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# **Software Requirements Specification**

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## **Airline Reservation System**



***Version 1.0***

**Prepared By**

**Group 19**

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**SEPTEMBER 10, 2023**

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# 1. Introduction

## 1.1 Purpose

This document specifies the software requirements for the Airline Reservation System (ARS) of B Airways, a subsidiary of Virgin Airlines. The ARS is a web-based application that enables online booking and management of flights with B Airways. This System Requirement Specification covers the entire scope of the Airline Reservation System, including the functional, non-functional, and quality requirements. The main objective of this document is to provide a clear, complete, and consistent description of the requirements of the Airline Reservation System, as well as to facilitate communication and collaboration among the stakeholders. This document also serves as a basis for design, implementation, testing, and maintenance of the Airline Reservation System.

## 1.2 Scope of Project

The proposed Airline Reservation System will be a web-based application that allows customers to book flights, select seats, and manage their bookings online with B Airways, a subsidiary of Virgin Airlines that operates small distance, internal flights in Indonesia and multiple destinations worldwide. The Airline Reservation System also supports the management of B Airways in generating reports, assigning airplanes, and updating flight schedules.

The Airline Reservation System aims to provide the following benefits to its stakeholders:

- **For customers:** The ARS offers a convenient, fast, and secure way to book flights, select seats, and manage their bookings online with B Airways. The ARS also offers discounts to frequent and gold customers who book with B Airways regularly.
- **For B Airways:** The ARS helps to increase customer satisfaction, loyalty, and retention by providing a user-friendly, reliable, and efficient service to its customers. The ARS also helps to reduce operational costs, improve resource utilization, and enhance decision making by providing accurate, timely, and comprehensive data and reports on the airline's performance.

## 1.3 Document Conventions

This Software Requirement Specification follows the IEEE standard 830-1998 for software requirements specification. The following typographical conventions are used in this document:

- **Bold** text indicates important concepts related to the product.
- *Italic* text indicates references to other documents or web addresses.
- <Text in angle brackets> indicates a placeholder that should be replaced by specific information.

- [Text in square brackets] indicates an optional or conditional part of a requirement.

## 1.4 Intended Audience and Reading Suggestions

This document is intended for the following audiences:

- **Developers:** The developers are responsible for designing, implementing, testing, and maintaining the ARS according to the requirements specified in this document. They should read the entire document to understand the scope, functionality, and quality of the system.
- **Project Managers:** The project managers are responsible for planning, coordinating, monitoring, and controlling the development process of the ARS. They should read the entire document to understand the objectives, scope, risks, and constraints of the project.
- **Marketing Staff:** The marketing staff is responsible for promoting and selling the services of B Airways to potential customers. They should read sections 1.2 (Scope of the Project) and 2 (Overall Description) to understand the benefits, features, and target market of the ARS.
- **Users:** The users are the customers who use the ARS to book flights, select seats, and manage their bookings online. They should read sections 1.2 (Scope of the Project) and the specific requirements section to understand the functionality and usability of the ARS.
- **Testers:** The testers are responsible for verifying that the ARS meets the requirements specified in this document. They should read the specific requirements section and non-functional requirements section to understand the functional, non-functional, and quality requirements of the ARS.
- **Documentation Writers:** The documentation writers are responsible for creating user manuals, help files, and other documents that explain how to use the ARS. They should read sections 1.4 and the specific requirements section to understand the functionality and usability of the ARS.

## 1.5 Document Overview

- The next section is the overall description section, which provides an overview of the ARS, including its perspective, functions, user characteristics, assumptions, dependencies, and limitations.
- The third is the external interface requirements section, which specifies the requirements for the interfaces between the ARS and other systems or users, such as the graphical user interface (GUI), the hardware interface, the software interface, and the communication interface.
- The system features section, which specifies the requirements for the main features of the Airline Reservation System, such as booking flights, selecting seats, managing bookings, generating reports, assigning airplanes, and updating flight schedules

- The next section is the non-functional requirements section, which specifies the non-functional requirements of the ARS, including performance, security, maintainability requirements.

## **2. Overall Description**

### **2.1 Product Perspective**

#### **2.1.1 Context**

B Airways operates independently of Virgin Airlines and does not have access to Virgin's advanced airline reservation system. The ARS is conceived as a critical step in company's expansion strategy, allowing B Airways to cover multiple destinations worldwide. This system will replace B Airways' existing manual reservation system, offering enhanced efficiency, accessibility and scalability to meet the demands of global operations.

#### **2.1.2 Origin**

The need for the ARS is originated from the growing demand for B Airways' services and the desire to expand beyond the Indonesian market. The decision to invest in this system was made by the director board of B Airways to streamline operations, improve customer experiences, and facilitate future growth.

#### **2.1.3 Relationship to Existing Systems**

At present, B Airways does not have an advanced reservation system, and the ARS is a standalone product designed to address this gap. It is not a part of a larger system but is intended to be the core platform for managing flight reservations, passenger information and related services.

