth of information available online, it takes time to locate recommendations that are precise, trustworthy, and customized
- 5. Inconsistency with Arranged Trips:** Tourism companies advertise a range of prearranged trips, but these sometimes don't fit the unique requirements, preferences, and limitations of individual tourists.



Without a structured and intelligent approach to trip planning, tourists run a chance of missing out on experiences that suit their interests, which could result in less than ideal travel arrangements and lower levels of pleasure. This difference highlights the necessity of a **smart, user-focused solution** that:

- Takes as input the description of a tourist's trip, including their budget, time limits, and preferences.
- Provides personalized destinations and activities depending on their specific requirements.
- Recommends pre-planned trips advertised by tourism companies that best meet their needs.
- Simplifies decision-making and improves the whole travel experience.

## 1.4 Overview

This project introduces a smart, recommendation-based model designed to enhance the travel planning experience for tourists visiting Egypt. By addressing the challenges of information overload, lack of personalization, and time constraints, our model offers tailored suggestions for destinations, accommodations, landmarks, and curated trips, all of which can be booked directly through the system.

The system operates by collecting specific input from tourists, such as:

**Preferred Activities:** Whether they wish to explore historical sites, enjoy adventurous experiences, or relax in serene locations.

**Travel Season:** The time of year they plan to visit, ensuring recommendations are seasonally appropriate.

Using this information, the model generates personalized recommendations, including:

**Cities:** Suggesting the most suitable cities to visit based on the tourist's interests and the season.



**Hotels:** Identifying accommodations that match their preferences for comfort and proximity to attractions.

**Landmarks:** Highlighting iconic sites and hidden gems aligned with their interests.

**Organized Trips:** Proposing pre-planned trips offered by local companies that cater to their described preferences, which tourists can book directly through the system.

By streamlining the decision-making process, this project aims to save time, reduce uncertainty, and improve the overall travel experience. It also benefits local tourism companies by connecting them with tourists through targeted trip suggestions and booking options.

## 1.5 Conclusion

In conclusion, System overview highlights Rahhal's ability to revolutionize travel planning in Egypt. By addressing key challenges such as information overload, lack of personalization, and limited time, the system provides tourists with customized recommendations for cities, landmarks, accommodations, and trips.

Through its intelligent design, Rahhal not only enhances the travel experience for users but also supports the local tourism industry by facilitating direct connections between travelers and tourism companies. With its innovative features and user-centric approach, Rahhal sets the stage for memorable and efficient travel planning.

The next chapter, **Related Work**, will explore similar projects and systems in the travel and tourism domain, analyzing how they function and identifying what sets Rahhal apart. This comparison will demonstrate the unique value Rahhal brings to the tourism industry.



# Chapter 2

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## Related Work

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## 2.1 Introduction

The **Related Work** chapter explores existing platforms and systems in the travel and tourism industry that share similarities with Rahhal. By analyzing tools like Kayak Explore, Routeperfect, Viator, and GetYourGuide, this chapter identifies the strengths and limitations of current solutions. These platforms offer various features, such as destination discovery, itinerary planning, and activity booking, but often lack the level of personalization and AI-driven insights that Rahhal aims to provide. This chapter will highlight how Rahhal differentiates itself by combining user-driven trip planning with AI-powered recommendations, offering a more tailored and efficient travel planning experience.

## 2.2 Kayak Explore: A Personalized Travel Discovery Tool



Figure 1: Kayak Explore: A Personalized Travel Discovery Tool

Kayak Explore is a comprehensive destination discovery tool integrated into the Kayak travel platform. It offers a simplified way of travel planning by taking consideration of preferences, budgetary constraints, and preferred vacation dates in order to help users find suitable travel destinations. (*Kayak Travel*, n.d.)

### Key Features

1. **Destination Discovery:** Users input budget, departure city, and travel dates, with flexibility to adjust parameters. Kayak Explore generates a

map displaying potential destinations that align with the user's criteria, accompanied by estimated flight prices.

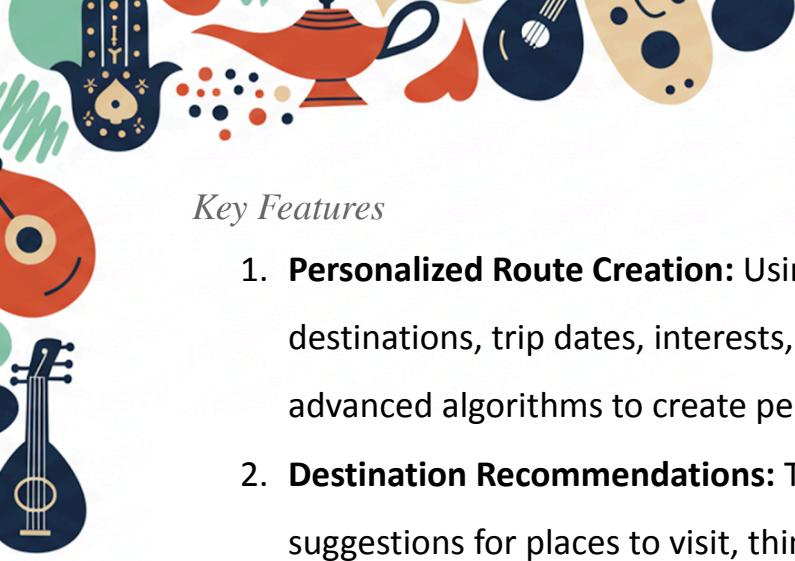
2. **Flexible Search:** The "Anywhere" feature enables users to investigate a broad array of destinations, utilizing filters to refine results based on flight duration, climate, and available activities.
3. **Cost Concerns:** helps with budget-based decision-making by providing predicted flight prices to various locations.
4. **Interactive Map:** With the flexibility to zoom in and out to examine regions or individual cities, the interactive map that shows destinations helps consumers see vacation possibilities that fit within their budget.
5. **Motivating Travel:** highlights popular vacation spots, special offers, and unusual locations; perfect for last-minute budget travel or tourists looking for inspiration.
6. **Cost-effective Choices:** helps find places where flights are less expensive at particular times.

## 2.3 Routeprofet: Travel Itinerary Planning Platform



Figure 2: Routeprofet: Travel Itinerary Planning Platform

RoutePerfect is an online trip planning tool made to make the process of making customized and efficient travel plans easier. Through the use of advanced algorithms and user settings, RoutePerfect helps travelers create specific routes that fit their time, money, and interests. (*Routeprofet*, n.d.)



## *Key Features*

1. **Personalized Route Creation:** Using user inputs including preferred destinations, trip dates, interests, and budget, RoutePerfect employs advanced algorithms to create personalized travel plans.
2. **Destination Recommendations:** The website offers carefully chosen suggestions for places to visit, things to do, and activities, assisting users in finding popular hotspots and hidden treasures based on their interests.
3. **Optimized Route Planning:** RoutePerfect makes sure customers can make the most of their trip without needless delays or detours by optimizing travel routes to save travel time and maximize efficiency.
4. **Budget Management Tools:** Users can choose their spending limits, and the site makes recommendations for lodging, entertainment, and modes of transportation that fit within their means.
5. **Interactive Maps and Visualizations:** The platform integrates interactive maps to help users visualize their itinerary, making it easier to understand the geographical layout of their trip and adjust plans as needed.
6. **Multi-Destination Trips:** RoutePerfect supports the planning of complex, multi-destination trips, allowing users to seamlessly connect multiple cities or countries within a single itinerary.

## 2.4 Viator: Global Travel Experiences Marketplace

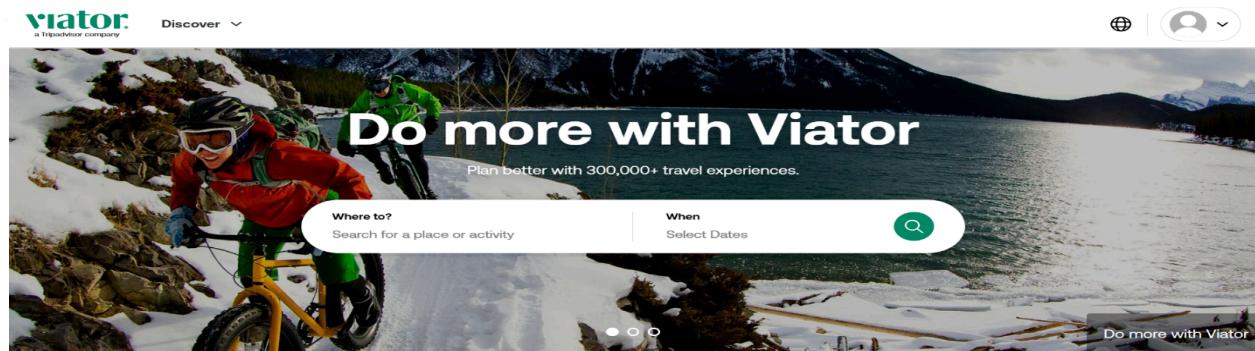


Figure 3: Viator: Global Travel Experiences Marketplace

Viator is a popular global marketplace for travel experiences, providing a thorough platform for tourists to find, evaluate, and reserve tours, activities, and attractions across the world. Viator, a subsidiary of Tripadvisor, links millions of tourists with regional tour companies, giving them access to a wide range of well-chosen experiences in global locations. From gourmet experiences and family-friendly excursions to adventure sports and cultural trips, the platform is made to accommodate a wide range of travel interests.

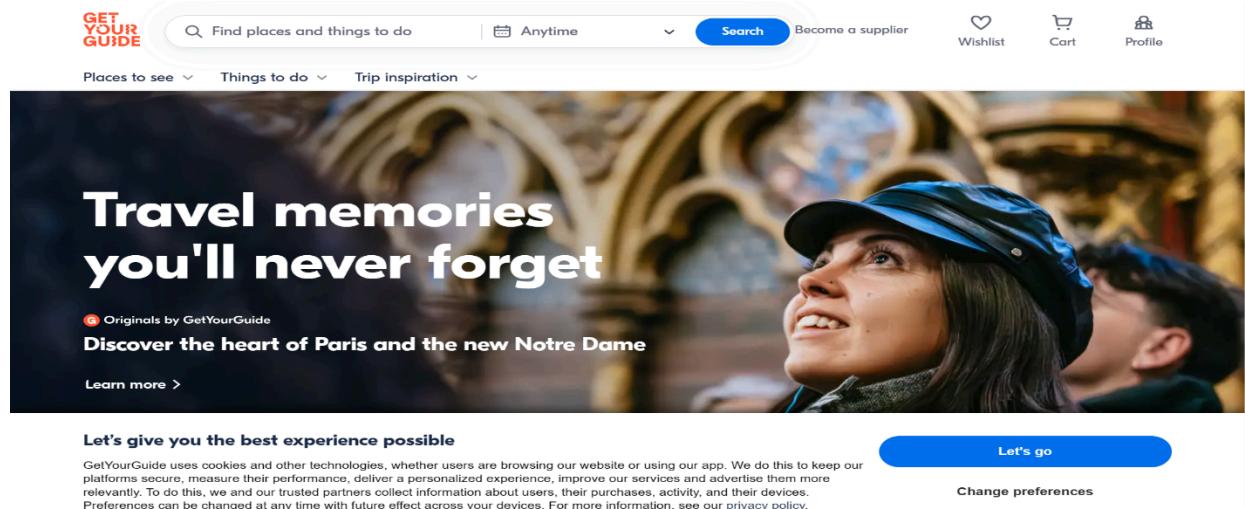
(*Viator*, n.d.)

### *Key Features*

- Wide Selection of Travel Experiences:** Viator makes sure that travelers may find experiences that suit their interests and preferences by providing a vast array of more than 300,000 tours, activities, and attractions in locations across the globe.
- User-friendly Search and Booking Interface:** Users may browse the platform by destination, activity type, duration, price, and customer ratings with ease thanks to its user-friendly search and filtering system.
- Verified Reviews and Ratings:** Viator gives consumers access to real traveler reviews and ratings, enabling them to base their choices on prior customers' experiences.

4. **Instant Confirmation and Mobile Tickets:** The majority of reservations made on Viator are confirmed instantly, and users may access mobile tickets for increased convenience by doing away with printed paperwork.
5. **Managed Collections and Suggestions:** The website offers carefully chosen collections and tailored suggestions, like "Top Attractions," "Bucket List Experiences," and "Hidden Gems," to motivate tourists and make choosing easier.
6. **Integration with Tripadvisor:** Viator, a member of the Tripadvisor family, easily incorporates into Tripadvisor's ecosystem, giving consumers access to extra travel resources in one location, like restaurant reviews and hotel reservations.

## 2.5 GetYourGuide: A Global Platform for Booking Local Tours and Activities



*Figure 4: GetYourGuide: A Global Platform for Booking Local Tours and Activities*

GetYourGuide is a popular platform that offers a wide range of carefully chosen activities and guided tours in many different countries, all aimed at improving travel experiences. It acts as a marketplace where tourists can easily find and



reserve local experiences, guaranteeing a fun and easy trip. (*GetYourGuide*, n.d.)

#### *Key Features*

1. **Extensive Activity Selection:** GetYourGuide provides a comprehensive range of activities, from cultural tours and adventure experiences to gourmet workshops, catering to diverse interests and preferences.
2. **Easy Booking Process:** Users can effortlessly browse, select, and book activities with a simple, intuitive interface.
3. **User Reviews and Ratings:** Trustworthy reviews and ratings from fellow travelers help users make informed decisions.
4. **Mobile Accessibility:** The platform is fully optimized for mobile devices, allowing users to book and manage activities on the go.
5. **Instant Confirmation:** Users receive immediate confirmation upon booking, ensuring peace of mind.
6. **Filters for Personalized Search:** Advanced filters enable users to find activities based on interests, duration, price, and more.
7. **Special Offers and Deals:** GetYourGuide often features exclusive discounts and deals, offering value for money.

## **2.6 Our Project: A New Era of Travel Solutions**

Previous projects faced several challenges and limitations that led us to develop our current project, aiming to provide a more personalized and enhanced user experience. Key issues identified include:

1. **Limited Personalization:** Most platforms offer generic recommendations without tailoring them to the user's specific interests and preferences.
2. **Complexity in Trip Planning:** Users often find it difficult to plan and organize trips due to scattered information and limited guidance.
3. **Limited Integration:** Lack of integration with multiple service providers for a seamless booking experience across different components of a trip



Our project introduces a unique blend of user-driven trip planning with AI-powered recommendation systems to offer a more personalized and efficient travel experience. Unlike traditional platforms, our system allows users to describe their trips in natural language, providing a comprehensive overview of their preferences, interests, and requirements. Leveraging machine learning and Natural Language Processing (NLP), we analyze user inputs to recommend tailored destinations, activities, and pre-designed trips from leading tourism companies.

This approach empowers travelers to plan their vacations more effectively, with the aid of user-centric feedback and advanced AI. Our chatbot facilitates intelligent decision-making by swiftly presenting curated vacations and activities from trusted sources.

Additionally, our system is flexible, accommodating a broad range of customer preferences—from families seeking all-inclusive packages to solo travelers exploring unique destinations. By optimizing travel dates and costs, we enhance the planning experience with personalized recommendations.

Ultimately, this innovative solution marks a significant advancement in travel technology, reshaping how people plan their vacations. It meets the needs of modern travelers while setting a new benchmark for future travel technology developments through the integration of AI insights and natural language input adaptability.

## 2.7 Conclusion

In conclusion, Related Work demonstrates that while existing platforms provide valuable tools for travel planning, they often fall short in delivering personalized, AI-driven recommendations. Rahhal stands out by leveraging Natural Language Processing (NLP) and machine learning to understand user preferences and generate tailored suggestions. By addressing the gaps in current systems, Rahhal offers a more user-centric and innovative approach to travel planning. The next chapter, **Domain Analysis and Technique**, will delve into the technical and operational aspects of Rahhal, exploring how the system is designed to meet the needs of its users and stakeholders.

# Chapter 3

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## Domain Analysis and Technique

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### 3.1 Introduction

The **Domain Analysis and Technique** chapter provides a detailed examination of the technical and operational foundations of Rahhal. It begins by analyzing the domain—identifying key users, their interactions, and the environment in which the system operates. This chapter also explores the risks and constraints associated with building a travel recommendation system, such as data accuracy, privacy concerns, and scalability. Additionally, it outlines the feasibility of the project, assessing whether the proposed solution is technically and operationally viable. Finally, the chapter introduces the quality assurance plan, ensuring that the system meets high standards of performance, reliability, and user satisfaction.

### 3.2 Domain Analysis

#### 3.2.1 Clients and Users

##### USERS:

- Tourists: The primary users of the system, tourists input their preferences and receive tailored travel recommendations. They can explore various cities and trips and make bookings directly through the platform.
- System Administrators: Responsible for managing the platform, ensuring data accuracy, updating content, and maintaining the overall system functionality. They handle user accounts, oversee bookings, and ensure smooth operations.

##### CLIENTS:

- Tourism Companies: These entities collaborate with the system to list their trips and packages, providing tourists with curated travel options. They benefit from the platform's exposure and integrated booking system.

### 3.2.2 The Environment

#### Web-Based Application:

- Framework: The frontend of the application uses HTML, CSS, Bootstrap, JavaScript, and React, ensuring a responsive and interactive user interface. This combination allows for a seamless user experience across different devices and screen sizes.
- Backend Operations: The backend is built with Spring Boot and PostgreSQL, providing robust server-side operations and efficient data management.

#### Server Infrastructure:

- Hosting Services: The application is hosted on a cloud platform, ensuring scalability, reliability, and security for user interactions and data storage.
- Spring Boot Integration: Optimized to support backend functionalities, enabling real-time processing and interaction with the frontend.

#### Development and Testing:

- GitHub: Employed as the version control system, facilitating Agile Development and continuous integration, allowing for collaborative updates by the development team.
- Jira: Used for project management and issue tracking, helping the team stay organized and meet project deadlines.

### 3.2.3 Tasks and Action Currently Being Performed

- Tourist Interaction: Tourists are currently interacting with the system by inputting their preferences, receiving recommendations, and making bookings for trips.

- **System Administration:** Administrators are managing the platform's content, ensuring data accuracy, and maintaining system operations to provide a seamless user experience.
- **Content Updates:** Regular updates to the database of cities and trips are being performed to keep the information current and relevant.
- **Trip Management:** Tourism companies are listing and updating trip packages to provide tourists with the latest and most suitable options.
- **Feedback and Support:** The system is collecting user feedback and providing support to address any issues or improve the platform's functionality based on user suggestions.

### 3.3 Risks

Risk	Description	Impact	Likelihood	Mitigation
<b>Data Collection and Accuracy</b>	Collecting accurate, comprehensive, and up-to-date data for (e.g. places, trips) can be challenging, due to limited sources or uncooperative tourism companies.	Incomplete or outdated suggestions, leading to poor user experience.	High	<ul style="list-style-type: none"> <li>- Partner with reliable tourism companies and government tourism boards to ensure accurate and up-to-date data.</li> <li>- Integrate third-party APIs (e.g., Google Places, TripAdvisor) to supplement data collection.</li> </ul>
<b>Inaccurate Suggestions</b>	The system may suggest irrelevant, inappropriate places or trips due to poor data quality, insufficient algorithms, or failure to understand user input	Users may lose trust in our website, leading to decreased engagement and negative reviews.	Medium	<ul style="list-style-type: none"> <li>- Continuously train and refine NLP models with diverse datasets to improve understanding of user inputs.</li> <li>- Use advanced algorithms to ensure relevant and personalized suggestions.</li> </ul>
<b>Data Privacy and Security Risks</b>	User data (e.g. trip descriptions, preferences) could be exposed to unauthorized parties due to weak security measures.	Legal consequences, loss of user trust, and reputational damage.	High	<ul style="list-style-type: none"> <li>- Conduct regular security audits and penetration testing to identify and fix vulnerabilities.</li> <li>- Implement multi factor authentication (MFA) and role-based access control to restrict unauthorized access.</li> </ul>

Table 1: Risks

Risk	Description	Impact	Likelihood	Mitigation
<b>Dependency on Tourism Company Data</b>	The platform relies heavily on data from tourism companies. So it may suggest biased or limited options, excluding smaller or independent providers.	Users may think the platform is unfair or incomplete, making it less attractive.	Low	<ul style="list-style-type: none"> <li>- Diversify data sources by including smaller and independent providers to ensure a wider range of options.</li> <li>- Implement user preference filters (e.g., budget, provider type) to offer more personalized and unbiased results.</li> </ul>
<b>Scalability Issues</b>	The platform may struggle to handle a large number of users or trips, leading to slow performance or crashes.	Poor user experience and potential loss of users.	Low	<ul style="list-style-type: none"> <li>- Regularly test the platform under high traffic conditions.</li> <li>- Use cloud-based infrastructure (e.g., AWS, Google Cloud) for dynamic scaling to handle traffic spikes.</li> <li>- Optimize database queries and implement caching mechanisms to improve performance.</li> </ul>
<b>Technical Failures</b>	The platform may experience technical issues such as bugs, server downtime, or integration failures.	Disruption of service and frustrated users.	Medium	<ul style="list-style-type: none"> <li>- Implement automated testing (unit, integration, and stress testing) to identify and fix bugs early.</li> <li>- Maintain a disaster recovery plan to quickly restore services in case of failures.</li> </ul>

