Software Requirements Specification

for

# Biman Bangladesh Airlines
# Flight Booking Management System

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March 2025

# Contents

# Chapter 1

# Introduction

## 1.1 Purpose

This document outlines the software requirements for the "Biman Bangladesh Airlines Flight Booking Management System". The system is designed to provide a seamless and user-friendly platform for passengers to search, book, and manage flights operated by Biman Bangladesh Airlines. It allows users to check real-time flight schedules, track booking statuses, and manage their travel history through a secure and efficient interface. The mission of this system is to simplify flight reservations, enhance customer experience, and streamline airline operations by offering a centralized platform for both passengers and administrators. Passengers can conveniently book tickets online, and modify existing reservations, while administrators can efficiently manage flight schedules, bookings, and customer information through a dedicated admin panel. This document also provides a comprehensive overview of the system's features, functionalities, performance expectations, limitations, and interactions necessary for the development, deployment, and maintenance. It ensures that all aspects of the system are well-defined, aligning with the operational requirements of Biman Bangladesh Airlines while prioritizing security, usability, and scalability.

## 1.2 Intended Audience

The Software Requirements Specification (SRS) for the "Biman Bangladesh Airlines Flight Booking Management System" is designed to serve a diverse group of stakeholders involved in the development, management, and utilization of the system.

The primary stakeholders include:

- Administrators: Responsible for managing flight schedules, bookings, and user accounts.
- Business Analysts (BAs): Tasked with analyzing and defining business requirements to align the system with airline operations.
- Project Managers (PMs): Overseeing the development process, ensuring timely completion, and maintaining system efficiency.
- Developers: Engaged in coding and implementation, following the defined software requirements.
- QA/QC Engineers: Ensuring the system meets quality standards and functions correctly before deployment.
- End-users (Passengers): Interacting with the platform to search, book, and manage flights and access customer support.
- Testers: Responsible for validating the system's functionality, performance, and security.
- Potential Investors & Stakeholders: Interested in understanding the project's scope, functionality, and feasibility for future enhancements.

## 1.3 Intended Use

The intended audience of this SRS has been outlined in the previous section. In this section, we will discuss how each stakeholder can use the SRS for a better understanding of the "Biman Bangladesh Airlines Flight Booking Management System".

### 1.3.1 Administrators

- They will use the SRS to understand system requirements, deployment considerations, and administrative tasks related to managing flights, bookings, and users. This will help ensure smooth airline operations and efficient booking management..

### 1.3.2 Business Analysts (BAs)

- They will analyze the business logic, user interactions, and functional requirements detailed in the SRS to gain a clear understanding of the system's objectives. By translating these business needs into precise technical requirements, the team will ensure that the system aligns seamlessly with Biman Bangladesh Airlines' operational goals, delivering a solution that enhances efficiency and meets stakeholder expectations.

### 1.3.3 Project Managers (PMs)

- Project managers will utilize the SRS to gain a thorough understanding of the project scope, user needs, and constraints.
- They will oversee the development process to ensure that the system adheres to the specified requirements and is delivered within the established deadlines.
- They will ensure that the final product aligns with user expectations and supports the broader business objectives of Biman Bangladesh Airlines.

### 1.3.4 Developers

- Developers will refer to the SRS to gain a clear understanding of the system's functionalities, user interactions, and constraints.
- They will utilize the outlined functional requirements to build and implement key features, such as flight search, booking management, and user authentication. Throughout the development process, they will ensure that the system complies with established performance and security standards, delivering a robust and reliable solution.

### 1.3.5 QA/QC Engineers

- Quality assurance and quality control engineers will use the SRS to develop comprehensive test cases that validate the system's reliability, performance, and security. Their primary focus will be to ensure that the implemented system meets the specified quality standards before deployment.
- By identifying and resolving bugs and inconsistencies, they will contribute to delivering a stable and high-quality product that aligns with user expectations and business requirements.