#### **2.1.4 External Interfaces**

The ARS will integrate with external payment gateways to facilitate secure and efficient payment processing. Additionally, it may interface with future airline systems or travel-related services as part of its expansion plans.

### **2.2 Product Functions**

The ARS must perform or enable users to perform the following major functions:

#### **1. User Registration and Authentication:**

- Allow users to register on the platform.
- Authenticate registered users securely.

**2. Flight Schedule Management:**

- Display available flight schedules and details.
- Enable administrators to manage flight schedules, including updates and delays.

**3. Flight Booking and Reservation:**

- Facilitate flight booking, including seat selection.
- Apply discounts to registered users based on their booking history.

**4. Payment Handling:**

- Allocate tickets upon successful payment completion.

**5. Reports Generation:**

- Generate various reports, including passenger age groups, destination passenger counts, booking statistics by passenger type, flight history, states and revenue per aircraft type.

**6. User Categorization:**

- Categorize registered users into Frequent and Gold categories based on their booking history.
- Apply discounts of 5% and 9% to Frequent and Gold users, respectively.

**7. Data Consistency:**

- Ensure data consistency and integrity in seat selection and booking processes.
- Prevent the overbooking of seats.

**8. Dynamic Pricing:**

- Calculate ticket prices based on traveler class (Economy, Business or Platinum)

These functions collectively provide users with a comprehensive airline reservation experience, from searching for flights to completing bookings and making payments. Administrators also have the necessary tools to manage flight schedules and monitor system performance.

## 2.3 User Classes and Characteristics

The Airline Reservation System (ARS) is anticipated to be used by various user classes, each with unique characteristics, needs and levels of interaction with the system:

**1. Guest Users:**

- Characteristics: These are users who use the ARS without creating an account or logging in. They have limited access to some functionalities and are primarily looking to browse flight schedules.
- Frequency of Use: Not frequent or first-time users.

- Functions: View flight schedules, search flights, but may need to register or log into book.
- Importance: Moderate. While they don't utilize the full features of the platform, converting them to registered users is crucial for business growth.

## **2. Registered Passengers:**

- Characteristics: Users who have created an account on the ARS. They have their basic information stored in the system, which allows for quicker bookings and access to potential discounts.
- Frequency of Use: Regular to occasional travelers.
- Functions: View flight and search flights, book flights, access discounts, view booking history.
- Importance: High. They form the core user base and source of consistent revenue.

## **3. Frequent Users:**

- Characteristics: A subset of registered passengers who book flights often and are categorized for additional discounts.
- Frequency of Use: Very frequent.
- Functions: All functions of registered passengers plus access to the 5% discount.
- Importance: High. Their frequent interactions and loyalty make them pivotal for sustained business.

## **4. Gold Users:**

- Characteristics: Elite users who have a long-standing relationship and significant booking history with B Airways. They are given additional benefits.
- Frequency of Use: Very frequent.
- Functions: All functions of registered passengers plus access to the 9% discount.
- Importance: Very high. They represent the most valued customers of the airline.

## **5. Administrators:**

- Characteristics: Staff members or representatives of B Airways responsible for managing the backend operations of the ARS.
- Frequency of Use: Daily or as needed.
- Functions: Manage flight schedules, monitor bookings, handle system settings, generate reports, address user queries or concerns.

- Technical expertise: High. Understands the ARS's inner workings.
- Importance: Critical. Their role ensures the smooth functioning and updates of the system.

#### **6. Customer Support:**

- Characteristics: Staff assigned to assist users with any inquiries, issues or guidance related to the ARS.
- Frequency of Use: As required based on the queries.
- Functions: Address user concerns, guide users on using the ARS, escalate technical issues to administrators.
- Importance: High. They enhance user experience and satisfaction.

## **2.4 Operating Environment**

The Airline Reservation System will operate in a specific environment that encompasses hardware, operating systems and software components. The key components of the operating environment consist:

### **2.4.1 Hardware Platform:**

The ARS will run on standard hardware components commonly found in data centers and web hosting environments. It should be compatible with a variety of hardware setups to accommodate potential scalability requirements. Key hardware considerations include:

- **Server Hardware:** The ARS application will be hosted on one or more web servers capable of handling concurrent user requests efficiently. These servers should have adequate processing power and memory to support the application's performance requirements.
- **Database Server:** A dedicated database server will host the ARS database. It should be configured to handle data storage and retrieval optimally.
- **Networking Infrastructure:** Reliable network infrastructure with sufficient bandwidth to handle data traffic between users and servers is essential. Load balancing and redundancy may be implemented to ensure high availability.



### 2.4.2 Operating System and Versions:

The ARS is designed to be platform-independent, ensuring compatibility with a range of operating systems. Key considerations include:

- **Web Server OS:** The web server hosting the ARS application may run on operating systems such as Linux (e.g., Ubuntu, CentOS), Windows Server, or others. Compatibility and performance optimizations will be ensured for each supported OS.
- **Database Server OS:** The database server may also run on a variety of operating systems, including Linux distributions (e.g., CentOS, Debian) and Windows Server editions. Compatibility and performance will be validated for each.