### 3.4 Project plan

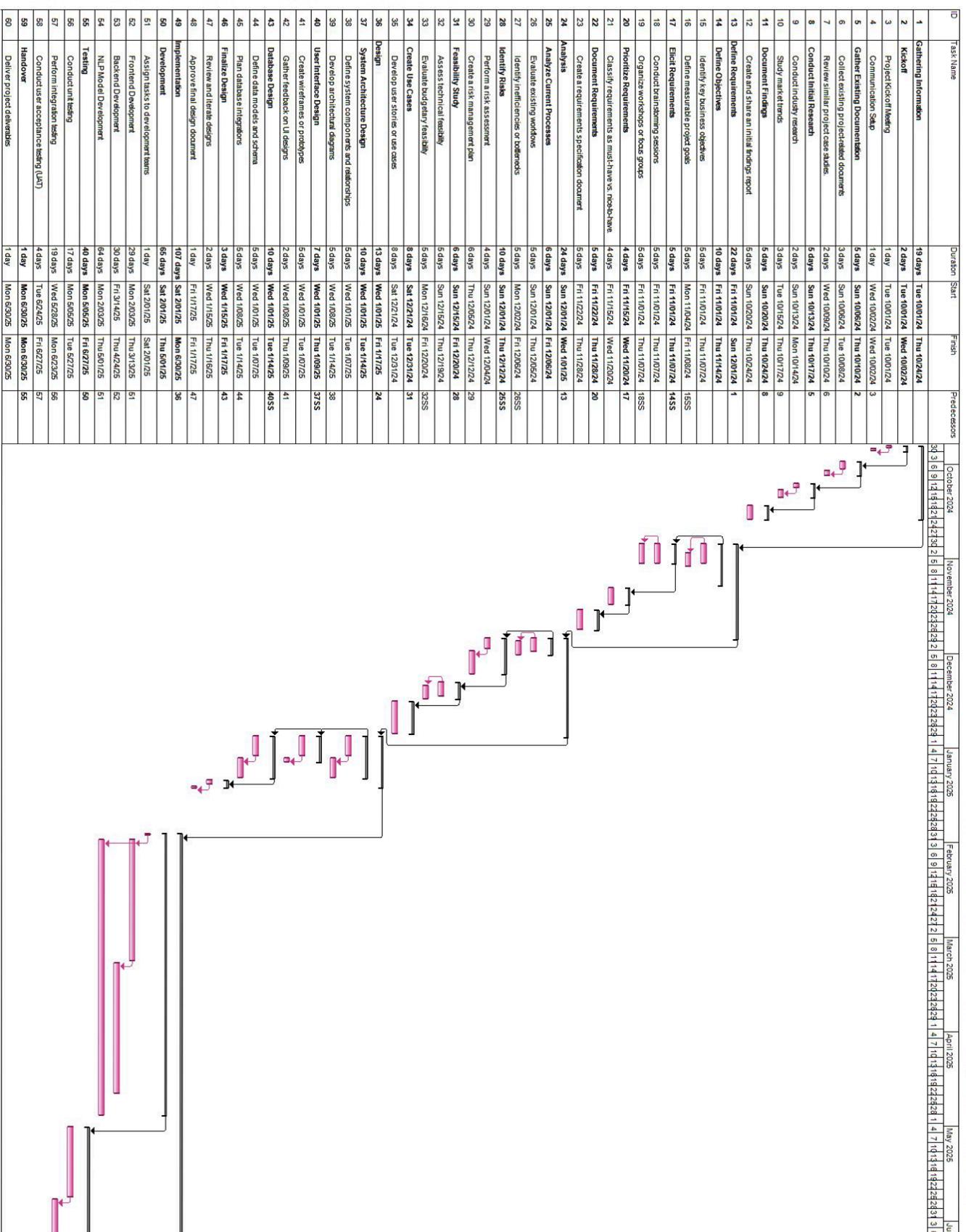


Figure 5: Project Plan

## 3.5 Feasibility Study

### 3.5.1 Technical Feasibility

SECTION	DESCRIPTION
<b>Software Requirements</b>	<ul style="list-style-type: none"><li>- The platform will use React for the frontend, providing a responsive and interactive user interface.</li><li>- Spring Boot will power the backend, offering a robust framework for developing secure and scalable RESTful APIs.</li><li>- PostgreSQL is selected as the relational database system for its reliability and ability to handle structured data efficiently.</li></ul>
<b>Hardware Requirements</b>	<ul style="list-style-type: none"><li>- The platform will be hosted on a scalable cloud service such as AWS EC2, Google Cloud, or Azure, ensuring high availability and performance.</li><li>- The database is hosted on Neon, a managed PostgreSQL cloud service that supports easy backend integration, team collaboration, and auto-scaling without the need for manual server management.</li></ul>
<b>Technology Assessment</b>	<ul style="list-style-type: none"><li>- React is chosen for its component-based architecture and extensive library support, enabling fast and maintainable UI development.</li><li>- Spring Boot is selected for its ability to simplify backend development and integrate seamlessly with PostgreSQL.</li><li>- PostgreSQL is chosen for its efficiency in handling structured data, ensuring robust transaction management and data integrity.</li></ul>
<b>Technical Expertise</b>	<ul style="list-style-type: none"><li>- The development team is skilled in React, Spring Boot, and PostgreSQL, minimizing additional training or recruitment costs.</li><li>- Expertise in integrating third-party APIs for payments and notifications is also available.</li></ul>
<b>Development Tools</b>	<ul style="list-style-type: none"><li>- IDEs: IntelliJ IDEA, Visual Studio Code.</li><li>- Version Control: Git.</li></ul>
<b>Security Measures</b>	<ul style="list-style-type: none"><li>- SSL encryption for secure data transfer between the client and server.</li><li>- Regular database backups and security patches to safeguard data integrity.</li></ul>

Table 2: Technical Feasibility Study

### 3.5.2 Operational Feasibility

SECTION	DESCRIPTION
User Acceptance Rate	<ul style="list-style-type: none"> <li>- Anticipated to exceed <b>85%</b> based on the platform's intuitive design and user-friendly features tailored to tourists and tourism companies, enabling straightforward navigation and efficient functionality.</li> </ul>
System Integration Period	<ul style="list-style-type: none"> <li>- The system is expected to be fully operational within <b>4 months</b>, ensuring seamless onboarding for tourism companies and effective adoption of trip planning and booking features.</li> </ul>
Throughput Enhancement	<ul style="list-style-type: none"> <li>- Anticipated 25% improvement in operational efficiency for tourism companies, streamlining processes such as trip creation, bookings, and user communication.</li> </ul>
Information Accessibility	<ul style="list-style-type: none"> <li>- A projected <b>30% enhancement</b> in timely and accurate access to travel information, curated trip plans, and user preferences, leading to better decision-making for both tourists and tourism companies.</li> </ul>
Adaptation Period	<ul style="list-style-type: none"> <li>- Users (tourists and companies) are expected to adapt within 1-2 weeks, thanks to the platform's intuitive design and straightforward features.</li> </ul>
User Satisfaction	<ul style="list-style-type: none"> <li>- <b>Satisfaction Goals:</b> Targeting a <b>90% satisfaction rate</b> post-implementation by focusing on personalized recommendations, efficient booking processes.</li> </ul>

Table 3: Operational Feasibility Study

## 3.6 Quality Assurance Plan

### Testing Levels

- **Unit Testing:** Validate individual components like user authentication, payment processing, and trip creation to ensure functionality.
- **Integration Testing:** Ensure seamless interaction between the frontend, backend, and database for consistent performance across features.
- **System Testing:** Test the entire platform to confirm all workflows, such as booking trips and sending messages, function as intended.

### Performance Metrics

- **Responsiveness:** Ensure fast and reliable interactions throughout the platform.
- **System Reliability:** Maintain consistent functionality during peak usage periods.
- **Scalability:** Confirm the platform can handle increased user activity smoothly

### Monitoring and Feedback.

- **Real-Time Monitoring:** Use tools to track system performance and detect issues proactively.
- **User Feedback:** Provide options for users to report issues and suggest improvements.
- **Continuous Improvement:** Incorporate feedback and monitoring insights into regular updates to enhance usability and performance.

## Expected Outcomes

- A reliable, high-performing application with accurate recommendations.
- Seamless integration between all components.
- Continuous improvement based on monitoring and user feedback.

## 3.7 System Requirements

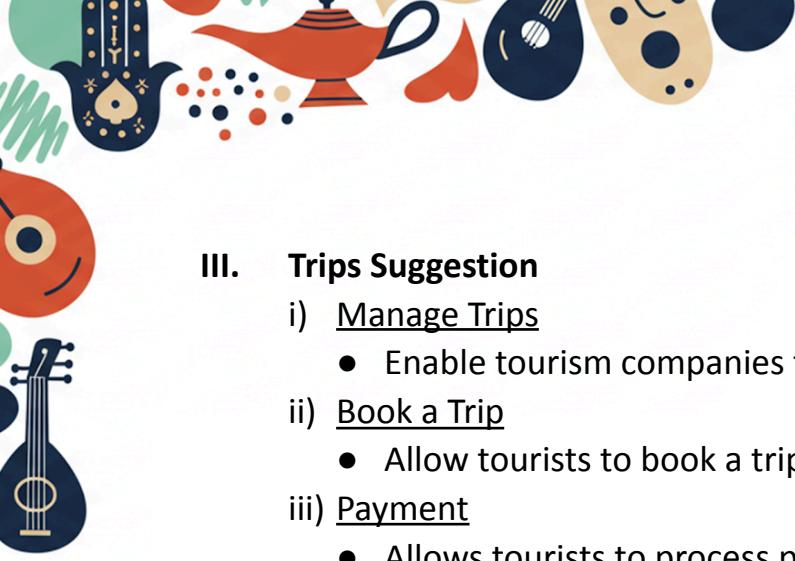
### 1. Functional Requirements

#### I. Chatbot Functionalities

- i) User Input Handling:
  - Accept free-text input from tourists regarding their travel preferences.
  - Provide guidance or prompts to help users structure their preferences if needed.
- ii) Preference Extraction:
  - Extract key features from the input text, such as destination type, activities, and time preferences.
- iii) Natural Language Understanding (NLU):
  - Handle synonyms and variations in user language.
- iv) Response Generation:
  - Respond with recommended destinations ranked by similarity scores.
  - Provide additional information about suggested destinations.

#### II. Recommendation System

- i) Data Matching:
  - Compare user preferences with destination data.
  - Compute similarity scores and rank destinations based on relevance.
- ii) Dynamic Suggestions:
  - Adapt recommendations based on real-time updates to user preferences.
- iii) Feedback Loop:
  - Allow users to provide feedback on recommendations to improve future suggestions.
  - Update destination data based on user interactions.



### **III. Trips Suggestion**

#### i) Manage Trips

- Enable tourism companies to add, update, or delete trips.

#### ii) Book a Trip

- Allow tourists to book a trip if it has available slots.

#### iii) Payment

- Allows tourists to process payments for their bookings.
- Tourists can choose a payment method from various methods (e.g., credit card, PayPal).

## **IV. Destination Data Management**

#### i) Data Storage:

- Maintain a database of destinations with metadata.

#### ii) Data Enrichment:

- Allow administrators to add or update destination details regularly.
- Include photos, descriptions, and links for more information.

#### iii) Categorization:

- Classify destinations into categories (e.g., beach, city, adventure) to assist in matching.

## **V. User Account Management**

#### i) Registration and Login:

- Enable users to create accounts and log in securely.
- Store user preferences for personalized recommendations.

#### ii) Preference History:

- Allow users to view and update previously entered preferences.

## **VI. User Experience Enhancements**

#### i) Interactive Filters:

- Allow users to refine results (e.g., filter by budget or location).

#### ii) Visual Feedback:

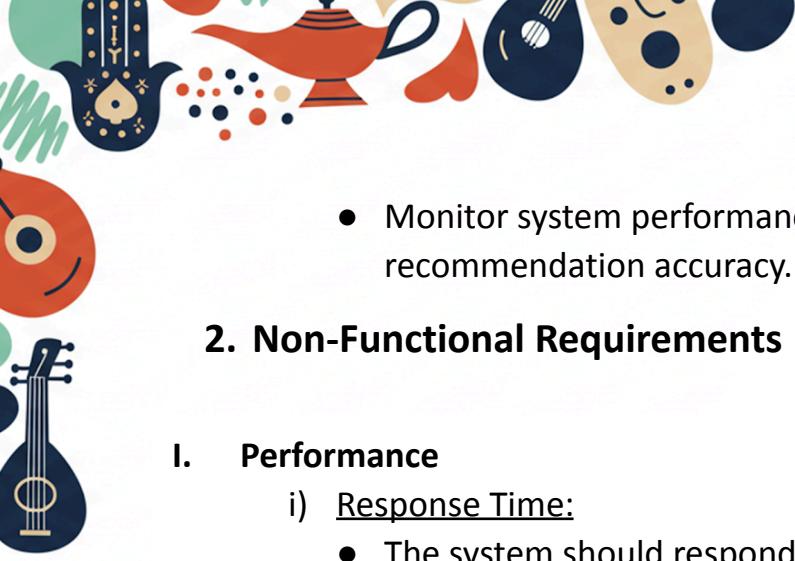
- Display recommendations with images, maps, and brief descriptions for each destination.

## **VII. Reporting and Analytics**

#### i) User Insights:

- Generate reports on user preferences and popular destinations.

#### ii) Performance Metrics:

- 
- Monitor system performance, including response time and recommendation accuracy.

## 2. Non-Functional Requirements

### I. Performance

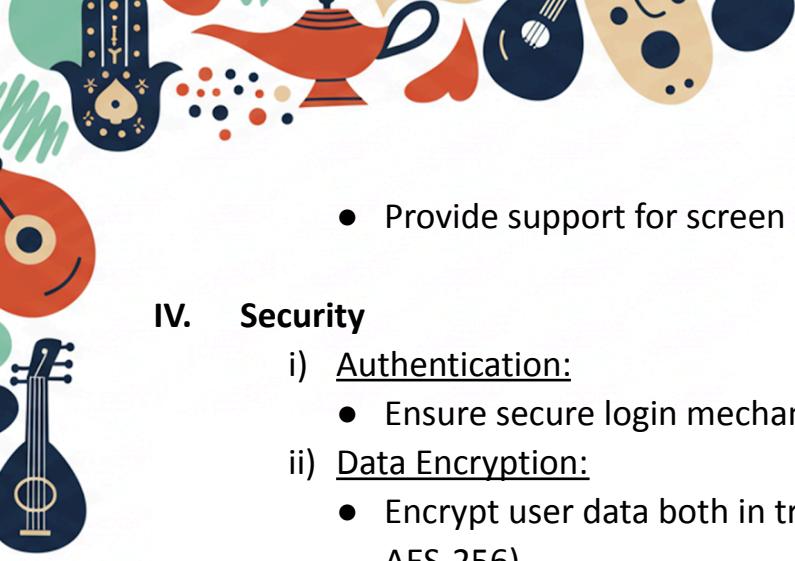
- i) Response Time:
  - The system should respond to user queries within 2 seconds for most inputs.
  - Recommendations should be generated in under 3 seconds after processing the user's preferences.
- ii) Scalability:
  - The system should handle at least 10,000 concurrent users without degradation in performance.
- iii) Throughput:
  - The system should support a high volume of transactions, such as processing 1,000 recommendations per minute.

### II. Reliability

- i) Availability:
  - The system should have 99.9% uptime to ensure users can access the service at any time.
- ii) Fault Tolerance:
  - In case of a server or database failure, the system should automatically redirect traffic to backup servers.
- iii) Error Handling:
  - The system should provide clear error messages and recover gracefully from unexpected inputs or failures.

### III. Usability

- i) Ease of Use:
  - The chatbot should be intuitive and require minimal learning effort.
  - Provide guided prompts or suggestions to help users frame their preferences.
- ii) Accessibility:
  - Ensure the interface complies with accessibility standards, such as WCAG 2.1.

- 
- Provide support for screen readers and keyboard navigation.

#### IV. Security

- i) Authentication:
  - Ensure secure login mechanisms with multi-factor authentication.
- ii) Data Encryption:
  - Encrypt user data both in transit (using HTTPS) and at rest (e.g., AES-256).
- iii) Privacy Compliance:
  - Provide users with options to view, update, or delete their personal data.

#### V. Maintainability

- i) Code Modularity:
  - Use a modular architecture to simplify maintenance and updates.
- ii) Documentation:
  - Provide detailed technical documentation for developers, including API specifications and deployment instructions.
- iii) Error Logging:
  - Implement comprehensive logging for debugging and monitoring purposes.

#### VI. Scalability

- i) Cloud Deployment:
  - Use cloud services (e.g., AWS, Google Cloud, or Azure) for dynamic scaling based on demand.

### 3.8 Techniques and tools

#### 3.8.1 React.js

Why React.js?

- It's a powerful frontend library for building dynamic and responsive user interfaces.

- Offers component-based architecture, making it easy to reuse and maintain code.
- Provides a rich ecosystem of libraries and tools for enhanced functionality.

How It Fits with Our Project:

- User Interface: Build an intuitive and interactive UI for users to input trip descriptions and view recommendations.
- State Management: Use tools like Redux or Context API to manage user preferences and application state.
- Integration: Seamlessly connect with the backend (Spring Boot) to fetch and display personalized recommendations.

### 3.8.2 Spring Boot

Why Spring Boot?

- It's a robust backend framework for building scalable and secure web applications.
- Offers built-in features like dependency injection, security, and database integration.
- Simplifies development with auto-configuration and a wide range of plugins.

How It Fits with Our Project:

- API Development: Create RESTful APIs to handle user inputs, process data, and return recommendations.
- Business Logic: Implement logic for analyzing user preferences, querying the database, and integrating with AI models.
- Integration: Connect with the frontend (React) and database (PostgreSQL) to ensure smooth data flow.

### 3.8.3 PostgreSQL

Why PostgreSQL?

- It's a powerful, open-source relational database management system (RDBMS) known for reliability and advanced features.
- Supports complex queries, full-text search, and JSON data types, offering flexibility for both structured and semi-structured data.
- Provides full ACID compliance and robust data integrity, ensuring secure and consistent transactions.

How It Fits with Our Project:

- Data Storage: Stores user profiles, trip information, destinations, tourism company details, and booking records.
- Querying: Enables efficient and optimized queries for features like personalized trip recommendations.
- Integration: Seamlessly integrates with the backend (Spring Boot), allowing real-time data access, updates, and validations.

### 3.8.4 RASA

Why Rasa?

- It's designed for conversational AI with built-in NLP capabilities.
- Create custom actions to fetch trip suggestions based on user input.
- Easy to train models to understand complex trip descriptions.

How It Fits with Our Project:

- Intent Recognition: Detect intents like "describe trip", "suggest destinations" or "match trips".
- Entity Extraction: Extract key entities like location, budget, trip type, duration, etc.

- Custom Actions: Use custom Python actions to query database and return results.

### 3.8.5 FastAPI

Why FastAPI?

- Acts as a bridge between the chatbot, database, and tourism companies.
- Offers flexibility to handle additional logic, authentication, or pre/post-processing
- Implement custom APIs to query trips and destinations efficiently.

How It Fits with Our Project:

- Database Queries: FastAPI can handle PostgreSQL queries to fetch trip and destination data.
- Response Formatting: Format responses to be more user-friendly before sending them back to Rasa.

## 3.9 Application Components

### 1. Frontend:

Tourist Interface:

- Login page.
- Chatbot for trip planning (AI-powered).
- Display of suggested travel plans, trips, hotels.
- Trip booking and payment page.
- User dashboard to manage bookings and tickets.

Tourism Company Interface:

- Login page.
- Dashboard to advertise new trips and manage trips.
- List of tourists who booked and their payment status.

Admin Interface:

- Dashboard for managing accounts and content.
- Dashboard for viewing bookings, payments, and tourism company interactions.
- Dashboard to enter data that used in AI model

## 2. Backend:

### AI Model:

- Processes tourist input and generates personalized travel plans.
- Suggests trips, hotels, and tourism companies.

### Database:

- Stores data for tourists, tourism companies, trips, hotels, bookings, and payments.

### APIs to handle:

- Tourist queries and AI suggestions.
- Booking and payment processes.
- Admin management operations.

### Booking and Payment System:

- Securely handle transactions.
- Manages bookings, payments, and generates unique ticket number for each confirmed payment.

### Notifications System:

- Send notifications to tourists (e.g., booking confirmation, ticket details).

### 3.10 Conclusion

In conclusion, Domain analysis and technique establishes the technical and operational feasibility of Rahhal, demonstrating that the system is well-equipped to handle the challenges of modern travel planning. By addressing risks such as data accuracy and scalability, and by implementing a robust quality assurance plan, Rahhal ensures a reliable and efficient user experience. The next chapter, **Proposed System & Methodology**, will provide a detailed blueprint of the system's architecture, use cases, and interaction models, showcasing how Rahhal integrates cutting-edge technology to deliver a seamless travel planning experience.



## Chapter 4

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# Proposed System & Methodology

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## 4.1 Introduction

The **Proposed System & Methodology** chapter serves as a comprehensive blueprint for the design, functionality, and operational framework of Rahhal. This section elaborates on the system's structure, including its core use cases, user scenarios, and technical components. By highlighting both client-side and admin-side functionalities, it demonstrates how the system meets the diverse needs of its users while maintaining seamless interaction and efficient management.

The chapter delves into the system's architecture, interaction flow, and underlying database schema, showcasing how data is processed, stored, and utilized to deliver personalized recommendations. It also incorporates design mockups to provide a visual understanding of the user interface, ensuring that both usability and functionality are well-aligned.

Through detailed diagrams, such as sequence, state, and data flow diagrams, the chapter provides a clear visualization of Rahhal's internal processes and user interactions. This structured approach illustrates how the system integrates cutting-edge technology to deliver an intuitive and efficient travel planning experience.

