
Software Requirements Specification

for

Railway Reservation System

Version 1.0 approved

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Revision History

Name	Date	Reason For Changes	Version

1. Introduction

1.1 Purpose

In order to construct the Railway Reservation System, the software requirements must be specified in this Software Requirements Specification (SRS) document. The Railway Reservation System's initial release or version, such as Version 1.0, is covered by this document. It provides a clear roadmap for the project's development team and stakeholders by outlining the software's features, limitations, and user interfaces.

1.2 Document Conventions

Standard typographic principles are used throughout the document, and bold formatting for headings and subheadings helps to clearly demarcate parts and establish hierarchies. The relevance of each demand is clearly indicated by the use of numbered sections to specify requirements and the prioritisation of each requirement statement individually. As a result, each demand is given a priority based on its importance and effect on the operation and performance of the Railway Reservation System, rather than the priorities of higher-level requirements being assumed to be inherited by detailed requirements.

1.3 Intended Audience and Reading Suggestions

The developers, project managers, marketing personnel, users, testers, and documentation writers participating in the Railway Reservation System project are the target audience for this Software Requirements Specification (SRS) document. To design and implement the system, developers can refer to the specific requirements' comprehensive functional and non-functional requirements in the "Requirements" section. The "Introduction" and "Overall Description" parts give project managers a general knowledge of the project's goals, limitations, and scope, which facilitates effective project planning. The "Product Scope" part can be used by marketing personnel to comprehend the system's characteristics for promotional purposes, and users can consult it to understand the capabilities of the system. The "Functional Requirements" portion of the document can be used by testers to verify the system's behaviour, and writers of documentation can use the information throughout to construct user manuals and guides. The SRS is divided into sections such as the Introduction, Overall Description, Specific Requirements, External Interface Requirements, Other Requirements, and Appendices to enable readers to follow a structured sequence beginning with the overview and moving on to the sections most pertinent to their roles.

1.4 Product Scope

The Railway Reservation System, a sophisticated piece of software aimed at facilitating effective train ticket ordering and management, is the item being defined. The main objective of the system is to give customers an easy-to-use platform where they can look for trains, check seat availability, purchase tickets, and manage their reservations without any hassle. The system seeks to improve users' entire booking experiences by integrating with the current rail infrastructure and providing real-time access to train timetables, availability, and reservations. By enhancing consumer pleasure, expediting the ticket ordering process, and improving operational effectiveness for the railroad corporation, the railway reservation system is in line with corporate objectives and business strategy. It puts an emphasis on fulfilling user demands and expectations while upholding modern technology standards, thereby enhancing service quality and generating income for the railway business. For more information on the product's overall vision and alignment with business goals, readers are directed to a separate vision and scope paper, if one is available.

1.5 References

Not Applicable

2. Overall Description

2.1 Product Perspective

The Railway Reservation System is a brand-new, stand-alone software created to offer a productive and user-friendly platform for managing and buying train tickets. It is neither intended to replace any current system nor is it a new member of an established product family. Instead, it is a standalone piece of software designed to streamline the ticket purchase process and improve customer experience.

The Railway Reservation System runs independently and connects to the reservation and ticketing systems of the current railway infrastructure to retrieve up-to-the-minute information on train availability, schedules, and reservations. It merely facilitates ticket purchase and gives users useful information; it has no control over how trains run or how schedules are managed.

2.2 Product Functions

The Railway Reservation System must perform the following major functions:

User registration: Make it possible for users to open new accounts and edit their profiles.

Train Search and Availability: Allow users to conduct a seat availability and search for trains based on a variety of criteria.

Ticket booking: Make it possible for consumers to reserve tickets for certain trains and seats.

Allow users to cancel their reserved tickets by providing this option.

User authentication and security: To guarantee the confidentiality of user information, put in place secure login and data protection procedures.

User profile management: Provide users with the ability to access and amend their booking history and personal information.

2.3 User Classes and Characteristics

The Railway Reservation System will cater to the following user classes, each differentiated based on their characteristics and roles:

1. Regular Users:

Variable, ranging from infrequent commuters to those who travel frequently.

Utilize the system for searching for trains and booking, cancelling, and changing tickets.

Technical proficiency: A range of technical backgrounds, from simple computer literacy to advanced users.

Standard users have only the ability to manage their own reservations and profiles in terms of security and rights.

Education and Experience: Widely Variable, with a Variety of Educational Backgrounds and Travel Experiences.

2. Administrators:

Utilization: Manage user accounts and system settings frequently by using the system.

Be able to access administrative tools for managing users and system settings.

High level of technical competence and understanding required to manage the system well.

Higher security/privilege levels are required for system administration and user management.

Technical training and system management experience at an appropriate level of education.

3. Guest Users:

Use: Occasional use not requiring login or registration from users.

Product Features: Basic availability and search data for trains, with limited access.

Technical Knowledge: The ability to utilise a computer at a basic level to navigate the system.

No access to personalised or advanced booking features in terms of security or privilege levels.

Education and Experience: Widely Variable, with a Variety of Educational Backgrounds and Travel Experiences.