### 2.4.3 Software Components:

The ARS interacts with several software components and may rely on specific software libraries and frameworks. These include:

- **Web Server Software:** The ARS application will be deployed on a web server that may use software like Apache, Nginx, or Microsoft Internet Information Services (IIS).
- **Database Management System (DBMS):** The ARS database will be managed using a DBMS such as MySQL, PostgreSQL, or Microsoft SQL Server. The system will be designed to support multiple DBMS options.
- **Server-Side Runtime Environment:** The application's server-side code will be developed using a runtime environment like Node.js, Python (e.g., Django), or Java (e.g., Spring Boot).
- **Payment Gateway Integration:** The ARS will integrate with external payment gateways or APIs for processing payments. Compatibility and secure integration with payment processing software will be ensured.

## 2.5 Design and Implementation Constraints

The design and implementation of the Airline Reservation System (ARS) will be subject to various constraints and considerations that limit the options available to the developers. It is

crucial to understand and address these constraints to ensure the successful development and operation of the system. The key design and implementation constraints include:

#### **2.5.1 Regulatory Compliance:**

- **Airline Industry Regulations:** The ARS must adhere to the regulations and standards set forth by the airline industry. This includes compliance with safety, security, and operational guidelines as mandated by aviation authorities
- **Data Privacy:** The system must comply with data privacy regulations, including GDPR (General Data Protection Regulation) and other applicable data protection laws. The handling of personal and payment data must be in accordance with these regulations.

#### **2.5.2 Hardware and Performance Limitations:**

- **Hardware Constraints:** The system's performance and scalability are constrained by the underlying hardware infrastructure. Developers must optimize code and database queries to operate efficiently within these constraints.
- **Timing and Response Requirements:** The ARS must meet specific timing and response requirements, particularly in handling real-time seat reservations and payment processing. Delays or poor response times can lead to a poor user experience.

#### **2.5.3 Software and Technology Constraints:**

- **Technology Stack:** The choice of technologies, frameworks, and programming languages may be constrained by the client's preferences or existing IT infrastructure. For example, if the client has standardized on a specific database management system (DBMS) or programming language, the ARS should be compatible with these choices.
- **Integration with External Systems:** Integration with external payment gateways and services may impose constraints on communication protocols, data exchange formats, and security measures. The ARS must ensure seamless and secure integration with these systems.
- **Parallel Operations:** The system may need to support concurrent operations, such as multiple users booking flights simultaneously. Developers must implement mechanisms to handle parallel operations without conflicts or data inconsistencies.

#### **2.5.4 Security Considerations:**

- **Data Security:** Ensuring the security of user data, including personal information and payment details, is paramount. The system must employ encryption, secure authentication mechanisms, and access controls to protect sensitive data.
- **Payment Security:** Payment processing must comply with Payment Card Industry Data Security Standard (PCI DSS) requirements. This includes secure storage and transmission of payment card data

#### **2.5.5 Design Conventions and Standards:**

- **Programming Standards:** The development team must adhere to coding standards and best practices to ensure code maintainability, readability, and reliability. Compliance with established coding guidelines is crucial.
- **UI/UX Design Standards:** The user interface and user experience must follow design conventions and standards to provide a consistent and user-friendly experience for passengers.

## **2.6 User Documentation**

The Airline Reservation System (ARS) will include comprehensive user documentation to assist users in effectively utilizing the system. The user documentation components to be delivered along with the software include:

#### **2.6.1 User Manuals:**

- **User Registration Manual:** This manual will guide new users through the process of creating an account and setting up their profiles.
- **Booking and Reservation Manual:** This manual will provide step-by-step instructions on how to search for flights, make bookings, select seats, and complete reservations.
- **Payment and Checkout Manual:** Users will be guided through the payment process, including secure payment options, payment gateways, and confirmation of bookings.
- **User Profile Management Manual:** This manual will explain how users can manage their profiles, including updating personal information, preferences, and viewing booking history.

### **2.6.2 On-line Help:**

- Contextual On-line Help: The ARS will provide on-line help within the application. Contextual help will be available throughout the system to guide users as they navigate various functions.

### **2.6.3 Tutorials:**

- Video Tutorials: The system will offer a series of video tutorials that visually walk users through common tasks, such as booking a flight, managing bookings, and applying discounts.
- Interactive Tutorials: Interactive tutorials may be included to provide hands-on guidance for specific tasks, enhancing the learning experience.

### **2.6.4 Frequently Asked Questions (FAQs):**

- FAQ Section: A dedicated FAQ section will be available on the ARS platform, addressing common user queries and providing quick solutions to frequently encountered issues.

### **2.6.5 Delivery Formats:**

- Online Documentation: User manuals, on-line help, FAQs, and the knowledge base will be accessible through the ARS web platform, allowing users to access information within the application.
- PDF Downloads: Users will have the option to download PDF versions of user manuals for offline reference.
- Video Streaming: Video tutorials will be available for streaming within the ARS platform.