### 1.3.6 End-users (Passengers)

- The functional requirements in the SRS provide a clear visualization of how passengers will interact with the system.
- Users can easily search for flights, book tickets, manage reservations, and check flight schedules, ensuring a seamless and efficient experience that meets their travel needs and enhances their overall satisfaction.

### 1.3.7 Testers

- Testers will utilize the SRS to create detailed test scenarios and validate the system's expected behaviors, ensuring that all functionalities operate as intended.
- They will rigorously verify that the system meets both functional and non-functional requirements, including performance, security, and usability.
- They will focus on ensuring that the user experience is smooth, intuitive, and free from errors, delivering a high-quality product that aligns with user expectations and business goals.

### 1.3.8 Potential Investors & Stakeholders

- Stakeholders will refer to the SRS to gain a comprehensive understanding of the project's scope, potential returns, and associated risks.
- They will analyze critical aspects such as the system's scalability, security, and long-term feasibility to assess its viability and alignment with organizational goals. This analysis will enable stakeholders to make informed decisions regarding funding, resource allocation, and future enhancements, ensuring the system's sustained success and value to Biman Bangladesh Airlines.

## 1.4 Product Scope

The Biman Bangladesh Airlines Flight Booking Management System is a web-based platform that allows passengers to search, book, and manage flights with ease. It provides a seamless booking experience by offering real-time flight schedules, booking status tracking, user profile management, and an efficient admin panel for administrators.

### 1.4.1 Purpose

The primary purpose of this system is to simplify flight reservations and enhance the overall customer experience. It ensures that passengers can easily find available flights, make secure bookings, manage their reservations, and access customer support. Additionally, the system helps Biman Bangladesh Airlines efficiently manage flights, bookings, and passenger data through a centralized admin panel.

### 1.4.2 Benefits and Objectives

- Simplifying the Flight Booking Process: Allows passengers to search, select, and book flights quickly and conveniently.
- Enhancing Customer Experience: Provides easy access to booking details, flight schedules, and support services.

- Ensuring Data Accuracy and Security: Uses secure database management to protect passenger information and booking records.
- Improving Airline Operations: Enables Biman Bangladesh Airlines administrators to manage flights, bookings, and passenger information efficiently.
- Providing Real-time Updates: Ensures passengers receive live updates on flight schedules, booking status, and payment confirmations.

### 1.4.3 Alignment with Corporate Goals

This system aligns with our vision to provide a user-friendly, efficient, and modern flight booking service. By enhancing digital accessibility, customer satisfaction, and operational efficiency, the system contributes to the airline's growth and reputation in the industry.

### 1.4.4 Relating to Business Strategies

By implementing this system, we're expanding how we do business. We're making it easier for passengers to access flight information and complete reservations, enhancing their overall experience. This helps us be recognized for providing a modern, efficient, and customer-friendly travel booking solution.

## 1.5 Risk Definition

The Software Requirements Specification (SRS) identifies several potential risks include users not fully adhering to platform policies, terms of use, or ethical guidelines, which could lead to issues such as unauthorized access, data breaches, or misuse of the system. Such non-compliance may disrupt the seamless experience intended for passengers and administrators, potentially compromising the system's performance, security, and overall integrity.

### 1.5.1 System Downtime

Risk that the system may become temporarily unavailable due to server failures, database overload, or unexpected traffic surges, affecting passengers' ability to book flights, check schedules, or manage reservations.

### 1.5.2 Data Security and Privacy Breach

Risk that unauthorized access, hacking attempts, or data leaks could compromise passenger information, payment details, and booking records, leading to financial losses and reputational damage.

### 1.5.3 Payment Failures

Risk that online transactions may fail due to gateway errors, insufficient funds, or network issues, resulting in booking disruptions and customer dissatisfaction.

