Software Requirements Specification

for

Recommendation System For Tourism

Version 1.0

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University of Peradeniya

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Revision History

Name	Date	Reason For Changes	Version
Group Q	08.07.2023	Initial Version	1.0

Document Approval

The following Software Requirements Specification has been accepted and approved by the following:

Date	Printed Name	Title	Signature
	Dr. Hakim Usoof	Supervisor	

1.   Introduction

1.1   Purpose

The recommendation system for tourism is designed to address the challenges faced by travelers in selecting suitable destinations and planning their itineraries. With an abundance of travel options available, users often struggle to find relevant and reliable information to make well-informed decisions. The purpose of this system is to simplify and streamline the travel planning process by leveraging advanced algorithms and data analysis techniques.

This is an intelligent software application designed to provide personalized recommendations and assist users in planning their travel itineraries. The system utilizes advanced algorithms, data analysis techniques, and attraction, activity, and accommodation suggestions that align with user preferences and requirements.

1.2   Intended Audience and Reading Suggestions

This targets developers, project managers, users, testers, and documentation writers. This provides a detailed overview of the recommendation system for tourism, including its objectives, functionalities, scope, and constraints. The document is organized to cover system overview, requirements, architecture, data needs, user interface, testing, documentation, and project management. Readers are encouraged to start with the overview sections before delving into sections pertinent to their roles. Developers require technical details, project managers need a comprehensive understanding, users seek personalized recommendations, testers require functional information, and documentation writers need a complete understanding to accurately document the system.

1.3   Project Scope

The intelligent software application at hand is a sophisticated system tailored to the needs of travelers seeking personalized recommendations and seamless assistance in crafting their travel itineraries. Harnessing the power of advanced algorithms and data analysis techniques, this application employs a vast array of data sources to offer users a wealth of information and suggestions for attractions, activities, and accommodations. By analyzing user preferences and requirements, the system ensures that its recommendations align perfectly with each individual's unique travel style and interests. With a focus on enhancing the overall travel experience, this comprehensive application serves as a trusted companion in planning unforgettable journeys

1.4 References

1. The reference for the use case diagram.

2. The reference for the wireframe.

2. Overall Description

2.1 Project Features

- User Profile Creation : Users can create personalized profiles.

- Preference Capture : The system allows users to input their preferences for various aspects of travel, including destinations, types of attractions, activities, and accommodations.

- Recommendation Generation : Based on user preferences, the system employs advanced algorithms and data analysis techniques to generate personalized recommendations for destinations, attractions, activities, and accommodations that align with the user's preferences.

- Real-Time Data Integration : The system integrates with real-time data sources, such as actual Weather, to provide up-to-date weather information for destinations, ensuring users have relevant and accurate information for their travel planning.

- Itinerary Planning : Users can customize their travel itineraries, incorporating the recommended destinations, attractions, activities, and accommodations. The system provides tools for managing and organizing the itinerary, including time allocation, travel routes, and scheduling.

- User Feedback and Reviews : Users can provide feedback and reviews for destinations, attractions, activities, and accommodations they have experienced. This feedback contributes to the system's recommendation engine and helps other users in their decision-making process.

- Personalization and Customization : The system offers a high degree of personalization, allowing users to fine-tune their preferences, modify recommendations, and customize their travel plans based on their specific needs and interests.

- Mobile Compatibility : The recommendation system is designed to be compatible with mobile devices, enabling users to access and utilize its features on smartphones and tablets while on the go.

- User-Friendly Interface : The system provides a user-friendly interface, with intuitive navigation, interactive elements, and clear instructions, ensuring ease of use for users with varying levels of technical expertise.

- Data Privacy and Security : The system prioritizes data privacy and security, implementing measures to protect user information, secure data transmission, and comply with relevant regulations and industry standards.

2.2   User Classes and Characteristics

Travelers:
- Characteristics: Occasional travelers who plan trips infrequently and have varying levels of technical expertise.
- Usage Frequency: Irregular use of the system.
- Product Functions: Primarily interested in destination recommendations, attractions, and general travel information.
- Requirements: Intuitive user interface, simplified recommendation process, and easily accessible information.

Travel Enthusiasts:
- Characteristics: Regular travelers with a deep interest in exploring new destinations and activities.
- Usage Frequency: Frequent use of the system.
- Product Functions: Seek personalized recommendations for destinations, attractions, accommodations, and activities based on specific preferences and interests.
- Requirements: Advanced personalization options, comprehensive and diverse recommendation choices, ability to customize itineraries, and access to detailed information and reviews.