Distinguishing Importance:

Regular users are the most crucial user group to satisfy because they make up the bulk of the system's customers and frequently use its basic features, such as ticket cancellation and booking. Additionally, administrators are important since they manage user accounts and uphold the system's security and performance. Even though guest users only have restricted access, their demands are nonetheless taken into account because granting them access to the system's most basic train search capabilities can make it more accessible and usable.

2.4 Operating Environment

1. Hardware Platform: The programme and databases will be hosted on servers, and users will access the system using client devices that are common in modern computer environments. To guarantee lag-free performance, the hardware must satisfy the minimal system requirements.

2. Operating System and Versions: A number of well-known operating systems, including but not exclusive to:

- *Microsoft Windows (e.g., Windows 10)*
- *macOS (e.g., macOS Big Sur)*
- *Linux distributions (e.g., Ubuntu 20.04 LTS)*

3. Modern web browsers will be supported by the Railway Reservation System to give users a consistent and smooth experience. The supported browsers could consist of:

- *Google Chrome*
- *Mozilla Firefox*
- *Microsoft Edge*
- *Safari*

4. Web server: In order to host the backend application and web-based user interface, the system needs a web server. Depending on the development stack of choice, the web server must support pertinent technologies and coding languages, such as PHP, Python, Node.js, or Java.

5. Database Management System: Data pertaining to reservations will be stored and retrieved using a database management system (DBMS). The chosen DBMS, such as MySQL, PostgreSQL, or MongoDB, must be compatible with the system.

6. Internet connectivity is required for users to access and utilise the Railway Reservation System in an efficient manner. To guarantee real-time data access and seamless user interactions, a dependable internet connection is required.

7. Other Software Components: The Railway Reservation System can have to communicate with other software elements or programmes, such payment gateways for safe online transactions. While exchanging data, the system must maintain data integrity and cohabit peacefully with these components.

The operating system, web server, database management system, and web browsers should all receive frequent updates and security patches in order to maintain optimal performance and compatibility. To ensure smooth operation across various hardware and software combinations, compatibility testing should also be carried out.

2.5 Design and Implementation Constraints

The following limitations apply to the Railway Reservation System's design and implementation:

1. Business Rules and Regulatory Compliance: The development process must comply with all corporate policies and regulations pertaining to data protection, security, and any other applicable legal requirements. The system must safeguard user data and guarantee adherence to applicable legal requirements and industry standards.

2. Hardware and Performance Limitations: The software must be built to work within any timing or memory restrictions as well as other hardware restrictions that have been specified. Particularly during times of high booking demand, when the system encounters heavy user traffic, it should be optimised for effective performance.

3. Interface Compatibility: The Railway Reservation System needs to be able to smoothly interface with the current train infrastructure, including the databases for reservations and tickets. For a successful data transmission, the interfaces need to be clearly specified and compliant with industry standards.

4. Technology and Tools: As specified in the project requirements, the development team must use particular technologies, tools, and programming languages. A specific web development framework, database management system, and version control tools may be mentioned here.

5. Parallel Activities: The system must allow for numerous concurrent users to carry out operations like train searches, ticket reservations, and cancellations without causing data conflicts or inconsistencies.

6. Security Considerations: The programme must include strong security safeguards to secure user data, thwart unwanted access, and fight against potential cyberthreats such data breaches and assaults.

7. To preserve code uniformity, readability, and maintainability, the development team must adhere to established design conventions and programming standards. This makes sure that the customer's business or potential developers can easily maintain the given software.

8. Language requirements: The user interface of the Railway Reservation System should be made to support many languages, enabling users to communicate with the system in their native tongue.

9. Secure communication protocols must be used by the system to transmit data over the internet in order to safeguard sensitive user data during online interactions and transactions.

10. Maintenance and Support: After the programme has been deployed, the customer's company may be in charge of maintaining it. Because of this, the development team must offer thorough documentation and support materials to facilitate system upkeep and troubleshooting.

The Railway Reservation System will be developed and deployed successfully, fulfilling the required specifications while complying with organisational policies and industry norms, if certain restrictions are followed.

2.6 User Documentation

The following user documentation elements will be provided along with the software by the Railway Reservation System:

- 1. User Handbook: The Railway Reservation System will come with a thorough user manual that offers complete instructions on how to use it. Step-by-step directions, feature explanations, and the most effective usage techniques will all be included.*
- 2. Online Help: The software will include an online help system that will give users context-sensitive guidance as they work their way through the programme. Depending on the task they are working on, users can get pertinent help material.*
- 3. Interactive tutorials or video guides will be made available to assist new users in becoming accustomed to the system's features and user interface. Tutorials will show how to carry out typical tasks and engage with other users of the Railway Reservation System.*
- 4. FAQs and Knowledge Base: To answer frequent user inquiries and offer quick fixes for regular problems, a knowledge base and a list of frequently asked questions (FAQs) will be added.*

Standards and Delivery Formats:

To ensure usability and accessibility, the user manual will be given in digital formats. The formats could consist of:

- Portable Document Format (PDF): The user manual will be made available in PDF format so that users can download, view, and print it for offline use.*
- Online HTML: The application's online help system and knowledge base will be created using HTML and housed on the web interface, making it easier for users to access them from any internet-connected device.*
- Video Tutorials: Tutorials may be provided in video format (such as MP4) to graphically illustrate particular tasks, improving user comprehension and usability.*

To ensure user-friendliness, the user documentation will utilise simple, plain language, include visuals (such as screenshots and diagrams), and conform to accepted writing styles. Users will easily be able to locate pertinent information thanks to its logical organisation. The purpose of the user manual is to enable users to use the Railway Reservation System's functions and to efficiently traverse the system.