### 1.5.4  Incorrect Flight Information

Risk that outdated or incorrect flight schedules may be displayed due to manual data entry errors or synchronization issues, potentially misleading passengers and causing travel inconveniences.

### 1.5.5  High Administrator Workload

Risk that airline staff and administrators may face challenges in handling large volumes of flight updates, booking modifications, and user inquiries, leading to delays in customer service response times.

### 1.5.6  User Inactivity

Risk that passengers may not actively engage with the system, reducing the effectiveness of features such as flight alerts, booking modifications, and user profiles, impacting customer retention and system adoption.

### 1.5.7  Communication Breakdown

Risk that stakeholders (developers, testers, project managers, and administrators) may interpret the SRS differently, leading to misalignment in project objectives, development delays, or feature mismatches.

### 1.5.8  Limited User Reference to Policies

Risk that passengers may not read or follow the airline's policies and terms & conditions, leading to frequent booking disputes, refund requests, or misunderstandings regarding cancellation and baggage rules.

### 1.5.9  Changes in Project Scope

Risk that unforeseen changes in airline requirements, regulations, or customer expectations may not be updated in the SRS, causing inconsistencies in system development and implementation.

### 1.5.10 Evolving Stakeholder Needs

Risk that business objectives, customer expectations, or airline policies may evolve over time, requiring continuous system updates and enhancements to stay relevant and efficient.

# Chapter 2

# Overall Description

## 2.1 User Classes and Characteristics

In the Biman Bangladesh Airlines Flight Booking Management System, user classes are categorized based on their roles and specific system interactions.

### 2.1.1 User Class: Passengers

**Characteristics:**

- They search for available flights by entering travel details such as departure city, destination, date, and number of passengers.
- They compare different flight options, including fare classes (economy, business, first class), to make informed decisions.
- Passengers book flights by selecting their preferred options and providing necessary passenger details.
- They complete secure payments using integrated online payment gateways to finalize their bookings.
- Passengers check real-time flight schedules to stay updated on departure and arrival times, ensuring smooth travel planning.
- They access their user profiles to view booking history, save preferences, and streamline future bookings.
- They contact customer support for assistance with bookings, payments, or general inquiries, ensuring a seamless and hassle-free experience.

### 2.1.2 User Class: Administrators

**Characteristics:**

- Admins manage flight schedules by adding, updating, or removing flights to ensure accurate and up-to-date information.
- They oversee passenger bookings to maintain smooth operations and prevent overbooking or scheduling conflicts.
- Admins modify user accounts by verifying passenger details, managing access levels, and ensuring compliance with airline policies.
- They handle booking disputes, such as cancellations, refunds, or payment failures, to resolve issues and maintain customer satisfaction.
- Admins generate system reports on flight occupancy, revenue, and customer activity to support data-driven decision-making.
- Admins monitor system security, implementing measures to prevent unauthorized access and protect sensitive passenger data.
- They serve as a central communication hub, addressing user inquiries and ensuring a seamless experience for all stakeholders.

## 2.2   User Needs

This section of the Software Requirements Specification (SRS) outlines the specific requirements and expectations of end-users, including passengers, and administrators, within the context of the Biman Bangladesh Airlines Flight Booking Management System.

### 2.2.1  General User Needs

- Flight Search & Booking: Passengers need an easy-to-use interface to search for flights based on departure location, destination, travel date, and passenger count.
- Booking Management: Users should be able to modify or cancel bookings, select preferred seat options, and check ticket confirmation details.
- Payment & Security: A secure and seamless payment system should allow users to complete transactions using online payment methods.
- Flight Schedule Information: Passengers require real-time updates on flight availability, departure/arrival times, and delays.
- User Profile & Travel History: Users should be able to create and manage profiles, store personal details and travel history, and retrieve past bookings for easy reference.

## 2.3   Operating Environment

### 2.3.1  Hardware Platform

- Desktops: Intel Core i3 processor or equivalent, 2GB RAM, 128GB SSD or higher.
- Laptops: Intel Core i3 processor or equivalent, 2GB RAM, 128GB SSD or higher.