## 4.2 System Use-Cases

### 4.2.1: Client use-case

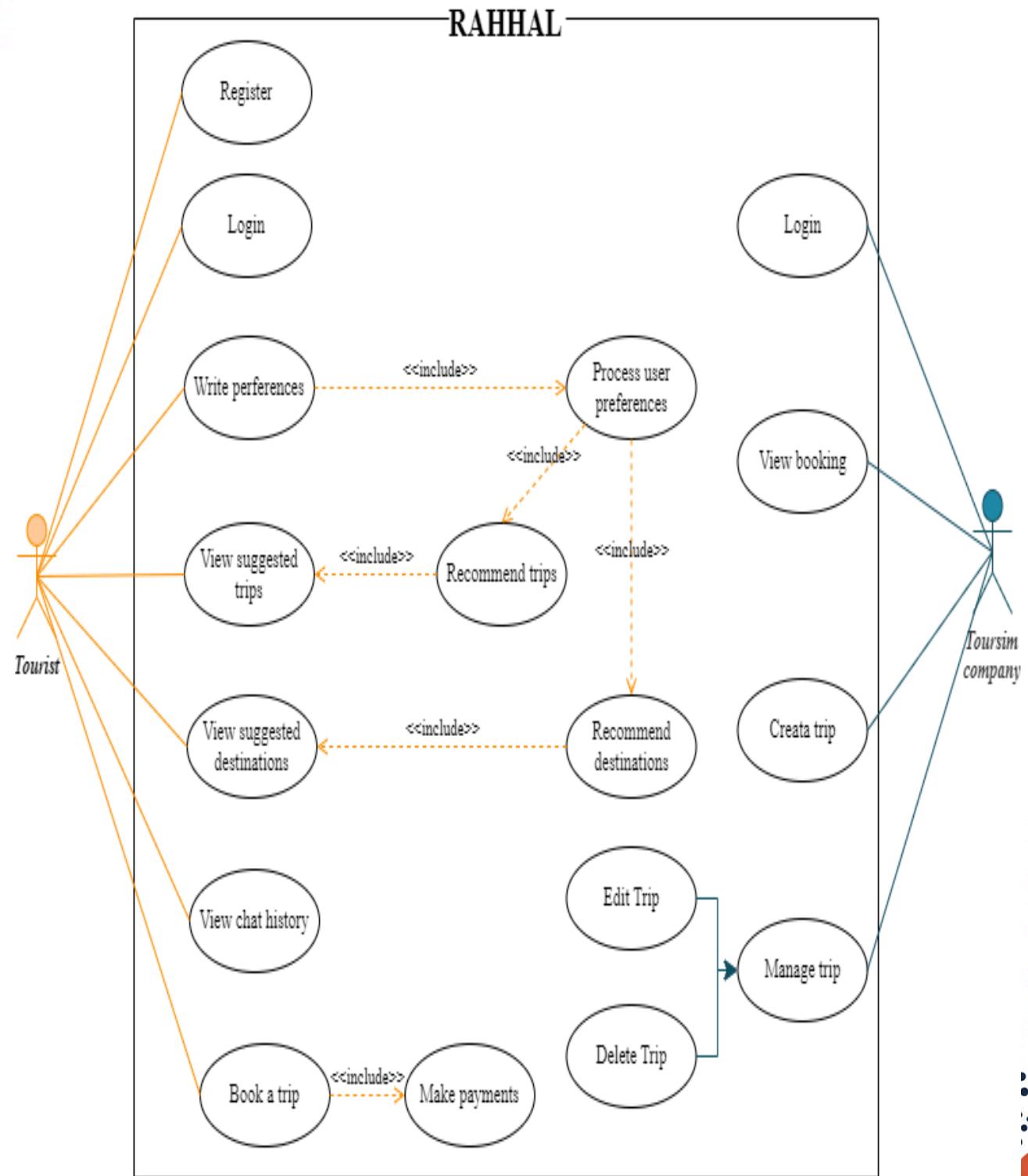


Figure 6: Client Use Case Diagram

#### 4.2.2: Admin Use-Case

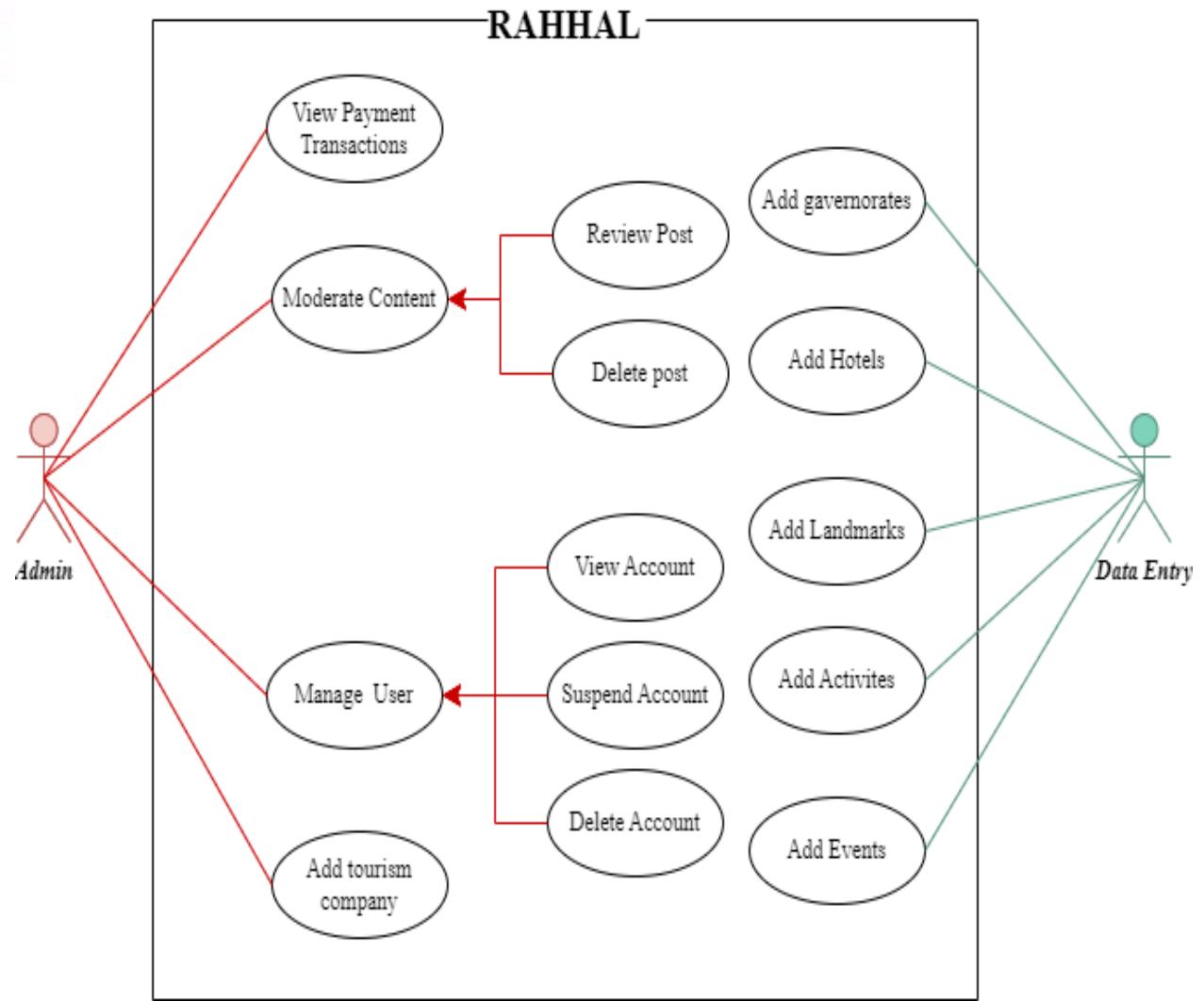


Figure 7: Admin Use Case Diagram

## 4.3 Use Case Description (Use case scenario)

### 4.3.1 Client-side scenarios

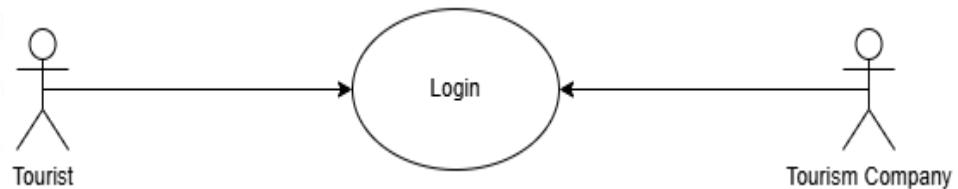
#### 4.3.1.1 Register



<b>Use Case ID:</b>	UC001
<b>Use Case Name:</b>	Register
<b>Area:</b>	User Authentication
<b>Actor:</b>	Tourist
<b>Description:</b>	Allows tourists to create an account in the system to access its features.
<b>Preconditions:</b>	The tourist is not already registered.
<b>Post conditions:</b>	The tourist's account is successfully created.
<b>Main Flow:</b>	<ol style="list-style-type: none"><li>1. The tourist navigates to the registration page.</li><li>2. The system displays a form with fields for required details.</li><li>3. The tourist fills out the form and submits it.</li><li>4. The system validates the input and creates the account.</li></ol> <p>The system sends a confirmation email to the tourist.</p>
<b>Alternative Flow:</b>	If invalid data is provided, the system prompts for corrections.

Table 4: "Register" Use Case Scenario

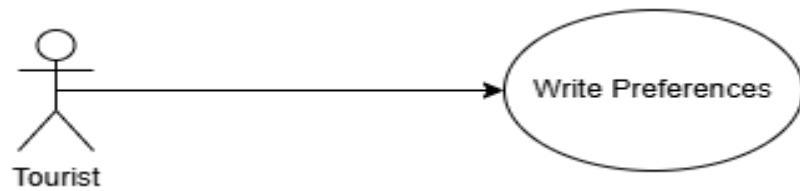
#### 4.3.1.2 Login



<b>Use Case ID:</b>	UC002
<b>Use Case Name:</b>	Log In
<b>Area:</b>	User Authentication
<b>Actor:</b>	Tourist, Tourism Company
<b>Description:</b>	Allows registered users (Tourists and Tourism Companies) to securely access their accounts.
<b>Preconditions:</b>	.The actor has a registered account
<b>Post conditions:</b>	The actor is successfully logged into the system.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The actor navigates to the login page.</li> <li>2. The system displays a form for username and password.</li> <li>3. The actor enters their credentials and submits the form.</li> </ol> <p>The system validates the credentials and grants access.</p>
<b>Alternative Flow:</b>	The system prompts the actor to retry or reset their password.

Table 5: "Login" Use Case Scenario

#### 4.3.1.3 Write Preference



<b>Use Case ID:</b>	UC003
<b>Use Case Name:</b>	Write Preferences
<b>Area:</b>	Personalization
<b>Actor:</b>	Tourist
<b>Description:</b>	Allows tourists to specify their travel preferences to receive personalized recommendations.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>• The tourist has logged into the system.</li> <li>• The preferences section is available.</li> </ul>
<b>Post conditions:</b>	The preferences are saved successfully in the system.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The tourist logs into the system.</li> <li>2. The tourist navigates to the preferences section.</li> <li>3. The system displays a form with a field for description.</li> <li>4. The tourist fills out and submits the form. The system confirms the preferences are saved.</li> </ol>
<b>Alternative Flow:</b>	If the tourist enters invalid data, the system prompts for corrections.

Table 6: "Write Preferences" Use Case Scenario

#### 4.3.1.4 Process User Preferences



<b>Use Case ID:</b>	UC004
<b>Use Case Name:</b>	Process User Preferences
<b>Area:</b>	Personalization
<b>Actor:</b>	Preferences Extractor
<b>Description:</b>	Processes the preferences provided by tourists to extract key themes and keywords.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>The tourist has written their preferences.</li> <li>The system is connected to the natural language processing (NLP) engine.</li> </ul>
<b>Post conditions:</b>	The extracted preferences are stored for recommendation purposes.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>The tourist writes their preferences in free text.</li> <li>The system processes the input using an NLP engine to identify themes and keywords.</li> <li>The system stores the extracted preferences in the database.</li> </ol>
<b>Alternative Flow:</b>	If the input is incomplete, the system prompts the tourist to provide additional details.

Table 7: "Process User Preferences" Use Case Scenario

#### 4.3.1.5 Recommend Destinations



<b>Use Case ID:</b>	UC005
<b>Use Case Name:</b>	Recommend Destinations
<b>Area:</b>	Personalization
<b>Actor:</b>	Trip Seeker
<b>Description:</b>	Uses tourist preferences to suggest destinations from the system database.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>User preferences are processed and stored.</li> <li>The system has access to a database of destinations.</li> </ul>
<b>Post conditions:</b>	A list of recommended destinations is displayed to the tourist.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>The system retrieves the stored preferences.</li> <li>The system computes similarity between preferences and destinations in the database.</li> <li>The system ranks destinations based on relevance and displays them to the tourist.</li> </ol>
<b>Alternative Flow:</b>	The system displays a message suggesting broader options, when there is no relevant destinations.

Table 8: "Recommend Destinations" Use Case Scenario

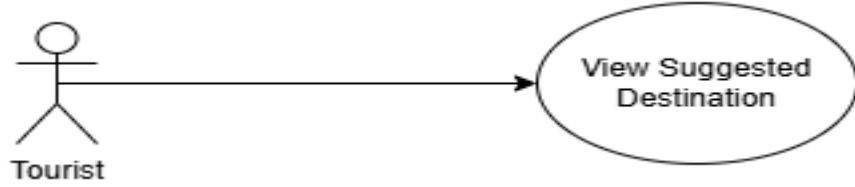
#### 4.3.1.6 Recommend Trips



<b>Use Case ID:</b>	UC006
<b>Use Case Name:</b>	Recommend Trips
<b>Area:</b>	Trip Recommendation
<b>Actor:</b>	Trip Seeker
<b>Description:</b>	Suggests trips from the stored trips created by tourism companies.
<b>Preconditions:</b>	Trips are available in the system database.
<b>Post conditions:</b>	A list of recommended trips is displayed to the tourist.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The system retrieves trips created by tourism companies from the database.</li> <li>2. The system ranks trips based on popularity, reviews, and relevance.</li> <li>3. The system displays the ranked trips to the tourist.</li> </ol>
<b>Alternative Flow:</b>	The system displays a message suggesting broader options, when no relevant trips available.

Table 9: "Recommend Trips" Use Case Scenario

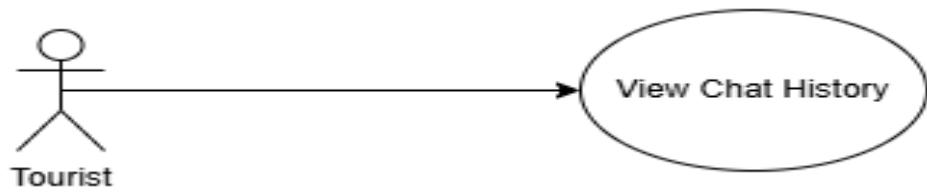
#### 4.3.1.7 View Suggested Destinations



<b>Use Case ID:</b>	UC007
<b>Use Case Name:</b>	View Suggested Destinations
<b>Area:</b>	Personalization
<b>Actor:</b>	Tourist
<b>Description:</b>	Allows tourists to browse destinations suggested by the system based on their preferences.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>The tourist has saved preferences.</li> <li>The system has generated destination suggestions.</li> </ul>
<b>Post conditions:</b>	The tourist views a list of suggested destinations.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>The tourist logs into the system.</li> <li>The system retrieves destination suggestions based on the tourist's preferences.</li> <li>The tourist browses the suggested destinations and clicks on individual destinations for more details.</li> </ol>
<b>Alternative Flow:</b>	If no suggestions match preferences, the system suggests broader options.

Table 10: "View Suggested Destinations" Use Case Scenario

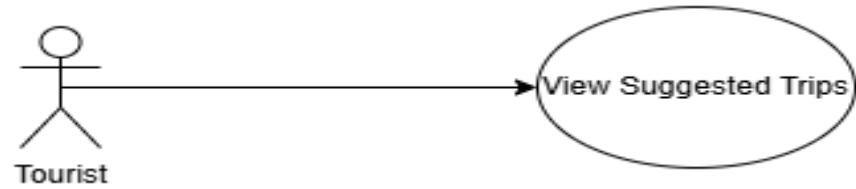
#### 4.3.1.8 View Chat History



<b>Use Case ID:</b>	UC008
<b>Use Case Name:</b>	View Chat History
<b>Area:</b>	Customer Support
<b>Actor:</b>	Tourist
<b>Description:</b>	Allows tourists to access their past communications with customer service.
<b>Preconditions:</b>	The tourist has written preferences before.
<b>Post conditions:</b>	The tourist successfully views past chat interactions.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The tourist logs into the system.</li> <li>2. The tourist clicks on the "Chat History" option.</li> <li>3. The system retrieves and displays past conversations.</li> </ol>
<b>Alternative Flow:</b>	The system informs the user that no previous chats are available.

Table 11: "View Chat History" Use Case Scenario

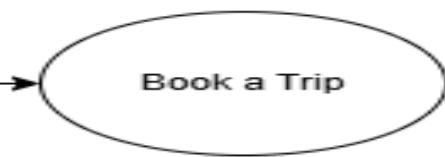
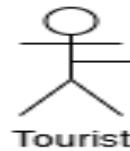
#### 4.3.1.9 View Suggested Trips



<b>Use Case ID:</b>	UC009
<b>Use Case Name:</b>	View Suggested Trips
<b>Area:</b>	Suggestion
<b>Actor:</b>	Tourist
<b>Description:</b>	Allows tourists to browse curated trip options.
<b>Preconditions:</b>	Suggested trips created by tourism companies.
<b>Post conditions:</b>	The tourist views a list of curated trip options.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The tourist logs into the system.</li> <li>2. The system displays a list of suggested trips.</li> <li>3. The tourist clicks on a trip to view detailed information.</li> </ol>
<b>Alternative Flow:</b>	The system notifies the user that there are no trips available at the current time.

Table 12: "View Suggested Trips" Use Case Scenario

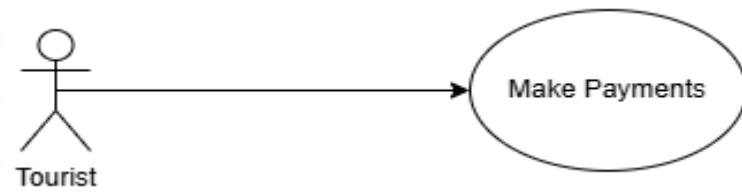
#### 4.3.1.10 Book a Trip



<b>Use Case ID:</b>	UC010
<b>Use Case Name:</b>	Book a Trip
<b>Area:</b>	Booking
<b>Actor:</b>	Tourist
<b>Description:</b>	Allows tourists to select and book trips offered by the system.
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>The tourist has selected a trip.</li> <li>The trip has available slots.</li> </ul>
<b>Post conditions:</b>	The trip is booked, and the payment is processed.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>The tourist selects a trip from the suggested list.</li> <li>The system displays the trip details, including price and itinerary.</li> <li>The tourist clicks the "Book Now" button.</li> <li>The system navigates to the payment page.</li> <li>The tourist completes the payment (triggers the "Make Payments" use case).</li> <li>The system confirms the booking and generates a receipt.</li> </ol>
<b>Alternative Flow:</b>	<ul style="list-style-type: none"> <li>The system informs the tourist and suggests alternate trips.</li> <li>If payment fails, the system prompts the tourist to retry or use another method.</li> </ul>

Table 13: "Book a Trip" Use Case Scenario

#### 4.3.1.11 Make Payments



<b>Use Case ID:</b>	UC011
<b>Use Case Name:</b>	Make Payments
<b>Area:</b>	Payment Processing
<b>Actor:</b>	Tourist
<b>Description:</b>	Allows tourists to securely process payments for their bookings.
<b>Preconditions:</b>	The tourist has initiated the payment process.
<b>Post conditions:</b>	Payment is successfully processed.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The tourist selects a payment method (e.g., credit card, PayPal).</li> <li>2. The system processes the payment.</li> <li>3. A confirmation receipt is generated and sent to the tourist.</li> </ol>
<b>Alternative Flow:</b>	The system prompts the user to retry with another method.

Table 14: "Make Payments" Use Case Scenario

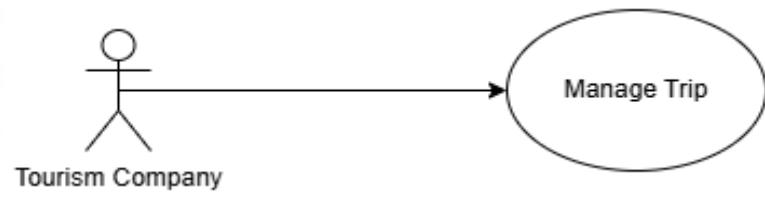
#### 4.3.1.12 Create a Trip



<b>Use Case ID:</b>	UC012
<b>Use Case Name:</b>	Create a Trip
<b>Area:</b>	Trip Management
<b>Actor:</b>	Tourism Company
<b>Description:</b>	Allows tourism companies to add new trips to the system for tourists to book.
<b>Preconditions:</b>	The company has access to the trip creation feature.
<b>Post conditions:</b>	A new trip is successfully created and listed.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The tourism company logs into the system.</li> <li>2. They navigate to the "Create Trip" section.</li> <li>3. The company inputs details like destination, activities, price, and availability.</li> <li>4. The system saves the trip and makes it available for tourists.</li> </ol>
<b>Alternative Flow:</b>	The system prompts the user to complete missing fields.

Table 15: "Create a Trip" Use Case Scenario

#### 4.3.1.13 Manage Trip



<b>Use Case ID:</b>	UC013
<b>Use Case Name:</b>	Manage Trip
<b>Area:</b>	Trip Management
<b>Actor:</b>	Tourism Company
<b>Description:</b>	Allows tourism companies to update and modify details of their trips.
<b>Preconditions:</b>	The trip is already created.
<b>Post conditions:</b>	The trip details are updated successfully.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The tourism company logs into the system.</li> <li>2. They navigate to the "Manage Trip" section.</li> <li>3. The company updates trip details, such as itinerary or pricing.</li> <li>4. The system saves the changes.</li> </ol>
<b>Alternative Flow:</b>	If the trip already booked, display error message.

Table 16: "Manage Trip" Use Case Scenario

#### 4.3.1.14 View Booking



<b>Use Case ID:</b>	UC014
<b>Use Case Name:</b>	View Booking
<b>Area:</b>	Booking Management
<b>Actor:</b>	Tourism Company
<b>Description:</b>	Allows tourism companies to access and review bookings made by tourists.
<b>Preconditions:</b>	Bookings have been made by tourists.
<b>Post conditions:</b>	The company successfully views the booking details.
<b>Main Flow:</b>	<ol style="list-style-type: none"> <li>1. The company logs into the system.</li> <li>2. They navigate to the "View Booking" section.</li> <li>3. The system displays a list of all bookings.</li> <li>4. The company selects a specific booking to view details such as customer information, trip details, and payment status.</li> </ol>
<b>Alternative Flow:</b>	The system notifies the company that no bookings are currently available.

Table 17: "View Booking" Use Case Scenario

### 4.3.2 Admin-side scenario

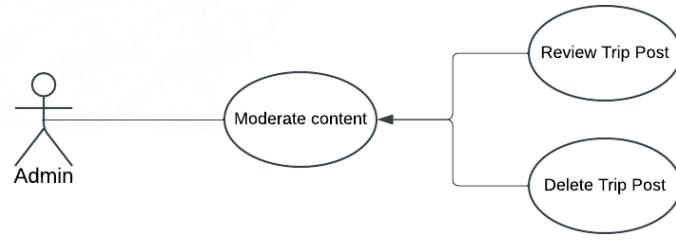
#### 4.3.2.1 View Payment Transactions



<b>Use Case ID:</b>	UC_011
<b>Use Case Name:</b>	View Payment Transactions
<b>Area:</b>	Payment Management
<b>Actor:</b>	Admin
<b>Description:</b>	The admin reviews and monitors payment transaction.
<b>Preconditions:</b>	1- Admin must be logged in 2- Payment transactions is existed
<b>Post conditions:</b>	The admin has a clear understanding of payment transactions and can solve errors in the payment process if they exist.
<b>Main Flow:</b>	<ol style="list-style-type: none"><li>1. The admin navigates to the Transactions section.</li><li>2. Filters transactions by date, user, type or payment ID.</li><li>3. Review the transaction details.</li><li>4. Exports the data if needed.</li></ol>
<b>Alternative Flow:</b>	If no transactions are found, the admin receives a notification indicating no records are available.