## **2.7 Assumptions and Dependencies**

The development and successful implementation of the Airline Reservation System (ARS) rely on certain assumptions and dependencies. These factors, while not confirmed as known facts, are important to acknowledge as they could impact the project's requirements and outcomes. Additionally, external dependencies on third-party components and factors are identified. These assumptions and dependencies include:

### 2.7.1 Assumptions:

- **Airline Industry Regulations:** The project assumes that the ARS will comply with all relevant aviation industry regulations and standards. Any changes or updates to these regulations during the project may necessitate adjustments to the system.
- **Data Privacy Laws:** It is assumed that the ARS will adhere to data privacy laws, including GDPR and other data protection regulations. Changes in these laws could require modifications to data handling and security measures.
- **Hardware Scalability:** The project assumes that the underlying hardware infrastructure will be scalable to accommodate potential increases in user traffic and system load as the airline expands its services.
- **User Behavior:** User behavior patterns, including booking frequency and preferences, are assumed to remain relatively stable during the project's development. Shifts in user behavior may impact system design and performance

### 2.7.2 Dependencies:

- **Payment Gateway Integration:** The ARS depends on third-party payment gateways and processors for secure payment handling. Changes or issues with these external services may affect payment processing within the system.
- **Database Management System (DBMS):** The choice of the DBMS for the ARS is a dependency, as the system's design and data storage depend on the selected DBMS. Changes in the chosen DBMS could impact database interactions and queries.
- **External APIs:** The system may integrate with external APIs for services such as flight data, weather information, or geographical data. Dependence on these APIs means that changes or unavailability of these services could affect system functionality.
- **Operating System and Web Server Updates:** The ARS depends on specific operating systems and web server software. Updates or changes to these software components may require adjustments to the system for compatibility.

- **User Engagement:** The success of the ARS relies on user engagement and adoption. It is dependent on user registration and bookings. Any factors affecting user engagement could impact the system's effectiveness.
- **Client Resources:** The client's organization is responsible for maintaining and supporting the delivered software post-implementation. The availability of client resources and personnel may affect ongoing system maintenance and support.
- **Budget and Resource Allocation:** The project's budget and resource allocation are dependencies that can influence the choice of technologies, development timeframes, and the scope of the ARS.

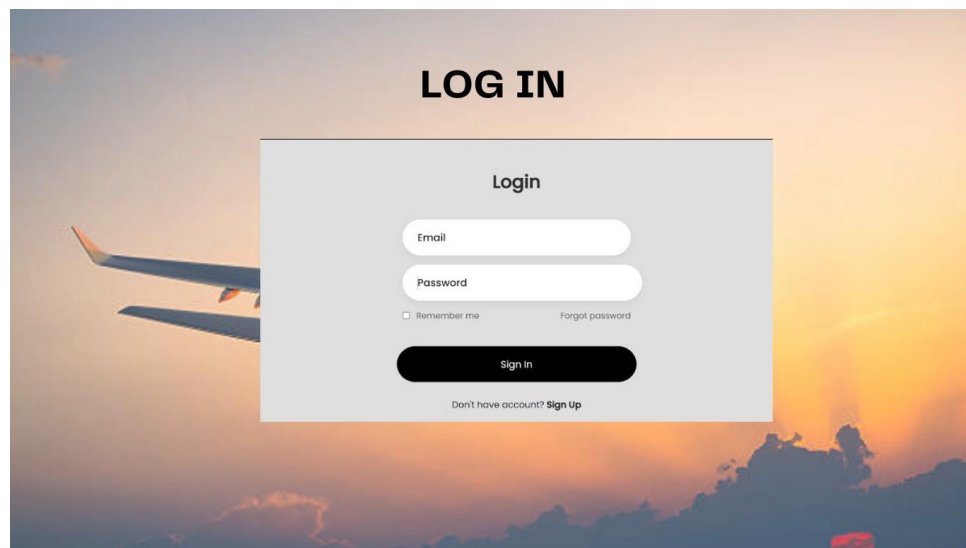
## **3. External Interface Requirements**

### **3.1 User Interfaces**

- The ARS should provide a graphical user interface (GUI) that allows the customers to interact with the system and perform various tasks, such as searching for flights, booking flights, selecting seats, managing bookings, viewing flight information, and canceling or modifying bookings.
- The GUI should be user-friendly, intuitive, and consistent, following the principles of user interface design and usability.
- The GUI should be responsive, adaptive, and accessible, supporting different platforms, browsers, devices, screen sizes, and resolutions.
- The GUI should use appropriate colors, fonts, icons, images, and animations to enhance the appearance and functionality of the system.
- The GUI should provide clear and concise instructions, feedback, error messages, and help to guide and assist the users.
- The GUI should also provide a login and registration feature that allows the customers to create and access their accounts on the ARS.