2.7 Assumptions and Dependencies

Assumptions:

- 1. Accessibility to Railway Data APIs: It is presumable that the current railway infrastructure offers APIs or data interfaces for train timetables, seat availability, and reservation information. The*

reliability and accessibility of this data will have a direct impact on how well the Railway Reservation System works.

2. Stable Internet Connectivity The system makes the assumption that customers would have reliable internet access in order to access the railway reservation system. The user experience and system performance may be impacted by any interruptions or sluggish internet connections.

3. Legal and Regulatory Compliance: The development team anticipates that the Railway Reservation System will abide by all pertinent legal and governmental regulations pertaining to data protection, online transactions, and other applicable legislation.

4. Prompt and Appropriate User Feedback: During the testing and implementation phases, prompt and appropriate user feedback is essential to the system's effective development and improvement. The identification of usability problems and improvement areas will be aided by user feedback.

Dependencies:

1. Third-Party Payment Gateways: The Railway Reservation System might depend on third-party payment gateways to safely handle online purchases. For handling ticket bookings and guaranteeing secure transactions, the effective integration and operation of various payment gateways are essential.

2. External Database Management System: The system could be reliant on an external database management system (like MySQL or PostgreSQL) to store and retrieve information about reservations. The main features of the system depend on this database working well and being accessible.

3. Web hosting services: Constant access and the effective operation of the system depend on the availability and dependability of the web hosting services on which the Railway Reservation System is placed.

4. Software Development Tools and Frameworks: In order to construct the Railway Reservation System, the development team may rely on particular software development tools, frameworks, and libraries. In the development process, these tools' compatibility and support are essential.

The project's timeframes, functionality, and overall success may be affected by any changes or inconsistencies in these assumptions or dependencies. For the project to run smoothly and for a reliable and fully functional railway reservation system to be delivered, it is crucial that all stakeholders be aware of and in agreement with these assumptions and dependencies.

3. External Interface Requirements

3.1 User Interfaces

- A user-friendly web-based interface will be offered by the Railway Reservation System to communicate with users. The user interface will have the subsequent logical traits:
 -
 - Screen Layout: The elements will be properly arranged on the screen in a user-friendly and intuitive screen layout.
 - GUI Standards: The user interface will adhere to current GUI standards to guarantee consistency and user familiarity.
 - Sample Screen Images: In the separate User Interface Specification, sample screen images will be provided to illustrate the system's appearance and operation.

- Standard Buttons and Functions: Typical buttons, such as "Search," "Book," "Cancel," and "Logout," will show up on the appropriate panels to facilitate consistent user interactions.
- Keyboard Shortcuts: Keyboard shortcuts, such as "Ctrl + S" for search and "Ctrl + B" for booking, will be supported for effective user interactions.
- Standards for Error Message Display: To validate user input and handle errors, clear and informative error messages shall be shown.

User Interface-Required Software Components:

- Train Search and Availability User Registration and Login
- Purchasing and Cancelling Tickets
- Management of User Profiles

3.2 Hardware Interfaces

The hardware elements listed below are interfaced with by the railway reservation system:

1) Servers (Logical Features):

- Standard web servers that may host web applications are supported device types.
- The type of interactions between data and controls: To manage user requests and responses, the programme interacts with the web server. In order to display the user interface and provide booking information, it sends data for processing and receives data.

2. Client Devices (Logical Characteristics):

- Supported Device Types: Internet-connected desktops, laptops, tablets, and smartphones.
- User interactions with the system are of a data and control nature and take place through client devices' web browsers. They transmit the information needed to look for trains, book tickets, and cancel them. The system analyses the data and displays the findings to consumers on their devices.

3. Communication Protocols:

- Web communication: The system transmits data between client devices (users' web browsers) and the web server using industry-standard web protocols including HTTP (Hypertext Transfer Protocol) and HTTPS (Hypertext Transfer Protocol Secure).
- Data Send: TCP/IP (Transmission Control Protocol/Internet Protocol) is used to transfer data between client devices and the web server across the internet.

4. Physical Characteristics:

- Servers: Physical servers or cloud-based servers located in data centres will be used to deploy the Railway Reservation System. The servers will have enough processing speed, memory, and storage space to effectively handle several concurrent user demands.
- Client Devices: The hardware requirements, screen sizes, and input techniques of client devices that users use to access the system can vary. The user interface of the system must be flexible and responsive to various device kinds.