Business Travelers:
- Characteristics: Individuals traveling for work purposes, often with time constraints and specific location requirements.
- Usage Frequency: Frequent use, especially for itinerary planning.
- Product Functions: Need quick and efficient recommendations.
- Requirements: Integration with calendar systems, ability to prioritize proximity and convenience, and access to weather updates.

Family Travelers.
- Characteristics: Travelers with children or larger groups, seeking family-friendly destinations, accommodations, and activities.

- Usage Frequency: Occasional to frequent use, depending on travel frequency.
- Product Functions: Require recommendations for family-friendly attractions, accommodations with suitable facilities, and activities suitable for all ages.
- Requirements: Family-oriented recommendations and the ability to create and share itineraries with other family members.

Administrators:
- Characteristics: System administrators responsible for managing and maintaining the recommendation system, Handling and managing account creation.
- Usage Frequency: Regular use for system administration tasks.
- Product Functions: Maintain user accounts, manage data sources, monitor system performance, and handle user feedback.
- Requirements: Administrative access privileges, data management tools, user management capabilities, and reporting features.

Hotel Owners:
- Characteristics: Owners or managers of hotels, guesthouses, or other accommodation establishments.
- Usage Frequency: Regular use to promote their properties and attract potential guests.
- Product Functions: Utilize the system to showcase their accommodations, update availability and pricing, and respond to guest reviews.
- Requirements: User-friendly interface for property management, integration with booking systems, ability to update property information and amenities, and access to guest reviews and feedback.
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2.3   Operating Environment

Hardware Platform:
- The recommendation system is intended to run on various hardware platforms, including desktop computers, laptops, tablets, and mobile devices such as smartphones.
- It should be compatible with standard hardware configurations and specifications commonly found in these devices, ensuring optimal performance and user experience.

Web Browsers:
- The system should be compatible with popular web browsers, such as Google Chrome, Mozilla Firefox, Apple Safari, and Microsoft Edge.
- Compatibility with the latest versions of these browsers is essential to ensure a consistent and seamless user experience.

Database Management System (DBMS):
- The recommendation system may rely on a DBMS to store and retrieve data efficiently.
- It should be able to integrate with popular DBMS software like MySQL, PostgreSQL, or MongoDB.

APIs and External Services:
- The system may interact with external APIs and services to gather relevant data, such as destination information, attraction details, accommodations, and real-time data.
- It should be capable of integrating and communicating with these APIs and services, ensuring smooth data retrieval and exchange.

Security Components:
- The recommendation system should adhere to security standards and protocols to protect user data and maintain system integrity.

2.4   Design and Implementation Constraints

The developers of the recommendation system for tourism face certain limitations and considerations that restrict their options during the project. These include corporate policies, regulatory requirements, interface dependencies, technology choices, security considerations, and maintenance responsibilities. Corporate policies and regulations dictate data privacy and security measures that must be adhered to. Interface dependencies require seamless communication with external applications. Technology choices are influenced by organizational standards and licensing restrictions. Security considerations encompass secure data transmission, access control, and vulnerability mitigation. If the customer's organization is responsible for maintenance, adherence to design conventions, programming standards, and documentation requirements is necessary. By addressing these limitations, developers ensure compliance, optimal performance, and compatibility within the specified constraints.

2.5   User Documentation

- User Manuals
- On-line Help
- Tutorials
- FAQs and Troubleshooting Guides

2.6   Assumptions and Dependencies

- Third-Party Data Provider - Kayak:

  - Assumption: Utilizing Kayak as the data provider for hotel information in Sri Lanka.
  - Impact: If the assumed integration with Kayak is not possible or encounters technical limitations, an alternative data provider or data aggregation method may need to be explored.

- Third-Party Data Provider - AccuWeather:

○ Assumption: Utilizing AccuWeather as the source for weather data.
○ Impact: If the assumed integration with AccuWeather is not feasible or presents challenges, an alternative weather data provider or service may be required.

3. System Features

3.1 Software Requirements

3.1.1 Functional Requirements

- User Registration and Profile Management : Users should be able to register an account, create and manage their profiles, and provide preferences and interests that will be used to generate personalized recommendations.

- Data Collection and Management : The system should collect, store, and manage a comprehensive dataset containing information about tourist attractions, accommodations, events, transportation options, user feedback, and ratings. The data should be regularly updated and maintained.

- Recommendation Generation :The system should utilize machine learning algorithms to generate personalized recommendations and schedule for their vacation based on user profiles, historical data, popular destinations, and similarity analysis. The recommendations should be accurate, relevant, and continuously improved over time.