Sample Home page for Airline Reservation System



Sample Login page

**SEARCH FLIGHT**

Current UTC Time : Thu, 04 Mar 2021 19:22:48

FLIGHT	FROM	TAKE-OFF IN UTC TIME	TO	LANDING IN UTC TIME	BOOK
B019	CGK	Sun Mar 03 2024 23:00:00	BIA	Mon Mar 04 2024 03:35:00	<input type="button" value="BOOK FLIGHT"/>
B006	BIA	Sun Mar 03 2024 20:00:00	MAA	Sun Mar 03 2024 21:15:00	<input type="button" value="BOOK FLIGHT"/>
B028	DPS	Sun Mar 03 2024 20:00:00	BCM	Mon Mar 04 2024 06:00:00	<input type="button" value="BOOK FLIGHT"/>
B002	BIA	Sun Mar 03 2024 08:00:00	CGK	Sun Mar 03 2024 12:45:00	<input type="button" value="BOOK FLIGHT"/>
B001	BIA	Sun Mar 03 2024 07:30:00	BKK	Sun Mar 03 2024 10:50:00	<input type="button" value="BOOK FLIGHT"/>
B041	BCM	Sun Mar 03 2024 18:00:00	BIA	Sun Mar 03 2024 20:25:00	<input type="button" value="BOOK FLIGHT"/>
B009	HRI	Sun Mar 03 2024 20:00:00	SDN	Sun Mar 03 2024 23:40:00	<input type="button" value="BOOK FLIGHT"/>

Sample Search Flight page

**PAYMENT GATE**

HOME BOOK AGAIN

**BOARDING PASS**

**BIA** ✈️ **CGK**

DATE: SUN MAR 03 2024 DEPARTURE: 08:00:00 UTC

PASSENGER: Arishka Sharmendra CLASS: Platinum

DEPARTURE: 08:00:00 UTC SEAT: 1A

ESTIMATE ARRIVE: 12:45:00 UTC FLIGHT: 87

✓ **Payment Successful!**

**Thank You For Your Payment Of \$1400.00 For B Airways**

Sample Payment Gate

### 3.2 Hardware Interfaces

- The ARS should use a web server that hosts the system and communicates with the database server and the external systems.



- The web server should have sufficient memory, storage, processing power, and bandwidth to handle the requests from the client devices and the data from the database server and the external systems.
- The web server should also have a backup power supply and a cooling system to prevent any system failure or overheating.
- The ARS should use a database server that stores and manages the data of the system.
- The database server should have sufficient memory, storage, processing power, and bandwidth to store and retrieve the data of the system.
- The database server should also have a backup storage device and a recovery mechanism to ensure the availability and integrity of the data in case of any system failure or disaster.
- The ARS should use client devices that access the system through a web browser.
- The client devices can be desktop computers, laptops, tablets, or smartphones that have an internet connection and a web browser that supports HTML5, CSS3, JavaScript, and AJAX.

### 3.3 Software Interfaces

- The ARS should use a web application framework that supports the development of web-based applications.
- The web application framework should provide features such as routing, templating, session management, authentication, authorization, and testing.
- The ARS should use a programming language that supports web development and object-oriented programming.
- The programming language should provide features such as syntax highlighting, code completion, debugging, and documentation.
- The ARS should use a database management system that supports relational databases and SQL queries.
- The database management system should provide features such as data modeling, data manipulation, data integrity, and data security.
- The ARS should use a payment gateway system that processes the payments from the customers who book flights with B Airways.
- The payment gateway system should provide features such as credit card verification, fund transfer, transaction confirmation, and fraud prevention.

- The ARS should use an email system that sends confirmation emails to the customers who book flights with B Airways.
- The email system should provide features such as email formatting, email delivery, email tracking, and email security.
- The ARS should use an SMS system that sends confirmation text messages to the customers who book flights with B Airways.
- The SMS system should provide features such as text formatting, text delivery, text tracking, and text security.
- The ARS should use a Virgin Airlines system that provides information about the availability and prices of flights operated by Virgin Airlines.
- The Virgin Airlines system should provide features such as flight search, flight booking, flight confirmation, and flight cancellation.

Here is a table that shows the software interfaces of the ARS:

Software Interface	Name	Version	Source
Web application framework	Django	3.2.10	<a href="https://www.djangoproject.com/">https://www.djangoproject.com/</a>
Programming language	Python	3.10.0	<a href="https://www.python.org/">https://www.python.org/</a>
Database management system	MySQL	14.0	<a href="https://www.mysql.org/">https://www.mysql.org/</a>
Payment gateway system	Stripe	N/A	<a href="https://stripe.com/">https://stripe.com/</a>
Email system	Mailgun	N/A	<a href="https://www.mailgun.com/">https://www.mailgun.com/</a>
SMS system	Twilio	N/A	<a href="https://www.twilio.com/">https://www.twilio.com/</a>

### 3.4 Communications Interfaces

- The ARS should use HTTP protocol to communicate between the client devices and the web server.
- The ARS should use HTTPS protocol to encrypt and secure the communication between the client devices and the web server, especially when sensitive data such as personal information or payment details are involved.
- The ARS should use TCP/IP protocol to communicate between the web server and the database server and the external systems.
- The ARS should use JSON format to represent and transmit the data between the web server and the client devices and the external systems.