The web server, which manages user requests, processes data, and delivers the relevant responses back to the client devices, facilitates interaction between the software product and the hardware components. Due to the system's web-based design, customers can access the application from a variety of internet-connected devices, giving them a convenient and flexible booking experience.

3.3 Software Interfaces

The following software elements are interfaced with by the railway reservation system:

1. Database Management System (DBMS):

- Database: PostgreSQL or MySQL
- The system communicates with the selected DBMS in order to store and retrieve information about reservations, such as train schedules, seat availability, user profiles, and booking specifics. Data administration, storage, and retrieval are handled by the DBMS.

2. Web Server:

- either Nginx or Apache
- The software is used to process HTTP/HTTPS requests from client devices on a web server, which also hosts the software. The web server handles user requests, communicates with the database to retrieve and update data, and then sends back answers to the client devices.

3. Payment Gateway:

- Name: [Name of the Service Provider for the Payment Gateway]
- The system's interaction with a secure payment gateway serves the purpose of facilitating online booking transactions for tickets. The payment gateway manages the payment processing, guarantees secure transactions, and alerts the system when a transaction succeeds or fails.

Data Items and Messages:

Items of Data Entering the System:

- Train search parameters include the user's preferences, the source and destination stations, and the date (e.g., class of travel).
- User input for ticket booking includes passenger information, the train of choice, seat preferences, and payment information.
- Requests for cancelled tickets made by users, together with the booking reference and the traveler's information.

Items of Data Exiting the System:

- Based on the user's search criteria, data with train schedules, seat availability, and fare information are returned.
- Data validating successful ticket bookings, including the booking reference and ticket information.
- Data confirming successful ticket cancellations, including information on the cancelled booking, is known as cancellation confirmation.

Services Needed and Nature of Communications:

The following services and communication styles are necessary for the Railway Reservation System:

Database connectivity: To query and update data, the software communicates with the DBMS. It sends database queries and receives data responses using SQL (Structured Query Language).

Web communication: To manage user requests and responses, the system interacts with the web server using conventional web protocols (HTTP/HTTPS).

Payment Processing: To process online payment transactions securely, the system interfaces with the payment gateway service provider utilising secure APIs (Application Programming Interfaces).

Mechanism for Data Sharing: Through the use of well defined APIs and database communications, data is transferred between the various software components. The data sharing mechanism does not need a specific implementation restriction, but it does need to adhere to secure data transfer protocols to preserve data privacy and integrity.

Developers will get instructions on how to communicate with external software elements and services from the detailed Application Programming Interface (API) protocols and communication details provided in separate API documentation.

3.4 Communications Interfaces

The following requirements for communications functions are relevant to the Railway Reservation System:

1. Web Communication:
 - Specifically, HTTP (Hypertext Transfer Protocol) and HTTPS (Hypertext Transfer Protocol Secure) for secure communication will be used by the system to communicate with users via web browsers. Users must communicate via the web in order to use the system's web-based user interface to interact with it, find trains, purchase tickets, and maintain bookings.
2. Email Notifications:
 - Users will receive email notifications from the system when booking confirmations, ticket cancellations, and other pertinent developments occur. Email notifications are a crucial component of giving users timely information about their reservations and bookings.
3. Payment Gateway Communication:
 - Requirements: To execute online payment transactions safely, the system will speak with the chosen payment gateway service provider using secure communication protocols (such as HTTPS). For the ticket booking process to be secure and dependable, connection with the payment gateway is essential.
4. Data Transfer Rates and Synchronization:
 - Requirements: The system's web communication should be able to handle reasonable data transfer rates to provide smooth user interactions, particularly during busy times for purchasing tickets. In order to guarantee data accuracy and consistency between the web server and the database, synchronisation methods need also be put in place.
5. Communication Security and Encryption:
 - Requirements: The Secure Sockets Layer (SSL) and Transport Layer Security (TLS) protocols must be used to encrypt all data sent between the user's web browser and the system's web server. In order to guard against unwanted access and data breaches, this makes sure that sensitive data, such as login passwords and payment information, stays encrypted during data transfer.
6. Message Formatting:
 - Requirements: All messages, including email notifications and error messages, must be concise, educational, and formatted consistently. Users will receive clear and beneficial information regarding the status of their bookings, issues, and system upgrades if messages are formatted properly.
7. Communication Standards:
 - Requirements: For data transfer between client devices and the web server, the system will adhere to industry-standard HTTP/HTTPS web communication protocols. Interoperability is facilitated by standard protocols, which provide easy communication between various platforms and devices.

The Railway Reservation System can offer users a dependable, secure, and effective platform for train search, ticket purchase, and reservation management by satisfying certain communications interface requirements. The whole user experience is improved by the use of secure data transfer and standard communication protocols, which guarantee data privacy.

4. System Features

The Railway Reservation System provides a number of system capabilities to meet the requirements of various user classes and guarantee effective management and booking of train tickets. These features are arranged according to their main functions and services:

4.1 Train Search and Booking:

4.1.1 Description and Priority:

The Railway Reservation System's Train Search and Booking capability is essential and given high priority. Users can use it to search for available trains based on their preferences and purchase tickets for the trips they want to take.