### 2.3.2  Operating System and Versions

- Windows: Windows 10 (64-bit), Windows 11 (64-bit).
- macOS: macOS Big Sur (11.0) and above.
- Linux: Ubuntu 20.04 LTS and above, Fedora 35 and above.

### 2.3.3  Software Components and Applications

- Web Browsers (User Accessibility):

    - Google Chrome (latest stable version).
    - Mozilla Firefox (latest stable version).
    - Microsoft Edge (latest stable version).
    - Safari (latest stable version).

- Backend Technologies:

    - PHP 8.0 or higher.
    - Apache 2.4 or higher / Nginx 1.20 or higher.
    - MySQL 8.0 or higher (database).
    - PHPMyAdmin 5.0 or higher (database management).

- Frontend Technologies:

- HTML, CSS, JavaScript.
- Bootstrap (for responsive UI).

### 2.3.4 Database Compatibility

- Primary Database:

    - MySQL.

- Alternative Databases:

    - PostgreSQL 13 or higher.
    - MariaDB 10.5 or higher.

### 2.3.5 Network Requirements

- Minimum Bandwidth: 2 Mbps for optimal performance.

### 2.3.6 Security Considerations

- TLS Encryption (SSL Certificates): Ensures secure data transmission between users and the system.
- Firewalls & Security Software: The system should be compatible with firewalls, antivirus software, and intrusion detection systems.

## 2.4 Constraints

### 2.4.1 Technical Constraints

- The system must use PHP (backend), MySQL (database), and JavaScript (frontend) to maintain compatibility with airline industry standards.
- Secure payment processing must be implemented.
- The system must support high scalability to handle a growing number of users and bookings.
- Cross-browser compatibility must be ensured across Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.

### 2.4.2 Time Constraints

- Development phases must follow a strict timeline with set milestones for design, coding, testing, and deployment.
- Bug fixes and system optimizations must be completed before deployment to ensure a smooth user experience.

### 2.4.3 Regulatory and Compliance Constraints

- The system must comply with aviation industry regulations and data protection laws.
- Personal data (passenger details, booking history, payment records) must be securely stored and encrypted.

### 2.4.4 Resource Constraints

- Availability of skilled developers proficient in PHP, MySQL, and JavaScript development.

## 2.5 Assumptions

The Software Requirements Specification (SRS) is based on several key assumptions regarding user behavior, system accessibility, administrator authority, and project alignment.

### 2.5.1 User Participation

Assumes that passengers will actively engage with the platform by searching for flights, booking tickets, managing reservations, and using customer support when needed.

### 2.5.2 User Proficiency

Assumes that passengers have basic digital literacy, enabling them to navigate the booking system, enter flight details, and complete payments without difficulties.

### 2.5.3 Administrator Authority

Assumes that administrators have the required permissions and expertise to manage flight details, user accounts, and booking records securely.

### 2.5.4 Document Accessibility

- Assumes that all intended users (developers, testers, project managers, stakeholders, and administrators) have access to the SRS document and can interpret its content effectively.
- Assumes that team members will refer to the SRS throughout the development lifecycle for clarity on system requirements and functionalities.

### 2.5.5 Document Relevance

- Assumes that the SRS covers all necessary details for system development, ensuring alignment with business needs and technical capabilities.
- Assumes that future modifications to system requirements will be documented and communicated properly to all stakeholders.

### 2.5.6 Aligned Objectives

- Assumes that the functional and non-functional requirements in the SRS accurately represent the goals of the airline, developers, and users.
- Assumes that the project milestones and deadlines align with the development team's capabilities and airline business goals.

### 2.5.7 Stakeholder Collaboration

- Assumes that effective communication will be maintained between developers, testers, project managers, and administrators to ensure a shared understanding of the SRS.
- Assumes that team members will collaborate using platforms like Trello, Discord, and GitHub to track progress and resolve issues.