## 4. System Features

### 4.1 User Registration and Authentication

#### 4.1.1 Description and Priority:

This feature allows users to register on the platform and ensures secure authentication for registered users. It is of High priority as it forms the foundation for user interactions on the platform, ensuring data security and personalized experiences.

#### 4.1.2 Stimulus/Response Sequences:

Stimulus: A new user accesses the platform.

Response: The user is presented with a registration form to create an account.

Stimulus: An already registered user attempts to log in.

Response: The user is prompted to enter their credentials (username and password) for authentication.

#### 4.1.3 Functional Requirements:

REQ-1: User Registration

- The system shall provide a registration form with fields for the user's name, email, username, and password.
- The system shall validate that the email address is unique and follows a valid format.
- The system shall ensure that the username is unique.
- The system shall enforce password strength requirements (e.g., minimum length, use of special characters).

- The system shall store the user's registration data securely.
- The system shall send a verification email to the user's provided email address for account activation.

#### REQ-2: User Authentication

- The system shall compare the entered username and password with the stored credentials for authentication.
- The system shall lock the user's account temporarily after a specified number of failed login-attempts to prevent brute force attacks.
- The system shall provide a "Forgot Password" feature to allow users to reset their password in case they forget it.
- The system shall use secure hashing algorithms to store and manage user passwords.
- The system shall implement multi-factor authentication (MFA) as an optional security feature for users.

These functional requirements ensure that users can securely register and authenticate themselves on the platform, safeguarding their data and maintaining the platform's integrity.

## 4.2 Flight Schedule Management

### 4.2.1 Description and Priority:

This feature involves displaying available flight schedules and details to users and enabling administrators to manage flight schedules, including updates and delays. It is of High priority as it is essential for users to access up-to-date flight information.

### 4.2.2 Stimulus/Response Sequences:

Stimulus: User searches for available flight schedules.

Response: The system displays a list of available flights with details such as departure time, arrival time, and price.

Stimulus: An administrator logs in to manage flight schedules.

Response: The system provides access to a flight schedule management interface.

### 4.2.3 Functional Requirements:

#### REQ-1: Display Flight Schedules:

- The system shall retrieve and display a list of available flight schedules from a database.
- The displayed information shall include flight number, departure city, arrival city, departure time, arrival time, and price.
- Users shall be able to filter and sort flight schedules based on various criteria (e.g., date, price, airline).

**REQ-2: Flight Schedule Management for Administrators:**

- Administrators shall have access to an interface to add, update, and delete flight schedules.
- The system shall provide a mechanism for administrators to mark flights as delayed or canceled.
- Changes made by administrators shall be reflected in real-time for users.
- These requirements ensure that users can easily access flight schedules, and administrators can efficiently manage them.

## **4.3 Flight Booking and Reservation**

### **4.3.1 Description and Priority:**

This feature facilitates flight booking, including seat selection, and applies discounts to registered users based on their booking history. It is of High priority as it directly contributes to revenue generation and customer satisfaction.

### **4.3.2 Stimulus/Response Sequences:**

Stimulus: User selects a flight for booking.

Response: The system allows the user to select seats and proceed to the booking process.

Stimulus: Registered user logs in to book a flight.

Response: The system identifies the user and applies any eligible discounts based on their booking history.

### **4.3.3 Functional Requirements**

#### **REQ-1: Flight Booking:**

- The system shall allow users to select a flight for booking.
- Users shall be able to view available seats and select their preferred seats.
- The system shall calculate the total booking cost, including any applicable taxes and fees.
- Users shall be prompted to provide passenger details and payment information for booking confirmation.

#### **REQ-2: User Discounts:**

- The system shall track the booking history of registered users.
- Registered users with a specified booking history shall be eligible for discounts on future bookings.
- The system shall automatically apply discounts to eligible users during the booking process.

- These requirements ensure a seamless flight booking experience for users and encourage loyalty through discounts for registered users with a history of bookings.

## 4.4 Payment Handling

### 4.4.1 Description and Priority:

This feature involves handling secure payment processing for flight bookings and allocating tickets upon successful payment completion. It is of High priority as it directly impacts revenue generation and customer satisfaction.

### 4.4.2 Stimulus/Response Sequences:

Stimulus: User completes the booking process and initiates payment.

Response: The system securely processes the payment, verifies its success, and allocates tickets for the booked flight.

Stimulus: Payment processing fails due to an error.

Response: The system notifies the user of the payment failure and provides guidance on resolving the issue.

### 4.4.3 Functional Requirements

#### REQ-1: Payment Processing:

- The system shall support secure payment methods (e.g., credit card, PayPal).
- Payment information provided by users shall be encrypted and securely transmitted to payment gateways.
- The system shall handle payment gateway responses and verify payment success or failure.
- Upon successful payment, the system shall generate and allocate electronic tickets to the user.