4.1.2 Sequences of stimulus and response:

Searching by train

- *Stimulus: A user searches for trains by entering search parameters including origin, destination, date, and class.*
- *Reaction: The system analyses the search criteria and provides a list of trains that meet the required requirements.*

- Book tickets:

- *Stimulus: When booking a train, a user can choose their preferred seats.*
The system verifies the availability of tickets, holds the chosen seats, and confirms the booking.

4.1.3 Functional Requirements:

Requirement 1: Train Search - The system must have a search interface that enables users to enter trip information, such as origin, destination, date, and class.

- *When the system receives a search query, it will retrieve and present a list of available trains together with pertinent information like departure time and fare.*

Requirement 2: Seat Availability - The system must instantly identify whether seats are available for the chosen train and class, taking into account any reservations or cancellations that have already been made. In the event that there are no seats available for the requested journey, users will be informed.

Requirement 3: Ticket Booking - Users must be able to choose the train they want to go on as well as the quantity of seats they want to reserve.

- *If applicable, users will be able to select particular seats from a seating arrangement that is offered (e.g., for reserved seating classes).*
- *Using the selected train, class, and number of seats as inputs, the system shall compute and display the total fare.*

Requirement 4: Seat Reservation - The system must reserve the chosen seats after a successful ticket purchase in order to prevent another user from buying the same seats during the reservation period. The system must release the reserved seats after a predetermined amount of time if the booking process is interrupted or fails in order to make them available to other users.

Requirement 5: Ticket Confirmation - The system must generate a special booking ID and ticket confirmation information for the user following a successful booking.

- A booking confirmation notification including the booking ID and trip details must be sent to the user via email or SMS.

Requirement 6: Payment Integration - To execute online transactions securely, the system must link with a secure payment gateway.

- Multiple payment methods, such as credit/debit cards, net banking, and mobile wallets, shall be available to users.

Requirement 7: Cancellation of Tickets - The system must permit users to cancel their purchased tickets within a predetermined time frame, according to cancellation restrictions.

- When a ticket is cancelled, the system will start an automated refunding procedure, figuring out the refund sum in accordance with the cancellation terms.

Requirement 8: Fare Rules and Discounts - To comply with requirement 8, the system must apply any applicable fare rules, discounts, and concessions based on user eligibility, age, and class of travel.

4.2 Ticket Management:

4.2.1 Description and Priority:

A crucial and high-priority component of the railway reservation system is ticket management. It gives users the ability to effectively manage their purchased tickets, including cancelling tickets and retrieving purchasing history.

4.2.2 Stimulus/Response Sequences:

Cancellation of Ticket:

- Stimulus: Within the allotted period, a user starts the cancellation process for a reserved ticket.

- Reaction: The cancellation request is processed by the system, which also releases the reserved seats and determines the refund amount.

Booking Record:

- Stimulus: A logged-in user can explore their past and upcoming trips in the booking history section.

- Reaction: The system locates and shows the user's booking history along with any pertinent information.

4.2.3 Functional Requirements:

- Requirement 1: Ticket Cancellation

- The first need is that users be able to start the cancellation process for their reserved tickets within the allotted cancellation period.

- The system must release the reserved seats after a successful cancellation so that other users can utilise them.

- The system will immediately start the refund procedure after calculating the return amount based on the cancellation time and policies.

- Requirement 2: Refund Processing

- The system must execute refunds for cancelled tickets as soon as possible while abiding by the refund guidelines and time frames. Users will be informed of any applicable deductions and the amount of the refund, if any.

- **Requirement 3: Booking History**

Users will have access to their booking history, including past and upcoming trips, through the system. Users will be able to view each booking's specifics, including the date of travel, train information, class, and price.

- **Requirement 4: Upcoming Journey Reminders**

Users will receive alerts from the system regarding their planned trips, including train information, departure time, and seat information. Before the trip date, users will receive these reminders via email or SMS.

- **Requirement 5: Ticket Modification (TBD)**

- TBD: Under specific circumstances, the system shall permit users to amend certain ticket elements (such as the journey date, class, or passenger information). In the future, specific specifications for ticket modifications will be decided.

- **Requirement 6: Ticket Rescheduling (TBD)**

The technology will offer a rescheduling option for those who want to adjust the day or time of their trip. In following stages, specific specifications for ticket rescheduling will be developed.

- **Requirement 7: E-Ticket Generation**

- For simple access by users, the system shall create electronic tickets (e-tickets) with distinctive booking IDs and necessary trip information.

4.3 Guest User Functionality:

4.3.1 Description and Priority:

visitor user The Railway Reservation System's primary characteristic is its functionality, with Medium importance. It enables users to carry out basic rail searches without creating an account even if they haven't signed up or checked in.

4.3.2 Stimulus/Response Sequences:

Simple Train Search

- **Stimulus:** To find available trains, a guest user provides their travel information, including their origin, destination, date, and class.

- **Reaction:** After processing the search criteria, the system displays a list of available trains that meet the required requirements.