### 2.5.8 Consistent Connectivity

Assumes that passengers and administrators have reliable internet access to interact with the system without disruptions.

# Chapter 3

# Requirements

## 3.1 Functional Requirements

### 3.1.1 User Registration & Authentication

As a passenger, I want to create an account on the platform so that I can book flights and manage my travel history.

**Success:**

- After successful registration, the user receives an email verification link.
- If verified, the system redirects the user to the login page.

**Failure:**

- If the email format is incorrect, display "Invalid email address".
- If the password does not meet security standards, display "Password must be at least 8 characters".

### 3.1.2 Login & Authentication

As a passenger, I want to log in securely so that I can access my flight bookings and profile.

**Success:**

- If login credentials are correct, redirect the user to the dashboard.
- If "Remember Me" is selected, the session remains active.

**Failure:**

- If credentials are incorrect, display "Invalid email or password".
- If the account is inactive, display "Please verify your email before logging in".

### 3.1.3 Flight Search

As a passenger, I want to search for flights so that I can find available options for my trip.

**Success:**

- Display matching flights with departure, arrival, fare, and seat availability.
- Allow users to filter results by price, class, and flight duration.

**Failure:**

- If no flights match the criteria, display "No flights available for selected date".
- If network issues occur, display "Unable to fetch flight details. Please try again".

### 3.1.4 Flight Booking

As a passenger, I want to book a flight so that I can secure my seat.

**Success:**

- Display passenger details form after selecting a flight.
- Show payment options (credit/debit card, mobile banking).
- If payment is successful, generate e-ticket and confirmation email.

**Failure:**

- If the selected seat is no longer available, display "Seat not available".
- If payment fails, display "Transaction unsuccessful. Please try again".

### 3.1.5 Booking Status Tracking

As a passenger, I want to check my booking details so that I can confirm my flight information.

**Success:**

- Display ticket details, flight status, and payment confirmation.
- Allow cancellation or modification if the ticket is still valid.

**Failure:**

- If the booking reference is incorrect, display "Invalid Booking ID".

### 3.1.6 Flight Schedule Viewing

As a passenger, I want to check flight schedules so that I can plan my journey accordingly.

**Success:**

- Show real-time departure and arrival times for flights.
- Allow users to filter schedules based on the date and route.

**Failure:**

- If the schedule cannot be retrieved, display "Error fetching flight schedule".

### 3.1.7 Payment Processing

As a passenger, I want to pay securely so that my booking is confirmed.

**Success:**

- Redirect users to secure payment gateways.
- Generate payment receipt and email confirmation after a successful transaction.

**Failure:**

- If payment is declined, display "Payment failed. Please try again".
- If a network error occurs, retry the transaction or allow alternative payment methods.

### 3.1.8 Booking Cancellation & Refund

As a passenger, I want to cancel my booking so that I can receive a refund.

**Success:**

- Show refund eligibility based on airline policies.
- Send confirmation email upon successful cancellation.

**Failure:**

- If the ticket is non-refundable, display "Cancellation not allowed for this booking".
- If the refund request fails, display "Unable to process refund at this time".

### 3.1.9 User Profile Management

As a passenger, I want to update my profile so that I can store my travel preferences and details.

**Success:**

- Allow users to update name, contact details, and passport number.
- Save past bookings for reference.

**Failure:**

- If the email format is incorrect, display "Invalid email format".

### 3.1.10 Admin Flight Management

As an administrator, I want to add, update, and remove flights so that passengers have up-to-date flight information.

**Success:**

- Allow admins to add new flights with departure, arrival, and seat availability.
- Enable modifications to flight times and pricing.

**Failure:**

- If a required field is missing, display "All fields are required".
- If a flight number is already in use, display "Duplicate flight ID".