#### REQ-2: Payment Failure Handling:

- In case of payment failure, the system shall provide clear error messages to the user.
- The system shall offer alternative payment methods if available.
- Users shall have the option to retry payment or cancel the booking.
- These requirements ensure that users can complete bookings with confidence, knowing that their payments are secure and tickets will be allocated upon successful transactions.

## 4.5 Reports Generation

### 4.5.1 Description and Priority:

This feature involves generating various reports related to passenger demographics, booking statistics, flight history, and revenue analysis. It is of Medium priority, as it provides valuable insights but is not as critical as core booking and payment functionalities.

### 4.5.2 Stimulus/Response Sequences:

Stimulus: Administrator requests a specific type of report.

Response: The system generates the requested report and presents it to the administrator for download or viewing.

Stimulus: Scheduled report generation at regular intervals.

Response: The system automatically generates and stores scheduled reports for future reference.

### 4.5.3 Functional Requirements:

#### REQ-1: Report Types

- The system shall support the generation of various reports, including:
- Passenger age groups.
- Destination passenger counts.
- Booking statistics by passenger type.
- Flight history.
- Revenue per aircraft type.

#### REQ-2: Report Generation

- Administrators shall have access to a report generation interface with options to select report types and parameters.
- The system shall retrieve data from the database and generate reports in a downloadable format (e.g., PDF, CSV).
- Scheduled report generation shall be configurable, allowing administrators to set report generation intervals.

These requirements ensure that administrators can obtain valuable insights and data-driven information through the generation of various reports.

## 4.6 User Categorization

### 4.6.1 Description and Priority

This feature involves categorizing registered users into Frequent and Gold categories based on their booking history and applying discounts accordingly. It is of medium priority as it enhances user experience but is not as critical as core booking and payment functionalities.

#### 4.6.2 Stimulus/Response Sequences

Stimulus: User logs in or completes a booking.

Response: The system analyzes the user's booking history and assigns them to the appropriate category (Frequent or Gold) and applies discounts accordingly.

#### 4.6.3 Functional Requirements

##### REQ-1: User Categorization

- The system shall analyze a user's booking history to determine their categorization.
- Users with a specified number of bookings within a defined time frame shall be categorized as Frequent users.
- Users with a higher threshold of bookings shall be categorized as Gold users.

##### REQ-2: Discount Application

- Frequent users shall receive a 5% discount on their flight bookings.
- Gold users shall receive a 9% discount on their flight bookings.
- The system shall automatically apply the appropriate discount during the booking process.

These requirements enhance user loyalty and incentivize users to make repeat bookings on the platform.

### 4.7 Data Consistency

#### 4.7.1 Description and Priority

This feature ensures data consistency and integrity during seat selection and booking processes while preventing the overbooking of seats. It is of High priority as it directly impacts the reliability of the system and user satisfaction.

#### 4.7.2 Stimulus/Response Sequences

Stimulus: User selects a seat during the booking process.

Response: The system verifies seat availability and prevents double bookings.

Stimulus: Multiple users simultaneously attempt to book the same seat.

Response: The system handles concurrent requests, ensuring that only one user successfully books the seat.

#### 4.7.3 Functional Requirements

##### REQ-1: Seat Availability Check

- The system shall maintain real-time seat availability data.
- Users shall be able to view seat availability before selecting a seat.



- Once a seat is selected, the system shall mark it as unavailable to prevent multiple bookings.

#### REQ-2: Overbooking Prevention

- The system shall implement measures to prevent overbooking of flights.
- In case of concurrent booking attempts for the same seat, the system shall ensure that only one booking is accepted, and others are notified of seat unavailability.
- Overbooking scenarios shall be logged for auditing and analysis.

These requirements guarantee that users can confidently select and book seats without encountering double bookings or overbooking issues.

## 4.8 Dynamic Pricing

### 4.8.1 Description and Priority

This feature involves calculating ticket prices dynamically based on traveler class (Economy, Business, or Platinum). It is of medium priority as it enhances the pricing flexibility of the system and can influence user decisions.

### 4.8.2 Stimulus/Response Sequences

Stimulus: User selects a traveler class during the booking process.

Response: The system calculates and displays the ticket price based on the selected class.

### 4.8.3 Functional Requirements

#### REQ-1: Traveler Class-Based Pricing

- The system shall define different pricing tiers for traveler classes (e.g., Economy, Business, Platinum).
- Each pricing tier shall have its own pricing rules and factors that influence ticket prices.
- Ticket prices shall be calculated based on the selected traveler class and associated pricing rules.

#### REQ-2: Pricing Transparency

- The system shall provide clear pricing information to users, including the breakdown of ticket price components (e.g., base fare, taxes, fees).
- Users shall be able to see the price difference when switching between traveler classes during the booking process.

These requirements enable the system to offer dynamic pricing based on traveler class, giving users flexibility in choosing the class that suits their preferences and budget.