- User Interface and Interaction : The system should provide a user-friendly interface that allows tourists to interact with the recommendation system. Users should be able to input preferences, view recommended destinations, explore detailed information about each recommendation, and provide feedback on their experiences.

- Integration with External Services : The system should integrate with external services and APIs such as Google Map API to access data.

3.1.2 Nonfunctional Requirements

3.1.2.1. Performance Requirement

- Response Time: The website should have fast response times to ensure a seamless user experience. Pages should load quickly, and search results, information retrieval, and navigation should be near-instantaneous. Aim for response times within a few seconds to keep users engaged and satisfied.

- Scalability: The website should be designed to handle increased traffic and user demand. As the popularity of the website grows, it should be able to scale horizontally by adding more servers or utilizing cloud-based infrastructure to maintain optimal performance.

- Concurrent Users: Specify the expected number of concurrent users the website should be able to handle without significant degradation in performance. This requirement helps in determining the necessary server capacity and optimization techniques needed to support simultaneous user interactions.

- Availability: The website should be highly available, minimizing downtime and ensuring accessibility to users. Specify the required uptime percentage (e.g., 99.9%) to establish availability targets. This may involve redundant servers, load balancing, and effective error handling mechanisms.

- Search Speed: Users should be able to retrieve relevant information quickly, even when searching through large datasets. Consider optimizing search algorithms and utilizing indexing techniques to enhance search performance.

- Mobile Responsiveness: With the increasing use of mobile devices for travel planning, the website should be responsive and optimized for mobile platforms. Ensure that the website performs well on various screen sizes and mobile networks, with smooth scrolling, touch interactions, and fast-loading pages.

- Image and Media Loading: Have to use techniques such as optimizing image sizes, utilizing caching techniques and lazy loading to ensure that media-rich content loads quickly without impacting overall performance.

- Error Handling: Errors should be gracefully handled, with appropriate error messages and user-friendly feedback. This Minimizes any impact on performance due to error conditions.

- Performance Monitoring: Implementing performance monitoring tools to track and measure various performance metrics, such as server response times, page load times, and user interactions. Continuously monitor the website's performance and use this data to identify bottlenecks, optimize critical areas, and improve overall performance.

3.1.2.2. Safety Requirements

- Data Privacy: Ensuring that the website complies with relevant data protection regulations, such as GDPR or local privacy laws. Implement measures to protect users' personal information, including secure storage, encrypted transmission, and anonymization where applicable.

- Content Accuracy: Providing accurate and up-to-date information on the website to avoid misleading or outdated details that could potentially impact travelers' safety. Regularly review and verify the content to maintain its reliability.

- Warning and Advisory Notices: Include prominent warning notices or advisories on the website regarding potential safety hazards, such as natural disasters, civil unrest, health risks, or travel advisories issued by relevant authorities. Display clear instructions on what actions travelers should take in such situations.

- Emergency Contact Information: Providing readily accessible emergency contact information, such as local authorities, hospitals, embassies, and hotlines, to assist travelers in case of emergencies or urgent situations.

- User-Generated Content Moderation: Implementing a moderation system to review and filter user-generated content, such as reviews, comments, or recommendations, to prevent the dissemination of inappropriate or harmful information.

- Secure Authentication: Implementing a secure user authentication mechanism to ensure that only authorized individuals, such as hotel owners and administrators, can access privileged information and perform specific actions on the website. This may involve password hashing, session management, and multi-factor authentication.

- Secure Data Transmission: Utilizing encryption protocols, such as SSL/TLS, to secure data transmission between users and the website. This prevents unauthorized interception or tampering of sensitive information during transit.

- Protection against Cross-Site Scripting (XSS) and SQL Injection Attacks: Applying input validation and sanitization techniques to prevent common web application vulnerabilities like XSS and SQL injection attacks. Regularly update security patches and ensure that the website's software components are kept up to date.

- Access Control and Authorization: Implementing a robust access control system to manage user permissions and privileges within the website. Hotel owners should only have access to their own information and restricted actions to prevent unauthorized modifications or access to other users' data.

- Regular Security Audits: Conducting regular security audits and penetration testing to identify vulnerabilities and weaknesses in the website's security infrastructure. Address any identified issues promptly and implement security best practices throughout the development and maintenance process.

- Backup and Disaster Recovery:Implementing a disaster recovery plan to minimize the risk of data loss. Ensure that backups are securely stored and can be restored in the event of a system failure or data breach.