Table 18: "View Payment Transactions" Use Case Scenario

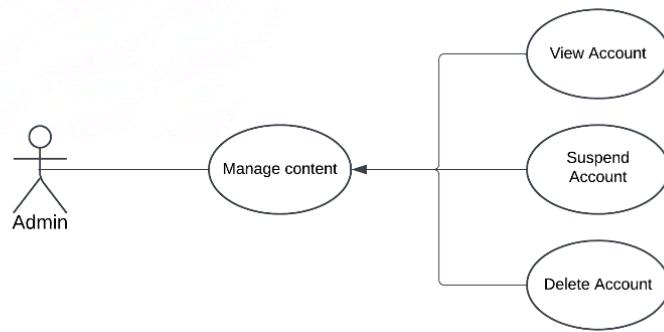
#### 4.3.2.2 Moderate Content



<b>Use Case ID:</b>	UC_012
<b>Use Case Name:</b>	Moderate content
<b>Area:</b>	Content Management
<b>Actor:</b>	Admin
<b>Description:</b>	The admin reviews and approves or rejects tourism company posts.
<b>Preconditions:</b>	1- Admin must be logged in 2- Trip posts existed
<b>Post conditions:</b>	Posts is either approved or rejected
<b>Main Flow:</b>	1- The admin navigates to the Moderate Content section. 2- Reviews trip posts that have been posted 3- Approves or rejects the post. 4- Notifies the tourism company if necessary.
<b>Alternative Flow:</b>	If the post does not obey the website rules or has missing necessary data, the admin rejects it and issues a warning to the tourism company.

Table 19: "Moderate Content" Use Case Scenario

### 4.3.2.3 Manage Users



<b>Use Case ID:</b>	UC_013
<b>Use Case Name:</b>	Manage Users
<b>Area:</b>	User Management
<b>Actor:</b>	Admin
<b>Description:</b>	The admin views user accounts and permissions.
<b>Preconditions:</b>	1- The admin is logged into the system. 2- User accounts exist on the platform.
<b>Post conditions:</b>	User accounts are updated or managed as required.
<b>Main Flow:</b>	1- The admin navigates to the Manage User section. 2- Selects a user account. 3- Updates roles or permissions. 4- Save the changes.
<b>Alternative Flow:</b>	If the user violates website rules, inactive for a long time or user requests to suspend or delete his account, the admin can delete or suspend his account

Table 20: "Manage Users" Use Case Scenario

#### 4.3.2.4 Add Tourism Company



<b>Use Case ID:</b>	UC_014
<b>Use Case Name:</b>	Add Tourism Company
<b>Area:</b>	Trip management
<b>Actor:</b>	Admin
<b>Description:</b>	The admin adds a new tourism company.
<b>Preconditions:</b>	1- The admin is logged into the system. 2- The tourism company details are available.
<b>Post conditions:</b>	The new tourism company is added to the data
<b>Main Flow:</b>	1- The admin navigates to the Add Tourism Company section. 2- Enters company details (e.g., name, location, services, contact information). 3- Publishes the company listing.
<b>Alternative Flow:</b>	If the company already exists, the admin updates the existing listing.

Table 21: "Add Tourism Company" Use Case Scenario

#### 4.3.2.5 Add Governorates



<b>Use Case ID:</b>	UC_015
<b>Use Case Name:</b>	Add Governorates
<b>Area:</b>	Data Management
<b>Actor:</b>	Data Entry
<b>Description:</b>	The Data Entry adds government information
<b>Preconditions:</b>	<ul style="list-style-type: none"> <li>1- The Data Entry is logged into the system.</li> <li>2- Government information is correct and available.</li> </ul>
<b>Post conditions:</b>	Government information added to the database.
<b>Main Flow:</b>	<ul style="list-style-type: none"> <li>1- The admin navigates to the Add Governments section.</li> <li>2- Enters government details (e.g., name, description).</li> <li>3- Verifies the information for accuracy.</li> <li>4- Save the information.</li> </ul>
<b>Alternative Flow:</b>	If the information is incomplete, the Data Entry role saves it as a draft for later completion.

Table 22: "Add Governorates" Use Case Scenario

#### 4.3.2.6 Add Hotels



<b>Use Case ID:</b>	UD_015
<b>Use Case Name:</b>	Add Hotels
<b>Area:</b>	Data Management
<b>Actor:</b>	Data Entry
<b>Description:</b>	The Data Entry adds a new hotel.
<b>Preconditions:</b>	1- The Data Entry is logged into the system. 2- Hotel details are correct and available.
<b>Post conditions:</b>	The new hotel is listed on the platform.
<b>Main Flow:</b>	1- The admin navigates to the Add Governments section. 2- Enters hotel details (e.g., name, location, star rating). 3- Verifies the information for accuracy. 4- Save the information.
<b>Alternative Flow:</b>	If the information is incomplete, the Data Entry role saves it as a draft for later completion.

Table 23: "Add Hotels" Use Case Scenario

#### 4.3.2.7 Add Landmarks



<b>Use Case ID:</b>	UC_017
<b>Use Case Name:</b>	Add Landmarks
<b>Area:</b>	Data Management
<b>Actor:</b>	Data Entry
<b>Description:</b>	The Data Entry adds a new landmark.
<b>Preconditions:</b>	1- The Data Entry is logged into the system. 2- Landmark details are correct and available.
<b>Post conditions:</b>	Landmark details added to the database.
<b>Main Flow:</b>	1- The admin navigates to the Add Landmark section. 2- Enters Landmark details (e.g., name, description, location). 3- Verifies the information for accuracy. 4- Save the information.
<b>Alternative Flow:</b>	If the Landmark details are incomplete, the Data Entry role saves it as a draft for later completion.

Table 24: "Add Landmarks" Use Case Scenario

#### 4.3.2.8 Add Activities



<b>Use Case ID:</b>	UC_015
<b>Use Case Name:</b>	Add Activities
<b>Area:</b>	Data Management
<b>Actor:</b>	Data Entry
<b>Description:</b>	The Data Entry adds new activity.
<b>Preconditions:</b>	1- The Data Entry is logged into the system. 2- Activity details are correct and available.
<b>Post conditions:</b>	Activity details added to the database.
<b>Main Flow:</b>	1- The admin navigates to the Add Activity section. 2- Enter activity details (e.g., name, description, type). 3- Verifies the information for accuracy. 4- Save the information.
<b>Alternative Flow:</b>	If the information is incomplete, the Data Entry role saves it as a draft for later completion.

Table 25: "Add Activities" Use Case Scenario

#### 4.3.2.9 Add Events



<b>Use Case ID:</b>	UC_015
<b>Use Case Name:</b>	Add Events
<b>Area:</b>	Data Management
<b>Actor:</b>	Data Entry
<b>Description:</b>	The Data Entry adds upcoming events
<b>Preconditions:</b>	1- The Data Entry is logged into the system. 2- Event details are correct and available.
<b>Post conditions:</b>	Event details added to the database.
<b>Main Flow:</b>	1- The admin navigates to the Add Event section. 2- Enters event details (e.g., name, date, description). 3- Verifies the information for accuracy. 4- Save the information.
<b>Alternative Flow:</b>	If the information is incomplete, the Data Entry role saves it as a draft for later completion.

Table 26: "Add Events" Use Case Scenario

## 4.4 System Architecture

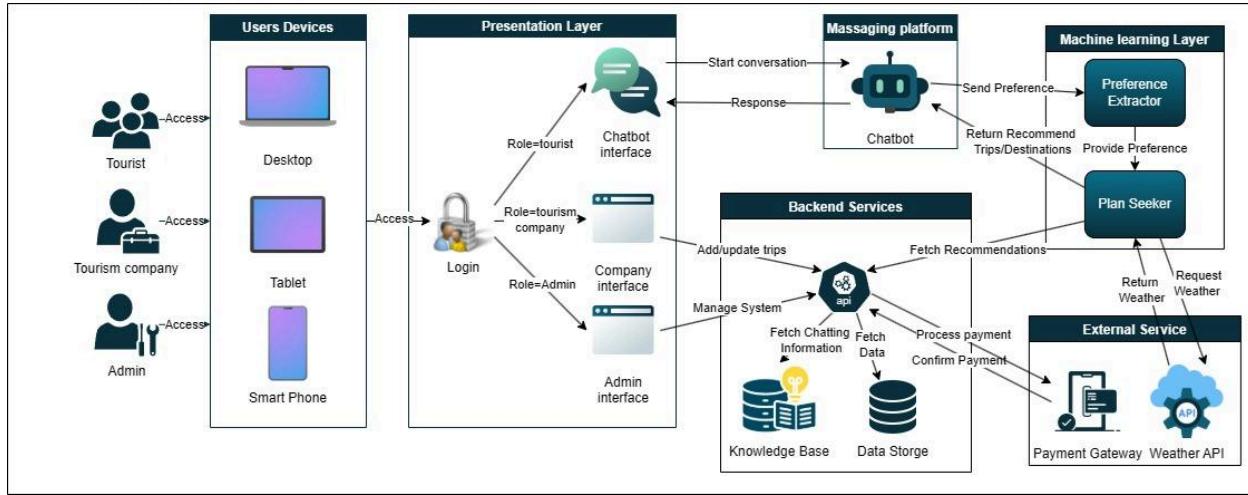


Figure 8: System Architecture

### 4.4.1 Methodology

Our project adopts the **Waterfall Methodology**, a linear and structured approach to software development. This methodology divides the development process into distinct phases, each completed sequentially. Given the nature of our project, the Waterfall approach ensures clarity, thorough documentation, and systematic progress through predefined stages. Below, we outline the phases, focusing on the progress achieved thus far.

#### 1. Requirement Analysis

- This phase involved gathering and analyzing detailed project requirements from stakeholders, including users and tourism companies.
- Techniques such as surveys, and competitive analysis were used to capture the functional and non-functional requirements.
- The outcome was a comprehensive **Requirement Specification Document**, which serves as the foundation for subsequent phases.

## 2. System Design

- We have successfully completed the **System Design** phase.
- During this phase, we transformed the requirements into a structured system architecture:
  - Created **use case diagrams, class diagrams, sequence diagrams**, and a detailed **database schema**.
  - Defined the integration of key technologies such as **React.js, Spring Boot, PostgreSQL, RASA, and FastAPI**.
  - Developed mockups for the system's user interface to ensure alignment with user expectations.
- This phase provided a clear blueprint for the implementation phase.

## 3. Implementation (Upcoming Phase)

- The next step involves developing the system based on the design documents.
- Key tasks include:
  - Frontend development using React.js.
  - Backend implementation using Spring Boot.
  - Integration of Machine Learning and NLP components for recommendation features using RASA and FastAPI.

## 4. Integration and Testing

- After implementation, the system components will be integrated and tested as a unified platform.
- Testing will include:
  - **Unit Testing** for individual modules.

- **Integration Testing** to validate interactions between components.
- **System Testing** to ensure the complete system meets requirements.

## 5. Deployment

- In this phase, the system will be deployed to a live environment for real-world use.
- Deployment will include server setup, database configuration, and user access testing.

## 6. Maintenance

- Following deployment, the system will enter the maintenance phase to address any issues and accommodate evolving requirements.
- This includes updates, optimizations, and user feedback incorporation.

### Current Status and Justification

We have successfully completed the **System Design** phase and are transitioning to the **Implementation** phase. The **Waterfall Methodology** was chosen for its structured approach, which ensures each phase is thoroughly completed and documented before proceeding. This approach is particularly suitable as we have clearly defined requirements and a comprehensive system design, minimizing the risk of major changes during development.

Our progress so far demonstrates a strong foundation for building a robust and innovative travel solution.