4.3.3 Functional Requirements:

- **Preparing Search for Guest Users** is the first requirement.

- The system must provide a streamlined train search interface to visitors without requesting their login or registration information.

- To identify available trains, users can enter their travel information, including origin, destination, date, and class.

- **Requirement 2: Search Result Display**

- Following receipt of search criteria, the system will show a list of accessible trains together with pertinent information, such as departure time and fee.

- In order to choose a train wisely, the system must give visitors the necessary information.

- **Requirement 3: Limitations for Guest Users**

- The system must alert visitors to the restrictions on their access, such as the inability to make reservations or book tickets without logging in and registering.

- The system will prompt guest users to register or log in if they attempt to access restricted functionalities.

- Requirement 4: Conversion to Registered User (Optional, TBD)

- TBD: The system might give visitors the option to turn their searches into registered user profiles, enabling booking and other features. Later on, the specifications for this functionality will be decided.

Nota Bene: TBD is used as a stand-in for any extra specs or requirements that will be decided in the course of the development process. The Guest User Functionality makes it possible for all users, registered or not, to access critical train search services, enhancing usability and encouraging potential customers to form accounts for extra benefits.

4.4 Security and Privacy:

4.4.1 Description and Priority:

In the Railway Reservation System, security and privacy are given high attention. These elements work to protect user information, financial transactions, and system integrity, giving users access to a safe and reliable platform.

4.4.2 Stimulus/Response Sequences:

- Secure Transactions:

- Stimulus: A user starts an online transaction to purchase tickets.

- Reaction: The system creates a secure connection to the payment gateway, encrypts private information, and conducts the transaction securely.

- Data Protection:

- Stimulus: When registering and making reservations, users disclose personal and financial information.

In order to prevent unauthorised access, the system saves and safeguards user data using encryption or hashing methods.

4.4.3 Functional Requirements:

- Requirement 1: User Data Protection

- The system must keep user data, including financial and personal data, in a secure database with limited access. Passwords and other private information, as well as payment information, must be encrypted or hashed before being stored.

- Requirement 2: Secure Communication

- The system must encrypt data transmission between users and the server using secure communication protocols like HTTPS.

- To reduce potential security threats, public Wi-Fi connections must be avoided.

- Requirement 3: Authentication and Authorization

- Strong user authentication procedures must be implemented by the system to guarantee that only authorised users can access their accounts.

- To specify multiple degrees of authorisation for users and administrators, role-based access control must be used.

- Requirement 4: Payment Security

- To handle online transactions securely, the system must be integrated with a reputable payment gateway that complies with PCI-DSS.

- After a transaction has been completed, users' payment information must not be kept in the system's database.

- Requirement 5: Protection Against SQL Injection and Cross-Site Scripting (XSS)

- In order to defend against SQL injection attacks, the system must use input validation and parameterized queries.
- To stop cross-site scripting attacks, data shown on web sites must be properly encoded.
- Requirement 6: Session Management
 - To prevent session hijacking, the system must handle user sessions securely using tokens or session identifiers.
- Requirement 7: Backup and Disaster Recovery
 - The system must implement regular data backups to guard against losing information in the event of a security breach or system failure.
 - In the event of a catastrophic catastrophe, a disaster recovery strategy must be in place to bring the system back online.
- Requirement 8: Compliance with Data Protection Laws
 - In order to safeguard user rights and privacy, the system must adhere to applicable data protection and privacy legislation, such as GDPR.

4.5 Multilingual Support:

4.5.1 Description and Priority:

The Railway Reservation System's Multilingual Support is a useful feature with a Medium priority. It strives to provide a user-friendly experience in their preferred languages for users with a variety of linguistic backgrounds.

4.5.2 Stimulus/Response Sequences:

- Language Choice:

- Stimulus: A user logs in and chooses their chosen language.

The user interface and content are translated into the chosen language by the system.

4.5.3 Functional Requirements:

- First requirement: Language choices

- The system must support a variety of tongues to serve users with various regional and linguistic preferences.

- From a list of accepted languages, users can choose their chosen language.

- Requirement 2: User Interface Translation

- In the chosen language, the system must provide translated versions of the user interface elements, such as buttons, labels, and messages.

- Users should have no trouble switching between languages as they move about the application.

- Requirement 3: Content Translation

- The system must allow for the translation of content into supported languages, such as FAQs, how-to guides, and crucial notifications.

- Translations of content must be accurate and coherent with the source language.

- Requirement 4: Language Switching

Users should be able to quickly switch between languages using the system without having their current session or data affected.

- Preferences for languages will be stored for subsequent sessions.

- Requirement 5: RTL Language Support

- The system might handle languages written in the right-to-left (RTL) direction, including Arabic and Hebrew. In later stages, specific specifications for RTL language support will be decided.