3.1.2.3. *Software Quality Attributes*

- Usability: The website should be user-friendly and intuitive, allowing travelers to easily navigate and access the desired information. Conduct user testing and gather feedback to continuously improve usability. Aim for a high satisfaction rate in user surveys or usability testing sessions.

- Reliability: The website should be reliable, providing consistent and accurate information to users. Minimize system errors, crashes, or downtime that may disrupt the user experience. Aim for a high uptime percentage, such as 99.9%.

- Performance Efficiency: Ensures that the website operates efficiently, utilizing system resources optimally. Monitor and optimize server response times, database queries, and page loading speed to

provide a smooth and responsive experience. Set specific targets, such as page load time under 2 seconds.

- Maintainability:. Use of techniques such as clean code, modular architecture, and well-documented APIs facilitate future development and maintenance tasks.

- Portability: Ensuring that the website is compatible with different web browsers and devices commonly used by travelers.

- Security: Implementing robust security measures to protect user data, prevent unauthorized access, and ensure secure transactions. Regularly assess and update security protocols to stay ahead of emerging threats.

- Testability: Implementing automated testing frameworks and provide comprehensive test cases to ensure that new features or changes do not introduce regressions.

- Robustness: The website should be resilient and able to handle unexpected inputs or scenarios. Implement error handling mechanisms and provide informative error messages to guide users in resolving issues.

- Accessibility: Ensuring that the website is accessible to users with disabilities, adhering to relevant accessibility guidelines such as WCAG 2.1. Consider factors such as screen reader compatibility, keyboard navigation, and color contrast for visually impaired users.

4. External Interface Requirements

4.1 User Interfaces

- The user interface should be intuitive, user-friendly, and visually appealing to enhance user experience.
- The interface should be responsive and compatible with various devices, including desktops, laptops, tablets, and mobile devices.
- The system should support multiple languages to cater to users from different regions.

- The interface should provide clear and concise instructions for users to navigate and interact with the system.
- The system should have appropriate error messages and feedback mechanisms to guide users in case of input errors or issues.

4.2   Integration with Third-Party APIs

- The system should integrate with external APIs such as kayak,accuweatherAPI and googleAPI to access relevant data sources such as hotel information, weather forecasts, and maps respectively.
- The integration should ensure proper authentication and authorization mechanisms to securely access and retrieve data from third-party APIs.
- The system should handle API rate limits and potential downtime to minimize disruption in service.

4.3   Social Media Integration

- The system should allow users to share their travel experiences, recommendations, and bookings on popular social media platforms.
- The integration should provide options for users to log in or sign up using their social media accounts for a streamlined registration process.
- The system should support social media APIs for retrieving user profiles, profile pictures, and social interactions if applicable.

4.4   Communications Interfaces

- The system should support standard communication protocols, such as HTTP, HTTPS, or WebSocket, for secure and efficient data exchange between the client-side and server-side components.
- The protocols should ensure reliable transmission of data and support encryption to protect sensitive information during communication
- The system should operate effectively over various network connections, including wired or wireless networks, to ensure users can access the system regardless of their location or the network they are using.
- The system should be designed to handle intermittent or unstable network connectivity gracefully, providing appropriate error handling and ensuring data integrity.
- The system should implement authentication mechanisms, such as API keys, tokens, or OAuth, to verify the identity and authorization of external systems or users interacting with the system's APIs.
- The system should have proper error handling mechanisms to capture, handle, and communicate errors or exceptions that occur during communication with external systems or components.
- Error messages or status codes should be returned appropriately to external entities to indicate the success or failure of communication requests.
- The system should implement logging mechanisms to record relevant communication events, including successful requests, errors, and system responses, for debugging and auditing purposes.

5.   Other Requirements

- Internationalization (I18N): Designing the website to be easily adaptable to different languages, cultures, and regions. Consider implementing language localization features and accommodating date and time formats used in different countries.

- Search Engine Optimization (SEO): Implementing SEO techniques to improve the website's visibility in search engine rankings.

- Analytics and Reporting: Defining requirements for tracking website usage, user behavior, and key performance indicators (KPIs). Implement analytics tools to gather and analyze data, enabling informed decision-making and the ability to generate reports for stakeholders.

- Reusability: Identifying any reusable components, modules, or code snippets that can be utilized across the project or in future development.

- Documentation: Defining requirements for comprehensive documentation, including user manuals, API documentation, system architecture diagrams, and any other necessary technical documentation to support future maintenance and development efforts

6. Appendix

Glossary

- API: Application Programming Interface
- OAuth: Open Authorization
- SRS: Software Requirements Specification