## 4.5 Analysis Class

### 4.5.1 Swim Lane Diagram

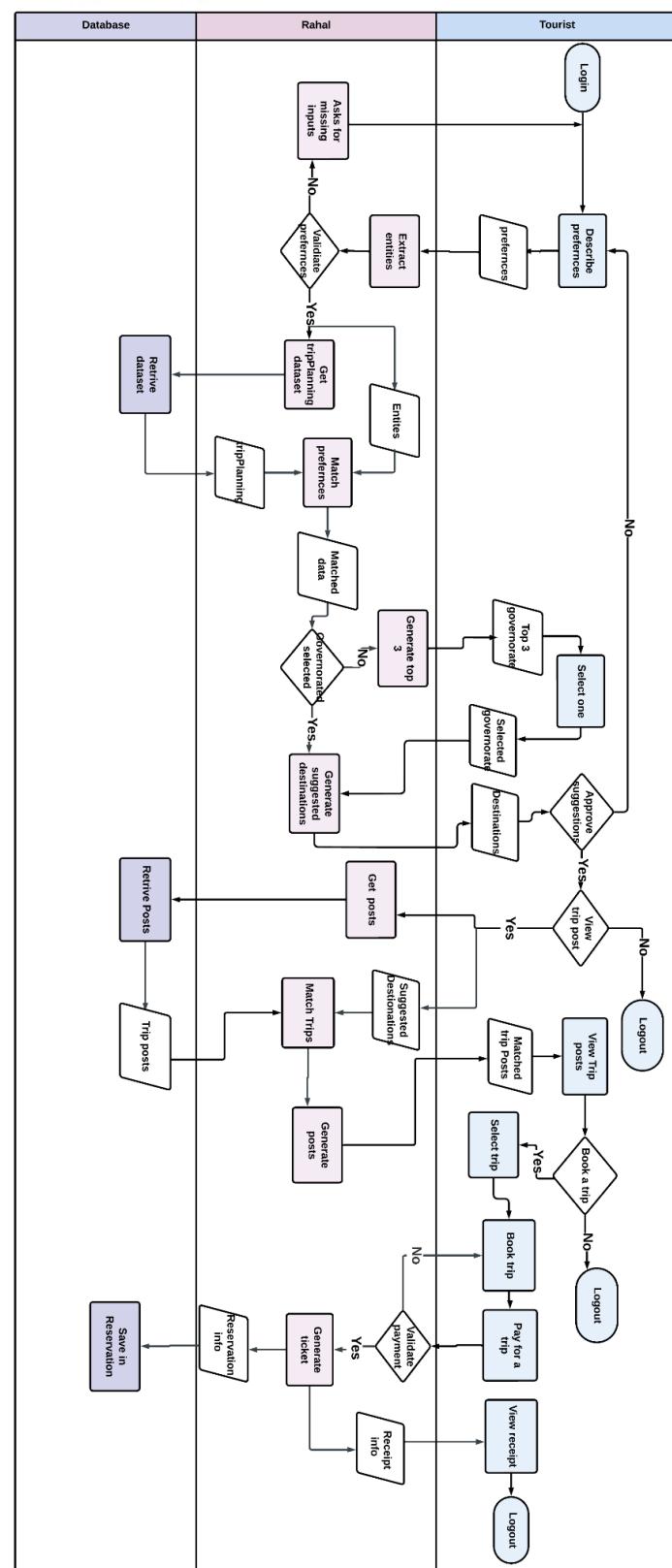


Figure 9: Swim Lane Diagram

## 4.5.2 State Diagram

### 4.5.2.1 State for company

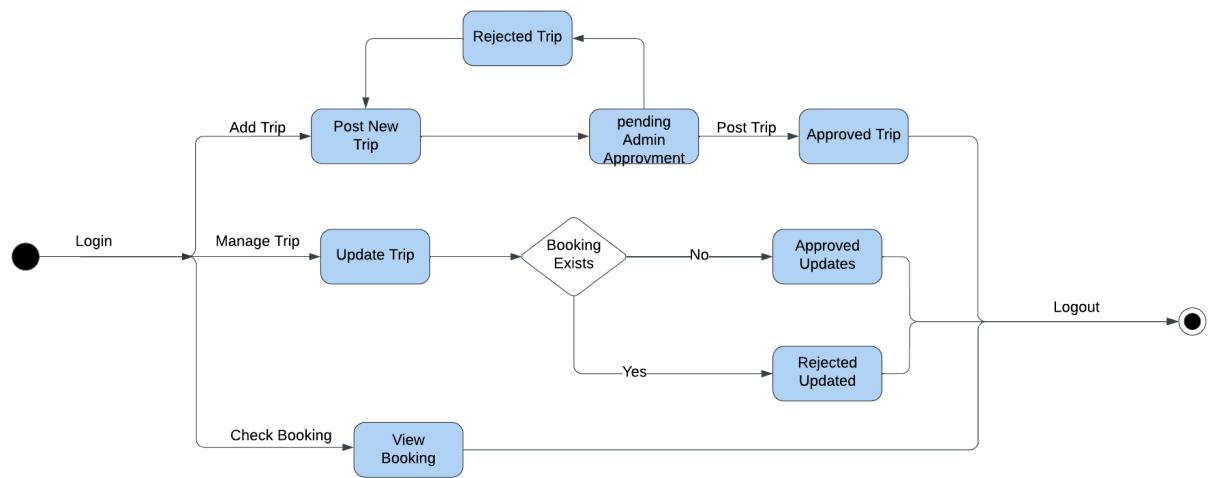


Figure 10: "Company" State Diagram

### 4.5.2.2 State for Admin

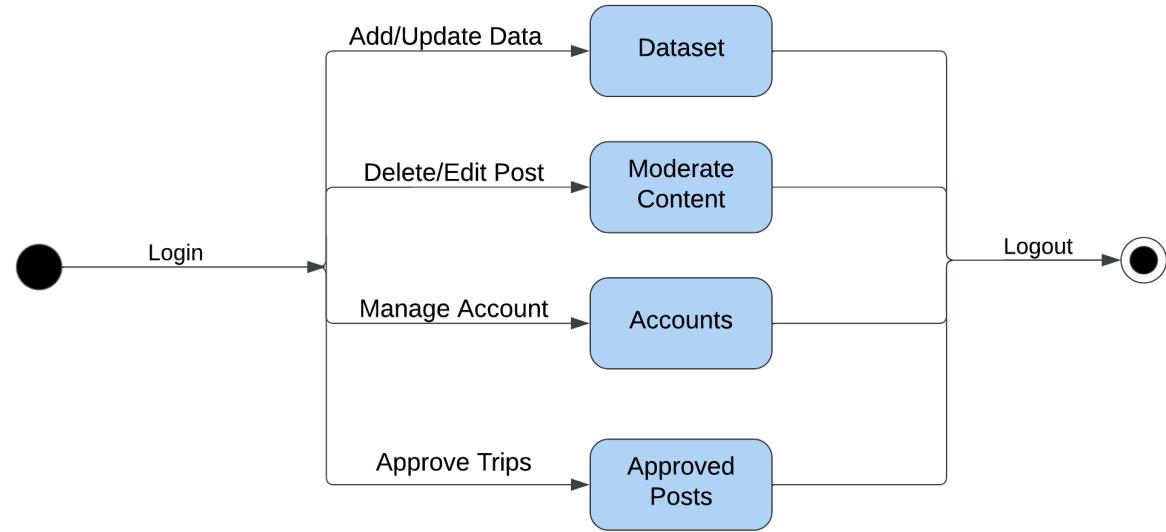


Figure 11: "Admin" State Diagram

## 4.5.2 Context Diagram

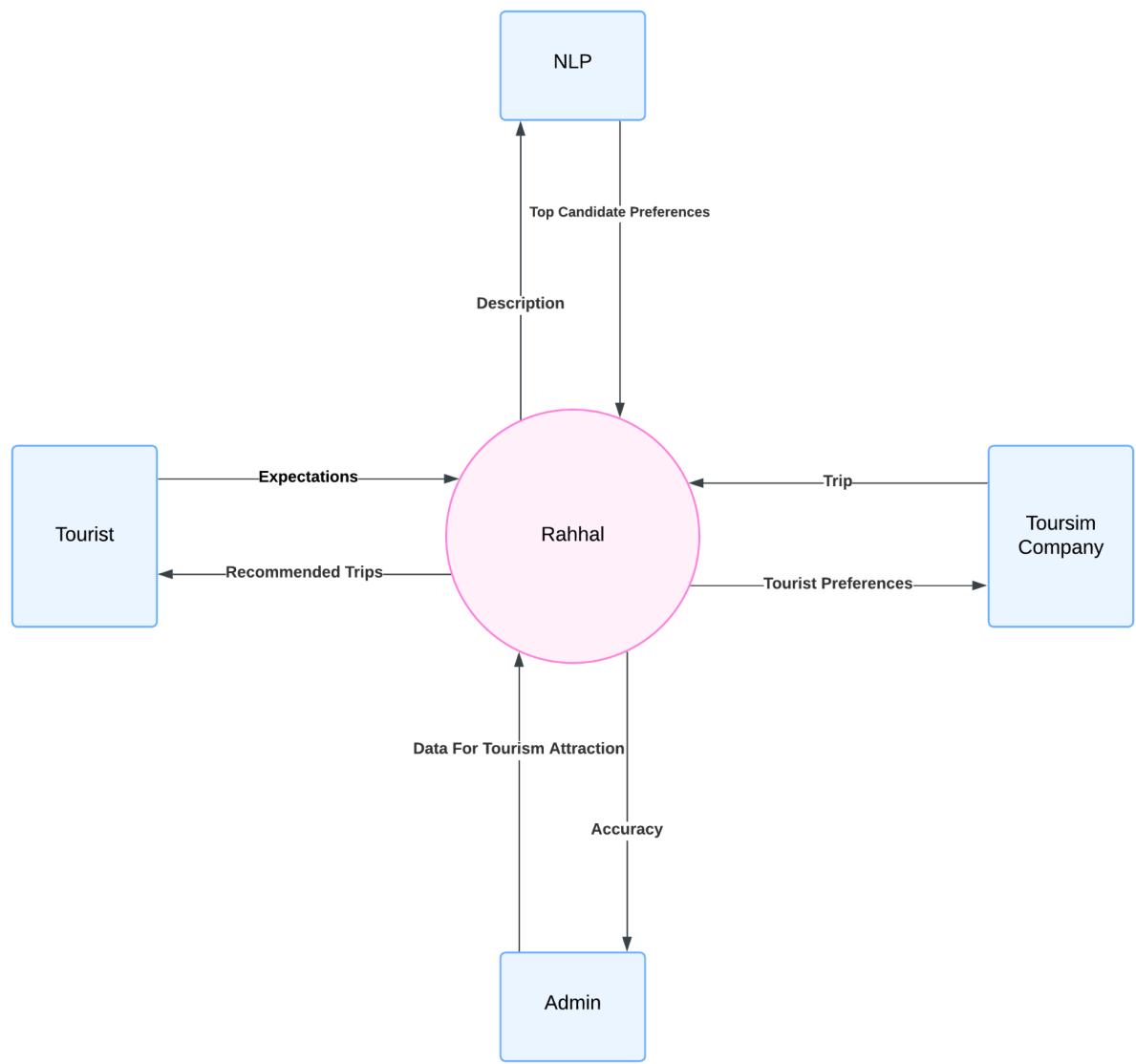


Figure 12: Context Diagram

## 4.5.2 Data flow diagram

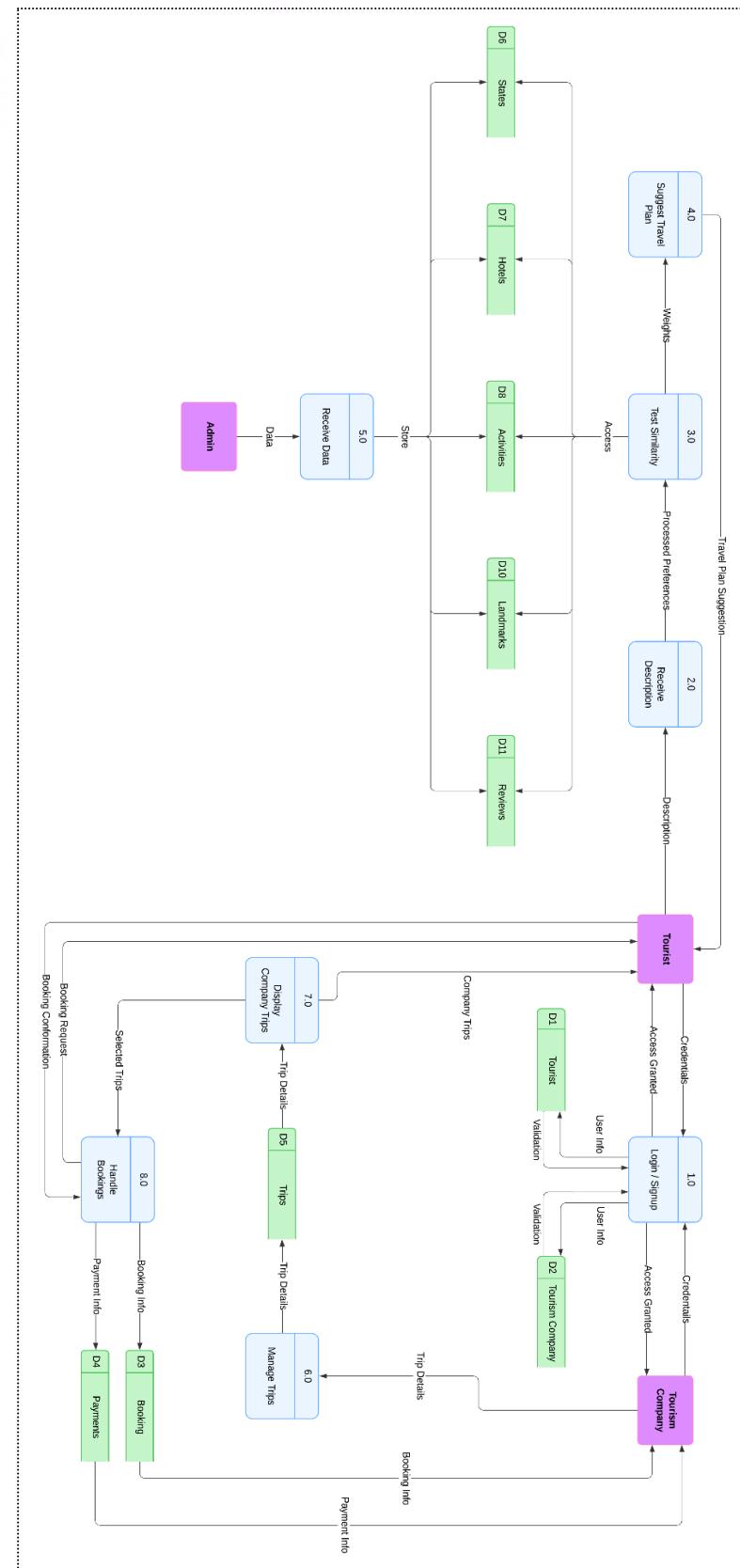


Figure 13: Data Flow Diagram

## 4.6 interaction class diagram

### 4.6.1 Sequence Diagram

#### 4.6.1.1 NLP sequence

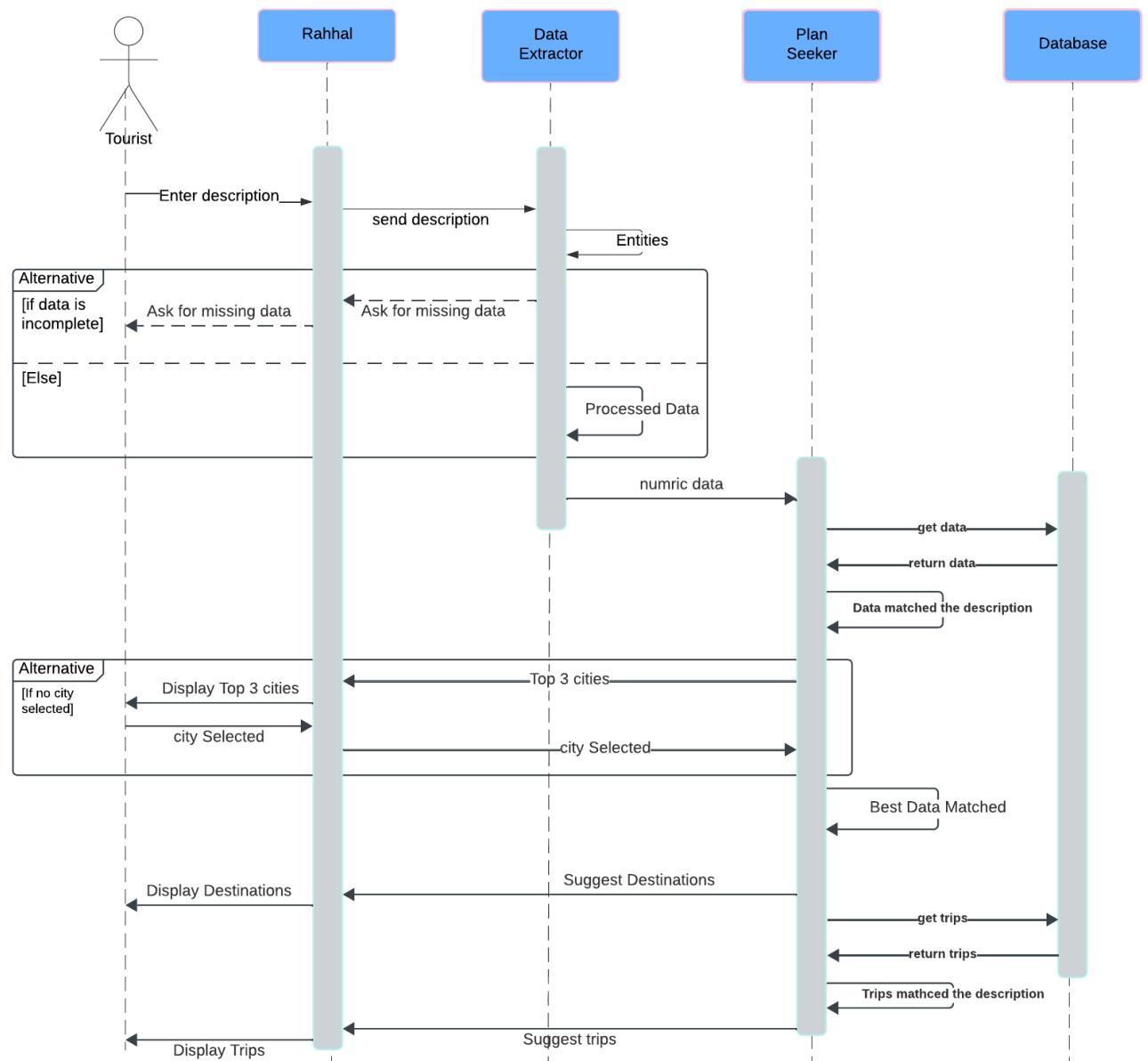


Figure 14: "NLP sequence" Sequence Diagram

#### 4.6.1.2 Payment

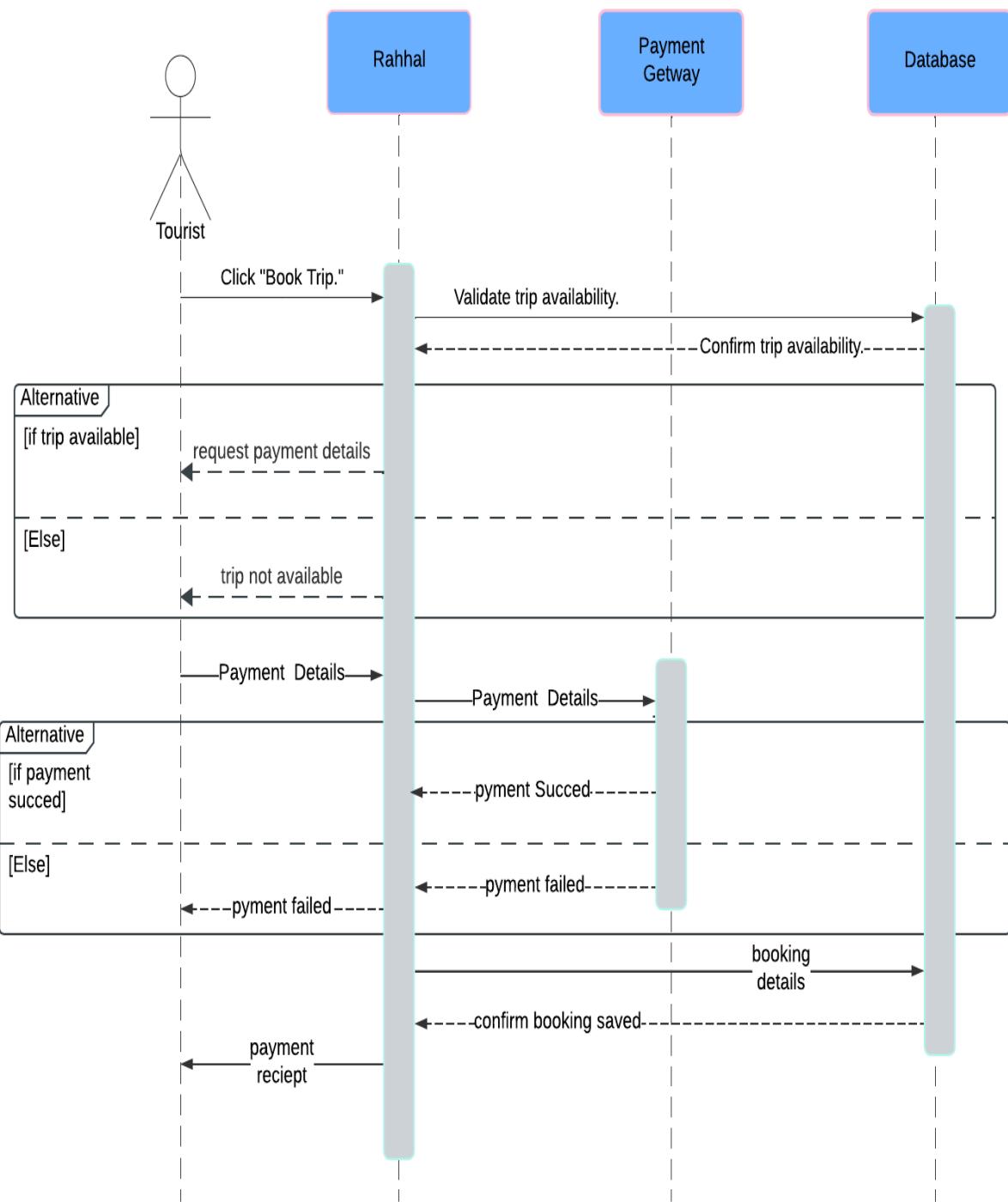


Figure 15: "Payment" Sequence Diagram

#### 4.6.1.3 Manage trip

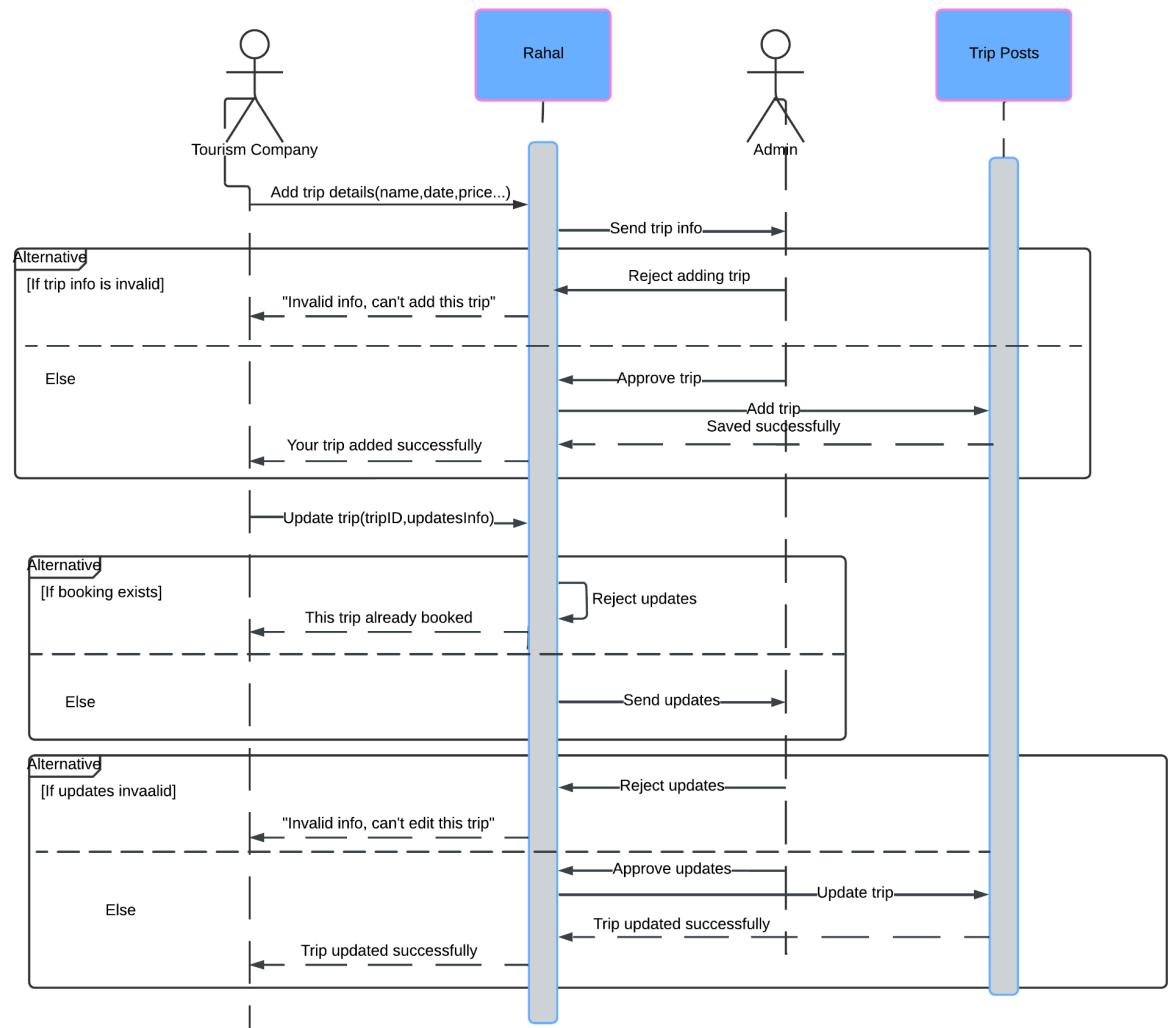


Figure 16: "Manage trip" Sequence Diagram

## 4.7 Design Class

### 4.7.1 Class Diagram

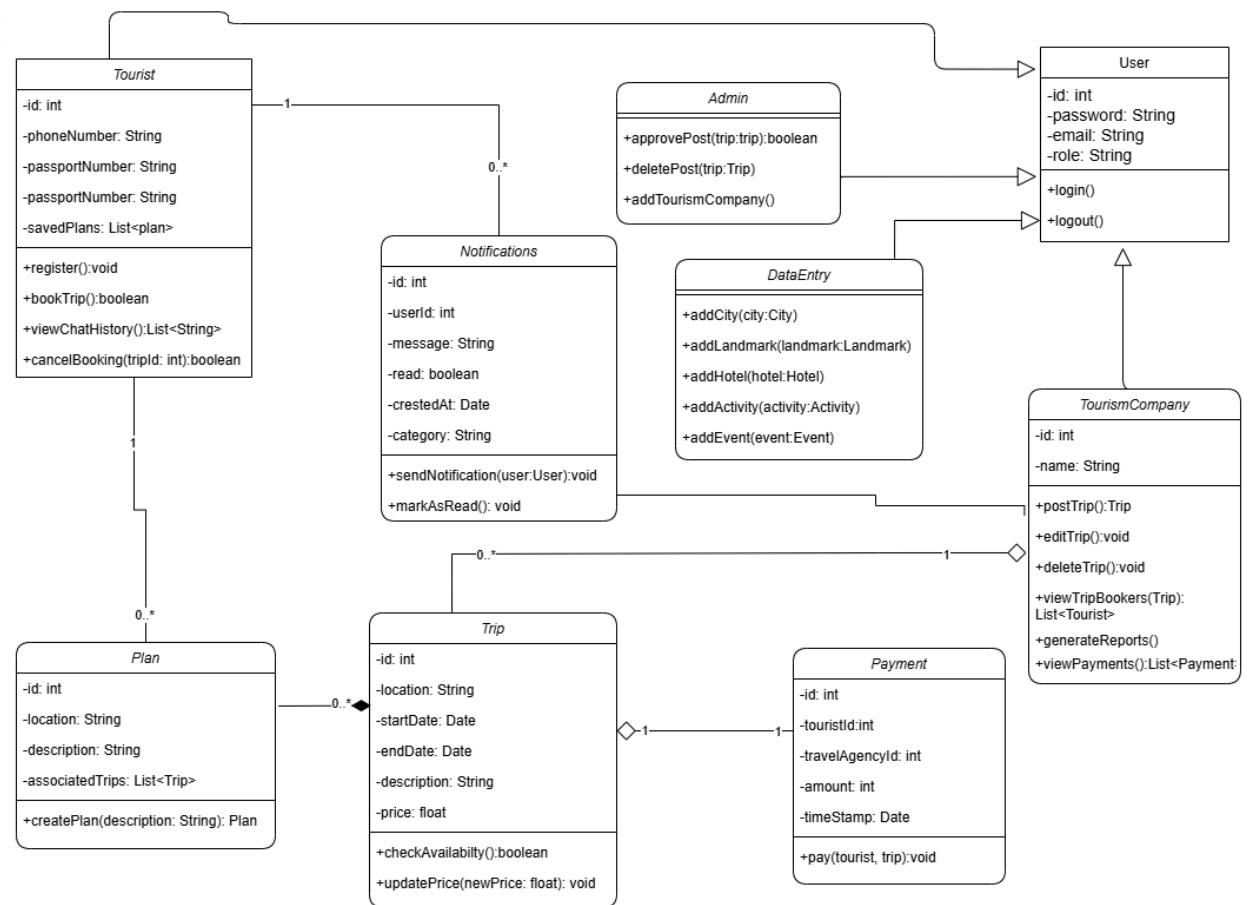


Figure 17: Class Diagram

## 4.8 Database Schema

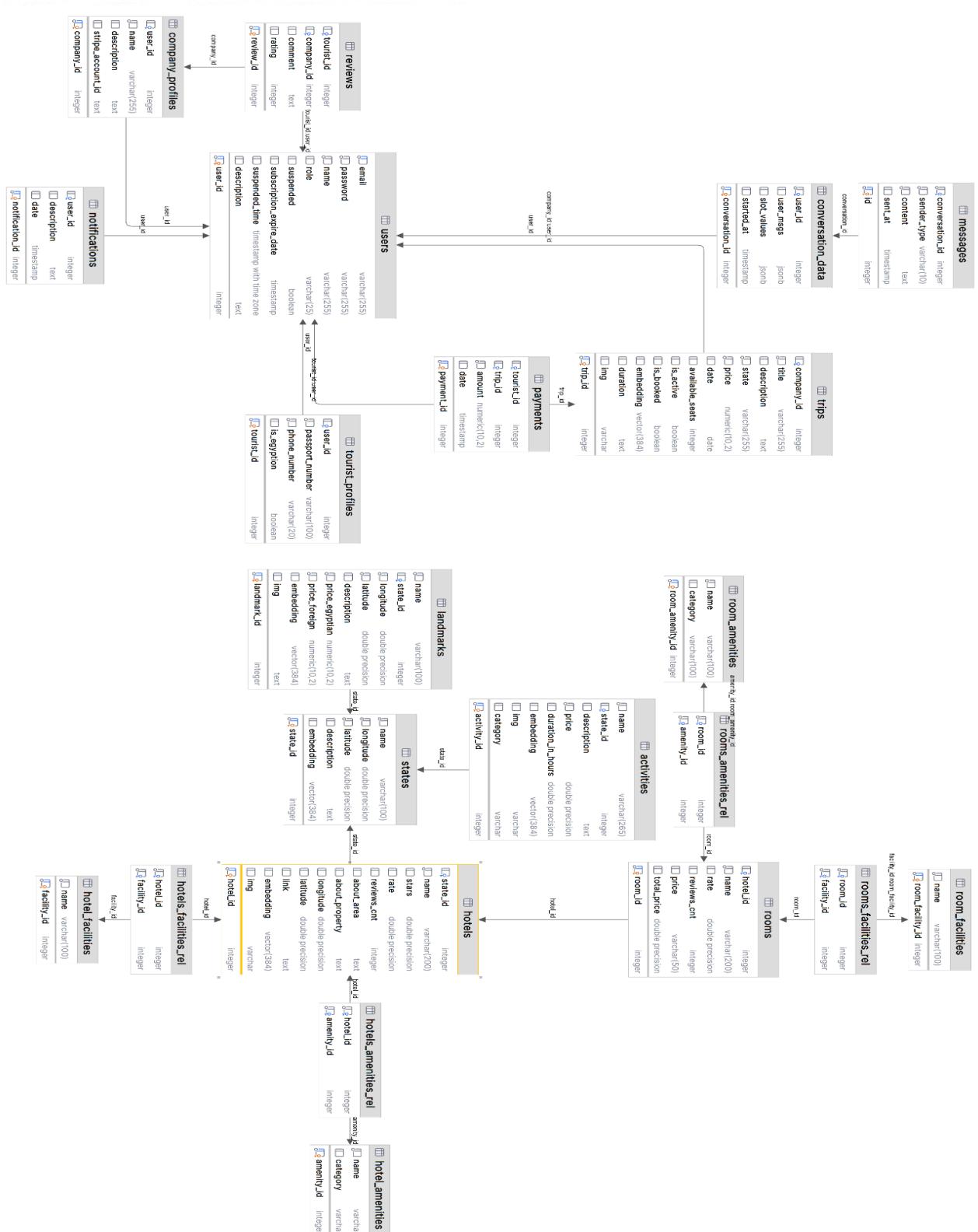


Figure 18: Database Schema

## 4.9 Conclusion

In conclusion, the Proposed system and methodology outlines the technical backbone and operational flow of Rahhal. By breaking down use cases, system architecture, and interaction models, it offers a detailed view of how the system functions effectively for both tourists and administrators.