- Requirement 6: Language Preferences for Guest Users

- The system must let visitors choose their language at the beginning of their session.
- The entire user experience shall be conducted in the chosen language.
- Requirement 7: Admin Interface Translation
- If accessible, the system must give administrators the choice to view the admin dashboard in their preferred language.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

- *Response Time:* To ensure a seamless and responsive user experience, the system must react to user inputs, such as train searches and ticket reservations, in less than three seconds.
- *In order to effectively handle heavy user traffic, the system should be able to accommodate at least 500 concurrent users during peak use times.*
- *To enable rapid and easy booking operations, the processing time for a ticket booking should not be more than 5 seconds.*
- *Database Query Time:* Database queries should be streamlined to produce results within 2 seconds to minimise user wait times.
- *System uptime:* To provide constant user accessibility, the system must maintain an uptime of at least 99.9%.

Justification: To guarantee that the Railway Reservation System can manage a sizable number of concurrent users without encountering delays or slowdowns, certain performance criteria are required. To deliver a positive customer experience, especially during peak hours when demand is strong, rapid response times and speedy booking processing are vital.

5.2 Safety Requirements

- *Data Privacy:* In order to safeguard user information and stop unauthorised access or data breaches, the system must abide by all applicable data privacy laws and regulations.
- *Payment Security:* To protect customer payment information during online transactions, the system must incorporate secure communication protocols and encryption techniques.
- *Error Handling:* To avoid misunderstanding and any safety issues, the system should gracefully manage faults and show relevant error messages to users.
- *To guarantee that only authorised users can access and manage their appointments, user identity authentication should be put into place.*

Justification: To safeguard user information and guarantee safe online transactions, safety regulations are essential. Respect for data privacy and payment security policies lowers the possibility of financial fraud or data abuse, fostering user confidence.

5.3 Security Requirements

- *User Authentication:* Before allowing users to access sensitive information or conduct transactions, the system must require them to prove their identity using secure credentials, including passwords or multi-factor authentication.
- *Role-Based Access Control:* To protect data and stop unwanted acts, different user roles, such as normal users and administrators, should have the proper access privileges.
- *Sensitive data must be encrypted during transmission and storage to prevent unwanted access, such as login passwords and payment information.*

- *Cross-Site Scripting (XSS) and SQL Injection Protection: The system must put in place safeguards to stop typical web application security flaws like XSS and SQL Injection attacks.*

Reason: To preserve user data and shield the system from any online attacks, security measures are crucial. The danger of unwanted access and data breaches is reduced by putting in place robust user authentication and access control systems.

5.4 Software Quality Attributes

- *Usability: To increase user satisfaction and shorten the learning curve, the system should put a high priority on usability by offering a user-friendly interface and straightforward navigation.*
- *Reliability: To guarantee a dependable booking experience for consumers, the system should constantly operate as predicted without unanticipated crashes or problems.*
- *Maintainability: The system design and codebase should be well-organized and maintained so that future upgrades, bug fixes, and improvements will be simple to implement.*

Justification: Stressing software quality characteristics like usability, stability, and maintainability improves user experience, lowers support and maintenance costs, and lengthens the life of the system.

5.5 Business Rules

- *Users can only reserve seats on trains and courses that are running.*
- *To make reservations or reserve tickets, users must be logged in.*
- *System settings and user accounts can be managed by administrators.*
- *Only within a certain window of time prior to the train's departure schedule may tickets be cancelled.*

The system's operational principles are defined by these business rules, which ensure that users may only carry out authorised operations and abide by predetermined guidelines for maintaining and buying tickets. To ensure adherence to the specified principles, these rules may imply specific functional needs.