### 3.1.11 Admin Booking Management

As an administrator, I want to manage user bookings so that I can assist passengers with modifications or cancellations.

**Success:**

- Allow manual modification or cancellation of bookings.
- Provide refund processing options if applicable.

**Failure:**

- If the booking ID is invalid, display "Booking not found".

### 3.1.12 System Security & Access Control

As an administrator, I want to secure user data so that only authorized users can access sensitive information.

**Success:**

- Implement role-based access control (passengers, admins, support agents).
- Require two-factor authentication (2FA) for admin logins.

**Failure:**

- If login attempts exceed the limit, lock the account temporarily.

## 3.2 Non-Functional Requirements

### 3.2.1 Performance Requirements

1. Response Time: The system should respond to user actions within 2 seconds under normal operating conditions to ensure a fast and responsive experience.
2. Concurrent Users: The system must support at least 500 concurrent users without performance degradation.
3. Load Handling: The system must be able to process at least 100 bookings per minute without affecting response times.
4. Database Performance: Queries should execute within 1 second for retrieving flight schedules and booking details.

### 3.2.2 Safety Requirements

1. User Data Protection: The system must implement secure data handling measures to protect passenger information from unauthorized access.
2. Transaction Integrity: In the event of a system failure or network outage, the system must automatically recover and resume ongoing transactions without data loss.
3. Error Handling: The system must have built-in error detection and logging to track system failures and prevent incorrect transactions.
4. Automated Backups: The database should have daily automated backups to prevent data loss in case of system failures.

### 3.2.3 Security Requirements

1. User Authentication:

   - All users must log in using secure authentication methods.
   - Two-Factor Authentication (2FA) must be enabled for administrators and customer support agents.

2. Data Encryption:

   - All sensitive user data (personal details, payment information) must be encrypted using AES-256 encryption before storage.
   - All communications between the frontend and backend should use TLS 1.3 encryption.

3. Role-Based Access Control (RBAC):

   - Passengers, administrators, and customer support agents should have different access permissions.
   - Administrators should only be able to modify flight details, bookings, and user accounts.

4. Session Management:

   - Users should be automatically logged out after 15 minutes of inactivity to enhance security.
   - Active sessions must expire after 24 hours.

### 3.2.4 Software Quality Attributes

1. Usability:

   - The system should provide a user-friendly interface with a simple and intuitive navigation system.
   - At least 90% of users should find the system easy to use based on user feedback surveys.

2. Reliability:

   - The system should have an uptime of 99.99%, ensuring that users can access the system without frequent interruptions.
   - If the system crashes, it should recover within 10 seconds to maintain reliability.

3. Maintainability:

- The system should follow modular coding practices, making it easy to update or modify individual components without affecting the entire system.
- Error logs should be generated for every system failure to assist in quick debugging and troubleshooting.

4. Accessibility:

- The system must comply with Web Content Accessibility Guidelines (WCAG 2.1) to ensure usability for individuals with visual or motor impairments.
- Must support screen readers and keyboard navigation.

5. Compatibility:

- The system should work across all major browsers (Google Chrome, Mozilla Firefox, Microsoft Edge, Safari).

## 3.2.5  Business Rules

1. Booking Eligibility:

- Only registered users can book flights through the system.
- Passengers must provide valid passport or national ID details before confirming international flights.

2. Cancellation & Refund Policy:

- Cancellations are only allowed up to 24 hours before departure, subject to airline policies.
- Refunds must be processed within 7 business days after cancellation.

3. Flight Schedule Updates:

- Only authorized administrators can modify flight schedules.
- Any schedule changes must automatically notify affected passengers via email and SMS.

4. Payment Rules:

- Users must complete payment before a booking is confirmed.
- Incomplete payments will automatically cancel the booking after 15 minutes.

5. Loyalty & Discounts:

- Frequent travelers should be eligible for loyalty points and promotional discounts.
- The system should automatically apply discount codes for eligible users.