The chapter highlights the seamless integration of NLP for personalized recommendations, secure payment processing, and robust content management. It also emphasizes the importance of a well-structured database and user-centric design mockups to enhance usability and efficiency.

The next chapter, **Conclusion & Future Work**, will provide a summary of the project's vision and achievements while exploring potential improvements and future enhancements to expand Rahhal's capabilities and impact in the tourism industry.

# Chapter 5

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## IMPLEMENTATION & TESTING

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## 5.1 PROGRAMMING LANGUAGES AND FRAMEWORKS

### 5.1.1 FRONT-END

- HTML (Hypertext Markup Language): Used to structure the content of the web pages.
- CSS (Cascading Style Sheets): Used to apply styling and layout to the web pages.
- Tailwind CSS: A utility-first CSS framework that accelerates styling using predefined classes, ensuring consistency and responsiveness.
- JavaScript: Used for adding interactivity and dynamic behavior to the frontend components.
- React.js: The main frontend library used in the project. It enables the development of dynamic, component-based user interfaces and supports the integration of third-party libraries with ease.

### 5.1.2 BACK-END

- Java (Spring Boot): Spring Boot is used to build a robust, modular backend with a layered architecture. It simplifies the creation of RESTful APIs, handles security (via JWT), and manages business logic and data persistence.
- PostgreSQL (Hosted on Neon): A cloud-hosted relational database used to store structured data including users, trips, bookings, tourism companies, payments, and more. Neon allows remote collaboration, automatic scaling, and removes the burden of manual server management.
- RASA: An open-source framework that used to build the chatbot and controlling the flow
- Sentence Transformer (SBERT): A model that converts sentences into numerical vectors (embeddings), so that their meanings can be compared



easily in the machines. which helps to find similar sentences to obtain best recommendations.

- FastAPI: It is a framework for building APIs, used to create the backend server that handles user requests and sends responses. It is also used to manage requests for the recommendation system.

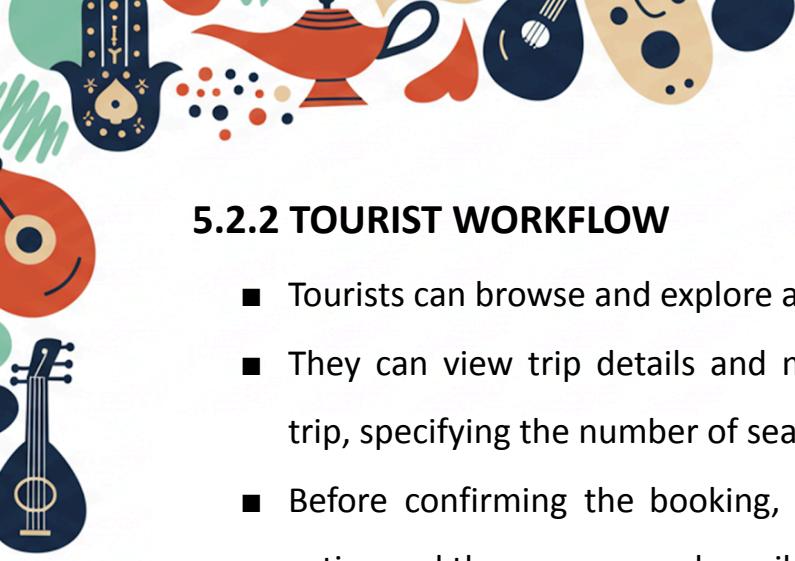
### 5.1.3 OTHERS

- Swagger (Springdoc OpenAPI): Auto-generated API documentation to facilitate development and testing.
- Postman: Utilized for manual testing of API endpoints throughout development.
- Git & GitHub: Git is used for version control and GitHub for remote collaboration.

## 5.2 ALGORITHM

### 5.2.1 AUTHENTICATION & REGISTRATION

- Tourists can sign up on the platform by providing their personal information (e.g., email and password).
- After successful registration, tourists can log in to the platform using their credentials.
- Tourism companies do not register themselves; instead, they are added and managed by the admin, who enters company details and activates their accounts.
- Upon login, a secure authentication token is issued, which is required to access user-specific and protected backend services.



## 5.2.2 TOURIST WORKFLOW

- Tourists can browse and explore a list of **active and approved trips**.
- They can view trip details and make a **booking request** for a selected trip, specifying the number of seats.
- Before confirming the booking, the system checks that the trip is still active and there are enough available seats.
- Upon successful booking and payment, a **unique ticket number** is generated and stored in the system.
- Tourists receive a **confirmation email** with their booking and ticket details.

## 5.2.3 TOURISM COMPANY WORKFLOW

- Tourism companies can create new trips by entering essential trip information (e.g., title, description, price, date, available seats).
- Created trips are marked as **inactive** by default and require **admin approval** before becoming visible to tourists.
- Companies can view their created trips, update trip details, or delete a trip if needed.
- Companies can also view the list of tourists who booked each trip to manage attendance and availability.

## 5.2.4 ADMIN WORKFLOW

- Trip Approval
  - Admins review all newly submitted trips from tourism companies.
  - Approved trips are marked as **active**, making them publicly available to tourists.
  - Admins may also delete inappropriate or invalid trips.

- Account Management
  - Admins can **add new tourism companies** to the platform by entering their data and creating credentials for them.
  - The admin has full control to **view, delete, activate, or deactivate** both tourist and company accounts
  - If a company is reapproved or reactivated, their access to the platform is restored.

### 5.2.5 AI-BASED SUGGESTIONS

- Tourists can input their travel preferences, such as destination, budget, preferred travel dates, or activities.
- These inputs are processed by an **AI model** integrated with the backend to generate **personalized travel plans**.
- The AI suggests a list of suitable hotels, activities and landmarks that align with the tourist's preferences.
- If the tourist wants a pre-planned trip that suits them, the model can suggest one that is already prepared by our tourism companies.
- A **PDF file** containing the full **personalized travel plan** is automatically generated.

### 5.2.6 EMAIL NOTIFICATION SYSTEM

- When an admin **approves a trip**, a notification email is sent to the tourism company to inform them that their trip is now active.
- When a tourist **books and pays** for a trip, they receive a confirmation email containing the trip details and a **unique ticket number**.
- This system helps ensure all users are promptly informed of important updates without needing to log in.

## 5.3 Back-End Implementation

<b>POST</b>	<b><a href="http://localhost:8088/api/company/trips/{tripid}">http://localhost:8088/api/company/trips/{tripid}</a></b>	
	Requestbody	Response body
	<pre>{   "title": "Explore the Pyramids",   "description": "A guided tour of the Great Pyramids of Giza with a professional Egyptologist.",   "state": "Giza",   "price": 150.00,   "date": "2025-04-10T10:00:00",   "availableSeats": 20,   "active": true,   "duration": "4 Days - 3 Nights" }</pre>	Trip was created successfully.
	<b>Allows a company to add a new trip</b>	

<b>PUT</b>	<b><a href="http://localhost:8088/api/company/trips/{tripId}">http://localhost:8088/api/company/trips/{tripId}</a></b>	
	Requestbody	Response body
	<pre>{   "title": "Explore the Pyramids",   "description": "A guided tour of the Great Pyramids of Giza with a professional Egyptologist.",   "state": "Giza",   "price": 150.00,   "date": "2025-04-10T10:00:00",   "availableSeats": 20,   "active": true,   "duration": "4 Days - 3 Nights" }</pre>	Trip was updated successfully.
	<b>Allows a company to update one of its trips only if it is not booked</b>	

<b>Delete</b>	<b><a href="http://localhost:8088/api/company/trips/{tripId}">http://localhost:8088/api/company/trips/{tripId}</a></b>	
	Requestbody	Response body
	Trip was deleted successfully	
	<b>Allows a company to delete a specific trip only if it has no bookings</b>	

<b>GET</b>	<b><a href="http://localhost:8088/api/company/trips">http://localhost:8088/api/company/trips</a></b>	
	Requestbody	Response body
	<pre>[   {     "tripId": 1,     "title": "Trip to Luxor",     "description": "Enjoy ancient ruins",     "state": "Luxor",     "price": 500.0,     "duration": "2 days",     "date": "2025-07-10T08:00:00.000Z",     "availableSeats": 10,     "isActive": true   } ]</pre>	
	<b>Returns a list of all trips belonging to the logged-in company</b>	

<b>GET</b>	<b><a href="http://localhost:8088/api/company/trips/bookings/{tripId}">http://localhost:8088/api/company/trips/bookings/{tripId}</a></b>	
	Requestbody	Response body
		<pre>[   [     {       "bookingId": 1,       "userId": 2,       "tripId": 1,       "date": "2025-06-15T14:00:00.000Z"     }   ] ]</pre>
	<b>Allows a company to add a new trip</b>	

<b>PUT</b>	<b><a href="http://localhost:8088/api/admin/trips/{tripId}">http://localhost:8088/api/admin/trips/{tripId}</a></b>	
	Requestbody	Response body
		Trip was activated successfully.
	<b>Allows an admin to activate a specific trip.</b> <b>Only inactive trips can be activated.</b>	

<b>DELETE</b>	<b><a href="http://localhost:8088/api/admin/trips/{tripId}">http://localhost:8088/api/admin/trips/{tripId}</a></b>	
	Requestbody	Response body
		Trip was deleted successfully.
	<b>Allows an admin to deactivate a specific trip.</b> <b>Only active trips can be deactivated.</b>	

<b>GET</b>	<b><a href="http://localhost:8088/api/admin/trips">http://localhost:8088/api/admin/trips</a></b>	
	Requestbody	Response body
		<pre>[   [     {       "tripId": 1,       "title": "Trip to Luxor",       "description": "Enjoy ancient ruins",       "state": "Luxor",       "price": 500.0,       "duration": "2 days",       "date": "2025-07-10T08:00:00.000Z",       "availableSeats": 10,       "isActive": true     }   ] ]</pre>
	<b>Returns all inactive trips across all companies.</b>	

<b>PUT</b>	<b><a href="http://localhost:8088/api/admin/accounts/{userId}/{status}">http://localhost:8088/api/admin/accounts/{userId}/{status}</a></b>	
	Requestbody	Response body
		Account status updated successfully.
	<b>Allows the admin to activate or deactivate a user account (e.g., company or tourist).</b>	

<b>PUT</b>	<b><a href="http://localhost:8088/api/admin/accounts/company/{companyId}">http://localhost:8088/api/admin/accounts/company/{companyId}</a></b>	
	Requestbody	Response body
		Company account reactivated successfully.
	<b>Allows the admin to reactivate a previously deactivated company account.</b>	

<b>POST</b>	<b><a href="http://localhost:8088/api/admin/accounts/company">http://localhost:8088/api/admin/accounts/company</a></b>	
	Requestbody	Response body
	<pre>{   "email": "company@gmail.com",   "password": "SecurePassword123",   "name": "Company Name" }</pre>	Company account created successfully.
	<b>Allows the admin to create a new tourism company account.</b>	

<b>GET</b>	<b><a href="http://localhost:8088/api/admin/accounts">http://localhost:8088/api/admin/accounts</a></b>	
	Requestbody	Response body
		<pre>[   {     "userId": 1,     "email": "admin@gmail.com",     "role": "ADMIN",     "status": true   },   {     "userId": 2,     "email": "company@gmail.com",     "role": "COMPANY",     "status": false   } ]</pre>
	<b>Returns a list of all user accounts in the system (admins, companies, tourists).</b>	

<b>POST</b>	<b><a href="http://localhost:8088/api/auth/sign-up">http://localhost:8088/api/auth/sign-up</a></b>	
	Requestbody	Response body
	<pre>{   "email": "user@gmail.com",   "password": "StrongPassword123",   "name": "John Doe" }</pre>	Account created successfully.
	<b>Allows a new tourist user to register an account.</b>	

<b>POST</b>	<b><a href="http://localhost:8088/api/auth/login">http://localhost:8088/api/auth/login</a></b>	
	Requestbody	Response body
	<pre>{   "email": "user@gmail.com",   "password": "StrongPassword123" }</pre>	<pre>{   "token": "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9...",   "role": "TOURIST" }</pre>
	<b>Authenticates the user and returns a JWT token along with their role (e.g., ADMIN, COMPANY, TOURIST).</b>	

POST	<a href="http://127.0.0.1:8002/api/hotels/recommend">http://127.0.0.1:8002/api/hotels/recommend</a>	
	Requestbody	Response body
	<pre>{   "hotels": [     {       "hotel_id": 288,       "hotel_name": "Pyramids Heart Hotel",       "longitude": 31.146385,       "latitude": 29.969424,       "facilities": [ "Free WiFi"],       "score": 1.0,       "price_per_night": 13.0,       "img":         "https://res.cloudinary.com/dgyikajcm         /image/upload/v1748656005/hotels/288.         jpg"     },     {       "hotel_id": 428,       "hotel_name": "Sami pyramids inn",       "longitude": 31.142007,       "latitude": 29.983852,       "facilities": [ "Free WiFi"],       "score": 1.0,       "price_per_night": 22.0,       "img":         "https://res.cloudinary.com/dgyikajcm         /image/upload/v1748656846/hotels/428.         jpg"     },     {       "hotel_id": 404,       "hotel_name": "Jana pyramids view       inn",       "longitude": 31.144293,       "latitude": 29.973485,       "facilities": [ "Free WiFi"],       "score": 1.0,       "price_per_night": 29.0,       "img":         "https://res.cloudinary.com/dgyikajcm         /image/upload/v1748656703/hotels/404.         jpg"     }   ] }</pre>	
<b>Suggest hotels that matches user preferences</b>		

POST	<a href="http://127.0.0.1:8002/api/activities/recommend">http://127.0.0.1:8002/api/activities/recommend</a>	
	Requestbody	Response body
	<pre>{   "city_name": "Cairo",   "user_message": "i want to visit ancient sites",   "preferred_activities": [     "ancient sites"   ] }</pre>	<pre>{   "activities": [     {       "id": 637,       "name": "sound and light show Giza pyramids Overview",       "description": "driver will pick you up from your hotel to enjoy by A magnificent night Tour to the most historical sites of ancient Egypt during the old Kingdom. building the pyramids and relates the history of great and famous figures of ancient Egypt, The sound and light show at Giza pyramids of Cheops, Chephren and Mykerinus .",       "score": 37.37,       "price": 40.0,       "duration": 2.0,       "state": "Cairo",       "img":         "https://res.cloudinary.com/dgyikajcm/image/upload/v1748677738/activities/637.jpg",       "category": "Pyramids Show Light Sound Giza"     }   ] }</pre>
	<b>Suggest activities that matches user preferences</b>	

Delete	<a href="http://localhost:8000/reset_chat/&lt;user_id&gt;">http://localhost:8000/reset_chat/&lt;user_id&gt;</a>	
	Requestbody	Response body
		<pre>{   "status": "success",   "message": "Chat reset for 123." }</pre>
	<b>Reset the Chat for a specific user</b>	

POST	<a href="http://localhost:8002/api/cities/recommend">http://localhost:8002/api/cities/recommend</a>	
	Requestbody	Response body
	<pre>{   "city_description": "i want     a city have an amazing     beach and a lot of     activities" }</pre>	<pre>{"top_cities": [{   "name": "Hurghada",   "description": "Hurghada is a vibrant Red Sea resort city known for its stunning beaches, crystal-clear waters, With its lively marina, bustling nightlife, and luxurious resorts, it's a perfect destination for both relaxation and adventure.",   "longitude": 27.259282077658405,   "latitude": 33.80498833291286,   "matched_features": [     {       "name": "sea",       "weight": 1.5,       "matched_keywords": [         "sea", "beach", "red sea"]     },     {       "name": "Sharm El Sheikh",       "description": "Sharm El Sheikh is a vibrant resort town on Red Sea coast, it's the ultimate destination for relaxation and adventure.",       "longitude": 27.96539195024769,       "latitude": 34.36120542563263,       "matched_features": [         {           "name": "sea",           "weight": 1.5,           "matched_keywords": [             "sea", "beach", "coast", "red sea"]         },         "match_score": 0.622241561114       ]     }   ] }</pre>
	<b>Suggest Top 3 cities to the user</b>	

POST	<a href="http://127.0.0.1:8002/api/landmarks/recommend">http://127.0.0.1:8002/api/landmarks/recommend</a>	
	Requestbody	Response body
	<pre>{   "city_name": "Hurghada",   "user_message": "i want to see beaches and if it applicable to go diving",   "preferred_landmarks":   ["diving", "beaches"] }</pre>	<pre>{   "landmarks":   [     {       "id": 36,       "name": "Sand City Hurghada",       "description": "An open-air museum with sand sculptures",       "score": 5.0,       "price": 3.95,       "longitude": 33.8,       "latitude": 27.2,       "img": null     }   ] }</pre>
	<b>Suggest landmarks that matches user preferences</b>	

POST	<a href="http://localhost:8002/api/plans/recommend">http://localhost:8002/api/plans/recommend</a>	
	Requestbody	Response body
	<pre>{   "city_name": "Hurghada",   "budget": 500,   "duration": 3,   "suggested_hotels": [     {       "hotel_id": 391,       "hotel_name": "Indiana Hotel Cairo",       "longitude": 31.217249,       "latitude": 30.043592,       "facilities": ["Pool"],       "score": 1.0,       "price_per_night": 78.0,       "img": "https://res.cloudinary.com/dgyika/jcm/image/upload/v1748656628/hotels/391.jpg"     },     "suggested_activities": [       {         "id": 1959,         "name": "Orange Bay Island",         "description": "You'll discover one of the liveliest seabeds in the world, you'll swim between the bright colours of the red sea. Our driver will pick you up from the hotel in high-class vehicles. The meeting point is in Hurghada Marina, Start 09:00am. After lunch 2 stops for snorkeling in 2 different locations. This trip includes transfer, lunch, equipment (masks and swimming fins) and soft drinks all day long.\r\nKindly remember to take your own towels with you.",         "score": 36.48,         "price": 23.0,         "duration": 7.0,         "state": "Hurghada",         "img": "https://res.cloudinary.com/dgyika/jcm/image/upload/v1748682411/activities/1959.jpg",         "category": "Sea Red Snorkeling Enjoy Boat"       },       {         "id": 1919,         "name": "ViP Orange Bay Giftun Island Tour By Boat With Lunch in Hurghada",         "description": "This day excursion includes lunch and unlimited soft drinks to the magnificent Giftun Islands National Park. This Orange Bay Island snorkeling tour begins with an easy, stress-free pick-up from Hurghada",         "score": 35.21,         "price": 20.0,         "duration": 7.0,         "state": "Hurghada"       }     ]   } }</pre>	<pre>{   "plan": {     "hotel": {       "hotel_id": 391,       "hotel_name": "Indiana Hotel Cairo",       "longitude": 31.217249,       "latitude": 30.043592,       "facilities": ["Pool"],       "score": 1.0,       "price_per_night": 78.0,       "img": "https://res.cloudinary.com/dgyika/jcm/image/upload/v1748656628/hotels/391.jpg"     },     "activities": [       {         "id": 1959,         "name": "Orange Bay Island",         "description": "You'll discover one of the liveliest seabeds in the world, you'll swim between the bright colours of the red sea. Our driver will pick you up from the hotel in high-class vehicles. The meeting point is in Hurghada Marina, Start 09:00am. After lunch 2 stops for snorkeling in 2 different locations. This trip includes transfer, lunch, equipment (masks and swimming fins) and soft drinks all day long.\r\nKindly remember to take your own towels with you.",         "score": 36.48,         "price": 23.0,         "duration": 7.0,         "state": "Hurghada",         "img": "https://res.cloudinary.com/dgyika/jcm/image/upload/v1748682411/activities/1959.jpg",         "category": "Sea Red Snorkeling Enjoy Boat"       },       {         "id": 1919,         "name": "ViP Orange Bay Giftun Island Tour By Boat With Lunch in Hurghada",         "description": "This day excursion includes lunch and unlimited soft drinks to the magnificent Giftun Islands National Park. This Orange Bay Island snorkeling tour begins with an easy, stress-free pick-up from Hurghada",         "score": 35.21,         "price": 20.0,         "duration": 7.0,         "state": "Hurghada"       }     ]   } }</pre>