## 5. Other Nonfunctional Requirements

### 5.1 Performance Requirements

- The ARS should be able to handle at least 1000 concurrent users without degrading the response time or the functionality.
- The ARS should respond to any user request within 5 seconds under normal load conditions and within 10 seconds under peak load conditions.
- The ARS should be able to process at least 500 bookings per hour without any errors or failures.
- The ARS should be able to generate reports within 15 minutes upon request from the management.

Performance Requirement	Acceptable Value	Measurement Method
Response time	5 seconds (normal load), 10 seconds (peak load)	Average time between sending a request and receiving a response
Throughput	500 bookings per hour	Number of bookings processed per hour
Report generation time	15 minutes	Time taken to generate a report upon request

### 5.2 Safety Requirements

- The ARS should comply with all the safety regulations and standards of the aviation industry and the relevant authorities.
- The ARS should not compromise the safety of the passengers, the crew, or the airplanes in any way.
- The ARS should have a backup and recovery mechanism to ensure the availability and integrity of the data in case of any system failure or disaster.
- The ARS should have a contingency plan to handle any emergency situations, such as flight delays, cancellations, or diversions.

### 5.3 Security Requirements

- The ARS should protect the confidentiality, integrity, and availability of the data and the system from unauthorized access, modification, or disclosure.
- The ARS should use encryption, authentication, authorization, and auditing techniques to ensure the security of the data and the system.
- The ARS should use a secure payment gateway system to process the payments from the customers and prevent any fraud or theft.
- The ARS should use a secure email and SMS system to send confirmation and notification messages to the customers and prevent any phishing or spamming.

### 5.4 Software Quality Attributes

- The ARS should be reliable, meaning that it should perform its functions correctly and consistently without any errors or failures.
- The ARS should be available, meaning that it should be accessible and operational at all times without any downtime or interruption.
- The ARS should be maintainable, meaning that it should be easy to modify, update, or enhance without affecting its functionality or quality.
- The ARS should be portable, meaning that it should be able to run on different platforms, browsers, and devices without any compatibility issues.
- The ARS should be compatible, meaning that it should be able to interact with other systems or users without any conflicts or errors.
- The ARS should be usable, meaning that it should be easy to use, understand, and learn by the customers and the management.

### 5.5 Business Rules

- The ARS should follow the business rules and policies of B Airways and Virgin Airlines regarding flight booking, seat selection, booking management, flight scheduling, airplane assignment, report generation, and customer loyalty program.
- The ARS should also follow the business rules and regulations of the aviation industry and the relevant authorities regarding flight safety, security, pricing, taxation, refunding, cancellation, modification, and compensation.

## 6. Other Requirements

- **Database Requirements:**

- Define the database management system (DBMS) to be used (e.g., MySQL).
- Specify the database schema, including tables, relationships, and data types.
- Describe data migration and import requirements from legacy systems, if applicable.
- Outline database security measures, including user roles and permissions.

- **Internationalization and Localization Requirements:**

- Address internationalization and localization needs for a global audience.
- Specify language support, including the languages to be supported initially.
- Define date and time formats, currency symbols, and number formatting for different regions.
- Ensure that user interfaces adapt to varying text lengths and character sets.
- Include translation and localization processes and tools to be used.

- **Legal and Regulatory Compliance Requirements:**

- Identify and detail legal and regulatory requirements relevant to the airline industry and passenger data.
- Ensure compliance with data protection laws, aviation regulations, and customer data privacy.
- Describe measures for handling sensitive passenger information and obtaining consent.

- **Accessibility Requirements:**

- Ensure that the reservation system adheres to accessibility standards for users with disabilities.
- Define accessible features such as screen readers, keyboard navigation, and alt text for images.

- **Environmental Considerations:**

- If the reservation system interacts with physical devices specify any environmental requirements.
- Include temperature, humidity, and durability constraints if relevant.

## Appendix A: Glossary

Term	Definition
ARS	Airline Reservation System. It refers to the software system being developed to handle flight bookings, seat selection, and booking management for B Airways.
B Airways	The airline for which the ARS is being developed. It is the primary user and beneficiary of the system.
IEEE	Institute of Electrical and Electronics Engineers. It is a professional association that develops standards for various industries, including software engineering. The SRS follows the IEEE standard 830-1998 for software requirements specification.
PCI DSS	Payment Card Industry Data Security Standard. It is a set of security standards designed to ensure that all companies that accept, process, store, or transmit credit card information maintain a secure environment.
HTTP	Hypertext Transfer Protocol. It is the protocol used for communication between client devices and the web server in the ARS.
HTTPS	Hypertext Transfer Protocol Secure. It is the secure version of HTTP that encrypts and secures the communication between client devices and the web server, especially when sensitive data such as personal information or payment details are involved.
TCP/IP	Transmission Control Protocol/Internet Protocol. It is the suite of communication protocols used for communication between the web server, database server, and external systems in the ARS.
JSON	JavaScript Object Notation (JSON) is a standard text-based format for representing structured data based on JavaScript object syntax. It is commonly used for transmitting data in web applications.

## Appendix B : Analysis Models