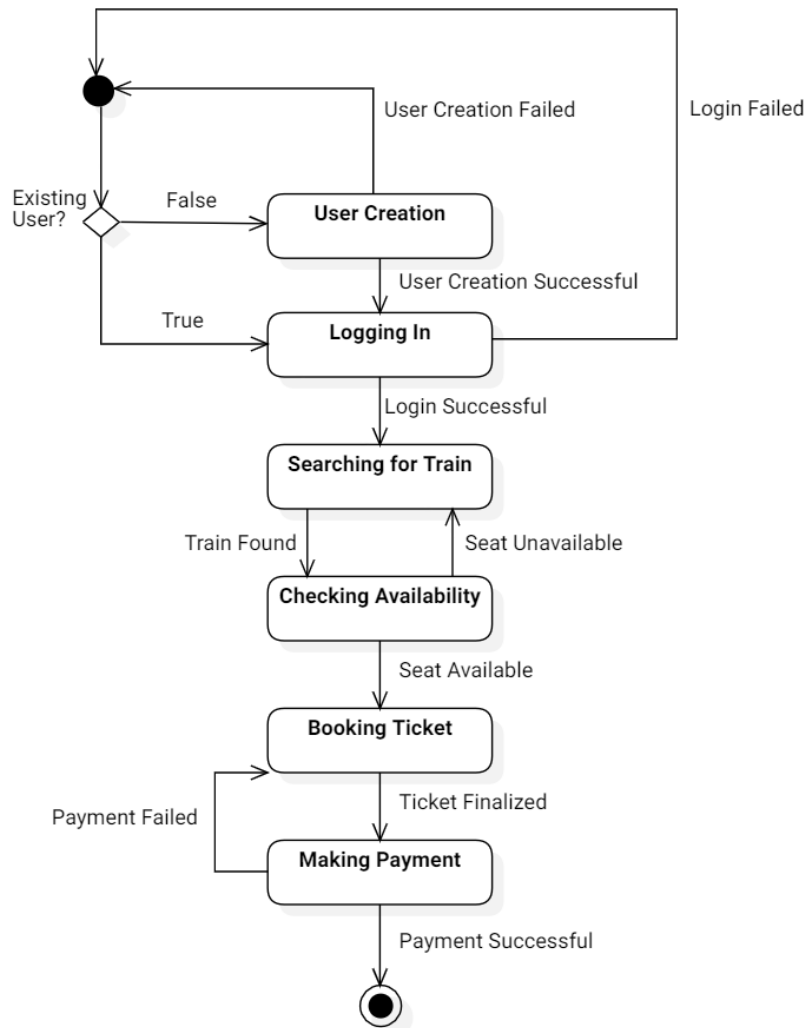
6. Other Requirements

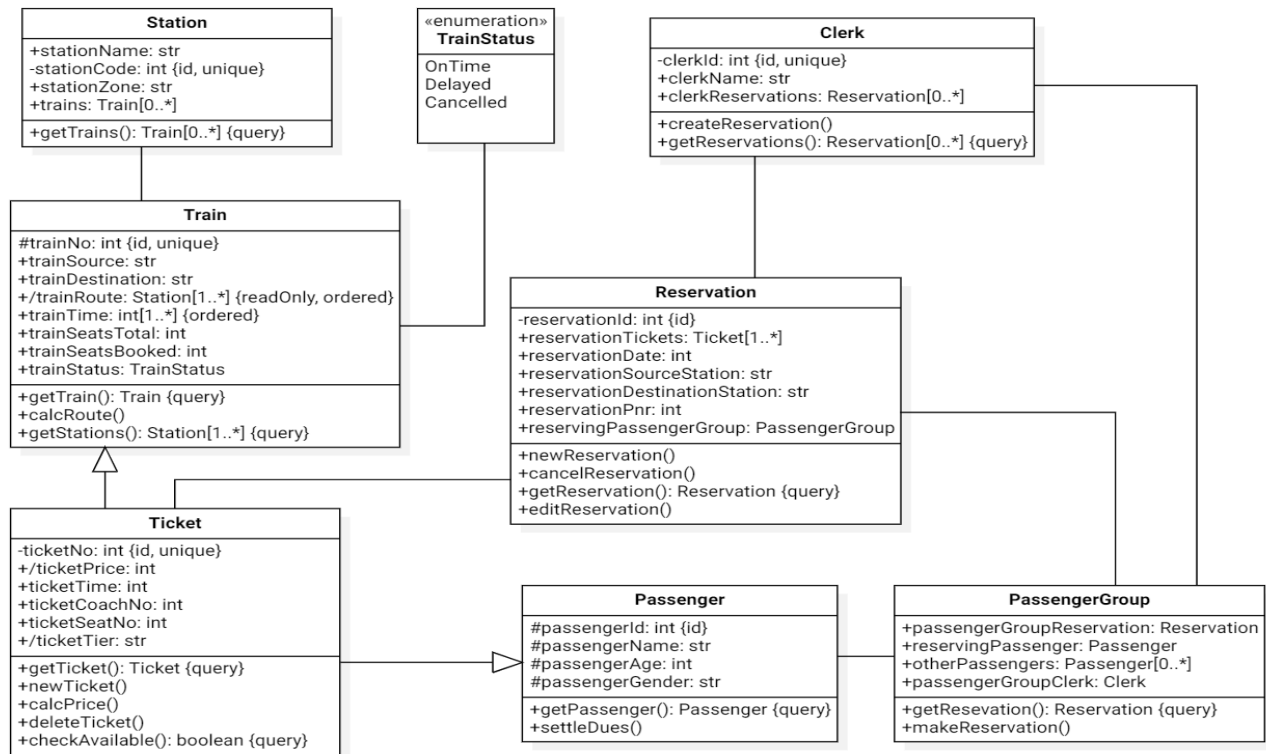
Appendix A: Glossary

Glossary:

- *SRS: Software Requirements Specification*
- *DBMS: Database Management System*
- *RDBMS: Relational Database Management System*
- *HTTP: Hypertext Transfer Protocol*
- *HTTPS: Hypertext Transfer Protocol Secure*
- *API: Application Programming Interface*
- *XSS: Cross-Site Scripting*
- *SQL: Structured Query Language*
- *WCAG: Web Content Accessibility Guidelines*

Appendix B: Analysis Models





Appendix C: To Be Determined List

TBD References:

- *Thresholds and outcomes of performance testing.*
- *Name and version of a certain payment gateway service provider.*
- *Comprehensive API docs for third-party programme interfaces.*
- *Any further business restrictions or guidelines that have not yet been decided.*

Unresolved elements in the SRS are referenced by the To Be Determined (TBD) list, which will be updated and finished during the project's development process.