	<pre> <img": "an="" "category":="" "description":="" "https:="" "img":="" "latitude":="" "longitude":="" "name":="" "price":="" "sand="" "score":="" "sea="" "suggested_landmarks":="" 1959.jpg",="" 27.2,="" 3.95,="" 33.8,="" 36,="" 5.0,="" <="" [="" activities="" boat"="" city="" dgylakajcm="" enjoy="" hurghada",="" image="" museum="" null="" open-air="" pre="" red="" res.cloudinary.com="" sand="" sculptures",="" snorkeling="" upload="" v1748682411="" with="" {id":="" }="" }]="" }],=""> </img":></pre>	<pre> "duration": 7.0, "state": "Hurghada", <img": "category":="" "description":="" "duration":="" "escape="" "https:="" "hurghada="" "hurghada",="" "name":="" "paradise="" "price":="" "score":="" "sea="" "state":="" "total_plan_cost":="" &amp;="" 18.0,="" 1919.jpg",="" 1989,="" 1989.jpg",="" 30.29,="" 499.36="" 8.0,="" <="" <img":="" a="" activities="" and="" boat="" boat"="" confines="" convenient="" day-long="" delectable="" dgyikajcm="" embark="" enjoy="" enjoy"="" excursion="" explore="" giftun="" hotel="" hurghada="" hurghada",="" image="" in="" included="" island="" islands.="" journey.",="" lunch="" lunch,="" of="" on="" pre="" red="" refreshing="" res.cloudinary.com="" resort="" round-trip="" sea="" snorkeling="" soda,="" stunning="" the="" this="" to="" transportation—all="" unforgettable="" upload="" v1748682228="" v1748682570="" with="" your="" {id":="" }="" },=""> </img":></pre>
	<p><b>Take the suggested hotels, activities and landmarks and suggest top plan for the user</b></p>	

POST	<a href="http://127.0.0.1:8002/api/trips/recommend">http://127.0.0.1:8002/api/trips/recommend</a>	
	Requestbody	Response body
	<pre>{   "preferences": {     "budget": 1000,     "duration": 5,     "state": "Cairo",     "arrival_date": "2025-06-11"   },   "user_messages": {     "request_trip": "I want to visit Cairo for 5 days",     "state": "Cairo",     "budget": "1000",     "duration": "5",     "arrival_date": "2025-06-11"   } }</pre>	<pre>[   {     "trip_id": 91,     "title": "From El Gouna/Hurghada/Safaga: Cairo Overnight Trip by Air",     "description": "Discover the wonders of the Giza Plateau, home to the legendary Pyramids and Sphinx, explore ancient artifacts at the Egyptian Museum, and visit the historic sites of Memphis, Saqqara, and Dahshur.",     "state": "Cairo, Hurghada",     "price": 495.0,     "date": "2025-08-21",     "available_seats": 30,     "duration": "2 Days - 1 Night",     "img": "https://res.cloudinary.com/dgyikajcm/image/upload/v1748643719/trips/91.png",     "match_score": 0.0   } ]</pre>
	<b>Suggest trips that matches user preferences</b>	

POST	<a href="http://localhost:8001/api/embeddings/text">http://localhost:8001/api/embeddings/text</a>	
	Requestbody	Response body
	<pre>{   "text": "hello" }</pre>	<pre>{   "embedding": [     -0.04983338713645935,     0.048187486827373505,     0.06076899915933609,     0.0853128582239151,     -0.08480749279260635   ] }</pre>
	<b>Convert text data to numerical vectors [embedding]</b>	

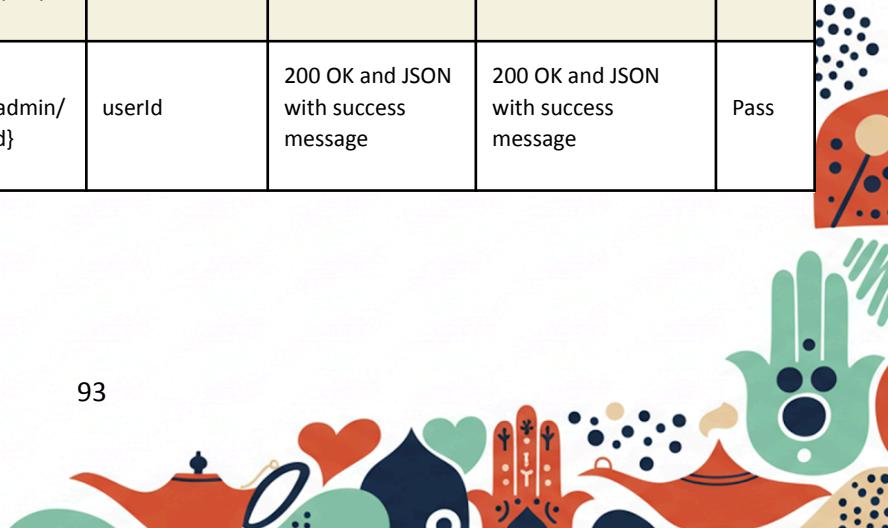
## 5.5 TESTING SCENARIOS

ID	Description	PRE-REQUISITES	TEST STEPS	TEST DATA	EXPECTED RESULT	ACTUAL RESULT	STATUS
BTC-01	Create a trip with valid data	Authenticated company user	1. Send POST request to /api/company/trips with valid trip data	title, description, state, price, date, available_seats	201 Created and JSON with new trip details	201 Created and JSON with new trip details	Pass
BTC-02	View all company trips	Authenticated company user	1. Send GET request to /api/company/trips	None	200 OK and JSON list of company trips	200 OK and JSON list of company trips	Pass
BTC-03	Update a trip with valid ID	Trip exists	1. Send PUT request to /api/company/trips/{tripId} with updated data	tripId, updated title, date, price	200 OK and JSON with updated trip details	200 OK and JSON with updated trip details	Pass
BTC-04	Update a trip with invalid ID	None	1. Send PUT request to /api/company/trips/{invalidTripId}	invalidTripId, updated data	404 Not Found and JSON error	404 Not Found and JSON error	Pass
BTC-05	Delete a trip with valid ID	Trip exists	1. Send DELETE request to /api/company/trips/{tripId}	tripId	200 OK and JSON with success message	200 OK and JSON with success message	Pass
BTC-06	Delete a trip with invalid ID	None	1. Send DELETE request to /api/company/trips/{invalidTripId}	invalidTripId	404 Not Found and JSON error	404 Not Found and JSON error	Pass
BTC-07	View bookings for a trip	Trip exists	1. Send GET request to /api/company/trips/bookings/{tripId}	tripId	200 OK and JSON list of bookings	200 OK and JSON list of bookings	Pass
BTC-08	View all inactive trips (admin)	Admin user authenticated	1. Send GET request to /api/admin/trips	None	200 OK and JSON list of company's inactive trips	200 OK and JSON list of company's inactive trips	Pass
BTC-09	View inactive trips for a company	Admin user authenticated	1. Send GET request to /api/admin/trips/{companyId}	companyId	200 OK and JSON list of company's inactive trips	200 OK and JSON list of company's inactive trips	Pass
BTC-10	Activate a trip	Trip exists, admin user	1. Send PUT request to /api/admin/trips/{tripId}	tripId	200 OK and JSON with updated trip (is_active=true)	200 OK and JSON with updated trip	Pass

Testing Scenarios

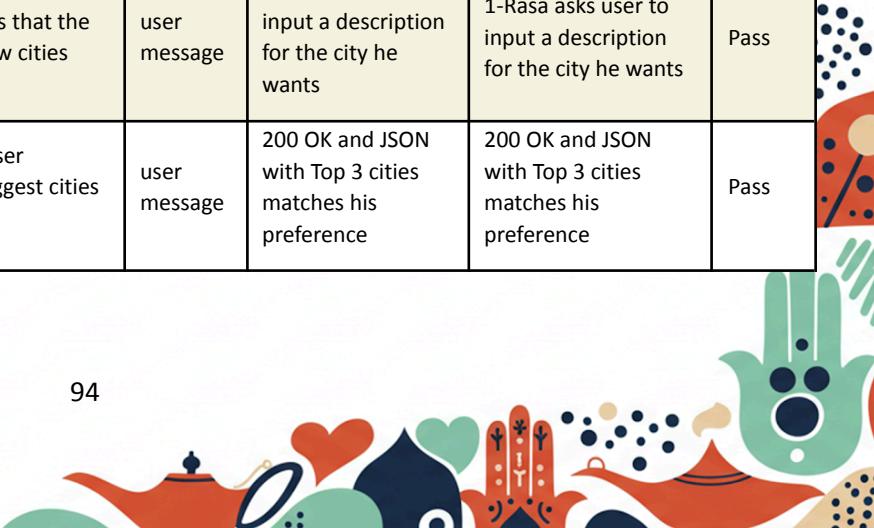


ID	Description	PRE-REQUISITES	TEST STEPS	TEST DATA	EXPECTED RESULT	ACTUAL RESULT	STATUS
BTC-11	Delete a trip (admin)	Trip exists, admin user	1. Send DELETE request to /api/admin/trips/{tripId}	tripId	200 OK and JSON with success message	200 OK and JSON with success message	Pass
BTC-12	Sign up new user	None	1. Send POST request to /api/auth/sign-up with user data	email, password, role	201 Created and JSON with new user info + token	201 Created and JSON with new user info + token	Pass
BTC-13	Login with valid credentials	User exists	1. Send POST request to /api/auth/login with correct credentials	email, password	200 OK and JSON with user info + token	200 OK and JSON with user info + token	Pass
BTC-14	Login with invalid credentials	User exists	1. Send POST request to /api/auth/login with wrong credentials	email, wrong password	401 Unauthorized and JSON error	401 Unauthorized and JSON error	Pass
BTC-15	Get all accounts (admin)	Admin user authenticated	1. Send GET request to /api/admin/accounts	None	200 OK and JSON with list of users	200 OK and JSON with list of users	Pass
BTC-16	Update account status	User exists, admin user	1. Send PUT request to /api/admin/accounts/{userId}/{status}	userId, new status	200 OK and JSON with updated user status	200 OK and JSON with updated user status	Pass
BTC-17	Create new company account (admin)	Admin user authenticated	1. Send POST request to /api/admin/accounts/company	name, email, password	201 Created and JSON with new company info	201 Created and JSON with new company info	Pass
BTC-18	Activate company account with valid companyId	Company exists, admin user	1. Send PUT request to /api/admin/accounts/company/{companyId} with valid companyId	companyId	200 OK and JSON with success message	200 OK and JSON with success message	Pass
BTC-19	Activate company account with invalid companyId	Admin user	1. Send PUT request to /api/admin/accounts/company/{companyId} with invalid companyId	invalid CompanyId	404 Not Found and JSON error	404 Not Found and JSON error	Pass
BTC-20	Delete user account	User exists, admin user	1. Send DELETE request to /api/admin/accounts/{userId}	userId	200 OK and JSON with success message	200 OK and JSON with success message	Pass





ID	Description	PRE-REQ VISITES	TEST STEPS	TEST DATA	EXPECTED RESULT	ACTUAL RESULT	STATUS
BTC -21	Tourist user Starts chat with greeting	Tourist user	1. Rasa predict greet intent	user message	response with greeting	response with greeting	Pass
BTC -22	Tourist Starts chat with requesting a trip without any details	Tourist user	1. Rasa predict request trip intent	user message	1. Activate the form 2. ask if user wants to specify a city	1. Activate the form 2. response with if user wants to specify a city	Pass
BTC -23	Tourist Starts chat with requesting a trip with the city	Tourist user	1. Rasa predict request trip intent with city_name as an entity	user message	1. Activate the form 2. ask about the budget	1. Activate the form 2. ask about the budget	Pass
BTC -24	Tourist Starts chat with requesting a trip with the city and budget	Tourist user	1. Rasa predict request trip intent with city_name and budget as entities	user message	1. Activate the form 2. ask about the duration	1. Activate the form 2. ask about the duration	Pass
BTC -25	Tourist Starts chat with requesting a trip with the city , budget and duration	Tourist user	1. Rasa predict request trip intent with city_name ,budget and duration as entities	user message	1. Activate the form 2. ask about the arrival date	1. Activate the form 2. ask about the arrival date	Pass
BTC -26	Tourist Starts chat with requesting a trip with the city , budget, duration and arrival date	Tourist user	1. Rasa predict request trip intent with city_name ,budget, duration and arrival date as entities	user message	1. Activate the form 2. ask about the facilities the tourist want in the hotel	1. Activate the form 2. ask about the facilities the tourist want in the hotel	Pass
BTC -27	Tourist Starts chat with requesting a trip with the city , budget, duration, hotel, and arrival date	Tourist user	1. Rasa predict request trip intent with city_name ,budget, duration, hotel and arrival date as entities	user message	1. Activate the form 2. ask about the activities he want to make	1. Activate the form 2. ask about the activities he want to make	Pass
BTC -28	Tourist Starts chat with requesting a trip with all the info required	Tourist user	1. Rasa predict request trip intent with putting all the plan info as entities	user message	1.Start suggesting plan	1.Start suggesting plan	Pass
BTC -29	Tourist don't know a city	Tourist user	1. Rasa predicts that the user don't know cities	user message	1-Rasa asks user to input a description for the city he wants	1-Rasa asks user to input a description for the city he wants	Pass
BTC -30	Tourist enters a description for the city he dreamed with	Tourist user	1- Rasa send user message to suggest cities api	user message	200 OK and JSON with Top 3 cities matches his preference	200 OK and JSON with Top 3 cities matches his preference	Pass



## 5.5 User Interface

### 5.5.1 Home Page

- Provides a welcoming entry point with navigation to main sections.

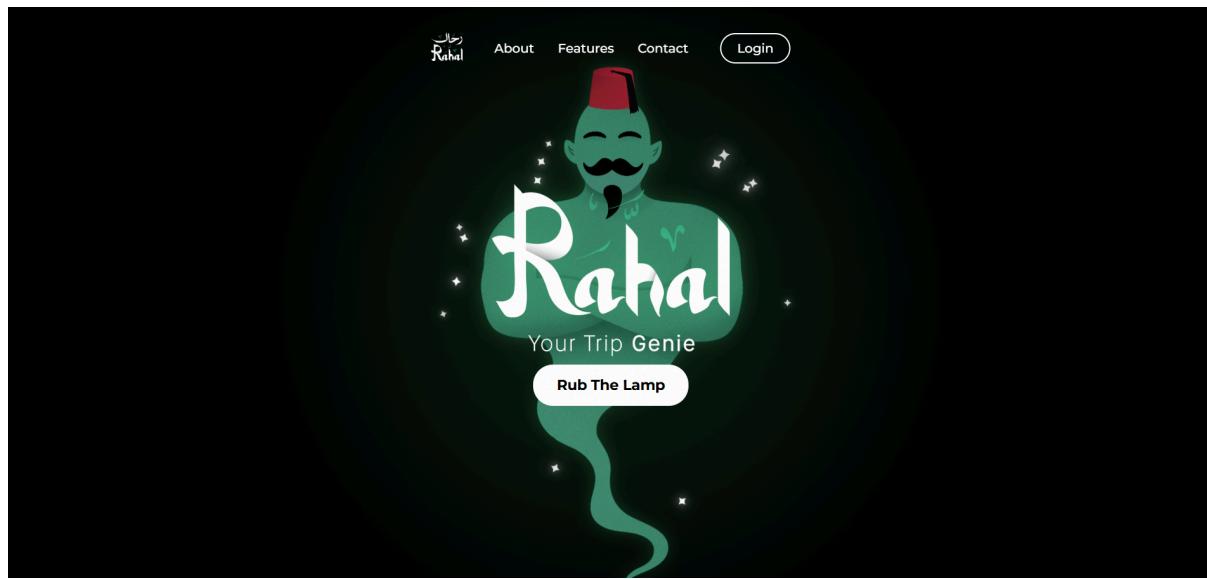


Figure 19: Home Page

### 5.5.2 Login Page

- Allows users to securely access their accounts.

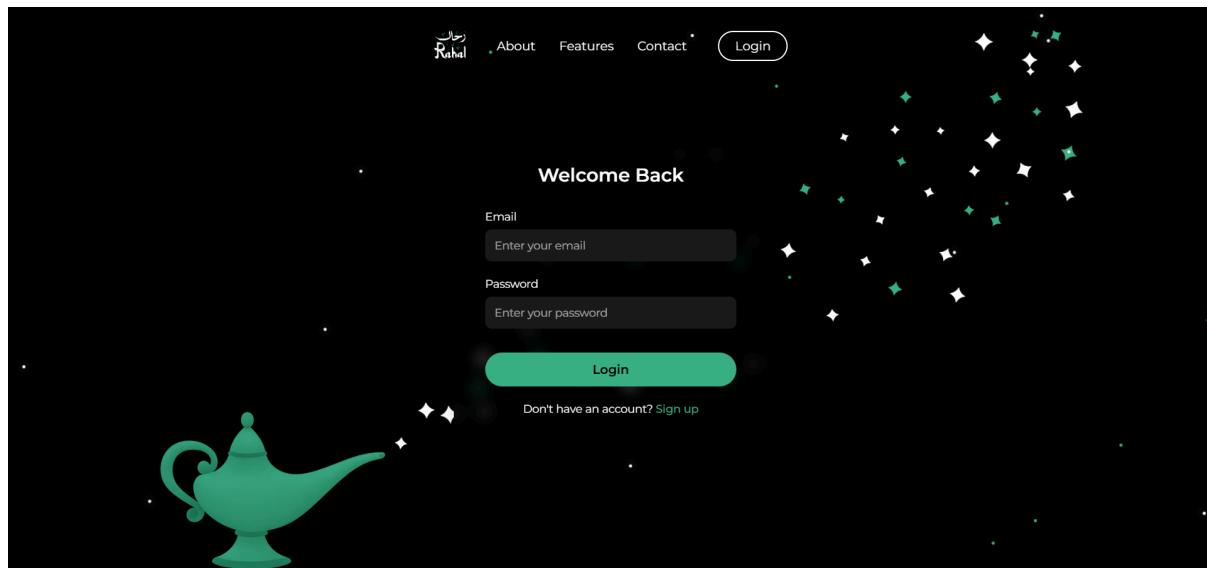


Figure 20: Login Page

### 5.5.3 SignUp Page

- Enables new users(Tourists) to create an account by providing basic details..

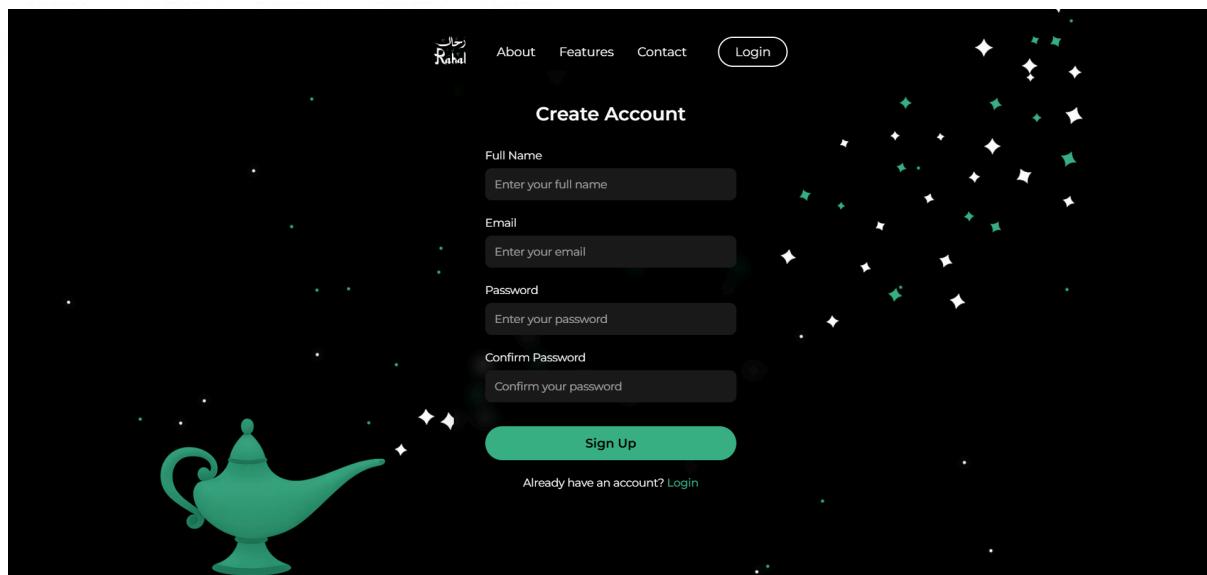


Figure 21: SignUp Page

### 5.5.4 About Page

- Provides information about the platform's purpose and team.

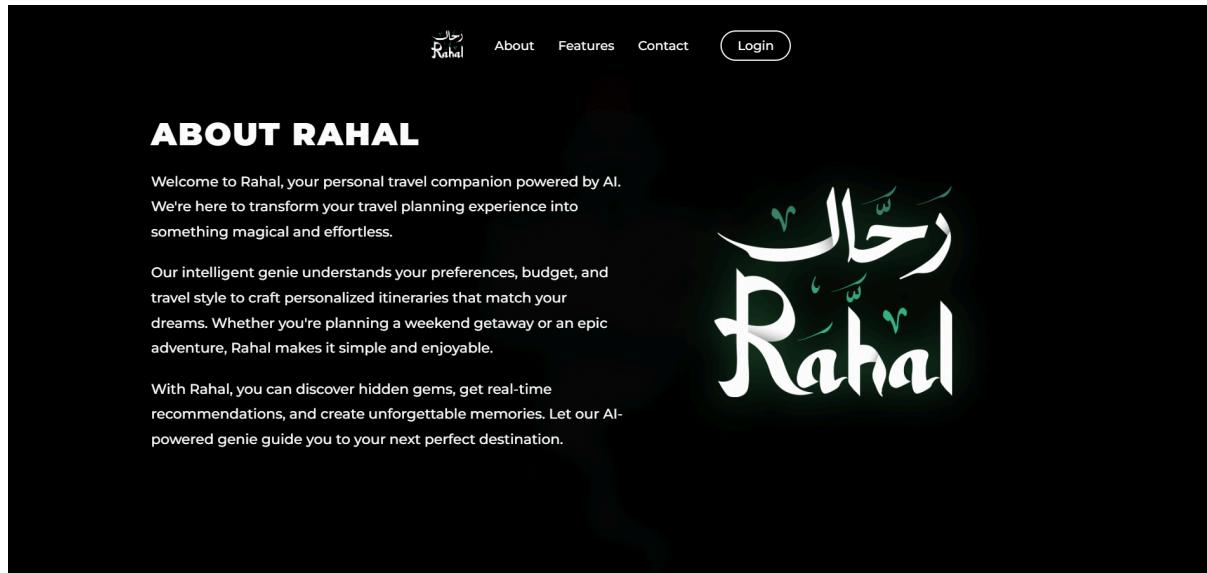


Figure 22: About Page

## 5.5.5 Company's Dashboard

- Displays trip statistics, booking insights, trip statuses, and provides access to create new trips.

The screenshot shows the Company Inc.'s Dashboard. On the left, there is a sidebar with navigation links: Dashboard (selected), Trips, Bookings, and Settings. The main area is titled "Company Inc.'s Dashboard" and features four summary boxes: "Total Trips" (5), "Active Trips" (3), "Total Bookings" (2), and "Available Seats" (78). Below these is a table listing five trips with columns for Title, State, Date, Duration, Price, Available Seats, and Actions. The trips are:

Title	State	Date	Duration	Price	Available Seats	Actions
Desert Safari Adventure	active	Mar 15, 2024, 04:00 PM	6 hours	\$299.99	15	
City Tour Package	pending	Mar 20, 2024, 12:00 PM	4 hours	\$149.99	20	
Mountain Hiking Expedition	completed	Feb 28, 2024, 10:00 AM	8 hours	\$199.99	0	
Beach Getaway	active	Mar 25, 2024, 01:00 PM	5 hours	\$179.99	25	
Cultural Heritage Tour	active	Mar 30, 2024, 11:00 AM	7 hours	\$249.99	18	

Figure 23: Company's Dashboard

## 5.5.6 Chatbot Welcome Message

- Displays a chat interface with a welcome message and chat history sidebar, awaiting user interaction.

The screenshot shows the Chatbot Welcome Message interface. On the left, there is a sidebar with a "Chat History" link. The main area features a large, bold "Welcome, Saady" message. At the bottom, there is a text input field with the placeholder "Ask about travel plans, destinations, or activities..." and a "Send" button with a paper airplane icon.

Figure 24: Chatbot Welcome Message

## 5.5.7 Chatbot Plan Suggestion

- Provides users with personalized travel plans based on their input.

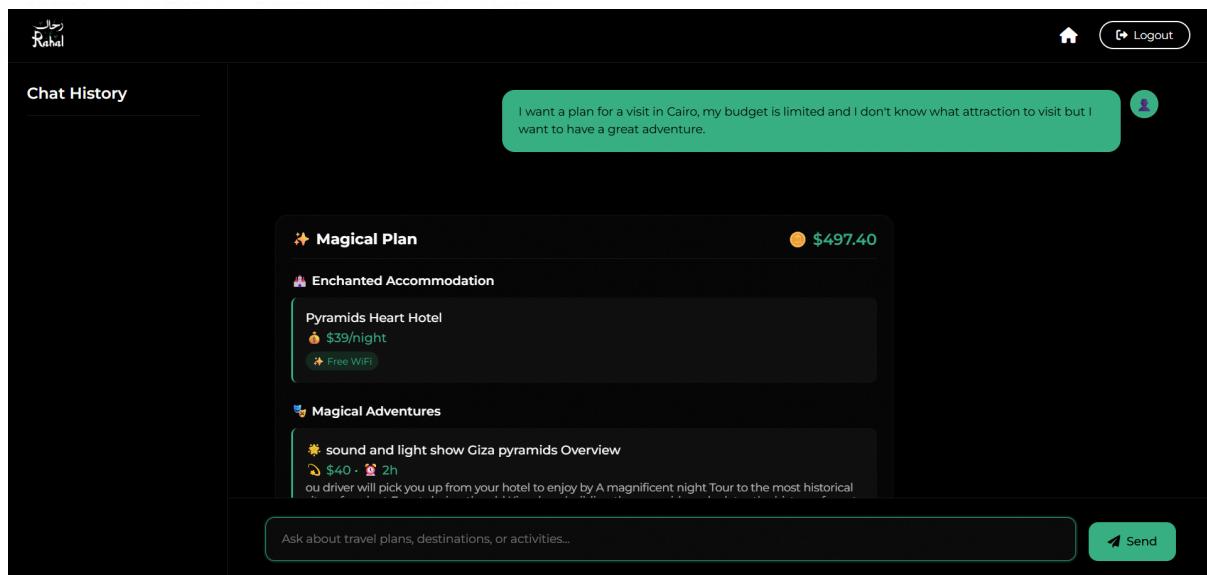


Figure 25: Chatbot Plan Suggestion 1

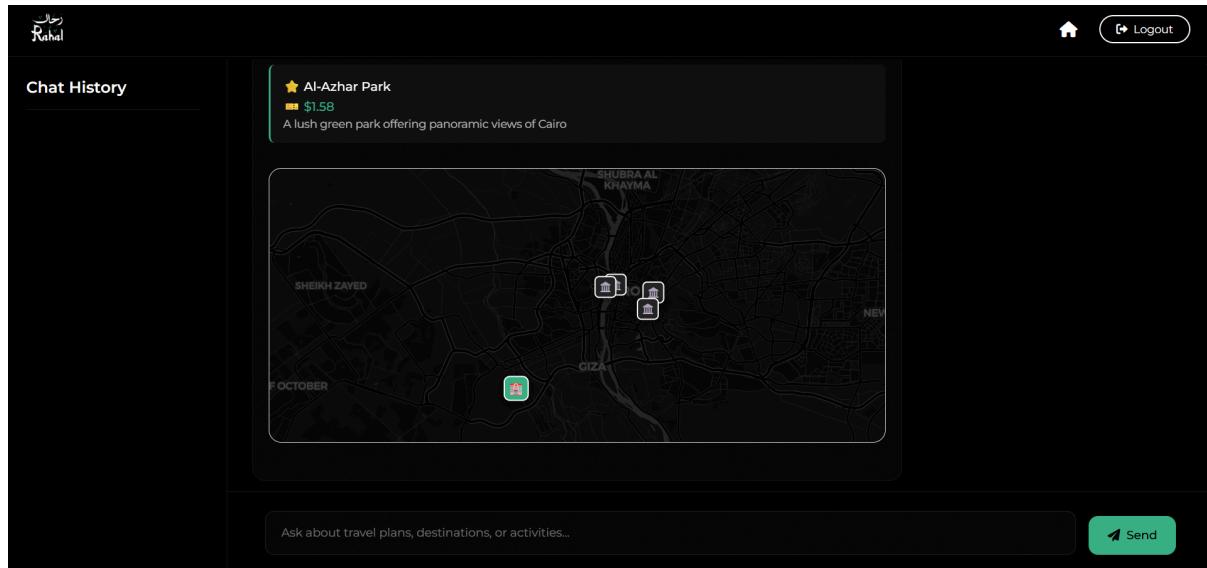


Figure 26: Chatbot Plan Suggestion 2

## 5.5.8 Chatbot Trip Suggestion

- Recommends suitable trips to users according to their preferences and needs.

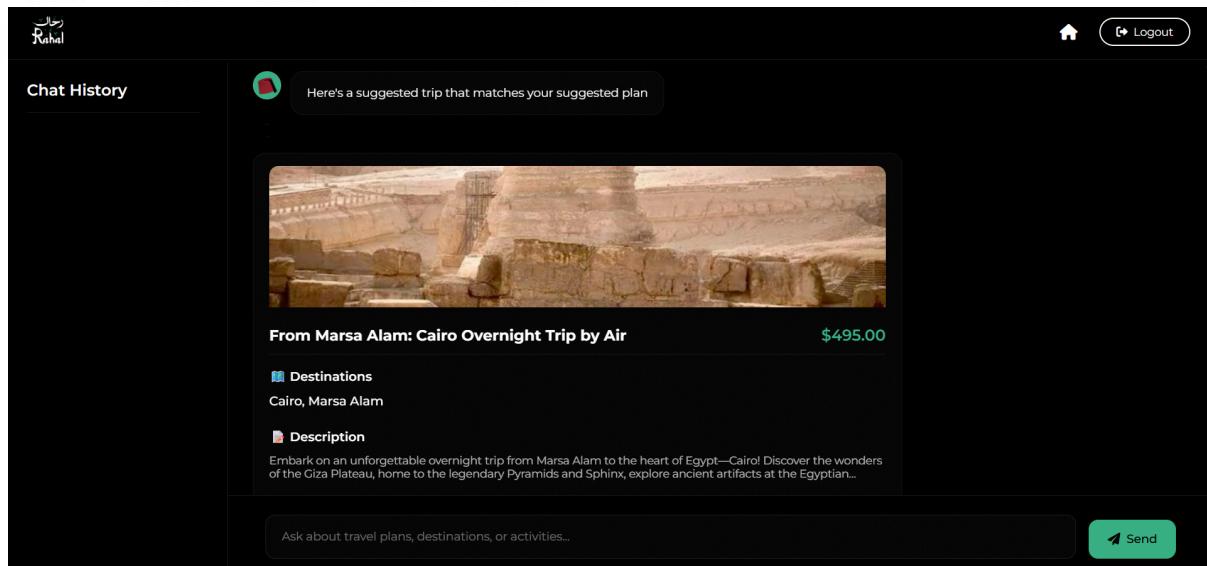


Figure 27: Chatbot Trip Suggestion 1

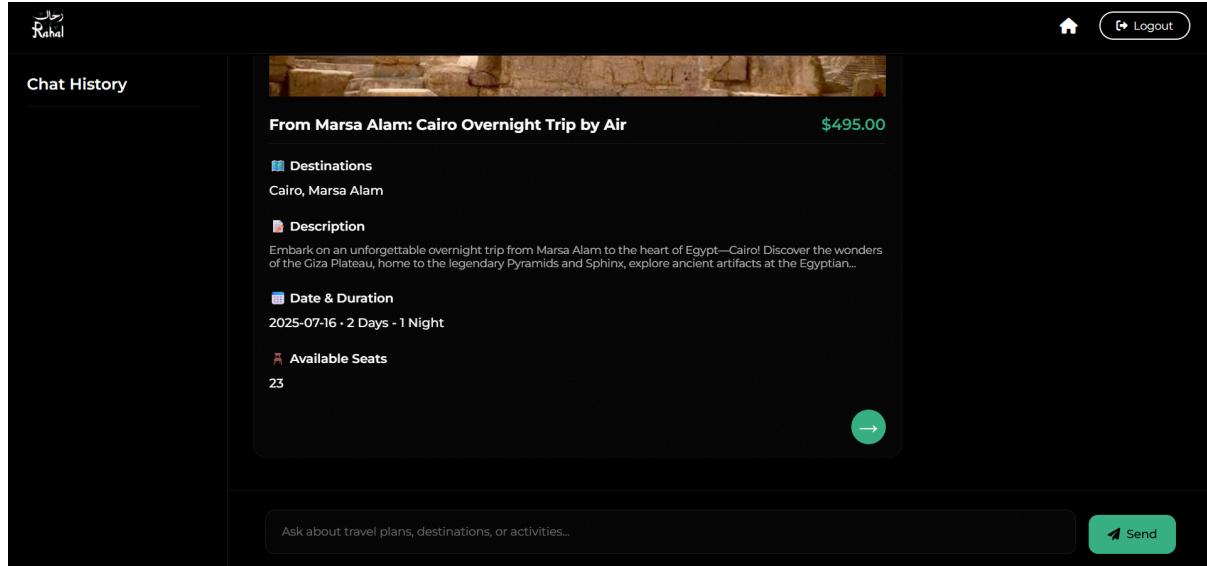


Figure 28: Chatbot Trip Suggestion 2

## 5.6 Conclusion

In the implementation and testing chapter, we presented the detailed implementation and testing of the proposed system. We began by outlining the technologies, programming languages, and frameworks used in both the front-end and back-end development.

We then described the core algorithms that handle key system functionalities such as authentication, user workflows, AI-powered trip suggestions, and the email notification system. Furthermore, we demonstrated the implementation of the backend components and illustrated various testing scenarios to ensure functionality and reliability.

Finally, we showcased the user interface design, covering all essential pages and their roles. This chapter highlights the practical realization of the system and validates its readiness through structured testing and a functional UI.



# Chapter 6

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# Conclusion & Feature Work

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## 6.1 Conclusions

Rahhal appears as a pioneering solution in the tourism industry, seamlessly blending artificial intelligence with travel planning to revolutionize how tourists explore destinations. By providing tailored itineraries, accommodation options, recommendations, and secure booking capabilities, Rahhal transforms the often complex process of trip planning into a simple and enjoyable experience. At its core, Rahhal serves as more than just a travel planner; it acts as a comprehensive platform connecting tourists with trusted tourism companies. The AI-powered chatbot personalizes recommendations based on user preferences, ensuring relevance and satisfaction. Meanwhile, its robust backend infrastructure allows admins to manage data efficiently, create new trips, and oversee user payments, maintaining operational excellence. A standout feature of Rahhal is its ticketing system, which generates unique identifiers for every booking, ensuring smooth operations and transparency. Furthermore, its secure payment integration builds trust, while the intuitive interface encourages seamless engagement from both tourists and administrators. With its innovative design, Rahhal not only caters to individual travelers but also enhances collaboration between admins and tourism companies, contributing to a dynamic and responsive ecosystem. The project sets a solid foundation for the future of smart, AI-driven tourism.

## 6.2 Future work

The future roadmap for Rahhal aims to expand its capabilities and enhance the user experience.

Key areas of development include:

### **AI Optimization:**

Incorporating advanced machine learning techniques to provide more precise and predictive trip recommendations.

Adding sentiment analysis to better understand user preferences and feedback.

### **Mobile Application Development:**

Launching a dedicated mobile app for Rahhal to cater to tourists planning trips on the go.

### **Global Support and Localization:**

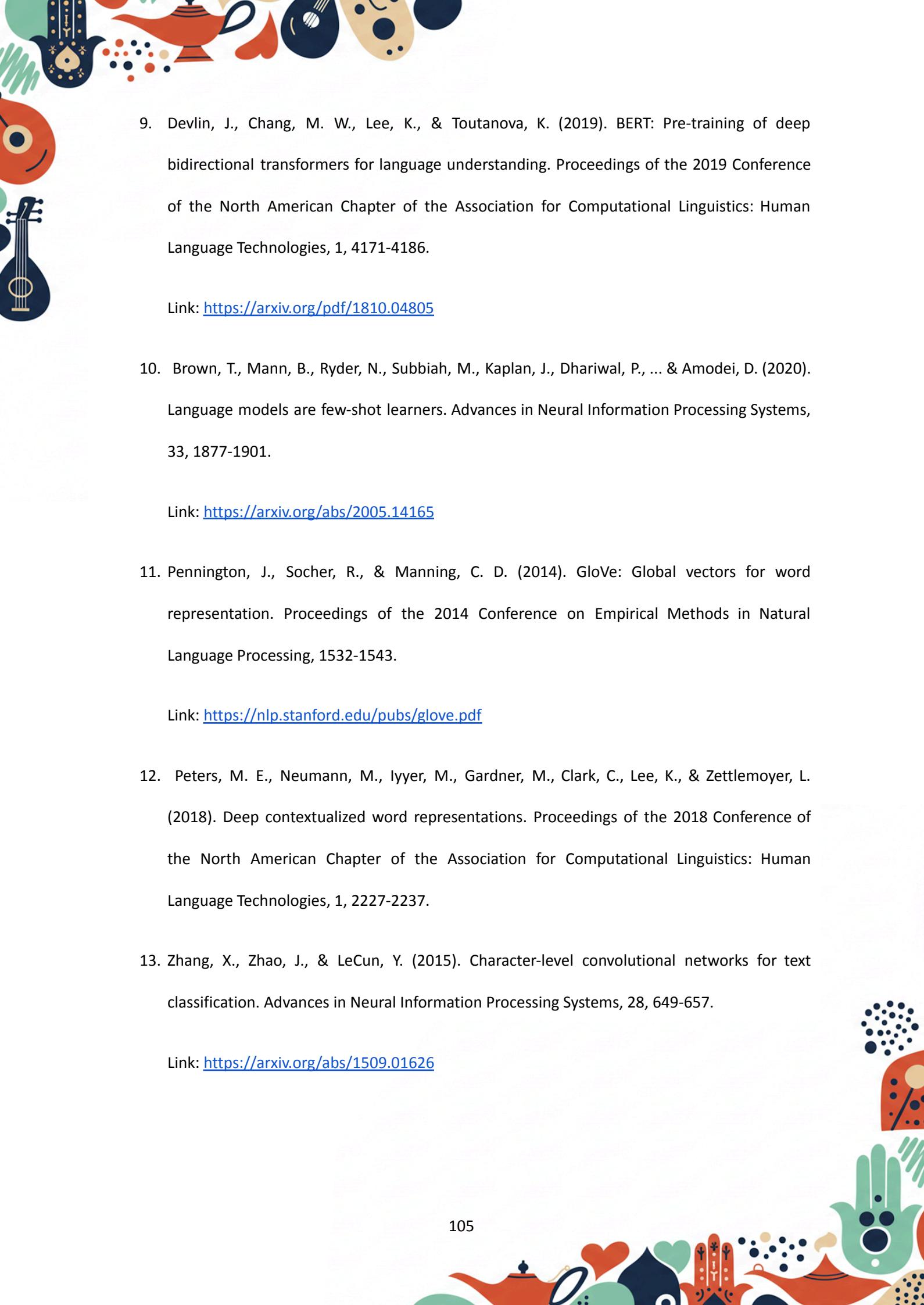
Expanding to support multiple languages and currencies, enabling seamless use for international travelers. Customizing recommendations based on regional and cultural factors.

### **User Engagement Features:**

Adding forums, reviews, and social sharing options to foster a community of engaged travelers. Enabling tourists to save and share itineraries with friends and family.

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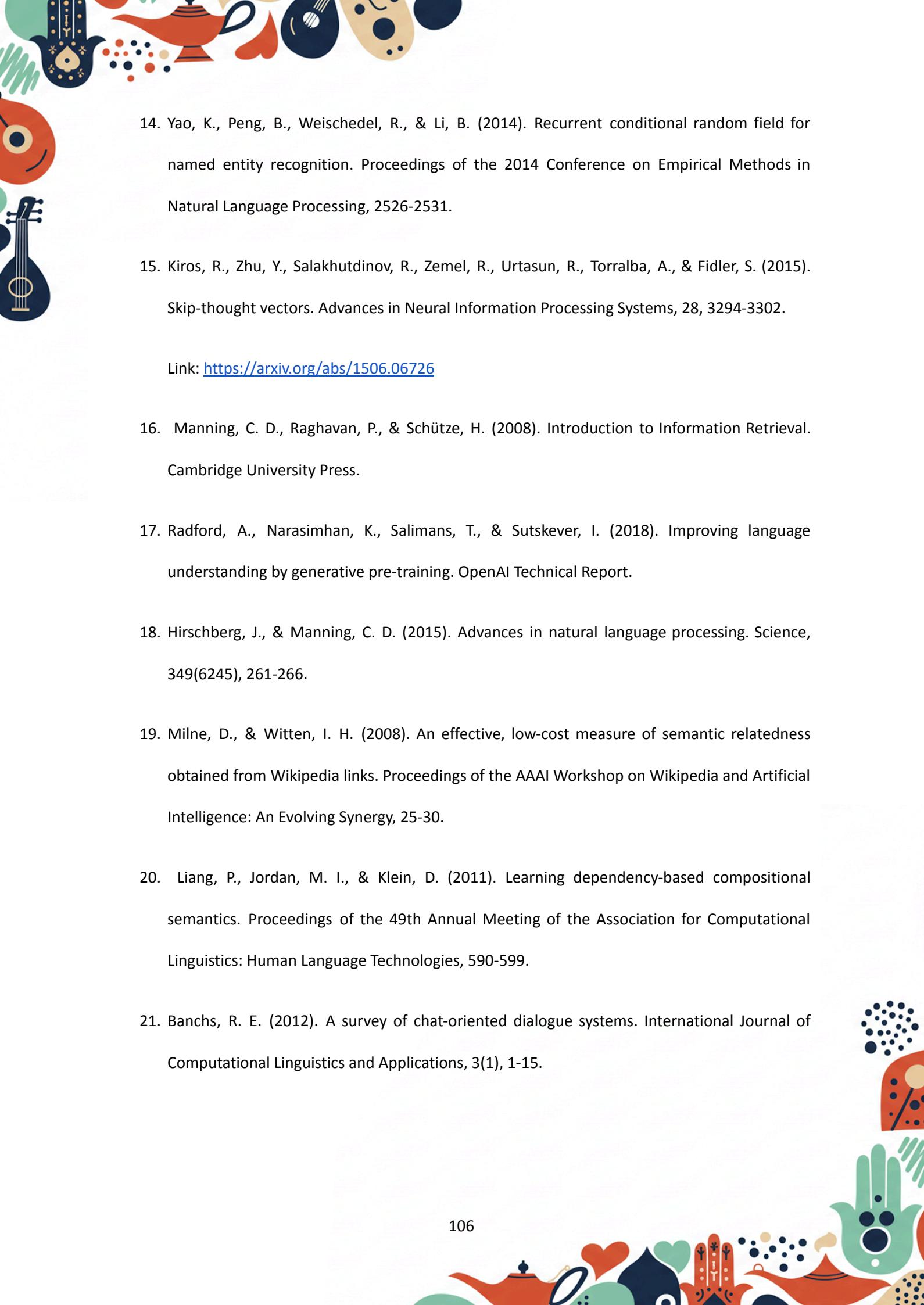
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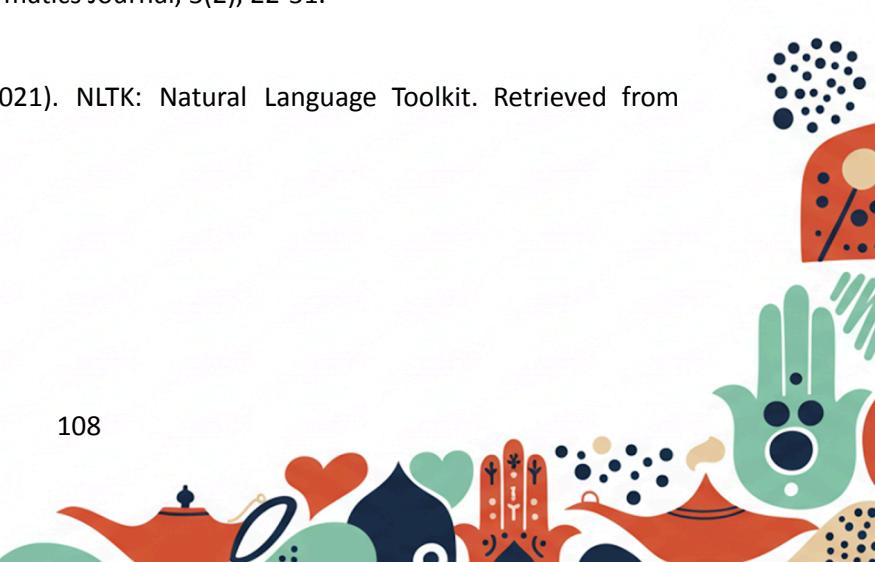
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